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7.17(Part 1 of 2)

Design Report

National Grid (North Wales Connection Project)



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North Wales Connection Project

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1 Introduction

1.1 PURPOSE OF THE REPORT

- 1.1.1 This Design Report has been prepared by National Grid to provide an overview of the design rationale for the new electricity transmission connection that National Grid is proposing to develop between substations located at Wylfa, on the north coast of the island of Anglesey, and Pentir, on the mainland in Gwynedd ('the Proposed Development'). It outlines how these design choices have sought to reduce the environmental effects of the Proposed Development. It demonstrates that the design has incorporated Mitigation by Design¹ (DM) in order to avoid or reduce significant environmental effects wherever practicable.
- 1.1.2 The form and design of the Proposed Development has evolved throughout the life of the project and has been influenced by feedback received during and following all consultation undertaken including Stage 1, Stage 2, and Stage 3 Consultation. Chapter 3 of this document provides a high-level overview of the stages of consultation undertaken by National Grid and the associated design considerations and amendments. The consultation process is described more fully in the Consultation Report (**Document 6.1**).
- 1.1.3 Following the Stage 1 and Stage 2 Consultation, the design decisions taken and the consideration of potential environmental and socio-economic effects are briefly described in Chapters 5 and 6 of this report.
- 1.1.4 At Stage 3 Consultation, a detailed design proposal was presented. This design has been subject to a comprehensive review following consultation and amendments to the design have been made throughout the route. The

¹ Mitigation by Design is one of the three categories of mitigation referenced within the Environmental Statement and includes measures that have been built into the design, such as the design of the overhead line, and the location of the THH/CSEC sites. This is detailed fully within Chapter 6 of the ES EIA Methodology and Basis for Assessment (**Document 5.6**)

resultant design for which Development Consent is sought and the design rational for this is described in Chapters 8 – 13 of this report. The design rationale for the design as presented at Stage 3 Consultation is not covered in this report but can be found within the Draft Route Alignment Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.5**) and the Menai Strait Crossing Report (September 2016) (**Document 9.6**).

- 1.1.5 In referring to 'Design' the following elements are referred to within this document:
 - The routeing of the permanent linear infrastructure (i.e. the 400 kV overhead line (OHL)) and underground tunnel;
 - The proposed siting of individual pylons that make up the 400 kV OHL;
 - The proposed siting of permanent above ground facilities (i.e. the Tunnel Head House and Cable Sealing End Compounds and substation extensions);
 - The proposed routeing and siting of temporary facilities required during construction (e.g. bellmouths, access tracks and construction compounds); and,
 - Essential mitigation measures associated with permanent facilities (e.g. permanent landscaping works).
- 1.1.6 More detailed engineering aspects are not addressed in this report, for instance, the detailed design and form of foundation works, access tracks or bellmouths.
- 1.1.7 This document does not seek to assess the likely environmental or socioeconomic effects of the Proposed Development. This information can be found in the Environmental Statement (ES) (**Volume 5**) which also accompanies the DCO application.
- 1.1.8 A full description of the Proposed Development is detailed in Chapter 3 of the ES (**Document 5.3**).

1.2 PROJECT NEED

1.2.1 Wylfa has been identified as a potential location for a new nuclear power station. The site, adjacent to the recently closed Wylfa 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. Horizon Nuclear Power submitted their application for Development Consent in June 2018.

1.2.2 Due to the output of the proposed power station, a new electricity connection from Wylfa to the mainland transmission system is required to allow the export of power. The need for the project is addressed in detail in National Grid's Project 'Need Case' (**Document 7.1**).

1.3 STRUCTURE OF THE DESIGN REPORT

- 1.3.1 This Design Report is structured as follows:
 - Chapter 2 (Project Context and Development): Provides a summary of the generic design considerations that take place across all National Grid projects.
 - Chapter 3 (Consultation): Provides a summary of the three main stages of consultation were undertaken during the development of the North Wales Connection Project and outlines how consultation has influenced design decisions.
 - Chapter 4 (Strategic Options): Outlines the work undertaken at the Strategic Options stage of the project and explains the selection of the Preferred Strategic Option.
 - Chapter 5 (Route Corridor Identification and Selection): Outlines the work undertaken to identify Route Corridors and explains the rationale behind the selection of the Preferred Route Corridor and crossing of the Menai Strait.
 - Chapter 6 (Route Option Identification and Selection): Identifies the approach to the identification of Route Options. This chapter also highlights the environmental and technical considerations for the identification of Route Options for each section of the Route, outlines the design related consultation feedback received and provides the rationale behind the selection of the Preferred Route Options.
 - Chapter 7 (Aspects of the Proposed Design): Describes aspects of the permanent design works (including separation distances, overhead line transpositions, pylon design choice and the tunnel), aspects of the temporary works (such as access, conductor pulling positions, scaffold protection, and utility crossings), and statutory powers (such as Order Limits and Limits of Deviation).

- Chapters 8 13 (Proposed Development Sections A-F): Provides an overview of each section of the route and description of the alignment of the Proposed Development. These chapters identify any restrictions proposed to Limits of Deviation and outline indicative pylon locations. The chapters then provide a description of design changes that have been made to both permanent and temporary works since the Stage 3 Consultation, resulting in the design of the Proposed Development for which consent is being sought.
- Chapter 14 (Conclusion): Presents a summary of the information presented in the Design Report.
- Appendix A: Shows the amendments made to the alignment between Stage 3 Consultation and the Proposed Development (Option A).
- Appendix B: Shows the amendments made to the alignment between Stage 3 Consultation and the Proposed Development (Option B).
- Appendix C: Shows the amendments made to the National Grid construction elements between Stage 3 Consultation and the Proposed Development (Option A).
- Appendix D: Shows the amendments made to the National Grid construction elements between Stage 3 Consultation and the Proposed Development (Option B).
- Appendix E: Shows the amendments made to Third Party works between Stage 3 Consultation and the Proposed Development (Option A).
- Appendix F: Shows the amendments made to Third Party works between Stage 3 Consultation and the Proposed Development (Option B).
- Appendix G: A Synchronisation Schedule showing the pylons that would be considered paired for Option A of the Proposed Development.
- Appendix H: A Synchronisation Schedule showing the pylons that would be considered paired for Option B of the Proposed Development.

1.4 **RELATIONSHIP WITH OTHER DOCUMENTS**

- 1.4.1 Contained within this report are references to design related reports and other documents relating to previous stages of this project. These have been submitted as background documents in support of the application and are:
 - Wylfa to Pentir Overhead Electricity Transmission Line Route Corridor Identification Report (October 2012) (**Document 9.1**);
 - Wylfa to Pentir Preferred Route Corridor Selection Report (October 2015) (**Document 9.2**);
 - Wylfa to Pentir Route Options Report (October 2015) (Document 9.3);
 - Preferred Route Option Selection Report Wylfa to the Menai Crossing Area (September 2016) (Document 9.4);
 - Draft Route Alignment Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.5**);
 - Menai Strait Crossing Report (September 2016) (**Document 9.6**).

2 Project Context and Development

2.1 INTRODUCTION

- 2.1.1 This chapter provides a summary of the generic design considerations that take place across all National Grid projects.
- 2.1.2 The proposed project is classified as a Nationally Significant Infrastructure Project in accordance with the Planning Act 2008, and as such a Development Consent Order (DCO) would be required for National Grid to undertake the work. As set out in the Planning Act 2008, the principal planning policies against which the application will be determined are set out within National Policy Statements (NPS). Those relevant to the Proposed Development are the Overarching National Policy Statement for Energy (EN-1) and the National Policy Statement for Electricity Networks Infrastructure (EN-5).

2.2 LEGISLATION, POLICY AND GUIDANCE

National Policy Statements

2.2.1 The Overarching National Policy Statement for Energy (EN-1) provides high level guidance on the design of Nationally Significant Infrastructure Projects. At paragraph 4.5.1, EN-1 states:

"The visual appearance of a building is sometimes considered to be the most important factor in good design. But 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."

2.2.2 In addition, paragraph 4.5.2 states:

"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."

2.2.3 The National Policy Statement for Electricity Networks Infrastructure (EN5) builds on the overarching design considerations in EN1 at paragraph 2.5.2 which states:

"Proposals for electricity networks infrastructure should demonstrate good design in their approach to mitigating the potential adverse impacts which can be associated with overhead lines, particularly those set out in Sections 2.7 to 2.10 below."

- 2.2.4 In referencing Sections 2.7 to 2.10, EN5 explicitly indicates that proposals should demonstrate good design in relation to the following aspects:
 - Biodiversity and geological conservation;
 - Landscape and visual;
 - Noise and vibration;
 - Electric and Magnetic Fields (EMFs).
- 2.2.5 National Grid has these design considerations at the forefront of the decision-making process and this Design Report intends to demonstrate how these considerations have led to the Proposed Development design which seeks to reduce the potential impacts outlined above.

The Electricity Act 1989

- 2.2.6 As the holder of the electricity transmission licence for England and Wales, National Grid has a statutory duty to consider the amenity impacts of its works when formulating proposals to develop an overhead electricity line, or carry out other works to the transmission system.
- 2.2.7 Under Section 9 (2) of the Electricity Act 1989, National Grid has a duty to:
 - develop and maintain an efficient, coordinated and economical system of electricity transmission; and
 - facilitate competition in the supply and generation of electricity.
- 2.2.8 Section 38 and Schedule 9 of the Electricity Act 1989 requires National Grid (when formulating its proposals) to:
 - have 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; and

- do what it reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects.
- 2.2.9 The extent to which National Grid has complied with its duties will be a consideration of the Secretary of State when determining the application for a Development Consent Order.
- 2.2.10 These statutory duties have been considered by National Grid as part of the overall design process, from the outset of the project to the development of the detailed design (the Proposed Development) which is the subject of the DCO application.

National Parks and Access to the Countryside Act and the Countryside and Rights of Way Act 2000

- 2.2.11 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 [statutory] duties do not override particular obligations or considerations which have to be taken into account by relevant authorities in carrying out any function." The guidance 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."
- 2.2.12 These statutory duties have been considered as part of the overall design process, from the outset of the project to the development of the detailed design, which is the subject of the DCO application.

Local Planning Policy

2.2.13 The Joint Local Development Plan (JLDP) for Anglesey and Gwynedd was adopted in July 2017 and is the planning policy document for Anglesey and Gwynedd (excluding that area within the Snowdonia National Park Planning Authority). It contains the policies and land use allocations that will facilitate the Plan area's development up to 2026.

- 2.2.14 As set out in NPS EN-1 (paragraph 4.1.5), Local Development Plans are one of the matters which the decision-maker may consider to be important and relevant.
- 2.2.15 The JLDP contains a number of design related policies that could be considered relevant to the consideration of the Proposed Development. The Planning Statement (**Document 7.14**) considers the compliance of the Proposed Development as a whole with relevant planning policy.

The Holford Rules

- 2.2.16 Broad principles for overhead transmission line routeing were formulated by the late Lord Holford and published in 1959 by the Royal Society of Arts. These rules, known as the 'Holford Rules' were reviewed by National Grid in 1992 and have become accepted within the electricity transmission industry as the basis for overhead transmission line routeing.
- 2.2.17 The Holford Rules seek to minimise any adverse impacts associated with new overhead lines (OHL) through the adoption of a series of common sense 'rules'. The seven 'rules' (described below) and supplementary notes seek to inform the design of OHLs by guiding them away from areas which are considered to be of the highest amenity value and maintain as direct and straight an alignment as possible (to minimise the use of larger angle pylons).
- 2.2.18 Paragraph 2.8.5 of EN-5 states that the Holford Rules and supplementary notes are intended as a common sense approach to the routeing of new OHLs and they should be used by developers when designing their proposals. As such, they are considerations when seeking to ensure a final design proposal complies with national planning policy. The Holford Rules state that developers should:
 - Rule 1 avoid altogether, if possible, the major areas of highest amenity value, by so planning the general route of the line in the first place, even if total mileage is somewhat increased in consequence;
 - Rule 2 avoid smaller areas of high amenity value or scientific interest by deviation, provided this can be done without using too many angle pylons i.e. the bigger structures which are used when lines change direction;
 - Rule 3 other things being equal, choose the most direct line, with no sharp changes of direction and thus with fewer angle pylons;

- Rule 4 choose tree and hill backgrounds in preference to sky backgrounds wherever possible. When a line has to cross a ridge, secure this opaque background as long as possible, cross obliquely when a dip in the ridge provides an opportunity. Where it does not, cross directly, preferably between belts of trees;
- Rule 5 prefer moderately open valleys with woods where the apparent height of pylons will be reduced, and views of the line will be broken by trees;
- Rule 6 where country is flat and sparsely planted, keep the high voltage lines as far as possible independent of smaller lines, converging routes, distribution poles and other masts, wires and cables, so as to avoid a concentration of lines or 'wirescape', and
- Rule 7 approach urban areas through industrial zones, where they exist, and when pleasant residential and recreational land intervenes between the approach line and the substation, carefully assess the comparative costs of undergrounding.
- 2.2.19 Of particular relevance to the Proposed Development is Holford Rule 6. The accompanying note to Holford Rule 6 goes on to state:

"In all locations minimise confusing appearance. 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."

- 2.2.20 The supplementary notes of Holford Rules state:
 - Residential areas avoid routeing close to residential areas as far as possible on grounds of general amenity;
 - Designations of county, district and local value where possible choose routes which minimise the effect on special landscape areas, areas of great landscape value and other similar designations of county, district or local value;
 - Alternative pylon design in addition to adopting appropriate routeing, evaluate where appropriate the use of alternative pylon designs where these would be advantageous visually and where the extra cost can be justified.

- 2.2.21 The Holford Rules were used by National Grid to inform the route corridor and detailed alignment studies which National Grid has undertaken to inform the design of the Proposed Development.
- 2.2.22 In developing the detailed design (the Proposed Development), National Grid has given due consideration to the Holford Rules. In particular, in reaching the detailed design National Grid has had due regard to Holford Rule 6 (and its accompanying note) with respect to the preference for paralleling the proposed 400 kV OHL with the existing 400 kV OHL and the 'synchronising' of pylons wherever possible.

National Grid's Substations and the Environment: Guidance on Siting and Design (The Horlock Rules)

- 2.2.23 These are internal National Grid guidelines (often referred as the Horlock Rules) for the sensitive siting and design of permanent facilities such as substations so as to reduce or avoid the environmental effects of such developments. Whilst the Proposed Development does not include a new substation (there is a proposed substation extension at Pentir and works at Wylfa), the principles contained in these guidelines were applied to the siting of large sites such as the main OHL construction compound at Penmynydd Road, and the operational compounds (including the tunnel head houses (THHs) and cable sealing end compounds (CSECs) at Braint and Tŷ Fodol in order to assist in the reduction of potential effects.
- 2.2.24 The guidelines state:
 - In the development of system options including new substations, consideration must be given to environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum;
 - The siting of new National Grid substations, sealing end compounds and line entries should as far as reasonably practicable seek to avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value by the overall planning of the system connections;
 - Areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas should be protected as far as reasonably practicable;

- The siting of substations, extensions and associated proposals should take advantage of the screening provided by land form and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum;
- The proposals should keep the visual, noise and other environmental effects to a reasonably practicable minimum;
- The land use effects of the proposal should be considered when planning the siting of substations or extensions;
- In the design of new substations or line entries, early consideration should be given to the options available for terminal pylons, equipment, buildings and ancillary development appropriate to individual locations, seeking to keep effects to a reasonably practicable minimum;
- Space should be used effectively to limit the area required for development consistent with appropriate mitigation measures and to minimise the adverse effects on existing land use and rights of way, whilst also having regard to future extension of the substation;
- The design of access road, perimeter fencing, earthshaping, planting and ancillary development should form an integral part of the site layout and design to fit in with the surroundings;
- In open landscape especially, high voltage line entries should be kept, as far as possible, visually separate from low voltage lines and other OHLs so as to avoid a confusing appearance; and
- The inter-relationship between pylons and substation structures and background and foreground features should be studied to reduce the prominence of structures from main viewpoints. Where practicable the exposure of terminal pylons on prominent ridges should be minimised by siting pylons against a background of trees rather than open skylines.

National Grid's Stakeholder, Community and Amenity Policy

2.2.25 National Grid's Stakeholder, Community and Amenity Policy ('National Grid's Commitments when undertaking works in the UK' (December 2016)) sets out how National Grid will work with stakeholders and communities to meet the environmental duties placed on it by Section 38 and Schedule 9 of the Electricity Act 1989. The relevant commitments are as follows:

- Establishing need;
- Involving stakeholders and communities promoting genuine and meaningful stakeholder engagement. Meeting and, where appropriate, exceeding the statutory requirements for consultation or engagement;
- Routeing networks and selecting lines seeking to avoid areas which are internationally or nationally designated for their landscape, wildlife or cultural significance;
- Minimising the effects of new infrastructure on communities by having particular regard to safety, noise and 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);
- Mitigating adverse effects of works through the application of environmental impact assessment techniques;
- Offsetting where mitigation is not practicable by engaging with relevant stakeholders;
- Enhancing the environment around our works.

2.3 APPROACH TO THE DESIGN AND ROUTEING OF NEW ELECTRICITY TRANSMISSION LINES

2.3.1 In August 2012, National Grid published 'Our Approach to the Design and Routeing of New Electricity Transmission Lines' which states:

"Whether the preferred route corridor is predominately overhead, underground or sub-sea, detailed survey and assessment work is carried out to find the alignment of the transmission line which best satisfies all of our obligations and the needs of stakeholders. In doing this we seek to avoid as far as possible any impacts on people, settlements, and environmentally sensitive areas. We continue to refine the route alignment to minimise any visual and other environmental impacts, in consultation with stakeholders and communities."

2.3.2 The approach to the routeing of new electricity transmission lines is summarised in **Figure 2.1** and is used as guidance for all of National Grid's

project teams and also provided to stakeholders to provide a transparent and clear understanding of how National Grid designs its transmission lines to meet its statutory obligations.





2.3.3 The design and routeing of new transmission lines is also informed by the results of Stage 1, Stage 2, and Stage 3 Consultation and experience of major transmission infrastructure projects. The approach complies with the requirements of the Electricity Act 1989 and National Policy Statements EN-1 and EN-5 as well as the principles of the Holford Rules which provide guidance on the routeing of OHLs.

Stage 1 – Strategic Options

- 2.3.4 In responding to a request for a connection and preparing a need case for a new electricity transmission line, National Grid seek to:
 - determine whether the existing network can accommodate the customer or capacity needs economically and efficiently before considering new build solutions;
 - consider alternatives to meet the need e.g. adjusting arrangements with the generator or considering different approaches to operating the network; or
 - consider investing in new equipment to optimise the use of the existing network.

- 2.3.5 Where new infrastructure would be required, National Grid consider the ways in which this could be achieved, this approach might include:
 - different technologies such as underground cables, gas-insulated lines OHLs or sub-sea high voltage direct current (HVDC) cables;
 - different geographical connection points; or
 - a combination of the two.
- 2.3.6 All strategic options are subject to a technical compliance filter to ensure that the options would work on the network and address the technical need identified. This filtering process takes place prior to options being presented to stakeholders. Options are then subject to appraisal to analyse their relative costs, effects and benefits. As part of this process, National Grid consider environmental, socio-economic and technical issues alongside a capital and lifetime cost for each strategic option. This appraisal is informed by feedback from Stage 1 consultation and subsequently back-checked as the project evolves.
- 2.3.7 Following this options appraisal work a preferred option or options are taken forward for further assessment and design work. This may involve a choice of technology or the identification of connection points, with further development of the technology at Stage 2. Where a largely overhead route is preferred, there would be a continuing process of appraisal and consultation throughout Stages 2 and 3 which would consider the ways to mitigate the impact of a proposed route. At this stage, National Grid may also look for opportunities to remove existing infrastructure to reduce the overall 'wirescape'.
- 2.3.8 The guidance identifies that National Grid may promote a sub-sea or predominately underground strategic option where there are very significant constraints relating to landscape or visual issues which would conflict with National Planning Policy. Such constraints could include: locations with physical difficulties in constructing an OHL or the presence of highly valued landscapes such as National Parks or AONBs.

Stage 2 – Outline Routeing and Siting

2.3.9 At Stage 2, routeing studies are carried out to identify broad potential corridors for the new transmission route for the strategic option(s) which National Grid would consider. Siting studies are also carried out to identify suitable locations for required infrastructure, such as construction compounds and operational compounds.

- 2.3.10 When routeing OHLs, National Grid apply the Holford Rules (described above) and consider the types of mitigation that could offset any landscape or visual effects.
- 2.3.11 Where the use of underground cables is proposed, this would necessitate the construction of cable sealing end compounds (which enable the transition from underground cable to OHL). The siting of infrastructure also requires careful consideration in accordance with the substation siting guidelines (described above).
- 2.3.12 Route corridor options are then subject to consultation with National Grid's core stakeholders followed by an options appraisal. This options appraisal is used to determine the environmental, socio-economic, technical and cost implications that would be associated with different route options.
- 2.3.13 At this stage, public consultation is undertaken to seek views both on the preferred strategic option and identified potential route corridors. Following this period of consultation, National Grid produce a feedback report which identifies all of the comments received and how they have been taken into account. The results of the consultations together with all of the studies carried out are used to identify the preferred route corridor (or corridors).

Stage 3 – Detailed Routeing and Siting

- 2.3.14 Whether the preferred route corridor identified in Stage 2 was identified to accommodate an OHL, underground or sub-sea cable, there would continue to be a process of appraisal and consultation throughout Stage 3. This additional appraisal work would involve detailed design, survey and assessment work to determine the alignment of the transmission line which would best satisfy National Grid's obligations and the needs of stakeholders. In undertaking this, National Grid would seek to avoid as far as possible any impacts on people, settlements, and environmentally sensitive areas.
- 2.3.15 National Grid would continue to apply the Holford Rules and engage with stakeholders, thematic groups and communities during the development of a proposed detailed alignment.

Stage 4 – The Proposed Application

2.3.16 Public consultation on the proposed application would be carried out in accordance with Sections 42, 47 and 48 of the Planning Act 2008. At the close of the consultation period, National Grid would review the proposals and makes any necessary amendments in light of the consultation responses that had been received.

Stage 5 – Application for Development Consent

2.3.17 Once the outcomes of the Stage 3 consultation have been assessed and any appropriate amendments are made to the proposals, an application for development consent would be submitted to the Planning Inspectorate.

Summary

2.3.18 The approach outlined above has been adopted by National Grid to inform the routeing and site selection of the Proposed Development in an iterative manner which has considered the physical context and features along the route corridors and responded to stakeholder feedback where appropriate.

3 Consultation

3.1 INTRODUCTION

- 3.1.1 As set out in Our Approach to the Routeing and Design of New Electricity Transmission Lines, National Grid undertakes consultation throughout various stages of project development.
- 3.1.2 Three main stages of consultation were undertaken during the development of the North Wales Connection Project and these are outlined below. These stages of consultation are briefly summarised in sections 3.2 3.4 below.
- 3.1.3 Further details on the stages of consultation, the feedback received and an explanation of how National Grid had regard to the comments made can be found in the Consultation Report (**Document 6.1**).

3.2 STAGE 1 CONSULTATION

- 3.2.1 In October 2012, National Grid undertook Stage 1 Consultation and sought feedback on its preliminary preferred Strategic Option and the other Strategic Options that were not preferred. The consultation also covered four possible route corridors within which a new overhead electricity line might be routed between Wylfa and a broad area common to all four corridors, close to the Menai Strait; from here, five corridors were identified to Pentir. These corridor options had been identified so as to avoid, as far as possible, the most sensitive sites and features, whilst also presenting a number of alternative route corridors in which the Connection might be achieved. This work was documented in the Wylfa-Pentir Route Corridor Identification Report (October 2012) (**Document 9.1**).
- 3.2.2 Having considered the findings of environmental and socio-economic appraisals and reviewed feedback received to the Stage 1 Consultation National Grid confirmed its preference for Strategic Option 3 (a new AC connection between Wylfa and Pentir, with associated works on the mainland) and announced this in January 2015. National Grid also announced the preference for the 'orange' route corridor on Anglesey which broadly followed the route of the existing 400 kilovolt (kV) OHL between Wylfa and the common area close to the Menai Strait. The reasons for preferring this route corridor are set out in National Grid's Wylfa-Pentir Preferred Route Corridor Selection Report (October 2015) (**Document 9.2**) and are outlined further in Chapter 5 of this document.

3.2.3 At that time, National Grid also expressed the view that an OHL crossing of the Anglesey Area of Outstanding Natural Beauty (AONB) in the vicinity of the Menai Strait would be likely to conflict with national planning policy and National Grid's statutory duties (as set out in Section 2.2). Consequently, National Grid began work to identify a search area and possible methods for crossing the AONB and Menai Strait using underground cables.

3.3 STAGE 2 CONSULTATION

- 3.3.1 Following the decision to progress with the 'orange' route corridor, National Grid identified potential route options (within the preferred 'orange' route corridor) for a new OHL between Wylfa Substation and the search area for an underground cable crossing of the Anglesey AONB and the Menai Strait, and from that area to Pentir Substation.
- 3.3.2 Feedback was sought on a range of route options at the Stage 2 Consultation in October 2015, together with search areas within which the sealing end compounds required to securely connect the OHL to the underground cables beneath the AONB and the Menai Strait might be sited. Further information is provided within the Wylfa to Pentir Route Options Report (October 2015) (**Document 9.3**) and is summarised within Chapter 6 of this report.
- 3.3.3 Further appraisals and assessment together with feedback from the Stage 2 Consultation helped inform the selection of a Preferred Route Option within the 'orange' route corridor which sought to reduce the local environmental and socio-economic effects of the Proposed Development. Further information is provided in the Preferred Route Option Selection Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.4**) and is summarised within Chapter 6 of this report. At the same time, further work was undertaken looking at the options for crossing the Menai Strait, using additional engineering information and consultation feedback to refine the options considered.
- 3.3.4 At the same time, further work was undertaken looking at the options for crossing the Menai Strait, using additional engineering information and consultation feedback to refine the options considered.
- 3.3.5 The Draft Route Alignment Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.5**) explains the rationale for the design of the proposed new overhead line in sections A-D of the route while the Menai Crossing Report (September 2016) (**Document 9.6**) explains the options considered for crossing the Menai Strait (sections E to F of the route), the options assessment undertaken and the selection of the

preferred option. The findings of environmental surveys and assessments which informed the development of the draft route alignment were set out in the Preliminary Environmental Information Report (PEIR).

3.4 STAGE 3 CONSULTATION

- 3.4.1 The statutory Stage 3 Consultation was held from 5 October 2016 to 16 December 2016. This consulted on the detailed proposals including pylon locations, the use and alignment of a tunnel underneath the Menai Strait and the Anglesey AONB, proposed works at Wylfa Substation and the proposed extension to Pentir substation, and other infrastructure such as the tunnel head houses, cable sealing end compounds (THH/CSEC), access tracks and construction compounds and traffic routes. In addition, the findings of environmental surveys and assessments of the draft route alignment were set out in the PEIR.
- 3.4.2 Information was provided on all options considered throughout the design evolution of the Proposed Development, so that people were able to comment on any aspect of the Proposed Development. Detailed appraisal supported the case for the selection of the preferred route and the detailed design presented. These design decisions were explained in the Preferred Route Option Selection Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.4**), the Draft Route Alignment Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.4**), the Draft Route Alignment **9.5**) and the Menai Strait Crossing Report (September 2016) (**Document 9.6**).
- 3.4.3 The project team considered feedback from the Stage 3 Consultation and ongoing engagement with technical Stakeholders and Persons with an Interest in Land (PILs). Where amendments to the design had been suggested these were reviewed and where possible and appropriate the changes were accommodated and the design changed as a result. Further appraisals and assessment also informed the process for refining and amending the design, resulting in the Proposed Development.
- 3.4.4 The amendments made to the design following the Stage 3 consultation are recorded and explained in this report. Further details regarding the Stage 3 Consultation, including National Grid's response to the representations received, is contained within the Consultation Report (**Document 6.1**).

3.5 HOW CONSULTATION INFLUENCED DESIGN DECISIONS

3.5.1 The process of reviewing and responding to consultation feedback is explained in section 3.16 of the Consultation Report (**Document 6.1**). This process is summarised briefly below.

Thematic Approach to Analysing Feedback

3.5.2 National Grid received a significant amount of feedback during the preapplication process and as a result, adopted a thematic approach to analysing that feedback for each stage of the consultation (i.e. Stages 1-3). Analysing feedback thematically provided a structure to the analysis process and enabled similar comments to be grouped together. This approach helped National Grid to respond more effectively to the feedback received. Following the identification and categorisation of the comments, National Grid reviewed how the feedback received might inform the evolution of the proposals. This involved a multi-disciplinary review of feedback including having regard to engineering, planning, environmental, property, community and cost considerations.

How Specific Changes Suggested through Consultation Feedback were Considered

- 3.5.3 Some consultation feedback contained specific requests to make changes to the design. Consultation responses were read and analysed in detail to identify where feedback made specific requests and suggested amendments to the design. Many of these requests came from Persons Requests to change or amend the with an Interest in Lands (PILs). proposals were fed back to the Project team who reviewed the options available to amend the design in response to the feedback. The project team had to establish if the suggested amendments were technically achievable and consider any possible effects which could occur from changing the proposals. In some cases, where no explicit design proposal accompanied the request the project team developed a design alternative that was considered to address the concerns raised. The project team undertook a thorough process in considering each of the suggested amendments and where possible and appropriate the suggested amendments were made.
- 3.5.4 The Consultation Report (**Document 6.1**) considers feedback received during the Stage 3 Consultation from prescribed consultees and local authorities in Chapter 8, feedback received from PILs in Chapter 9 and feedback received from members of the public and non-prescribed organisations in Chapter 11.
- 3.5.5 Within the Consultation Report (**Document 6.1**) National Grid has set out its response to feedback and any suggested changes under each of the feedback summaries within the relevant chapter. Where a specific change has been suggested, National Grid explains how it considered the change

and if the change has been made. For any of the suggested changes which could not be made, National Grid also explains why.

- 3.5.6 During and after the Stage 3 Consultation, National Grid received and considered a number of further requests to amend the design of the Proposed Development. Such requests were received from a variety of stakeholders including statutory undertakers, local authorities, PILs, and the local communities who have been consulted on National Grid's proposals throughout the life of the project, including in accordance with Sections 42 and 47 of the Planning Act 2008. In parallel, the North Wales Connection project team continued its work to consider refinements to the design.
- 3.5.7 All requests to amend the design were considered through a multi-discipline appraisal with regard to matters including the potential for different or new environmental effects, their technical feasibility, and estimated cost.

4 Strategic Options

4.1 **OPTIONS CONSIDERED**

- 4.1.1 In line with the process outlined in 'Our Approach to the Design and Routeing of New Electricity Transmission Lines', at the initial stage for any project that requires a new transmission route, National Grid identifies potential options for transmission system infrastructure development (the "Strategic Options") for assessment based upon high level design information. For the North Wales Connection Project, this process was undertaken in 2012, further detail can be found in the Strategic Options Report (SOR) (2012) (Document 9.8.1). The SOR was updated in 2015 (Document 9.8.2) and 2016 (Document 9.8.3) to ensure accurate information was presented at each of the three stages of public consultation. The SOR has also been updated in 2018 to accompany the DCO application (Document 7.2).
- 4.1.2 Each potential Strategic Option is initially assessed by National Grid to ensure that it meets the reinforcement need and that the resultant transmission system would comply with the minimum standards defined in the National Electricity Transmission System Security and Quality of Supply Standards (NETS SQSS). Potential Strategic Options which would not meet the reinforcement need or otherwise would not meet the standards set out in the NETS SQSS are discounted.
- 4.1.3 Five strategic options were initially identified for the reinforcement of the electricity transmission system in North Wales. National Grid considered that each of these options would be able to meet the additional transmission system requirements in North Wales and took these options forward for strategic option appraisal. These were:
 - Option 1 Two subsea cable circuits between Wylfa and Connahs Quay substations;
 - Option 2 One subsea circuit between Wylfa and Connahs Quay and one DC subsea cable circuit between Wylfa and Pembroke;
 - Option 3 Two new onshore circuits connecting Wylfa and Pentir, one new AC circuit between Pentir and Trawsfynydd to be installed on existing pylons, a new connection between Wern and Y Garth, a

new substation in west Gwynedd, re-conductoring of existing circuits in North Wales, and modifications at existing substations;

- Option 4 Two new offshore circuits east of Anglesey connecting Wylfa and Pentir, one new AC circuit between Pentir and Trawsfynydd to be installed on existing pylons, a new connection between Wern and Y Garth, a new substation in west Gwynedd, reconductoring of existing circuits in North Wales, and modifications at existing substations;
- Option 5 Two new offshore circuits west of Anglesey connecting Wylfa and Pentir, one new AC circuit between Pentir and Trawsfynydd to be installed on existing pylons, a new connection between Wern and Y Garth, a new substation in west Gwynedd, reconductoring of existing circuits in North Wales, and modifications at existing substations.
- 4.1.4 Following Stage 1 Consultation, a sixth option was identified as a result of consultation feedback. This was subject to a similar appraisal and included in the updated Strategic Options Report (2015) (**Document 9.8.2**). This option was as follows:
 - Option 6 Replace the existing 132 kV OHL between Wylfa and Valley with a 400 kV OHL, two new circuits (largely offshore) between Valley and a new substation in the vicinity of west Gwynedd, one new AC circuit between Pentir and Trawsfynydd to be installed on existing pylons, a new connection between Wern and Y Garth, reconductoring of existing circuits in North Wales, and modifications at existing substations.
- 4.1.5 An assessment of each of the six Strategic Options was undertaken based on the following criteria:
 - Technology and Cost;
 - Ecology and biodiversity;
 - Cultural heritage, landscape and visual;
 - Other environmental considerations;
 - Consideration of combined Environmental topics;
 - Socio-economic (Economic activity, people and communities).

4.2 SELECTING THE PREFERRED STRATEGIC OPTION

- 4.2.1 Following the options appraisal, it was concluded that Strategic Option 3, with new OHL circuits connecting Wylfa and Pentir (potentially with appropriate mitigation, including the use of underground technologies) was likely to best achieve an appropriate balance between National Grid's technical, economic, amenity and environmental obligations and was therefore identified as the preliminary preferred Strategic Option to be taken forward to Stage 2 of the 'Approach to Routeing' (Outline Routeing and Siting) as set out in **Figure 2.1**. The choice of preferred Strategic Option therefore sets the starting point for detailed design and assessment work as detailed within this report.
- 4.2.2 Whilst the preferred Strategic Option had potentially more significant environment and socio-economic effects on Anglesey and Gwynedd than some of the other Strategic Options appraised, it was considered that a final design proposal could be developed to include appropriate mitigation, including the possible use of underground technologies at more sensitive locations. The overall judgement was also informed by the significant additional costs associated with all the other Strategic Options considered, leading National Grid to conclude that the adoption of any other Strategic Option was likely to conflict with the statutory duty to provide connections in an economic and efficient manner. This decision has been reviewed as the project has progressed. The following chapters of this report explain detailed design decisions that have helped to limit the potential effects associated with the broader Strategic Option as originally defined, and in so doing, have confirmed National Grid's initial judgement at the Strategic Option stage.
- 4.2.3 As outlined in Section 3.2 of this document, the selection of Strategic Option 3 as the preferred Strategic Option was presented at the Stage 1 Consultation alongside route corridor options. The identification and selection of route corridor options is outlined in Chapter 5 of this document.

5 Route Corridor Identification and Selection

5.1 INTRODUCTION

- 5.1.1 This chapter provides a summary of the decision making which led National Grid to select the preferred 'orange' route corridor and the design decisions that informed this. It also explains how these design decisions have helped to limit environmental or socio-economic effects that might otherwise have occurred.
- 5.1.2 Full details regarding these design decisions can be found in the following documents:
 - Wylfa to Pentir Overhead Electricity Transmission Line Route Corridor Identification Report (October 2012) (**Document 9.1**);
 - Wylfa to Pentir Preferred Route Corridor Selection Report (October 2015) (**Document 9.2**).

5.2 IDENTIFYING THE ROUTE CORRIDORS

- 5.2.1 Following the process of appraising strategic options, a Preferred Strategic Option was identified which National Grid considered to achieve an appropriate balance between all of the important considerations that National Grid has to take into account when developing transmission proposals. This would involve the development of an overhead electricity transmission line from Wylfa to Pentir.
- 5.2.2 In accordance with National Grid's Approach to the Design and Routeing of New Electricity Transmission Lines (as outlined in Chapter 2), the next step was to undertake routeing studies to identify broad potential route corridors. For the purpose of the initial study it was assumed this line would comprise a single line of lattice steel pylons (towers) capable of carrying two circuits (one circuit on each side of the pylon). The most appropriate design of pylon was considered at a later stage of project development.

Identifying the Study Area

5.2.3 The study area for the identification of route corridors included the whole of the Isle of Anglesey and the Gwynedd coastline along the Menai Strait and
continuing inland towards Pentir Substation. This study area was defined in order to maximise the potential for finding a suitable route corridor, taking into account that, in certain circumstances, a longer route may reduce the overall environmental impact as against a shorter more direct route.

5.2.4 It is considered that in some situations the corridors of existing 400 kV and 132 kV overhead electricity transmission line routes or other elements of major linear infrastructure (e.g. major trunk roads) can present opportunities for routeing a new 400 kV line, with more limited landscape and visual effects. Such routes are known as 'Opportunity Corridors'. In particular, the landscape character and visual amenity of the area will already be affected by the overhead electricity transmission lines and there may be benefits of routeing a new OHL in place of or parallel to the existing OHL, rather than across areas which are currently unaffected by overhead electricity transmission line development.

Identification of Route Corridors and Crossing of the Menai Strait and Anglesey AONB

- 5.2.5 Route corridors and areas for a Menai Strait crossing were identified through a systematic process. This considered sensitive sites and features in the Study area and their likely sensitivity to an overhead transmission line. The objective was as far as possible to reduce the overall effects upon sensitive sites and features from the proposed overhead transmission line by identifying route corridors that avoided encroaching within them and took account of potential indirect effects.
- 5.2.6 The process involved a progressive series of refinements from the initial study area through broad areas of lesser constraints, to the identification of Opportunity Corridors, discrete route corridors and the eventual refinement of the boundaries of these route corridors in this way, the corridor boundaries varied in width throughout their length, widening in those areas considered less likely to be sensitive to the development of a connection.

Opportunity Corridors

- 5.2.7 Within the study area, three broad Opportunity Corridors were identified:
 - Existing National Grid 400 kV overhead electricity transmission line between Wylfa and Pentir;
 - Existing National Grid 132 kV overhead electricity transmission line between Wylfa and Valley;
 - A55 between Holyhead and Bangor.

Route Corridors

- 5.2.8 Following the initial assessment of the constraints and Opportunity Corridors within the study area, four route corridors were identified (see 5.2.9 below) across Anglesey from Wylfa to the Menai Strait and five Menai crossing corridors were identified to complete the connection to Pentir. These were divided into four Anglesey corridor options and five Menai crossing options linked by Common Areas, an area at the end of the four corridors at the Menai that connected each of the corridors with any of the five Menai crossing options.
- 5.2.9 The four Anglesey route corridors options are summarised below:

<u>Orange Corridor</u>

5.2.10 The Orange Corridor was approximately 24 kilometres (km) in length and was broadly based on the route of the existing 400kV overhead electricity transmission line as it runs from the existing Wylfa Nuclear Power Station to Pentir Substation.

Blue Corridor

5.2.11 The Blue Corridor was approximately 28 km in length and presented an option to avoid paralleling the majority of the existing 400 kV and 132 kV overhead electricity transmission lines. It ran generally through open countryside in the centre of the island before turning east to follow the A55 corridor to the South Common Area.

Yellow Corridor

5.2.12 The Yellow Corridor was approximately 29 km in length and presented an option to route a line to the west of the island. It largely mirrored the direction of the existing 132 kV overhead electricity transmission line and A5025 that runs along the west of the island down to the area near Valley and the A55. At that point the route corridor followed the line of the A55 and A5 to the Menai Strait.

Purple Corridor

5.2.13 The Purple Corridor was approximately 33 km in length and, similar the Yellow Corridor, presented an option to route the line to the west of the island before turning east within a corridor between the coast and the A55.

Menai Strait Crossing Options

5.2.14 Five corridors were identified to cross the Menai Strait and connect to Pentir Substation. Each of the crossing options connected to a Common Area which in turn linked to the four route corridor options. These were:

Crossing Option A

5.2.15 Crossing Option A ran between the settlements of the Menai Bridge and Llanfairpwll, across the Menai Strait east of Britannia Bridge and then travelled south- east to Pentir Substation.

Crossing Option B

5.2.16 Crossing Option B ran from the south-west of Llanfairpwll, across the Menai Strait west of Britannia Bridge and then travelled south-east to Pentir Substation.

Crossing Option C

5.2.17 Crossing Option C ran east from Llanedwen crossing the Menai Strait north of Y Felinheli. It continued east across the A487 before turning south to reach Pentir Substation.

Crossing Option D

5.2.18 Crossing Option D ran from Ysgubor Fawr south before crossing the Menai Strait and reaching the mainland between the National Outdoor Pursuits Centre and Llanfair Hall. It then headed to the north-east, north of Bethel, towards Pentir Substation.

<u>Crossing Option E</u>

- 5.2.19 Crossing Option E began north-east of Brynsiencyn before running south to the Menai Strait. It crossed the Menai Strait in an easterly direction meeting the mainland at the sewerage works. This option then split, with one corridor option running north of Bethel and another running to the south, before merging east of Bethel and heading north-east towards Pentir Substation.
- 5.2.20 Whilst all four route corridors were able connect to any one of the five identified crossing points through the Common Area, individually each of the route corridors were more closely related to certain crossing points. Dependent upon the combination of route corridor and crossing option, the overall route length between Wylfa and Pentir would have varied between approximately 35 and 55 km.

5.2.21 Through the identification of the four route corridors and five Menai Crossing Options referenced above, a number of principal environmental features were avoided which are outlined below. These were:

<u>Ramsar Sites</u>

- Although not possible to avoid the Corsydd Môn a Lln /Anglesey and Lln Fens Ramsar Site, it was acknowledged that this would be a significant constraint that would be given further consideration at the later stages of the development of the project;
- The area of the Ramsar site within the study area was kept to a minimum by proposing a corridor option that was tight to the existing overhead electricity transmission line at this location.

Special Protection Areas (SPA)

• Three SPAs that were identified within the study area were avoided by the corridors.

Special Areas of Conservation (SAC)

• Of the nine SACs within the study area, seven were avoided by the corridors.

Sites of Special Scientific Interest (SSSI)

• Of the 69 SSSIs within the Study area, 57 were avoided by the corridors.

<u>Nature Reserves</u>

- Three RSPB reserves and nine reserves owned by the North Wales Wildlife Trust were avoided by the identified corridors;
- Of the four National Nature Reserves (NNRs) within the study area, three were avoided through the identification of the corridors.

World Heritage Sites

• The Caernarfon and Beaumaris Castles which form part of the Castle and Town Walls of King Edward in Gwynedd World Heritage Site were avoided.

Scheduled Monuments

• Of the 171 Scheduled Monuments in the study area, 137 were avoided by the corridors.

Registered Historic Parks and Gardens

• 10 of the 12 identified Registered Historic Parks and Gardens within the study area were avoided.

Conservation Areas

• All identified Conservation Areas within the study area were avoided by the corridors.

Landscapes of Outstanding Historic Interest

 Five Landscapes of Outstanding Historic Interest were identified and all but one of these were avoided. The Dinorwig Landscape of Outstanding Historic Interest could not be avoided as Pentir substation lies within it.

Areas of Outstanding Natural Beauty

• The Anglesey AONB was largely avoided through the identification of the route corridors but couldn't be avoided in totality because the AONB designation applies to all open areas adjacent to the Menai Strait, which lies between Wylfa and Pentir. The area that could be affected was kept to a minimum and effects upon the designation were given significant consideration throughout the design evolution of the Proposed Development.

<u>Heritage Coast</u>

• The Anglesey Heritage Coast was avoided in its entirety through the identification of the corridors.

High Ground and Ridgelines

• Due to the landform of Anglesey, it was not possible to avoid all ridgelines, however, six principal areas of high ground were identified and avoided by the corridors.

<u>Waterbodies</u>

• Eight significant waterbodies were avoided by the corridors.

<u>Settlements</u>

• All larger settlements (with a population in excess of 1000) were avoided by the corridors.

Community Facilities

• Of the 87 identified community facilities within the study area, all but four were avoided by the corridors.

Wind Farms

• All operational wind farms were avoided by the corridors.

<u>Tourism</u>

- All identified 'main tourist attractions' were avoided;
- All main beaches were avoided;
- All but a small number of camping and caravan sites were avoided by the corridors;
- The area of National Trust land and property within the corridors was kept to a minimum.
- 5.2.22 Where environmental features would not be avoided by the corridors, it was acknowledged that these could be constraints to be given further consideration at the later stages of the Proposed Development.
- 5.2.23 Therefore, the definition and design of the Route Corridors identified substantially reduced or avoided the likelihood of significant environmental or socio-economic effects occurring on internationally, nationally and locally designated sites and other features.

5.3 SELECTING THE PREFERRED ROUTE CORRIDOR

Route Corridor Appraisal Process

- 5.3.1 At this stage, options appraisal was used to compare route corridors and to inform the selection of a preferred route corridor.
- 5.3.2 The selection of the preferred route corridor was based upon a qualitative review of the appraisal findings and consultation feedback received. The selection of the preferred route corridor aimed to balance environmental, socio-economic, technical and cost considerations, and taking account of the comments received through consultation. The detailed explanation of the process undertaken is set out within the Preferred Route Corridor Selection Report (Oct 2015) (**Document 9.2**) and is summarised below.

Consultation Feedback

5.3.3 Feedback from stakeholders and the public was considered as part of the process gathered through the Stage 1 Consultation undertaken between October and December 2012. Details of the consultation feedback received

and how National Grid had regard to the comments made is contained in the Consultation Report (**Document 6.1**).

- 5.3.4 Where stakeholders expressed a view, they generally preferred the Orange Route Corridor over the other route corridors for a new OHL 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. Of the 153 members of the public who expressed a route corridor preference, 121 expressed a preference for the Orange Route Corridor. The Blue Route Corridor was viewed by stakeholders as the least favoured option.
- 5.3.5 The Menai Strait area was indicated by stakeholders as a particularly sensitive area to OHL development due to potential effects on the AONB and many other sites and features located along the coast. Several stakeholders indicated that this would be contrary policy and internal National Grid guidance.
- 5.3.6 Additional details of the consultation feedback that informed the selection of the preferred route corridor can be found in Chapter 7 of the Wylfa to Pentir Preferred Route Corridor Selection Report (October 2015) (**Document 9.2**).

Route Corridor Design Refinement

- 5.3.7 The route corridor options presented for consultation in 2012 assumed the new transmission connection would be a fully OHL connection.
- 5.3.8 It was however appreciated that there may be 'pinch points' or more sensitive areas / sites within the route corridors where the construction of a new OHL could create significant adverse environmental or socio-economic effects. It was recognised that these effects may influence the selection of the preferred route corridor and crossing option.
- 5.3.9 At these locations, the possible need for mitigation measures, such as underground cables as an alternative to a new OHL, was considered as they may have offered the potential to reduce or remove some adverse environmental or socio-economic effects.
- 5.3.10 Additional details for the refinement of the route corridor design can be found in Chapter 8 of the Wylfa to Pentir Preferred Route Corridor Selection Report (October 2015) (**Document 9.2**).

Selection of a Preferred Route Corridor

- 5.3.11 Following a review of consultation feedback and differentiators between the route corridors, it was determined that the Orange Route Corridor was the preferred route corridor to be taken forward to develop a specific alignment and consent application as it provided an opportunity to significantly reduce the potential environmental impacts when compared to the other routes.
- 5.3.12 It should be noted that cost was not considered to be a differentiator at this stage and the route corridor was therefore selected on the basis of reducing environmental and socio-economic effects and taking account of consultation feedback.
- 5.3.13 The following is a summary of the reasons for selecting the Orange Route Corridor and identifies how this design decision has resulted in less significant environmental impacts being predicted:

Landscape and Visual Amenity

- The Orange Route Corridor was the shortest route, thus requiring fewer pylons.
- The Orange Route Corridor offered the opportunity to develop an OHL route within an area already affected by an existing overhead transmission line. This consideration was supported by current 'best practice' guidance, such as the third edition of 'Guidelines for Landscape and Visual Impact Assessment' (GLVIA), published by The Landscape Institute and Institute of Environmental Management and Assessment. The GLVIA recommends the consideration of 'sensitivity' of receptors together with the 'magnitude' of effects in order to assess their overall significance. The magnitude of visual effects depends in part on the size or scale of change within a view. Judging the magnitude of effects takes account of: "the degree of contrast or integration of any new feature or change in the landscape with the existing or remaining landscape elements and characteristics in terms of the form, scale and mass, line, height, colour and texture."
- The terrain in the Orange Route Corridor offered better natural screening and compliance with Holford Rules compared to the more expansive, long distance views of the Yellow and Purple Route Corridors. Computer modelling indicated that fewer new visual amenity receptors were likely to be affected along the Orange Route Corridor compared with other route corridors.

- The Yellow and Purple Route Corridors were also visible from long lengths of the Anglesey AONB, whilst there was less visibility of the Orange and Blue Route Corridors from the AONB.
- Any new OHL within the Blue, Yellow and Purple Route Corridors would affect undeveloped landscapes and was likely to more significantly affect panoramic views to Snowdonia; in particular, the Blue and Yellow Route Corridors had the potential to affect views for tourists travelling eastwards along the A55, for example those entering Wales from Holyhead.

<u>Ecology</u>

• The route corridor options were broadly similar in terms of their potential effects upon flora and fauna, especially protected species, and all options needed to cross the Y Fenai a Bae Conwy / Menai Strait and Conwy Bay SAC. The Orange Route Corridor was preferred as it provided opportunities for a route that would avoid all other designated nature conservation sites, whilst the Blue, Yellow and Purple Route Corridors provided no opportunity for a route alignment to avoid direct effects upon Malltraeth Marsh SSSI due to the constraints associated with the airfield low flying zone for RAF Mona.

Historic Environment

• There were no potential effects on the historic environment considered to be differentiating factors between route corridors.

Socio-economics (Local Economy)

 All route corridor options contained sensitive tourism facilities and attractions, with most tourism receptors on the coast near the Menai Strait, which were common to all route corridors. Potential effects on tourism are often linked to landscape and visual amenity concerns (refer to the Landscape and Visual Amenity above). From a landscape perspective, the Orange Route Corridor was preferred as it was the shortest route, thus requiring fewer pylons and offered the opportunity to develop within an area already affected by an existing overhead transmission line.

Socio-economics (Aviation and Defence)

• The Blue and Yellow Route Corridors may have required mitigation near RAF Mona in the form of two separate OHLs on low height pylons, whilst the Purple Route Corridor may also have required low height pylons depending on the final alignment. These risks were avoided by the Orange Route Corridor, which could avoid the need to manage risks of infringement of safeguarding zones, reinforcing the preference for the Orange Route Corridor.

Consultation Feedback

- Where members of the public gave feedback on the route corridor options, the majority of the 153 responses (79%) preferred the Orange Route Corridor as it was the shortest, most direct route and allowed the existing line to be followed (i.e. something that is already there). Blue and Yellow Route Corridors were also highlighted due to the potential effects on views for tourists entering Wales along the A55 from Holyhead.
- 5.3.14 A detailed appraisal of the Route Corridor Options can be found in Chapter9 of the Wylfa to Pentir Preferred Route Corridor Selection Report (October 2015) (Document 9.2).
- 5.3.15 Further details regarding the proposed route alignment options within the Orange Route Corridor can be found within Chapter 6 of this document.
- 5.3.16 In this way, the design decision to favour the Orange Route Corridor has helped to further limit the potential for environmental and socio-economic effects likely to result from the proposed development. The corridor represents the most direct route, limiting the development footprint, whilst avoiding the need to introduce new OHL development into landscapes currently unaffected by such infrastructure.

5.4 CROSSING OF THE MENAI STRAIT AND AONB

5.4.1 In January 2015, National Grid published information on its latest analysis which included a preference in design using underground cables through the Anglesey AONB and across the Menai Strait, avoiding the development of an OHL within this sensitive area. This decision took account of consultation feedback from public and statutory stakeholders, together with a review of the requirements set out in National Policy Statement EN-5. It was considered that the additional cost associated with this mitigation was justified to reduce effects upon the landscape of the AONB and to protect iconic views along the Menai Strait. It was also considered that an OHL proposal in this area would be likely to conflict with national planning policy. Avoidance of the use of an OHL was the most appropriate way to fulfil National Grid's statutory duty to have regard to the conservation and enhancement of the AONB. It was considered that while technically difficult, a viable means to cross the Menai Strait using underground cables should be sought.

- 5.4.2 This important design decision in the evolution in the design of the proposed development represents significant Mitigation by Design. In particular, the substantial landscape and visual effects upon a nationally designated landscape that would have resulted from the development of any further OHL in the vicinity of the Menai Strait have been avoided. In addition, this design decision has also reduced potential environmental and socio-economic effects on other receptors in this area including, but not limited to:
 - The Plas Newydd Grade I Listed Building;
 - The Vaynol Registered Parks and Gardens;
 - Communities in the vicinity of the Menai Strait.

6 Route Option Identification and Selection

6.1 INTRODUCTION

- 6.1.1 As described in Chapter 5 of this document, the extent of the Orange Route Corridor was defined and this corridor was subsequently preferred in order to reduce potential significant environmental and socio-economic effects of the proposed connection. In order to further refine the design of the connection, route options within the Orange Route Corridor were identified and subject to appraisal and consultation. The process and environmental and socio-economic benefits arising are described below in a section by section basis along the corridor.
- 6.1.2 It should be noted that in previously published documents (including the Wylfa to Pentir Route Options Report (Oct 2015) (**Document 9.3**)) the route sections were referred to by number as opposed to by letter as is outlined within this document. Whilst the section boundaries have changed slightly since the earlier document was published (to assist in consultation and reporting), they broadly align to the route sections referred to in the chapters of this report. The relationship between the variations in route section references is as follows:
 - Previous Section 1 broadly aligns to current Section A;
 - Previous Section 2 broadly aligns to current Section B;
 - Previous Section 3 broadly aligns to current Section C;
 - Previous Section 4 broadly aligns to current Section D;
 - Previous Section 5 broadly aligns to current Sections E and F;
- 6.1.3 For the purposes of this chapter, as previous Section 5 aligns to the current Sections E and F, those sections have been combined to illustrate the process undertaken for the identification and selection of the route option in this location.

6.2 THE APPROACH TAKEN TO THE IDENTIFICATION AND SELECTION OF THE PREFERRED ROUTE OPTION

Parallel Alignment Opportunity

- 6.2.1 The presence of the existing National Grid 400 kV line within the Orange Route Corridor provided both an opportunity and a constraint to the development of any new OHL. By constructing the new OHL close to the existing line the spread of transmission development, both within the route corridor and across the wider island, would be reduced. Whilst this would be likely to increase the effects of transmission development within the immediate vicinity of the OHL, it was generally considered that the cumulative effect would be less than the additional effects of a new OHL in one of the alternative route corridors presently unaffected by transmission development.
- 6.2.2 In principle, the more closely that the new OHL could parallel and mirror the existing OHL between Wylfa and the Menai approach, the more limited the area that would be affected by additional infrastructure. This opportunity was one of the considerations in selecting the preferred route corridor.
- 6.2.3 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. It was also acknowledged that there would be constraints along the Orange Route Corridor, such as designated sites and residential properties, which would likely require deviations from a close parallel route alignment or consideration of wider non-parallel route options. However, it was considered that the visual and cumulative effects arising from such deviations were not likely to be so significant as to negate the benefits of seeking a close parallel alignment, where possible.
- 6.2.4 The principle behind the decision to propose a broadly parallel route alignment was that, all other things being equal, the introduction of a closely routed OHL would be likely to give rise to a lower magnitude of change than the insertion of a new OHL into a landscape and views where there is currently no OHL. This is because the existing OHL already has an effect on views in the surrounding area and is a significant element in the landscape that exerts influence on local landscape character.
- 6.2.5 As the existing 400 kV OHL follows an alignment that broadly complies with the Holford Rules, especially in the context of the environmental sites designated at the time of its development, it was considered that much of the route would offer opportunities for the development of a closely routed new line. Whilst the Holford Rules state that new OHLs should be kept clear of other smaller lines, converging routes, poles, masts etc. to avoid a

visually confusing 'wirescape' (Rule 6), it is important to note that Rule 6 does not preclude parallel or closely related alignments and offers the following advice:

"In all locations minimise confusing appearance. 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."

The Process Followed to Identify and Select the Preferred Route Option

- 6.2.6 Given the potential for the environmental and socio-economic benefits that could arise from the development of a closely parallel alignment, a sequential approach to the identification and selection of a preferred route option was developed. This sought to identify a range of 100 m wide route options within the Orange Route Corridor which could be taken forward to options appraisal and consultation.
- 6.2.7 The first stage of this process was to identify parallel alignments on either side of the existing section of OHL and identify where these might result in significant environmental or socio-economic effects, such as the oversailing of property, more significant effects to heritage assets or their settings. Where the potential for such effects were identified, deviations to the route options away from the closely parallel routes were identified that would potentially reduce or avoid these effects. These deviations were either localised and short to avoid a constraint, or longer forming a discrete new route remote from the existing line. It was considered that any deviation needed to be either localised or remote from the existing line so as to limit the potential for greater cumulative effects associated with moving away from the closest parallel route.
- 6.2.8 Following the identification of potential route options, these were subject to initial environmental, socio-economic, technical and cost appraisal which allowed less well performing options to be screened out. This included consideration of feedback received at that time from stakeholders and opportunities to transpose from one route option to another.
- 6.2.9 The remaining route options within the Orange Route Corridor were then appraised and the appraisal findings and options presented at Stage 2 Consultation for public and stakeholder comment. The feedback received and further design and appraisal work was then considered to arrive at a preferred route option and initial design throughout the corridors between Wylfa and Pentir. This process is briefly summarised for each section of the

route corridor below. Full detail of this process is contained within the Wylfa to Pentir Route Options Report (October 2015) (**Document 9.3**) and Preferred Route Option Selection Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.4**).

6.2.10 In the vicinity of the Anglesey AONB and Menai Strait, as a result of the further appraisal of the route corridor and crossing options and consideration of consultation feedback, National Grid concluded that an OHL would be likely to conflict with relevant planning policy. The project team combined appraisals of OHL route options, site options for the possible development of a new permanent operational compound where the OHL could transition to an underground cable and identified a search area for the future identification of cable routeing options between the compound search areas on either side of the Anglesey AONB and Menai Strait.

6.3 TRANSPOSITIONS

- 6.3.1 The simplest form of parallel route would see the construction of the new line wholly to one side of the existing line. However, the distribution of sensitive receptors along the route could lead to local deviations away from a close parallel alignment. An alternative design response is to site the new line of the least sensitive side of the existing line in every section of the route. This could involve the development of new sections of OHL on either side of the existing 4ZA pylons. A more effective and less intrusive design response is the introduction of line 'transpositions' as described below.
- 6.3.2 A transposition is a reconfiguration of an existing OHL to allow the development of a second line whilst avoiding the need for a line 'duck under' or a physical crossing. Transpositions allow for the continuation of a route from a section of new pylons to a section of existing pylons, whilst the parallel route is a continuation of a route from a section of existing pylons to a section of new pylons. Transpositions are achieved by removing a section of the existing line forming two unconnected ends, which are then each connected to a new line approaching from either side, resulting in two parallel OHLs.
- 6.3.3 Transpositions were considered as part of the identification and appraisal of options within the Wylfa to Pentir Route Options Report (October 2015) (**Document 9.3**). These were presented for consultation as broad areas within which the route options might be transposed with the existing OHL. In this way, a range of route combinations might be achieved to arrive at an optimal new OHL route.

6.3.4 A transposition is illustrated in Image 6.1:



Image 6.1 Transposition Process

6.4 SECTION A: WYLFA TO RHOSGOCH ROUTEING CONSIDERATIONS AND ROUTE OPTION IDENTIFICATION

Introduction

- 6.4.1 Section A (referenced in earlier reports as Section 1) commences at Wylfa Substation, where works to the existing substation would be required, and extends in a south easterly direction towards Rhosgoch, passing to the north and east of the villages of Tregele and Llanfechell.
- 6.4.2 The environmental and technical considerations within Section A are summarised below.

Environmental Considerations

- 6.4.3 Notable environmental features and considerations in Section A are:
 - Views from the settlements of Tregele, and Llanfechell, and from isolated properties and groups of properties throughout Section A, including Coed Cottages and Caravan Park;
 - Views from and potential impacts on the settings of Scheduled Monuments to the east, north east and north west of Llanfechell;
 - The presence of several listed buildings in the area, including Cemaes Bay windmill to the north, the Grade II* Church of St Mechell in Llanfechell Church and other buildings associated with the Conservation Area in the village, and the listed house at Brynn Ddu further to the east;
 - Potential impacts to small areas of woodland associated with Bryn Ddu to the east of Llanfechell, some of which are subject to Tree Preservation Orders (TPO);
 - The presence of the Mynydd Mechell Special Landscape Area (SLA), albeit it generally on the far side of the existing OHL. This could give rise to effects from a new OHL upon views and landscape character in the area;
 - The Tre'r Gof SSSI;
 - The Anglesey AONB;
 - The Isle of Anglesey Coastal Path.

Technical Considerations

- 6.4.4 The following technical considerations were considered within Section A:
 - The complexity of re-configuring the existing 400 kV OHL connection into Wylfa substation and the need to allow power supplies on Anglesey to be maintained during the course of the construction works in this section;
 - The location of third party utilities that could be affected by the proposed development;
 - From a strategic highways perspective, access is good at the northern extent of Section A. However, the southern extent of

Section A towards Llanfechell and Rhsogoch becomes increasingly rural, with a number of minor roads which would not be suitable for HGVs;

- To achieve close paralleling of new sections of OHL to existing sections of OHL;
- The desire to reduce or avoid potential conductor oversail of property curtilages and to avoid the encirclement of properties wherever possible;
- To minimise the number of angle pylons in accordance with Holford Rule 3 which advises that "other things being equal, choose the most direct line, with no sharp changes of direction and thus with fewer angle towers";
- The crossing of the A5025;
- The interaction with the Llanfechell Water Treatment Works and existing and proposed new major water supply pipes running between Llyn Alaw and Wylfa;
- The location of telecommunications masts and meteorological mast associated with the Wylfa Nuclear Power Station.

Route Options

- 6.4.5 Following the process summarised in section 6.2 and detailed in the Wylfa to Pentir Route Options Report (October 2015) (**Document 9.3**), a number of route options were considered which closely paralleled on either side of the existing OHL.
- 6.4.6 Five localised route options to the west of the existing OHL were not favoured due to these having the potential for increased environmental and socio-economic effects. The decision was taken to bring forward two route options to the east of the existing OHL (1A and 1B). These route options were taken forward for consultation and had the benefits of:
 - Maximising the distance from Llanfechell, with its large number of residential properties, socio-economic receptors, listed buildings and conservation area;
 - Maximising the distance from the proposed Mynydd Mechell SLA;
 - Avoiding two Scheduled Monuments being located between the two OHLs upon construction of the Proposed Development;

- Avoiding the need for felling or other woodland management within the small area of ancient woodland to the east of Llanfechell, which is relatively rare on Anglesey and where the loss of this type of habitat cannot be fully mitigated.
- 6.4.7 In this way, the design decisions relating to the identification and initial screening of potential route options within Section A has helped to further reduce the potential for significant environmental and socio-economic effects to arise as a result of the proposed connection.

Consultation Feedback

- 6.4.8 Comments received in response to the Stage 2 Consultation on the route options presented for Section 1 of the route from Wylfa to Rhosgoch are noted below. A summary of the feedback received is detailed in Chapter 10 of the Preferred Route Option Selection Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.4**). This section of the route received relatively few comments on the route options compared to other sections.
- 6.4.9 In the context of their concerns about the potential cumulative impact of a new line with the existing OHL and the building of Wylfa Newydd, and effects on the residents of Tregele, Cemaes and Llanfechell, many respondents (including Llanbadrig Community Council) called for the proposed line to be placed underground in this section of the route. One respondent requested that the line be undergrounded at least up to the 6th pair of pylons or ideally up to the 13th pair of pylons in this area.
- 6.4.10 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. The Historic Environment Branch of Cadw and Gwynedd Archaeological Planning Service set out their preference for route option 1A (of the options presented) because they believe it would have less impact on local cultural heritage assets.
- 6.4.11 Further details on all consultation responses received and National Grid's response to this feedback is located within the Consultation Report (**Document 6.1**).

Outcome

6.4.12 Following further consideration and consultation, Option 1A was chosen as the preferred option in Section A as detailed within the Preferred Route Option Selection Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.4**). This route option was chosen as 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 OHL. The route alignment in Section A would also avoid areas of ancient woodland. The chosen route alignment in Section A would mean that the proposed new sections of OHL would be parallel to the existing sections of OHL. The proposed new build OHL would consist of pylons that would be largely synchronised with the existing pylon locations.

- 6.4.13 Option 1B was not taken forward due to the fact that it would sit on higher ground and was further away from the existing line. It therefore did not have the same potential to reduce environmental effects when compared with Option 1A.
- 6.4.14 The design decision to select the route option in Section A, has also helped to further reduce the potential for significant environmental and socioeconomic effects.
- 6.4.15 Within route Option 1A, the Draft Route Alignment Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.5**) identified an alignment that was presented at the Stage 3 consultation. A number of design changes have been proposed since consultation was undertaken on this alignment and these are detailed in Chapter 8 of this report.

6.5 SECTION B: RHOSGOCH TO LLANDYFRYDOG ROUTEING CONSIDERATIONS AND ROUTE OPTION IDENTIFICATION

Introduction

- 6.5.1 Section B (referenced in earlier reports as Section 2) commences immediately north of Rhosgoch and extends in a south easterly direction passing to the south of the village of Rhosybol towards Llandyfrydog.
- 6.5.2 The environmental and technical considerations within Section B are summarised below.

Environmental Considerations

- 6.5.3 Notable environmental features and considerations in Section B are:
 - The settlements of Rhosgoch and Rhosybol are on areas of higher ground; the edges of these settlements enjoy extensive views;
 - In addition to the settlements of Rhosgoch and Rhosybol, there are many scattered individual and small groups of properties to the south of these villages. In this respect the properties on the road

through Rhosgoch forming intermittent linear development are of note, with open views. There are also properties along the minor road between the two villages, further to the south east, many of whom also enjoy open views toward Llyn Alaw SSSI;

- The Llyn Alaw SSSI is approximately 1km south of the proposed development and supports important populations of overwintering wildfowl;
- Further to the south west is the small community of Llandyfrydog with its Grade II* listed Church of St Tyfrydog and associated group of Grade II listed buildings;
- There are also two Scheduled Monuments west of Llandyfrydog and approximately 700m west of the proposed 4AP OHL;
- To the north east of Llandyfrydog lies Bryn Goleu Caravan Park, which the existing OHL passes over on its southern boundary. To the north of this are a small group of further residential properties including Hafod Bychan and Gyfynwen;
- There are also isolated farmsteads scattered throughout this section of the route.

Technical Considerations

- 6.5.4 The following technical considerations were considered within Section B:
 - The location of third party utilities that could be affected by the Proposed Development;
 - From a strategic highways perspective, access is good as the B5111 is to the west of the proposed development between Rhosybol and Llanerchymedd;
 - The requirement for two transpositions (swap over of circuits) taking into account the design and orientation of the existing pylons to allow re-use where possible;
 - The complexity of dismantling sections of the existing 400 kV OHL and the need for temporary pylons to allow power supplies on Anglesey to be maintained during the course of the construction works in this section;
 - To maintain close parallel of the proposed new sections of OHL to the existing sections of OHL and pair pylons wherever possible;

- The desire to reduce or avoid potential conductor oversail of property curtilages and to avoid the consequence of properties being located between the two OHLs upon construction and operation of the Proposed Development wherever possible;
- To reduce the number of angled pylons in accordance with Holford Rule 3 which advises that "other things being equal, choose the most direct line, with no sharp changes of direction and thus with fewer angle towers";
- The presence of an existing water pipeline close to a proposed temporary pylon;
- The crossing of the B5111.

Route Options

- 6.5.5 Following the process summarised in section 6.2 and detailed in the Wylfa to Pentir Route Options Report (October 2015) (**Document 9.3**), a number of route options were identified and considered which would offer a complete overhead alignment that would remain close to and broadly parallel to the existing OHL. Due to the presence of individual properties close to the line, route options that would have deviated away from the existing OHL were also considered to reduce the risk of the potential oversailing of properties.
- 6.5.6 To allow for the consideration of combinations of the eastern and western route options, transposition zones were created between the western and eastern route options in this section.
- 6.5.7 Following the initial appraisal, four route options (2A, 2B, 2C and 2D) were taken forward for consultation at Stage 2. Route options that posed a high risk of oversailing properties or encroaching too far east of the existing OHL were discounted due to the potential for wider environmental and socio-economic effects.
- 6.5.8 In this way, the design decisions relating to the identification and initial screening of potential route options within Section B has helped to further reduce the potential for significant environmental and socio-economic effects to arise as a result of the proposed connection.

Consultation Feedback

6.5.9 Comments received in response to the Stage 2 Consultation on the route options presented for Section 2 of the route from Rhosgoch to Llandyfrydog

are noted below. A summary of the feedback received is detailed in Chapter 11 of the Preferred Route Option Selection Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.4**).

- 6.5.10 Respondents expressed general concerns often relating to the cumulative visual impact of the proposed new line, mentioning concerns relating to landscape, socio-economic, health and noise issues, and impact on private property. Several respondents called for the route to be undergrounded in this section. Other respondents requested that the line follow the existing route rather than running through an unspoilt area.
- 6.5.11 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.
- 6.5.12 Objections to route option 2A focused on environmental concerns, in particular biodiversity, wildlife, and landscape impacts. Other potential impacts identified related to historic assets and views. 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 is the lowest lying route option and would be screened by the landscape.
- 6.5.13 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.
- 6.5.14 Some respondents raised concern regarding the potential visual impact of route option 2B 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.
- 6.5.15 Route options 2C and 2D were preferred by some respondents due to their greater distance from Llyn Alaw Site of Special Scientific Interest (SSSI) their lesser effect on wildlife and Llyn Alaw, and proximity to the existing overhead line. Others raised concern regarding the potential cumulative visual impact with the existing line and the effect on Bryn Golau Caravan Park.
- 6.5.16 Potential biodiversity impacts of route options 2C and 2D focused on the specific flora and fauna present at or around individual properties. Other concerns raised by respondents related to disruption of agricultural

activities during construction and noise levels (specifically in relation to route options 2C or 2D due to cumulative noise impact with the existing line).

6.5.17 Further details on all consultation responses received and National Grid's response to this feedback is located within the Consultation Report (**Document 6.1**).

Outcome

- 6.5.18 Following further consideration and consultation, Route Option 2B was identified as the preferred option in this section as detailed within the Preferred Route Option Selection Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.4**).
- 6.5.19 This Route Option largely runs parallel and to the south of the existing OHL. 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 led to a design enhancement being proposed. This saw additional dismantling of the existing sections of OHL to allow two sections of OHL to be constructed in parallel past the settlements of Rhosgoch and Rhosybol. In this way, the modified Route Option 2B provided good opportunities to synchronise the design of the two OHLs at the detailed design stage.
- 6.5.20 The decision to dismantle and replace a 2.6 km section of the existing OHL in this part of the corridor was taken to limit the extent of potential adverse environmental and socio-economic effects, especially on the communities of Rhosgoch and Rhosybol that would have been associated with a simpler build, involving more localised route transpositions that would not have required the replacement of existing pylons. The decision to realign both the existing and proposed new lines in this section represents substantial Mitigation by Design.
- 6.5.21 Route Option 2A was not selected as it would have introduced a new OHL into currently unaffected views and may have posed an increase risk to wildfowl present on Llyn Alaw reservoir and SSSI to the south.
- 6.5.22 Route Options 2C and 2D would have brought the new OHL even closer to the villages of Rhosgoch and Rhosybol than the selected option, and would have resulted in more properties having overhead transmission lines to both sides. These route options would also have affected properties located between Llandyfrydog and Capel Parc and on Bryn Goleu Caravan Park in the same location.

- 6.5.23 The design decision to select the route option in Section B, has also helped to further reduce the potential for significant environmental and socioeconomic effects.
- 6.5.24 Within route Option 2B, the Draft Route Alignment Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.5**) identified an alignment that was presented at the Stage 3 consultation. A number of design changes have been proposed since consultation was undertaken on this alignment and these are detailed in Chapter 9 of this report.

6.6 SECTION C: LLANDYFRYDOG TO B5110 TO NORTH OF TALWRN ROUTEING CONSIDERATIONS AND ROUTE OPTION IDENTIFICATION

Introduction

- 6.6.1 Section C (referenced in earlier reports as Section 3) commences immediately south of Llandyfrydog and extends in a south easterly direction towards the B5110 north of Talwrn passing west and south of the village of Maenaddwyn, and east of the village of Capel Coch.
- 6.6.2 The environmental and technical considerations within Section C are summarised below.

Environmental Considerations

- 6.6.3 Notable environmental features and considerations in Section C are:
 - The rolling landscape of high and low ground;
 - The close proximity of an inland extension to the Anglesey AONB;
 - Extensive open views from within the Anglesey AONB at Mynydd Bodafon;
 - The Corsydd Môn (Anglesey Fens) SAC, Corsydd Môn a Llyn (Anglesey and Llyn Fens) Ramsar site and Cors Erddreiniog SSSI and NNR;
 - Isolated farmsteads to the south of Cors Erddreioniog SAC, SSSI, and NNR;
 - The settlements of Llandyfrydog, Maenaddwyn, and Capel Coch at the northern end of the proposed development, including the views from them;

- Isolated residential properties forming a broken ribbondevelopment to the north of Capel Coch;
- The Maenaddwyn Standing Stone designated as a Scheduled Monument on the roadside to the north of Capel Coch;
- The presence of Listed Buildings in the area;
- The Tre-Ysgawen Hall Country Hotel and Spa and other B&B businesses.

Technical Considerations

- 6.6.4 The following technical considerations were considered within Section C:
 - The location of third party utilities that could be affected by the Proposed Development;
 - The requirement for a transposition (swap over of circuits) taking into account the design and orientation of the existing pylons to allow re-use where possible;
 - The complexity of dismantling the existing sections of 400kV OHL and the need to maintain power supplies on Anglesey during the course of the construction works in this section;
 - To maintain close parallel of the proposed new section OHL to the existing section OHL and pair pylons wherever possible. This was considered in the knowledge that close paralleling would not be possible where the proposed OHL would be routed to avoid the Cors Erddreioniog SAC, SSSI, and NNR;
 - The desire to reduce or avoid potential conductor oversail of property curtilages and to avoid properties being located between the two OHLs upon construction and operation of the Proposed Development wherever possible;
 - To reduce the number of angled pylons in accordance with Holford Rule 3 which advises that "other things being equal, choose the most direct line, with no sharp changes of direction and thus with fewer angle towers";
 - The crossing of the B5110;
 - The location of a number of wind turbines.

Route Options

- 6.6.5 Following the process summarised in section 6.2 and detailed in the Wylfa to Pentir Route Options Report (October 2015) (**Document 9.3**), a number of route options close to the existing OHL were considered, primarily to avoid potential adverse landscape and visual effects from the proposed development. In considering parallel route options, sensitive ecological sites and the potential for oversailing properties at Capel Coch was taken into account.
- 6.6.6 Following the initial appraisal, parallel route options through the SAC were discounted due to the potential for significant effects on this area and three route options (3A, 3B and 3C) were taken forward for consultation. Route options were selected that would primarily avoid visual amenity effects on the AONB and areas to the east, the currently unaffected landscape to the west and heritage assets. In selecting route options, both large and small deviations were considered to avoid areas of high ecological importance and also to avoid the potential oversailing of properties. Route options that would not have resulted in the potential benefits resulting in a parallel design or a substantial deviation away from the existing OHL were discounted.
- 6.6.7 In this way, the design decisions relating to the identification and initial screening of potential route options within Section A has helped to further reduce the potential for significant environmental and socio-economic effects to arise as a result of the proposed connection.

Consultation Feedback

- 6.6.8 Comments received in response to the Stage 2 Consultation on the route options presented for Section 3 of the route from Llandyfrydog to B5110 North of Talwrn are noted below. A summary of the feedback received is detailed in Chapter 12 of the Preferred Route Option Selection Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.4**).
- 6.6.9 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) 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.
- 6.6.10 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. Concern was raised regarding the potential impact on

places of cultural and historical significance in relation to all route options in Section 3.

- 6.6.11 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; those who objected thought it would introduce overhead wires and pylons into new, currently unaffected, areas.
- 6.6.12 The Historic Environment Branch of Cadw stated the importance of the standing stones Carreg Leidr and Llech Golman in relation to route option 3A and the Ministry of Defence provided feedback in relation to route option 3A, requesting a height restriction for infrastructure on this route.
- 6.6.13 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.
- 6.6.14 Môn a Gwynedd Friends of the Earth expressed concern that route option 3B would be too close to Cors Erddreiniog, and 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.
- 6.6.15 Many of those who expressed positive comments in respect of route option 3C 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.
- 6.6.16 Gwynedd Archaeological Planning Service commented on route option 3C in the context of its perceived impact on local cultural heritage. 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.
- 6.6.17 Further details on all consultation responses received and National Grid's response to this feedback is located within the Consultation Report (**Document 6.1**).

Outcome

- 6.6.18 Following further consideration and consultation, Route Option 3C, connecting across to the southern part of Route Option 3B was identified as the preferred combination of options in this section of the route as detailed within the Preferred Route Option Selection Report: Wylfa to the Menai Crossing Area (September 2016) (**Document 9.4**). This Route Option initially ran parallel to the eastern side of the existing line, before switching to the western side in the vicinity of Maenaddwyn. From this point the route option passed a small group of properties to the north of Capel Coch and then followed lower ground to the east of the village, avoiding Cors Erdreinniog RAMSAR, SAC, SSSI and National Nature Reserve.
- 6.6.19 The northern section of Route Option 3B was less preferred than Route Option 3C partly because it would have led to OHLs being sited on both sides of the settlement of Llandyfrydog and may have affected the setting of a number of cultural heritage features.
- 6.6.20 Route Option 3A took a wide deviation to the west, away from the existing 400 kV OHL. However, it was considered that this was not sufficiently distant to avoid cumulative effects from both lines (especially where the route option and the existing 400 kV OHL diverged and converged), but would nevertheless have introduced a new OHL 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 needed addressing in detail.
- 6.6.21 The design decision to select the route option in Section C, has also helped to further reduce the potential for significant environmental and socioeconomic effects.
- 6.6.22 Within the preferred route option, the Draft Route Alignment Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.5**) identified an alignment that was presented at the Stage 3 consultation. A number of design changes have been proposed since Consultation was undertaken on this alignment and these are detailed in Chapter 10 of this report.

6.7 SECTION D: B5110 NORTH OF TALWRN TO CEINT ROUTEING CONSIDERATIONS AND ROUTE OPTION IDENTIFICATION

Introduction

- 6.7.1 Section D (referenced in earlier reports as Section 4) commences immediately south of the B5110 (and north of Talwrn) and ran in a south easterly direction passing west of the village of Talwrn and towards the B5420 east of Llangefni.
- 6.7.2 The environmental and technical considerations within Section D are summarised below.

Environmental Considerations

- 6.7.3 Notable environmental features and considerations in Section D are summarised below:
 - The proximity of the main settlements of Llangefni to the west and Talwrn to the east, along with the presence of scattered individual properties and farmsteads;
 - Gylched Covert, a mature broadleaf woodland, lies to the south west of Talwrn. This is a County Wildlife Site designated for its ecological value;
 - Hendre Hywel is a Grade II listed property to the south of the B5109, approximately 270m west of the existing section of the 4ZA OHL;
 - Further to the west and north of the B5109 lies the Caeau Talwrn SSSI, which also forms part of the Anglesey Fens SAC. This is approximately 350m west of the existing section of the 4ZA OHL, west of Talwrn.

Technical Considerations

- 6.7.4 The following technical considerations were considered within Section D:
 - The location of third party utilities that could be affected by the Proposed Development;
 - From a strategic highways perspective, the B5109 is in the northern extent of Section D and the B5420 is in the southern extent of Section D;

- To maintain close parallel of the proposed OHL to the existing OHL and pair pylons wherever possible;
- The desire to reduce or avoid potential conductor oversail of property curtilages and to avoid properties being located between the two OHLs upon construction and operation of the proposed development wherever possible;
- To reduce the number of angle pylons in accordance with Holford Rule 3 which advises that "other things being equal, choose the most direct line, with no sharp changes of direction and thus with fewer angle towers";
- The crossing of the B5420 and the B5109;
- The presence of a high pressure gas pipeline.

Route Options

- 6.7.5 Following the process summarised in section 6.2 and detailed in the Wylfa to Pentir Route Options Report (October 2015) (**Document 9.3**), a number of route options were considered which closely paralleled on either side of the existing OHL. Route options were identified to the east that could avoid potential oversail of properties close to the existing line and options to the west that could avoid residential properties and the Gylched Covert site.
- 6.7.6 Following the initial appraisal, two route options west of the existing OHL (4A and 4B) were taken forward for consultation. These route options were identified in response to the objective to increase the distance of the preferred route option from Talwrn and properties close to the existing OHL. Parallel route options to the east were not taken forward to consultation due to them being constrained by the need to avoid Talwrn, Caeau Talwrn SSSI and Tir Pori Talwrn Wildlife Site.
- 6.7.7 In this way, the design decisions relating to the identification and initial screening of potential route options within Section A has helped to further reduce the potential for significant environmental and socio-economic effects to arise as a result of the proposed connection.

Consultation Feedback

6.7.8 Comments received in response to the Stage 2 Consultation on the route options presented for Section 4 of the route from B5110 North of Talwrn to West of Star are noted below. A summary of the feedback received is

detailed in Chapter 13 of the Preferred Route Option Selection Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.4**).

- 6.7.9 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 called for the line to be undergrounded in this section of the route.
- 6.7.10 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. Some respondents expressed support for route option 4A on the grounds that they believed it would reduce or avoid this impact, while others disputed this, claiming that route option 4A would also have a negative impact on woodland.
- 6.7.11 Other respondents supported option 4A on the basis that it is in a less populated area, 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.
- 6.7.12 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.
- 6.7.13 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.
- 6.7.14 Natural Resources Wales expressed concern about potential impacts on several designated sites, noting the potential impact of western route deviations in this section. The Historic Environment Branch of Cadw expressed concern about the cumulative impact of the route options within Section 4 in terms of designated sites.
- 6.7.15 Further details on all consultation responses received and National Grid's response to this feedback is located within the Consultation Report (**Document 6.1**).

Outcome

- 6.7.16 Following further consideration and consultation, Route Option 4B was identified as the preferred option in this section of the route as detailed within the Preferred Route Option Selection Report: Wylfa to the Menai Crossing Area (September 2016) (**Document 9.4**). This would parallel the existing 400 kV OHL to the west.
- 6.7.17 Whilst this route would 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 was considered that the good opportunities to synchronise the design of the two lines at the detailed design stage. This would help to reduce effects making this Route Option more favourable in comparison with alternative Route Option 4A.
- 6.7.18 Route Option 4A would have resulted in more properties being located between the two OHLs upon construction and operation of the proposed development and would have ran 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.
- 6.7.19 The design decision to select the route option in Section D, has also helped to further reduce the potential for significant environmental and socioeconomic effects.
- 6.7.20 Within Route Option 4B, the Draft Route Alignment Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.5**) identified an alignment that was presented at the Stage 3 Consultation. A number of design changes have been proposed since consultation was undertaken on this alignment and these are detailed in Chapter 11 of this report.

6.8 SECTIONS E AND F: CEINT TO PENTIR - ROUTEING CONSIDERATIONS AND ROUTE OPTION IDENTIFICATION

Introduction

6.8.1 As outlined in paragraph 6.1.2, at earlier stages of the project sections of the route now referred to as Section E and Section F were referred to collectively as Section 5. For that reason, these sections of the route have been combined to more accurately reflect the considerations and consultation feedback received at this stage of project development.

- 6.8.2 Section E commences south of the B5420 (and east of Llangefni) and runs in a south easterly direction to the Afon Braint.
- 6.8.3 Section F commences at the Afon Braint on Anglesey and continues in a south easterly direction across the Menai Strait before connecting to Pentir Substation in Gwynedd.
- 6.8.4 The environmental and technical considerations within Sections E and F are summarised below.

Environmental Considerations

- 6.8.5 Notable environmental features in Section E are summarised below:
 - Views from the communities of Star and Llanfairpwll as well as individual properties close to and within these communities.
- 6.8.6 Notable environmental features in Section F are summarised below:
 - Consideration of the potential environmental effects associated with a buried connection across the Menai Strait, including potential effects on marine habitats and geology in relation to alternative crossing techniques and locations;
 - Potential effects on Plas Newydd, Bryn Celli Ddu Scheduled Monument, the Marquess of Anglesey's column and the Vaynol Estate;
 - The potential for visual effects for the communities of Star and Llanfairpwll;
 - The potential for effects on both the Anglesey and All Wales Coastal Paths and the Anglesey AONB;
 - Minimising the environmental effects, particularly visual effects associated with the THHs / CSECs at Braint and Tŷ Fodol.

Technical Considerations

- 6.8.7 The following technical considerations were considered within Section E:
 - The location of third party utilities that could be affected by the Proposed Development;
 - Areas where third party equipment would not be directly impacted but may need to be utilised for an electricity supply for construction and to the THH/CSEC;

- From a strategic highways perspective, the B5420 is in the northern extent of Section E providing strategic access east of the Proposed Development. To the southern extent of Section E, the A55 and the A5 provide strategic access east and west of the proposed development;
- To maintain close parallel of the proposed OHL to the existing OHL and pair pylons wherever possible. The acknowledgement that close paralleling of the two OHLs is not possible in Section E due to the need to route to a suitable position for the CSEC to enable the transition to an underground cable in a tunnel;
- The desire to reduce or avoid potential conductor oversail of property curtilages and to avoid properties being located between the two OHLs upon completion and operation of the proposed development wherever possible;
- To reduce the number of angle pylons wherever possible in accordance with Holford Rule 3 which advises that "other things being equal, choose the most direct line, with no sharp changes of direction and thus with fewer angle towers";
- The crossing of the A55, the A5 and the railway line.
- 6.8.8 The technical design considerations associated with Section F were:
 - The transition of the proposed OHL to underground cable north of the Menai Strait and the transition back to OHL south of the Menai Strait;
 - The location of third party utilities that could be affected by the Proposed Development;
 - From a strategic highways perspective, the A55, the A5 and the A4080 would provide strategic access to the proposed development north of the Menai Strait. Strategic access to the Proposed Development south of the Menai Strait could be provided by the A55 and the B4547;
 - The crossing of the Proposed Development of the A4080 and the B4547 by the proposed development;
 - The desire to reduce or avoid potential conductor oversail of property curtilages and to avoid the encirclement of properties wherever possible;

- To reduce the number of angled pylons in accordance with Holford Rule 3 which advises that "other things being equal, choose the most direct line, with no sharp changes of direction and thus with fewer angle towers";
- Undergrounding of the connection in a cable tunnel including consideration of the geology and the marine environment, depth of installation, space required for drilling operations, type of technology and cost and the most appropriate crossing locations.

Route Options

6.8.9 Following the process summarised in section 6.2 and detailed in the Wylfa to Pentir Route Options Report (October 2015) (**Document 9.3**), eight route options were identified and five search areas for CSECs (three on Anglesey and two on Gwynedd). Five proposed OHL route options (5A–5E) were identified to reach the CSEC search areas on Anglesey and three proposed OHL route options (5F–5H) from the CSEC search areas in Gwynedd to the existing substation at Pentir.

Consultation Feedback

- 6.8.10 Comments received in response to the Stage 2 Consultation on the route options presented for Section 5 of the route, from West of Star to Pentir substation, are noted below. A summary of the feedback received is detailed in the Menai Strait Crossing Report (September 2016) (**Document 9.6**).
- 6.8.11 Many respondents called for the proposed line to be placed underground or in the sea, some asking for this section of the route to be undergrounded citing environmental sensitivity and the high population of the area. Specific stretches where undergrounding was requested were Penmynydd to Pentir, Menai Strait to Pentir, Cefn Poeth to Pentir, Ceint to Pentir, and Star to the coast.

Overhead line route options

6.8.12 Of the overhead line route options on Anglesey, Option 5A was the most opposed. Respondents described this part of the route as unspoilt and raised concerns about the potential impact on local wildlife, landscape and cultural heritage. Respondents also raised concern that Option 5A (and Options 5B and 5C) would encircle the village of Star. In contrast, some respondents expressed support for Option 5A as it would not follow the existing line, thereby it would not impact on those property owners who are already exposed to one set of lines.
- 6.8.13 Many of the concerns raised in relation to Option 5A also relate to Options 5B and 5C, such as effects on properties (visual, noise, property value) tourism and businesses, and effects on wildlife and the currently unspoilt nature of the area. In contrast a small number of respondents favoured option 5C as it is close to the existing 400 kV overhead line, close to the A55 and would be less visually intrusive.
- 6.8.14 Route options 5D and 5E were the most supported options with slightly higher preference expressed towards Option 5E. For those respondents who preferred 5E the main reasons cited were that this option follows the existing OHL, is shorter, avoids crossing the A5 and A55 and would be less detrimental to tourism. Those respondents who explicitly opposed Options 5D and 5E expressed concerns about the potential impact on Star and Penmynydd, as well as the cumulative visual impact on those communities who are already close to the existing line.
- 6.8.15 In Gwynedd, a few respondents explicitly stated their preference for Option 5H mainly due to their support for Options 5D and 5E on Anglesey, but also because this option is close to the existing line. Only one respondent stated their explicit preference for Option 5F noting that it is in the least densely populated area, so the visual impact would be less significant. Other feedback received opposes Option 5F due to proximity to property.
- 6.8.16 Gwynedd Archaeological Planning Service (GAPS) found all three of the Gwynedd route options unsuitable as they fall partially within the Dinorwic Registered Landscape of Outstanding Historic Interest. Other concerns raised were the scheduled monument, Fodol Ganol Enclosed Hut Group, views in to and out, and between Plas Newydd and Vaynol Estate, and the scheduled monuments of Gors y Birthdir.

Cable Sealing End Compound Search Areas

- 6.8.17 Of the CSEC search areas on Anglesey, Anglesey North was the most preferred search area (including because it would connect to Options 5D / 5E the most widely supported routes). Other reasons noted were that it is a comparatively less populated, a less environmentally sensitive area and that it is already industrialised. One respondent noted that there are important habitats in this area.
- 6.8.18 One respondent objected to Anglesey North, stating that it would bring the pylons closer to the A5025 which is a major tourist route. Concerns were also raised over the significant disruption to the A5025 and the A5 that the undergrounding process would cause.

- 6.8.19 Cadw noted that the proposed Anglesey North CSEC Search Area has the potential to affect Ty Mawr and Pen Y Berth burial chamber. NRW noted that Anglesey North contains an area prone to flooding. IACC preferred Anglesey North.
- 6.8.20 Those respondents who supported Anglesey Central search area did so because it is close to existing infrastructure (A55 and A5), has already experienced industrial developments (particularly in its eastern end), and would have the least impact on the local landscape. Some respondents also noted that Anglesey Central would provide the shortest distance for the proposed pylons and is relatively close to the Gwynedd North and Gwynedd South CSEC Search Areas.
- 6.8.21 Gwynedd Council expressed concern about the visual effect of locating a Sealing End Compound in Gwynedd South, adding that this area does not have a visual relationship with the existing overhead lines. Gwynedd Council was supportive overall of the identified CSEC search areas as long as they avoid statutory designated conservation area, but between the two are most concerned about the location of Gwynedd South.

Underground cables

- 6.8.22 Concern was expressed over the effects of long underground cable runs on the AONB, and the Grade I Registered Parks and Gardens Plas Newydd and Vaynol Estates. Llanfairpwll Community Council stated that they would strongly oppose any cables being placed under homes in their area due to health risks.
- 6.8.23 Some respondents expressed concern regarding the impacts of construction and the use of heavy machinery which would disturb agricultural land.
- 6.8.24 Gwynedd Council, while welcoming the proposed undergrounding in the vicinity of the Menai Strait, requested its extension to Pentir. This was echoed by GAPS and Cadw.

Crossing zones

- 6.8.25 Views expressed on the proposed undergrounding at Menai Strait differed. Many respondents welcomed the proposal as it would protect the local landscape. However, some opposed the subsea element citing cost concerns.
- 6.8.26 Gwynedd Council noted that if a tunnel is used to put the connection under the Menai Strait, then the environmental implications of the disposal of the construction materials should be considered.

- 6.8.27 Môn a Gwynedd Friends of the Earth commented that selection of the route options and crossing points should be informed by the outcomes of the ongoing and already conducted environmental surveys.
- 6.8.28 Further details on all consultation responses received and National Grid's response to this feedback is located within the Consultation Report (**Document 6.1**).

Outcome

- 6.8.29 Following consultation and further engineering and environmental studies the options under consideration for this section were refined.
- 6.8.30 The Menai Strait Crossing Report (**Document 9.6**) provides information on how the options for the Sections E and F were developed and considered for each element (overhead line, cable sealing end compounds, underground cable and the Menai Crossing), in order to identify the preferred end to end option for the Sections.
- 6.8.31 CSEC siting areas were identified within the CSEC search areas:
 - Five siting areas were identified within the Anglesey North Search Area (referenced as AN1 - AN5), all located north of the A55 and north of Llanfairpwll in a very rural area and within the crescent formed by the B5420. The sites were all in agricultural use.
 - Six options were identified within the Anglesey Central Search Area (referenced as AC1 - AC6), all located south of the A55 and A5 roads and rail line to the south west of Lanfairpwll and north east of Llanddaniel in an otherwise very rural area. The siting areas were all in agricultural use.
 - Two options were identified in the Anglesey South Search Area (referenced as AS1 AS2), located south of Llanddaniel on greenfield sites in agricultural use.
 - Two siting areas were identified within Gwynedd North Search Area (referenced as GN1 GN2), both located to the south of Britannia Bridge, one either side of the A55.
 - Five siting areas were identified within Gwynedd South Search Area (referenced as GS1 GS5) and ranged in location from siting areas within Vaynol Park and lower area along the A487 to siting areas on the higher ground towards Pentir Substation. All were in agricultural

use with the exception of GS3 which was within the grounds of Vaynol Park.

- 6.8.32 Four potential zones were identified for a crossing of the Menai Strait. Potential underground cable route corridors (100 m width) were identified within the 'Underground Cable Route Search Area' to link from the CSEC siting areas to the crossing zones.
- 6.8.33 Crossing zones were identified based on desk top studies and a high level site visit review. The crossing zones identified were as follows:
 - Crossing Zone 1 between the Pilot Cottage to the Plas Newydd grounds (National Trust Property) on Anglesey and the slipway off Ffordd Heulyn to the Boat House Dock in the Vaynol Estate.
 - Crossing Zone 2 from the northern boundary of Zone C1 to Pwll Fangol Pier on Anglesey and Coed y Mor on the mainland.
 - Crossing Zone 3 from the northern boundary of Zone C2 to the Britannia Bridge
 - Crossing Zone 4 from north from the Britannia Bridge to between Ynys Gored Goch and Ynys Welltog on Anglesey and to Brices Beacon Point on the mainland.
- 6.8.34 A number of techniques were considered for crossing the Menai Strait. These were:
 - Tunnelling;
 - Large Bore Tunnel (sufficient to house two cable circuits plus additional supporting infrastructure);
 - Small Bore Tunnel (sufficient to house a single circuit therefore requiring two separate tunnels);
 - Horizontal Directional Drill; and
 - Seabed installation (laid either on or in the seabed).
- 6.8.35 Following a review of individual elements within Sections E and F, a number of end to end options were defined, and as appropriate a back check undertaken of options which were not preferred, to identify whether in combination with other elements these would create a more preferable overall solution. A number of end to end options were identified as follows:

- Option A OHL (5A (part), 5B or 5C) to AC6 with Underground Cables to Crossing Zone 1 then HDD and Underground Cables to GS1 then OHL (5F or 5G) to Pentir Substation;
- Option B OHL (5A, 5B or 5C) to AC6 with Underground Cables to Crossing Zone 2 then by Tunnel and Underground Cables to GS1 then OHL (5F or 5G) to Pentir Substation;
- Option C OHL (5A, 5B or 5C) to AC6 then a Tunnel to GS1 and OHL (5F or 5G) to Pentir Substation;
- Option D OHL (5A, 5B or 5C) to AC1 with Underground Cables to Crossing Zone 3 then a Tunnel and Underground Cables to GS1 then OHL (5F or 5G) to Pentir Substation;
- Option E OHL (5A, 5B or 5C) to AC1 with Underground Cables to Crossing Zone 3 then a Tunnel and Underground Cables to GN1 then OHL(5F or 5G) to Pentir Substation;
- Option F OHL (5D or 5E) to AN with Underground Cables to Crossing Zone 4 then by Tunnel and Underground Cables to GN2 then OHL (5H) to Pentir Substation; and
- Option G OHL (5D or 5E) to AN then a Tunnel to GS1 and OHL (5H) to Pentir Substation.
- 6.8.36 Options A, B and D were not preferred due to the considerable technical complexities of routeing underground cables up to GS1. These options would have also had potentially significant effects on areas designated for their landscape and historic characteristics.
- 6.8.37 Options E and F, although having lower estimated costs than Options C and G (the longer tunnel options) would have had potential visual effects on the setting of both an AONB and a National Park. Although Option F was preferred against technical considerations, both the CSEC siting areas were smaller and more constrained than other options.
- 6.8.38 Options C and G (the longer tunnel options) did not include any direct buried underground cables and reduced the potential for environmental effects against a number of considerations although there was the potential for significant effects. These options, with the tunnel shafts located at greater distance from the Menai Strait, required deeper tunnel shafts, due to topography, within which cable installation would be technically complex.

- 6.8.39 Option G would have required the deepest shaft and the longest tunnel. Overall, a long tunnel option was generally the preference for all environmental disciplines with the exception of traffic and transport. On balance, considering the potential environmental effects and technical complexities, the increased cost of a longer tunnel option, and National Grid's statutory duties, Option C was taken forward.
- 6.8.40 The preferred option was an OHL along route Option 5C to a site in Anglesey Central (AC6), and a long tunnel to a site in Gwynedd South. The route option in Section E was selected as it would ensure that the proposed OHL would be close to the existing OHL at the beginning of the route, allowing maximum opportunities for pylons to be paired. The proposed OHL would then take a different alignment to the Menai Strait area to enable the transition to underground cables. Views from Star, Llanfairpwll and individual properties were considered and the proposed OHL was routed further away from Star to reduce visual effects and reduce disturbance during construction and visual effects along the A55.
- 6.8.41 An OHL along route Option 5G was identified as the preferred option from the Gwynedd South THHs/CSEC to Pentir Substation as it would offer a direct route to Pentir Substation.
- 6.8.42 The design decision to select the route and tunnel option in Sections E and F, has helped to substantially reduce the potential for significant environmental and socio-economic effects.

6.9 SUMMARY

- 6.9.1 As described above, National Grid identified and undertook an assessment of the possible environmental effects of the potential route options within the Orange Route Corridor, between Wylfa and the Anglesey AONB at the Menai Strait, and on the mainland side of the Menai Strait, in Gwynedd, to the Pentir Substation. As outlined above, through this assessment National Grid has sought to reduce environmental and socio-economic effects through sensitive routeing and the consideration of Mitigation by Design.
- 6.9.2 Following the identification of Route Options and a draft route alignment, National Grid undertook Stage 3 Consultation on the proposals. The feedback from this consultation is detailed within the Consultation Report (**Document 6.1**).

- 6.9.3 The following chapters describe the Proposed Development and highlight the design changes that have been made since the Stage 3 Consultation took place.
- 6.9.4 The plans at **Appendix A to F** of this document indicate the amendments that have been incorporated in the design of the Proposed Development. The Proposed Development also includes a necessary and proportionate degree of flexibility, which has been incorporated into the design so that unforeseen issues that are encountered after a development has been consented, can be addressed. Therefore, to allow for this flexibility the Proposed Development would be constructed within specified Limits of Deviation (LOD), parameters and order limits. These are outlined in further detail in Chapter 7. Chapters 8 13 then address both the LOD and the 'centre-line' design of the OHL and main tunnel.

7 Aspects of the Proposed Design

7.1 INTRODUCTION

- 7.1.1 In order to further clarify the design decisions made in relation to the Proposed Development, a number of the relevant design principles are described in this chapter. It outlines design choices that apply to the Wylfa to Pentir connection.
- 7.1.2 As a result of the design decisions made following the Stage 1 and Stage 2 Consultation, sections of the existing OHL from Wylfa to Pentir would be used together with sections of new build OHL and a tunnel to create two separate but largely adjacent connections. The new build OHL route 'transpositions' required to facilitate this are detailed further in paragraphs 6.3 and 7.2; location specific detail on each transposition is contained within relevant section chapters that follow.
- 7.1.3 Aspects of the enduring design (such as pylon design and OHL transposition), aspects of the construction design (such as access and conductor pulling positions), and aspects of the statutory powers (such as Order Limits and LOD) are described within this chapter.

7.2 PERMANENT WORKS

Pylon Separation Distances

7.2.1 In order to maximise the flexibility associated with the construction of new pylons, a separation distance between the new and existing sections of OHL of approximately 85 m would be required. This would allow a crane to be sited on either side of the new build OHL as sufficient space would exist to allow this between the new and existing OHLs. However, for much of the route, this separation distance has been reduced so as to reduce the potential effects on local sites or features associated with the new build OHL. In places, the separation between the new and existing OHLs has been reduced to the minimum of 65 m. This would still provide a safe working environment where construction cranes can be located on the opposite side of the OHL being worked on.

OHL Transpositions

7.2.2 As outlined in Chapter 6, to reduce potential environmental effects the side of the OHL to which the new section of OHL is to be constructed,

transposes from one side to another in three locations along the route. These are:

Section B

- 7.2.3 At the beginning of Section B, the new build OHL is routed to the north-east of the existing section of OHL. South east of the settlement of Rhosybol the new build section of OHL would be located to the south-west of the existing section of OHL, the alignment of the new build OHL is transposed from one side to the other in this section of the route. This would be achieved by removing a 2.6 km length of existing OHL to the south-west of Rhosgoch and Rhosybol and replacing it with a parallel section of OHLs on an amended alignment to that of the existing section of OHL.
- 7.2.4 The new build OHL continues on the south-east of the existing section of OHL after the two sections of new build, until a point beyond Bryn Goleu Mobile Home Site south of Capel Parc. After this, the route of new build section of OHL would then transpose to the north east of the existing section of OHL at the end of the Section B primarily to reduce potential effects upon the community and cultural heritage assets in the area Llandyfrydog.
- 7.2.5 As mentioned in Chapter 6, this arrangement is considered to incorporate significant Mitigation by Design.
- 7.2.6 The design rationale and the reduction in environmental and socioeconomic effects for these transpositions are set out in Chapter 9 of this document.

Section C

- 7.2.7 At the beginning of Section C of the route, the new build section of OHL would be routed to the north-east, continuing from Section B. The route of the new build OHL would then transpose back to the south-west of the existing 400 kV OHL for the remainder of the connection. The transposition in this section would avoid the potential for impacts on the community of Hebron, views from the Anglesey AONB and would also avoid routeing into the Cors Erddreiniog SAC, SSSI, and NNR.
- 7.2.8 The design rationale and the resultant reduction in environmental and socio-economic effects for this transposition are set out in Chapter 10 of this document.

Pylon Choice

- 7.2.9 When selecting a pylon design, National Grid considers a wide range of issues including the power carrying capacity required, the nature of the landscape through which the line would be routed, the operational noise of the associated conductors, cost and engineering constraints along with any other relevant environmental considerations.
- 7.2.10 For the North Wales Connection, the existing OHL was an important consideration due to the intention to parallel the existing and proposed OHLs as far as possible.
- 7.2.11 A variety of pylon designs are available, including the typical steel lattice designs, low height steel lattice design and the T-pylon. All three of these pylon types can carry two electrical circuits. Horizontal form lattice designs are also available for use but these were dismissed at the early stage of the design process as these are only capable of accommodating a single electrical circuit and would therefore require the construction of two separate new OHLs.
- 7.2.12 The existing 400 kV OHL between Wylfa and Pentir uses a design of pylon that is no longer used for new build projects as it has been replaced by a new design since the existing line was installed in the 1960's. This is the largest pylon design used in Britain.
- 7.2.13 National Grid has selected a similar steel lattice pylon (to the existing OHL) for the proposed OHL. The steel lattice is considered the best option to reduce visual effects as far as possible as it would not introduce conflicting shapes into the environment.
- 7.2.14 Whilst similar in appearance, the modern design is not identical to the existing pylons on Anglesey. Other more slender, less bulky lattice steel pylon designs are also available for use in Britain. The connection however uses the lightest, most slender lattice steel pylon capable of carrying the size of conductors that are required to reduce potential effects of operational noise.
- 7.2.15 The form of pylon proposed for use has a number of angle pylons that are designed to accommodate differing maximum angles of route directional change. These accommodate either up to 10 degrees, 25 degrees or 55 degrees of route angle change. Those pylons designed to accommodate greater levels of angle change are necessarily bulkier and contain more steel than those associated with the shallower angles of change.

- 7.2.16 In a number of locations along the route (as indicated in later chapters of this report), the route changes by slightly more than 25 degrees which would normally necessitate the use of the larger and heavier 55 degree pylon type (D55). However, National Grid explored the possibility of utilising a strengthened version of the 25 degree pylon (D25) which could accommodate angles up to 33 degrees. In these instances, the pylon type has been amended to a 33 degree pylon (D33) which would be lighter in appearance and slimmer than the previously anticipated 55 degree pylon (D55). This design refinement has been made in an effort to further reduce potential landscape and visual effects.
- 7.2.17 A detailed appraisal of the pylon design options that are available to meet the technical needs of the North Wales Connection is set out in Chapter 6 of the Preferred Route Option Selection Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.4**).
- 7.2.18 The Indicative Pylon Schedule (**Document 5.3.2.1**) has been prepared which contains an indicative schedule of the proposed new and retained existing pylons comprising the centre line design. As well as detailing whether the pylon is new or existing, the schedule provides information for individual pylons and indicates whether it is a straight line 'suspension' pylon (indicated by a D 'type') or a larger angle pylon (indicated by a D followed by a number, which indicates the maximum angle of route deviation that the pylon could accommodate. Larger numbers indicate a broader, bulkier pylon form, which is required to accommodate the additional physical load owing to the angle of deviation. The schedule also provides indicative details of the anticipated pylon heights.
- 7.2.19 Synchronisation Schedules are included for Options A and B at Appendices G and H of this document which indicate the pylons on the 4ZA and 4AP OHLs that are referred to as 'paired'. This refers to those pylons that are located closer than 50m laterally to the position of the pylon on the adjacent OHL. It is acknowledged that whether or not two pylons are 'paired' is a matter of judgement; however, the 50m offset is a useful threshold against which these matters can be reported. The schedule also provides details of the anticipated pylon heights.
- 7.2.20 Further detail on the synchronisation of pylons is contained within Chapter 6 of the ES EIA Methodology and Basis of Assessment (**Document 5.6**). This outlines the following definitions of synchronisation when referring to two parallel 400 kV OHLs using approximately 50 m high pylons:
 - **Synchronised** Pylons are considered to be synchronised when they are located directly perpendicular (relative to the centre line) to

each other or are almost perpendicular within a maximum deviation of 20 metres from the centre of the two pylons up or down the line;

- **Broadly Synchronised** Pylons are considered to be broadly synchronised when they sit almost perpendicular (relative to the centre line) to each other within a maximum deviation of between 20 and 50 metres from the centre of the pylons up or down the line. Being broadly synchronised still gives a level of coherency between the two lines as in some views the pylons would still give an impression of being paired, but less so in views perpendicular from the line;
- **Not Synchronised** Pylons are considered to be unsynchronised when their longitudinal deviation is greater than 50 metres away from being directly perpendicular (relative to the centre line). It is considered when the deviation is more than the height of the pylons then the two lines would be less coherent in the majority of views.
- 7.2.21 Chapters 8 13 of this document refer to the number of sets of 'paired' pylons in each section of the route where they would be considered either 'synchronised' or 'broadly synchronised'. Where it is not proposed to pair pylons along the route, the rationale for this is provided.

Pylon Naming Convention

- 7.2.22 To allow each proposed or existing pylon location to be identified, a unique reference has been applied. All of National Grid's overhead transmission lines are provided with a unique route identifier, and pylons are (generally) numbered sequentially along the route.
- 7.2.23 For the Proposed Development, two OHL connections would be established; these have been allocated the route identifiers of '4ZA' and '4AP', with the 4AP route being the western route and the 4ZA the eastern route. Both routes would consist of both new and existing pylons and conductors.
- 7.2.24 The existing OHL between Wylfa and Pentir currently uses the 4ZA identifier. Accordingly, existing pylons may be renamed as 4AP or have a new 4ZA number assigned depending upon which route they would become part of.
- 7.2.25 In this document, all pylons are referred to using the new 4ZA and 4AP route identifiers. This is done for identification purposes only, subject to the LOD.

Tunnel

- 7.2.26 As described earlier in this document, National Grid have committed to the use of underground cables through the Anglesey AONB, and across the Menai Strait, primarily to reduce effects on the landscape of the AONB, to protect iconic views along the Menai Strait and reduce effects upon heritage and nature conservation assets either side of the Strait. As described Chapter 13, National Grid has taken the decision to install a deep tunnel (approximately 4 km in length) to accommodate the underground cables. Deep tunnels typically comprise of the following main elements:
 - Vertical access shafts at either end of the tunnel;
 - A horizontal tunnel between the two connecting access shafts (normally installed at a slight gradient to assist drainage);
 - A tunnel head house above the vertical shafts to afford access and accommodate equipment associated with the tunnel;
 - A cable sealing end compound close to the tunnel head house within which the transition from an OHL to underground cable can be safely made before the cables are routed into the shafts and tunnel.

7.3 TEMPORARY WORKS

Access

- 7.3.1 National Grid's general preference is to construct new pylons using mobile cranes. Due to the reach and carrying capacity required, these can be large heavy goods vehicles (HGV), requiring a good standard of temporary access track to be formed between the public highway and the pylon working areas. The access tracks would generally be formed from crushed stone laid on a geotextile base following soil strip and storage.
- 7.3.2 Other engineering works may also be required along the access tracks such as the culverting or bridging of watercourses that would be crossed and the construction of new bellmouth access points onto the public highway. Construction accesses and access tracks would generally be removed and the land reinstated following completion of construction works.
- 7.3.3 Two general approaches can be taken to the identification of construction access tracks.
- 7.3.4 Long linear accesses can be identified where one or two access points from the highway lead to many pylon working areas, running along a long section

of the route. Opportunities to construct a long linear access track may be limited by intervening obstacles such as major rivers or sensitive and protected sites.

- 7.3.5 Alternatively each pylon working area can be accessed by a dedicated access track from the nearest public highway.
- 7.3.6 The construction effects of installing access tracks can be reduced by limiting the number of access points that are proposed and reducing the length of new access track created. The length of the access tracks required to be constructed is dependent on the proximity of a proposed overhead line to the nearest road and the layout of the wider highway network. It should be noted however that by reducing the number of access tracks, this could have an effect of increasing the levels of construction traffic on public highways.
- 7.3.7 Discussion concerning the approach taken to the design of temporary construction accesses (bellmouths) and access tracks in each section of the route is provided in Chapters 8 13 of this document.

Conductor Pulling Positions

7.3.8 To keep construction disturbance to a minimum and ensure that all conductors are installed in a clean condition, conductors are not laid out on the ground before being winched up onto the pylon cross arms. Instead a thinner wire is laid out and lifted into place using pulleys attached to the pylon arms. This wire is attached to the conductors which are delivered to site on large drums. The wire is then pulled by a winch located at the far end of a length of the line drawing the conductor, from the drum located at the other end, through the pulleys on each pylon until it reaches the final pylon in that line length. The conductor is then attached to the strings of insulators hanging from each cross arm on the start and end pylons. The winches pull the conductor through a gentle slope from the cross arms, and therefore need to be sited some distance back from the tension pylon itself. Once the conductors are installed and connected so as to achieve the correct sag between each pylon in a section of the route, the position of the drums and winches are re-set to continue installing conductors on the next length of the route. This continues until conductors have been installed throughout the route. At this point the individual conductor lengths are connected together by clamping a short length of conductor between each, which then hangs between opposing insulator strings hanging below the cross arms of each of the tension pylons.

Scaffold Protection

- 7.3.9 Safeguarding measures may be required when installing conductors or earthwires above existing infrastructure (such as public highways or railway lines) and this normally takes the form of temporary nets located above the feature and supported by scaffold structures on either side. Scaffold protection measures are required to be designed to take account of the local features and topography and this could include the need to set the scaffolds back from the edge of the public highway, pylons and working areas.
- 7.3.10 Minor access routes, farm tracks and public rights of way would generally not require scaffold protection, and would be managed on a site by site, localised basis. For example, crossing points might be manned and controlled for a short duration whilst conductors are being pulled across the path or track.
- 7.3.11 Alternative methods are available where the use of scaffolding is not technically viable or appropriate. The alternative method generally involves running the conductors being installed through a series of supporting frames that are in turn suspended from a temporary support wire installed between pylons.

Utility Crossings and Third Party Works

- 7.3.12 Rather than installing scaffolding or using alternative support systems above existing overhead infrastructure (see above), National Grid's general preference with regards other third party utilities is to seek their removal by diversion or undergrounding. This simplifies both the initial construction activities for a proposed OHL, as well as subsequent maintenance. Removal of the third party above ground equipment normally involves burying (undergrounding) the service. However, it may simply require the reconfiguration of the local utility network to allow the section of equipment crossed by a proposed OHL to be entirely removed.
- 7.3.13 The modifications required to existing third party equipment along the proposed route would be carried out prior to commencement of construction for the Proposed Development. Access routes and working areas for the modifications of third party equipment have been included within the Order Limits following initial discussions with a number of utility companies.

7.4 STATUTORY POWERS

Order Limits

7.4.1 The Order Limits delineate the extent of the 'authorised development' for which development consent is being sought; and are the full extent of area required to construct and locate the Proposed Development pursuant to the DCO.

Limits of Deviation

- 7.4.2 As recognised by the Planning Inspectorate's Advice Note 9 (July 2018) a necessary and proportionate degree of flexibility often needs to be incorporated into the design of a development so that unforeseen issues, that are encountered after a development has been consented, can be addressed, without the need for re-application. In this instance, for example, previously unidentified poor ground conditions, or the identification of significant unrecorded archaeological remains, may require a pylon to be re-sited. To allow for this necessary flexibility, Limits of Deviation (LOD) are included within which the linear works (being the OHL and tunnel) would be located and the non-linear works would be constructed within parameters.
- 7.4.3 In respect of the OHL, LOD are not only applied horizontally, but also vertically, to allow for pylons to be increased in height if necessary, for example to allow for an increase in span length whilst still maintaining required ground clearance.

Above Ground Limits of Deviation

- 7.4.4 The above ground LOD provides a maximum distance or measurement of variation within which all the OHL permanent linear infrastructure must to be sited.
- 7.4.5 The proposed above ground OHL LOD for the Proposed Development are in summary:

Horizontal Limits of Deviation

7.4.6 The LOD is 100 m (50 m either side of the centre line). In certain locations, this has been pulled in to less than 100 m to avoid a particular receptor. The LOD is shown on the Works Plans (**Document 4.4**). Whilst the LOD have not been drawn in around more locally sensitive areas, many of these areas are referenced within the Schedule of Environmental Commitments (**Document 7.4.2.1**) which is an appendix to the Construction

Environmental Management Plan (**Document 7.4**) and restricts the siting of pylons in these specific locations.

Vertical Limits of Deviation

7.4.7 The upwards vertical LOD for the OHL pylons is 6 m. Standard extension panels for standard lattice pylons are designed for plus or minus 3 m, hence the LOD allows for two such panels. The final design of a pylon may be lower in height as there is no restriction placed on a reduction in height, save that statutory minimum safety clearances for all OHLs are legally prescribed and are legally binding. The statutory safety clearances must be maintained between conductors and the ground, trees, buildings and any other structure such as street lighting columns. The clearance required depends on the operating voltage of the line, its construction and design (including the type of pylon and distance between pylons), the topography of the location over which the line passes and the type of proposed development. To maintain the safety clearances, the height of any pylon must allow for the sag of the conductor (wires) and the span (i.e. the distance) between two pylons. The foundation element of the OHL may deviate downwards as far as necessary or convenient.

Tunnel Limits of Deviation

7.4.8 The proposed main tunnel would be subject to below ground LOD which would provide a necessary and proportionate degree of flexibility as to the final alignment of the works. There are two types of below ground main tunnel LOD which are described in the following sections:

Horizontal Limit of Deviation

7.4.9 This LOD provides the maximum distance of variation horizontally within which all the permanent works are to be constructed. This is required to provide the necessary flexibility to adjust the alignment of the tunnel should problematic ground conditions be identified. The horizontal LOD is shown on Works Plans (**Document 4.4**).

Vertical Limit of Deviation

7.4.10 The vertical LOD provides the highest tunnel level within the horizontal LOD that would maintain a minimum of 10m of cover to either the surface level or bedrock of the Menai Strait. The tunnel may deviate downwards as necessary or convenient.

Schedule of Environmental Commitments

7.4.11 As outlined in this report, design measures have been critical in avoiding or reducing a number of potential environmental effects. Where the design of

the Proposed Development has been unable to resolve potentially significant effects, further spatial commitments within the Order Limits have been identified. These are presented within the Schedule of Environmental Commitments (**Document 7.4.2.1**).

- 7.4.12 These environmental commitments have been categorised into 13 categories as follows:
 - Trees and Woodland;
 - Hedgerows;
 - Archaeology;
 - Cloddiau;
 - Habitat;
 - Protected Sites;
 - Watercourse;
 - Great Crested Newts;
 - Bats;
 - Water Vole;
 - Otter;
 - Limits of Deviation;
 - Contamination and Geology;
 - Other.
- 7.4.13 Whist this Design Report does not detail all environmental commitments for each section of the route, in several locations environmental commitments would relate to the siting of proposed pylons. Where relevant, these commitments have been referenced in Chapters 8 13 of this document.

8 Section A: Wylfa to Rhosgoch

8.1 INTRODUCTION

8.1.1 A summary description of the aspects of the Proposed Development in Section A together with the local design rationale is set out below together with a summary of the main amendments to the design following Stage 3 Consultation.

8.2 OVERVIEW

- 8.2.1 In Section A, two new sections of OHL are proposed. One would comprise a single new span of OHL running from a new terminal pylon (4AP001) south of the existing terminal pylon at Wylfa. This would connect to existing pylon 4AP002, and would facilitate an amended connection of the existing circuits into Wylfa Substation.
- 8.2.2 A realignment of the existing OHL as it enters Wylfa substation is proposed, allowing the new line to terminate using the existing terminal pylon. This would involve the dismantling of a short 279m single span between pylon 4AP002 and the existing terminal pylon at Wylfa Substation (4ZA004) and would facilitate the establishment of a new close parallel alignment throughout Section A.
- 8.2.3 The longer of the two new sections of proposed OHL in Section A would start at the existing terminal pylon 4ZA004 and then run to the south east, parallel to and on the north and east side of an existing section of OHL to the final new pylon (4ZA025) in Section A north west of Rhosgoch.
- 8.2.4 Works are proposed to replace the earth wire on the existing OHL between pylons 4AP001 and 4AP0021.

8.2.5 A summary of the proposed OHL works in Section A is provided in Table 8.1^2 .

Table 8.1: Summary of the Proposed Development in Section A			
	4AP	4ZA	
Number of New Pylons	1 (+2 New Gantries at Wylfa)	20 (+2 New Gantries at Wylfa)	
Number of Retained Pylons	20 (1 Modified, 19 Not Affected)	1 (Modified)	
Number of Dismantled Pylons		2 Gantries at Wylfa	
Route Length of New Line Build	233m (4AP001 – 4AP002) 76m Downleads (Wylfa – 4AP001)	6.8km (4ZA004 – 4ZA025) 75m Downleads (Wylfa – 4ZA004)	
Route Length of Existing Retained Line	6.55km (Modified (4AP002 – 4AP021))		
Route Length of Existing Line to be Dismantled	279m (4ZA004 – 4AP002) 86m Downleads (Wylfa – 4ZA004)		
Height of Tallest Retained Pylon	59.2m [4AP008, 4AP016 & 4AP018]	55.3m [4ZA004]	
Height of Tallest Proposed Pylon	46m [4AP001]	55.5m [4ZA017]	

8.3 WYLFA SUBSTATION

Proposed Development

8.3.1 Wylfa Substation is adjacent the existing Wylfa Power Station. It is proposed that the two new circuits on the proposed new build OHL would

 $^{^{\}rm 2}$ All measurements contained within this table are approximate only and do not consider conductor sag.

connect into two existing connection locations (bays) at Wylfa Substation where two existing gantries would be dismantled and four new gantries would be constructed.

Design Changes following Stage 3 Consultation

- 8.3.2 An extension on the southern boundary of Wylfa Substation was proposed at Stage 3 Consultation to accommodate new electrical equipment to enable the connection of one of the two new circuits. The substation layout presented at Stage 3 Consultation was based on a worst-case scenario.
- 8.3.3 Following the Stage 3 Consultation, National Grid considered an amendment to the layout of Wylfa Substation and finalisation of engineering requirements has confirmed that the previously proposed extension to the south would not be required; only the local realignment of the existing compound fence line to accommodate the proposed works.
- 8.3.4 This design decision has reduced the overall potential development footprint at Wylfa Substation since that proposed at Stage 3 Consultation, reducing potential environmental effects and therefore represents important localised Mitigation by Design.

8.4 THE ALIGNMENT

- 8.4.1 From Wylfa Substation, National Grid is proposing to build a new terminal pylon and downleads to the substation gantries and a single span of new OHL between 4AP001 and 4AP002 to the west of the existing OHL. This would have the following benefits:
 - Reducing the effects on the woodland located on the screening mounds to the south east of the substation;
 - Avoiding the need to undertake any significant re-profiling of the mound, which an alternative alignment to the north east would have necessitated.
- 8.4.2 As the route heads south east from Wylfa Substation, the two OHLs would generally run at a separation of between 65 90m apart. With the change in route direction as it crosses the A5025, the two OHL would be at the minimum separation distance of 65m from each other (between 4AP004 and 4ZA007 and between 4AP005 and 4ZA008), allowing the new route to pass to the south of the property at Llety, removing the potential impacts that could have occurred from oversailing the curtilage of the property.

- 8.4.3 The minimum 65m distance between the two OHLs would be maintained for a distance of approximately 2.1km between pylons 4ZA007 and 4ZA014. This would enable the proposed 4ZA OHL to be as far south as possible from the properties at Ty Newydd, Bryngwyn, and Gors, reducing potential effects. The property of Cae Adda Fach would have been located between the two OHLs close to proposed pylon 4ZA010; however, the route was amended after Stage 3 Consultation. This amendment is detailed in Section 8.5 below.
- 8.4.4 The proposed new section of OHL would be on the eastern (far) side of the section of existing OHL as it passes Tregele and Llanfechell, reducing visual effects for these communities.
- 8.4.5 As the proposed OHL passes Llanfechell Water Treatment Works, the property at Dymchwa, and towards pylons 4ZA018 and 4AP014, the distance between the proposed and existing OHLs would be approximately 70 m; ensuring that the new section of OHL would not oversail these properties.

Limits of Deviation

- 8.4.6 The LOD being sought for the new OHL in Section A is 100 m (50 m either side of the centreline of the Proposed Development) as described in section 7.4 of this report.
- 8.4.7 The LOD would be restricted at the following locations, adjacent to the following properties:
 - Llety the LOD would be restricted to approximately 27 m from the centreline northward past the property to avoid the adverse effects of potential oversail of conductors of the property curtilage;
 - Dymchwa the LOD would be restricted to approximately 21 m from the centreline to avoid the adverse effects of potential oversail of conductors of the property. The location of proposed pylon 4ZA016 has also been restricted along the line in this location to avoid increased adverse effects on views (as set out in the Schedule of Environmental Commitments (**Document 7.4.2.1**).

Pylon Locations

8.4.8 The centre-line route alignment in Section A (subject to the LOD) would enable the sections of proposed new OHL to be parallel to the existing sections of overhead OHL. The Proposed Development in Section A would achieve 19 pairs of paired pylons (out of a possible maximum of 21 pairs and based on a maximum difference of 50m difference along the centreline) where it would be considered that the two OHLs would be synchronised or broadly synchronised.

- 8.4.9 This synchronisation would be particularly important at the eastern end of the route, as the proposed section of new OHL would infringe upon the north-eastern boundary of the Mynydd Mechell SLA, helping to reduce any adverse effects on views and landscape character in the area.
- 8.4.10 South of Llety between Tregele and Cemaes, it not proposed to pair proposed pylon 4ZA008 with existing pylon 4AP005 in order to reduce the potential for visual impacts on properties to the north.
- 8.4.11 The second pylon in this section of the route that would not be paired would be the nearest proposed pylon (4ZA016) to the property of Dymchwa. This pylon would be immediately to the south west of the property, limiting the potential horizontal movement. The pylon would not be aligned precisely with the existing pylon to the south (4AP012) but has been sited slightly further to the north west, in order to keep out of the immediate southerly outlook from the property. Further movement to the north west would be restricted by the access road leading to the property.

8.5 DESIGN CHANGES SINCE STAGE 3 CONSULTATION

- 8.5.1 A summary of the main amendments to the permanent and temporary design of the Proposed Development in Section A of the route since Stage 3 Consultation are described below.
- 8.5.2 In some instances, pylon locations and other aspects of the proposed design have been amended a small amount since Stage 3 Consultation (e.g. as a result of an adjacent pylon movement). All amendments to the design have been reviewed in detail by the project team through the consideration of consultation feedback, engineering and environmental considerations.
- 8.5.3 Within this section, proposed specific locations for pylons are referenced for the purpose of illustrating how design changes have been incorporated to reduce potential effects. It should be noted however that these locations are not secured as referenced in section 7.4 of this document. The proposed alignment of the OHL would be subject to LOD to allow a necessary and proportionate degree of flexibility. In the locations where the LOD would be restricted to limit potential effects on a specific receptor, this has been indicated in paragraph 8.4.7 of this document and identified within the Schedule of Environmental Commitments (**Document 7.4.2.1**).

- 8.5.4 Descriptions have also been included relating to how amendments since Stage 3 Consultation to construction aspects of the Proposed Development are proposed to reduce potential effects. It should be noted that the referenced access track locations are not fixed within the Order Limits sought, however the locations of the bellmouths that would connect access tracks to the highway network are fixed.
- 8.5.5 Consideration has been given to any areas within the Order Limits where the sensitivity of receptors would be greater and effects of access tracks could be more significant. Where appropriate, the use of access tracks in these areas would be restricted and identified within the Schedule of Environmental Commitments (**Document 7.4.2.1**).

Permanent Works

8.5.6 The proposed amendments to the design in Section A since Stage 3 Consultation, resulting in the Proposed Development, are described below.

Alignment between proposed pylons 4ZA005 - 4ZA014

- 8.5.7 At Stage 3 consultation National Grid was proposing to route the new section of OHL to the north east of the residential property at Cae Adda Fach, in order to avoid the route oversailing the curtilage of the property. This would have brought the route closer to properties at Ty Newydd, Bryngwyn, and Gors. The previous alignment would have involved the two routes diverging, before converging again to the south at proposed pylon 4ZA014.
- 8.5.8 Recognising that it would prove difficult to effectively mitigate the likely significant effects upon the property at Cae Adda Fach, an amendment to the proposed section of new OHL between proposed pylons 4ZA005 and 4ZA014 has been made. Following discussion with the PIL, National Grid has now voluntarily acquired the property and as a result the Proposed Development would now route over the house and would remove the residential use of Cae Adda Fach (as detailed within the Schedule of Environmental Commitments (**Document 7.4.2.1**)).
- 8.5.9 The amendment would result in the OHL being as far south as possible from the properties at Ty Newydd, Bryngwyn, and Gors. This amendment allowed the alignment to be straightened, avoiding the requirement for the alignment to 'kick out' to the north at 4ZA008 to go around the property; removing the requirement for tension pylons in this location and would also result in one fewer pylon as previously proposed pylon 4ZA011 would no longer be required.

- 8.5.10 At Stage 3 Consultation, the requirement for an additional pylon and the need to route around Cae Adda Fach would have introduced an unsynchronised section of the route in this area. Following the design change, proposed pylon 4ZA010 has been paired with existing pylon 4AP007 and would be considered synchronised, further reducing potential environmental effects in this location. This change to the design, actively pursued by National Grid, therefore represents significant local Mitigation by Design.
- 8.5.11 The proposed amendment to pylons 4ZA005 4ZA014 is illustrated on Figures A-1 to A-3 in **Appendix A** of this document.

Proposed Pylon 4ZA019

- 8.5.12 Following a PIL request, an amendment was made to move pylon 4ZA019 further east to ensure it would be closer to the field boundary. This would enable easier use and management of the land when the Proposed Development was operational, reducing potential disturbance upon the agricultural business.
- 8.5.13 There were no technical or environmental reasons not to make the amendment; however, it was acknowledged that the amendment would result in pylon 4ZA019 being slightly less synchronised with existing pylon 4AP015 but would still be paired and within the 50m flexibility to be considered as 'broadly synchronised'.
- 8.5.14 The proposed amendment to pylons 4ZA019 is illustrated on Figure A-4 in **Appendix A** of this document.

Temporary Works

- 8.5.15 A number of amendments have been made to the construction design since Stage 3 Consultation, resulting in the Proposed Development. These amendments have been made to both address consultation responses and further work by the project team to reduce environmental and socioeconomic effects whilst ensuring the safe and efficient construction of the Proposed Development.
- 8.5.16 Where proposed pylon locations have been amended as described above, this would subsequently have an impact on the location of the associated pylon working areas and pulling positions. Amendments to these working areas and pulling positions have not been outlined in the section below but are illustrated in **Appendix C** of this document.
- 8.5.17 General amendments made to the design of the construction activities include:

- In several places, in response to ongoing discussions with affected PILs, construction aspects (e.g. working areas, pulling positions, scaffold positions, etc) have been revised with the intention to reduce impacts upon agricultural operations wherever possible;
- Construction components (e.g. pulling positions, scaffold positions, etc.) and working areas would be away from difficult topography and more sensitive landform wherever possible;
- Existing agricultural accesses and gaps in hedgerows have been utilised wherever possible, thereby reducing the requirement for additional new access points;
- The Order Limits and working areas have been reduced as far as possible to take into account the above and to reduce the land required to construct, operate, and maintain the Proposed Development;
- Permanent design requirements have discussed with a number of Third Parties and amendments have been made to associated accesses as a result.
- 8.5.18 In addition to the above, a number of more specific amendments to the construction design have been made since Stage 3 Consultation; these are described below.

Bellmouths

- 8.5.19 11 bellmouth access points are proposed to enable construction traffic to access the Proposed Development in Section A. This is a slight increase to the 10 bellmouth access points that were proposed at Stage 3 Consultation.
- 8.5.20 The proposed amendments to bellmouth locations since Stage 3 Consultation in Section A are outlined within table 8.2.

Table 8.2: Section A Bellmouth Design Changes			
Proposed Bellmouth Location	Proposed Function	Design Change and Anticipated Benefits	Location in Appendix C
Bellmouths A1 and A2	Provide a crossover bellmouth south of Wylfa Substation	Moved approximately 50m to the south to utilise existing bellmouths that are currently in place.	Figure A-1
	Bellmouth A1 provides access	Whilst the existing access points may require upgrading,	

Table 8.2: Section A Bellmouth Design Changes			
Proposed Bellmouth Location	Proposed Function	Design Change and Anticipated Benefits	Location in Appendix C
	from an unnamed road to 4AP002 and scaffolding Bellmouth A2 provides access south through to bellmouth A4	this amendment would remove the need to construct two new access points in this location.	
Bellmouth A4	Provide access close to proposed pylon 4ZA006, existing pylon 4AP003 and a proposed scaffolding area. Links to bellmouth A2 to the north.	Moved approximately 140m to the north west to ensure there would be sufficient space to construct scaffold protection for the A5025 crossing of the proposed section of 4ZA OHL	Figure A-1
Bellmouths A5 and A5a	Provide access off the A5025 to the south and link through to bellmouth A6.	Amendment made to include an alternative potential location for bellmouth A5 approximately 150m to the south of bellmouth A5 (referenced as A5a) following concerns raised by IACC regarding road safety. It is intended that only one of	Figures A-1 and A-2
		the proposed locations would be utilised should the DCO be granted.	
Bellmouths A6 and A7	Provide a crossover bellmouth to cross Ffordd Y Felin. A6 links north to provide access through to bellmouths A5/A5a	Due the alignment change following the purchase of Cae Adda Fach, the scaffold positions required for the road crossing of the proposed new section of OHL and the existing section of OHL had to be amended.	Figure A-2
	A7 provides access linking through to bellmouth A8 to	This movement would have located the scaffold on top of the proposed bellmouths and to avoid this, an amendment was made to relocate	

Table 8.2: Section A Bellmouth Design Changes			
Proposed Bellmouth Location	Proposed Function	Design Change and Anticipated Benefits	Location in Appendix C
	the south.	proposed bellmouths A6 and A7 approximately 65m to the south to ensure sufficient scaffold protection could be provided.	

Access Tracks

- 8.5.21 Following Stage 3 Consultation and the review of feedback received, a number of amendments were made to access proposals for both National Grid works and Third Party works in Section A.
- 8.5.22 The amendments to access proposals have originated from multiple sources, including consultation feedback and ongoing design work by the project team. A number of access proposals have also been necessitated by movements to the operational infrastructure.
- 8.5.23 As highlighted in paragraph 8.5.4, the proposed locations of the access tracks would not be fixed through the DCO, however, a number of the changes proposed would result in a reduction in the potential for environmental or socio-economic effects and are highlighted in this section.
- 8.5.24 It is not proposed to describe all changes to the access proposals within this section in detail, however all proposed amendments to National Grid access tracks in Section A are illustrated in **Appendix C** of this document. Amendments to Third Party access tracks in Section A are illustrated in **Appendix E** of this document.
- 8.5.25 The access track amendments proposed in Section A are:

National Grid Access Tracks

- Access between 4AP002 to 4AP004 and 4ZA005 to 4ZA006 This has been realigned to use an existing SP Manweb access point;
- Access at 4AP006 This has been amended to relocate the track to use an existing crossing over a Water Framework Directive (WFD) watercourse. This amendment would remove the need to install a new bridge over this watercourse;

- Access between 4AP010 and 4AP011 This amendment has been made to avoid an area of Tree Preservation Order (TPO) trees and a pond in this area. The amended route would also avoid using a bridge considered potentially unsuitable for HGV movements;
- Access between 4AP016 and 4AP017 This access track has been realigned to be routed further to the south to avoid a steep and wet ground and to approach a new bridge at a better angle;
- Access between 4ZA009 and 4ZA010 following feedback from a PIL, this access track has been moved closer to the field boundary to reduce disturbance during construction;
- Access between 4ZA012 and 4ZA014 this access track has been amended as a result of the proposed amendment to the pylon locations in this area as described in section 8.5 of this document;
- Access between 4ZA014 and 4ZA015 this access has been amended to avoid the Llanfechell Waste Water Treatment Works. The access in this area has also been amended to avoid impacting on a pond;
- Access at 4ZA016 this access track has been realigned south of the working area to allow sufficient space for construction practices;
- Access between 4ZA021 and 4ZA023 through engagement with the PIL, this access track has been realigned between 4ZA021 and 4ZA022 to make use of an existing gate, removing the requirement for an additional access point in this area. The amended alignment would avoid the potential encroachment into a better quality field to the north. The access track between 4ZA022 and 4ZA023 has been realigned to avoid impacting on an area of rocky outcrops and would also avoid impacting on an additional field to the south;
- Access between 4ZA023 and 4ZA025 this access has been amended in two locations to reduce the potential impact on hedgerows by crossing them at an angle as close to 90 degrees as practicable. It has also been slightly realigned to the north to move it further away from a GCN pond;
- Access between 4ZA025 and 4ZA026 (in Section B) access has been realigned in this location as a result of amendments to proposed pylon locations as outlined in section 9.4 of this document;

Third Party Access Tracks

- Access between 4AP003 and 4AP004 This access track has been repositioned and extended to access an area of undergrounding;
- Access between 4ZA005 and 4ZA006 This access has been amended in two locations to reduce the potential impact on hedgerows in this area;
- Access east of 4ZA007 following a reduction in Third Party undergrounding in this area, this proposed access track has been removed as it would no longer be required;
- Access between 4ZA006 and 4ZA007 following the confirmation of Third Party engineering requirements, a section of this access track has been removed;
- Access between 4ZA010 and 4ZA012 Third Party accesses have been amended in this location to move them slightly further away from the residential properties Gors and Ty Newydd. Confirmation of Third Party engineering requirements in this location has also led to less Third Party undergrounding in this area and therefore the removal of some lengths of access track;
- Access between 4ZA014 and 4ZA015 this access has been amended to utilise an existing gap in the trees in this location;
- Access west of 4ZA016 an access track has been added in this location to ensure access to Third Party assets;
- Access south of 4AP012 engineering requirements have led to a section of Third Party undergrounding no longer being required, thereby removing the need for an access track in this area;
- Access between 4ZA024 and 4ZA025 an access has been amended in this location to reduce the potential of impacting on land to the north-east and the potential for the impact on hedgerows in this area.

8.6 SUMMARY

8.6.1 It is considered that as a result of consultation feedback, engagement with PILs and continued design work by the project team, the design changes made in Section A have enabled National Grid to improve the design since Stage 3 Consultation.

- 8.6.2 Substantial design changes have been made in Section A including that proposed in relation to the property at Cae Adda Fach. Throughout the route, this larger scale change has been complimented by more localised amendments that offered the opportunity to improve the design.
- 8.6.3 Most of the design changes (either substantial or more localised) made to the permanent and temporary works as described above have helped to reduce the level of potential environmental and/or socio-economic effects and therefore represent further Mitigation by Design.

9 Section B: Rhosgoch to Llandyfrydog

9.1 INTRODUCTION

9.1.1 A summary description of the aspects of the Proposed Development in Section B together with the local design rationale are described below together with a summary of the main amendments to the design following Stage 3 Consultation.

9.2 OVERVIEW

- 9.2.1 Since the first stage of the project's development, it has been recognised that the area between the settlements of Rhosgoch and Rhosybol and Llyn Alaw presents a 'pinch-point' to the routeing of an OHL, which is more limited than in other sections of the connection. This is largely due to the constraints imposed by the settlements themselves and numerous scattered residential properties. As a consequence, no credible close-parallel OHL could be identified in Section B of the route with the existing OHL in place.
- 9.2.2 Therefore, as described in Chapter 6, in order to better synchronise the design of the two OHLs and avoid introducing OHLs into views currently unaffected by such infrastructure, the proposed design in Section B would involve the dismantling of two sections of the existing OHL:
 - a 2.3 km section to the south of Rhosgoch and Rhosybol to facilitate two new parallel sections of OHL to be routed past these settlements. The overall effect is to transpose the new build sections of OHL from one side of the existing OHL to the other; and
 - a shorter 300 m single span (of conductor only) to the north west of Llandyfrydog to facilitate a swap over of new build OHL to existing OHL and existing OHL to new OHL.
- 9.2.3 Three new sections of OHL are proposed.
- 9.2.4 The first section would be a continuation of the new build section of OHL in Section A (running initially to the north-east of the existing OHL) to

a point south of Rhosybol, where the proposed OHL would connect to the existing section of OHL at existing pylon 4ZA034.

- 9.2.5 The second section of new build OHL would run from existing pylon 4AP023 (which would be modified), continuing in a straight line for a single span before deviating to the south east to run parallel with the other new section of OHL to 4AP030, and continuing to parallel an existing section of OHL to the south-west until the line reconnects to an existing section of OHL at 4AP037.
- 9.2.6 The third section of new OHL would run from existing pylon 4ZA040 (which would be modified) and run close parallel to the north and east of the existing section of OHL into Section C.
- 9.2.7 A temporary OHL of approximately 2.4 km in length would also be required to the south of Rhosgoch and Rhosybol to carry one circuit whilst the dismantling and new build works take place. The temporary circuit would be required in order to maintain electricity supplies to Anglesey during the works.
- 9.2.8 A summary of the proposed OHL works in Section B is contained within Table 9.1^3 .

Table 9.1: Summary of the Permanent Works for the Proposed Development inSection B		
	4AP	4ZA
Number of New Pylons	14	11
Number of Retained Pylons	3 (1 Modified)	6 (1 Modified)
Number of Dismantled Pylons	8 (Existing 4ZA)	
Number of Temporary	None	2

³ All measurements contained within this table are approximate only and do not consider conductor sag.

Pylons		
Route length of New Line Build	4.91 km (4AP023 – 4AP037)	3.64 km (4ZA025 – 4ZA034 & 4ZA040 – 4ZA042)
Route Length of Existing Line to be Dismantled	2.64 km (4AP023 – 4ZA034 & 4ZA040 – 4AP037)	
Route Length of Existing Line to be Retained	0.94 km (Modified (4AP021 – 4AP023 & 4AP037 – 4AP038))	1.42 km Existing N/A (4ZA036 – 4ZA040) 0.79km Modified (4ZA034 – 4ZA036)
Route Length of Temporary OHL	2.43km (X4ZA028 – 4ZA035 & 4AP036 – 4ZA041)	
Height of Tallest Retained Pylon	65.3m [4AP038]	59.2m [4AP036, 4AP037, 4AP038 & 4AP039]
Height of Tallest Proposed Pylon	57.3m [4AP036]	58.5m [4ZA042]

Transpositions

- 9.2.9 The preference to parallel proposed new sections and existing sections of OHL to reduce the number of properties being located between the two OHLs in this Section has resulted in the Proposed Development incorporating two transpositions in Section B.
- 9.2.10 The first transposition would be as the OHLs pass south of Rhosgoch towards Rhosybol. The transposition would be on the section of new build OHL continuing on from the existing section of OHL from 4AP023 past Rhosgoch and Rhosybol and reconnecting to a section of existing OHL at 4AP037 on the 4AP line. The 4ZA new build would continue past Rhosgoch and Rhosybol from Section A before connecting to an existing section of OHL at 4ZA034.
- 9.2.11 This transposition would have the advantage of achieving closely parallel alignments in accordance with the recommendations set out in the Holford Rules, reducing potential visual effects for the settlements of Rhosgoch and Rhosybol. It should be noted that in the section of the route that would consist of two new build sections of OHL, these would be comprised of identical pylon types with a more slender design than that which was used for the existing 400 kV OHL.

- 9.2.12 The second transposition is proposed after the OHLs pass the Bryn Goleu Caravan Park. The transposition would connect the new 4AP section of OHL to the existing section of OHL at 4AP037, and an existing section of the 4ZA OHL to a new section of the 4ZA OHL (located to the east of the existing sections of 4AP line) to reduce potential effects upon properties and listed buildings. This transposition would reduce the potential for visual effects on the settlement of Llandyfrydog.
- 9.2.13 The increased technical complexity associated with the proposed transpositions (including the need to construct a temporary alignment to ensure electricity supplies are maintained on Anglesey) is considered to be outweighed by the environmental and socio-economic benefits that would result from parallel OHLs, avoiding a visually jarring dog-leg in the route that would introduce pylons into views currently unaffected.
- 9.2.14 The eleven transposition design options considered at these two locations are described in further detail in the Preferred Route Option Selection Report Wylfa to the Menai Crossing Area (September 2016) (**Document 9.5**).

9.3 THE ALIGNMENT

- 9.3.1 As the route heads south east at the start of Section B, the two OHLs would generally run at a distance of approximately 85m apart until they reach proposed pylons 4AP024 and 4ZA028 where the route deviates to the east.
- 9.3.2 At this point, the two proposed new sections of the 4AP and 4ZA OHLs would be approximately 75m apart between proposed pylons 4AP024 and 4AP028 and proposed pylons 4ZA028 and 4ZA032 as the parallel routes pass between the properties of Glasgraig Fawr and Pen yr Orsedd.
- 9.3.3 At proposed pylons 4AP028 and 4ZA032, the routes would deviate slightly to the south as they pass to the south of Rhosybol retaining a separation distance of 75m. The separation distance would gradually increase to 80m where the proposed new section of 4ZA OHL reconnects with the existing section of 4ZA OHL at existing pylon 4ZA034 (achieving the route transposition at Rhosybol).
- 9.3.4 East of the B5111, the proposed new section of 4AP OHL would continue eastwards and be parallel to and south of the existing section of 4ZA OHL retaining a separation distance of between 80m and 90 m as the route heads south east towards Bryn Goleu Caravan Park where the new section of 4AP OHL would pass over its southern boundary between proposed pylons 4AP035 and 4AP036 north of the residence at Bryn Hyfryd.

9.3.5 The new section of 4ZA OHL (from pylon 4ZA040) would then head to the north and east of Llandyfrydog with the proposed OHL being transposed so that the 4AP OHL would continue on a section of existing OHL and the new build would continue to the north east on the 4ZA OHL.

Limits of Deviation

- 9.3.6 The LOD being sought for Section B is 100 m, 50 m either side of the proposed alignment as described at section 7.4 of this document. It should be noted that in some areas, the LOD would be wider than 100 m due to the combined LOD where there would be two new adjacent sections of OHL. The maximum combined LOD would be approximately 185 m (taking into account an 85 m separation distance and 50 m to the outer side of each line).
- 9.3.7 Restrictions to the LOD are proposed adjacent to the following properties:
 - Dafarn Dyweirch here the LOD would be restricted to approximately 29 m to ensure that the OHL would not be constructed where the conductors could oversail the residential curtilage;
 - Dryll here the LOD would be restricted to approximately 45 m to ensure that the OHL would not be constructed where the conductors could oversail the residential curtilage;
 - Proposed pylon 4ZA031 as set out within the Schedule of Environmental Commitments (**Document 7.4.2.1**) this pylon would be restricted along the alignment to avoid increased impacts on views from nearby properties.

Pylon Locations

- 9.3.8 As described above, the proposal to dismantle a section of existing OHL would enable the centre-line route alignment in Section B (subject to the LOD) to be routed fully parallel to one another. The Proposed Development in Section B would achieve 16 pairs of paired pylons (out of a possible maximum of 17 pairs and based on a maximum difference of 50 m difference along the centre-line) where it is considered that the two OHLs of the Proposed Development would be synchronised or broadly synchronised.
- 9.3.9 Of the 16 paired pylons, nine would comprise proposed pylons paired with existing pylons whilst seven would comprise wholly new pylons.
9.3.10 There is one location where the pairing of pylons would not be proposed (at proposed pylons 4AP029 and 4ZA033 due to the presence of existing vegetation and field boundaries, taking into account feedback from the affected PIL), compared to three (different) locations for the Stage 3 Consultation design.

9.4 DESIGN CHANGES SINCE STAGE 3 CONSULTATION

- 9.4.1 A summary of the main amendments to the permanent and temporary design in Section B since Stage 3 Consultation are described below.
- 9.4.2 In some instances, pylon locations and other aspects of the proposed design have been amended a small amount since Stage 3 Consultation (e.g. as a result of an adjacent pylon movement). All amendments to the design have been reviewed in detail by the project team through the consideration of consultation feedback, engineering and environmental considerations.
- 9.4.3 Within this section, proposed specific locations for pylons are referenced for the purpose of illustrating how design changes have been incorporated to reduce potential effects. It should be noted however that these locations are not secured as referenced in section 7.4. The proposed alignment of the OHL would be subject to LOD to provide a necessary and proportionate degree of flexibility. Where the LOD would be restricted in certain locations to limit potential effects on a specific receptor, this has been indicated in paragraph 9.3.7 of this document.
- 9.4.4 Descriptions have also been included relating to how amendments since Stage 3 Consultation to construction aspects could reduce potential effects. It should be noted that the referenced access track locations are not fixed within the Order Limits sought, however the bellmouths that would connect access tracks to the highway network are fixed. Consideration has been given to any areas within the Order Limits where the sensitivity of receptors would be greater and effects of access tracks could be more significant. Where appropriate, the location of access tracks in these areas has been restricted and identified within the Schedule of Environmental Commitments (**Document 7.4.2.1**).

Permanent Works

9.4.5 The proposed amendments to the design in Section B since Stage 3 Consultation, resulting in the Proposed Development, are described below.

Alignment between proposed pylons 4ZA025 - 4ZA028

- 9.4.6 An amendment to the alignment of the proposed new section of OHL between pylons 4ZA025 and 4ZA028 has been made. At Stage 3 consultation National Grid was proposing to route the new section of OHL to the north of residential property at Bryn Alaw, in order to avoid the route oversailing the curtilage of the property. This routed the new OHL across a small area of open land that had previously been granted planning permission for the development of a residential property. This would have brought the route closer to properties in the village of Rhosgoch (including Trigfa, Bryn Aul and Rhosgoch Farm), in comparison with a close-parallel alignment to the north of the existing OHL, and involved the two routes diverging, before converging again south of the village. National Grid considered that significant effects would have resulted at Bryn Alaw due to the close proximity of the existing and new OHL to either side of the property.
- 9.4.7 National Grid recognised that acquiring the property at Bryn Alaw would allow a close parallel alignment to be maintained. Following discussion with the property owner, National Grid has now voluntarily acquired the property (removing the residential use of Bryn Alaw (as detailed within the Schedule of Environmental Commitments (**Document 7.4.2.1**)) and as a result the Proposed Development would now route over the house.
- 9.4.8 As well as avoiding significant effects upon residents at Bryn Alaw, this design change would also result in reduced effects by: increasing the distance between the new OHL and other properties in Rhosgoch; removing the route divergence in this area and; increasing design synchronisation with the existing and proposed new OHL section to the south. Specifically the location of pylons 4ZA027 and 4AP023 is now 'broadly synchronised' and that of pylons 4ZA028 and 4AP024 are now considered 'synchronised', where previously the proposed locations of all four pylons was considered unsynchronised. This change to the design, actively pursued by National Grid, therefore represents significant local Mitigation by Design.
- 9.4.9 The proposed amendment to pylons 4ZA025 4ZA028 is illustrated on Figures A-5 to B-1 in **Appendix A** of this document.

Proposed Pylons 4AP024 and 4ZA028

9.4.10 An amendment was made to proposed pylons 4AP024 and 4ZA028 following Stage 3 Consultation. The proposed angle pylon at this location would be in a visually prominent position and were previously a D55 design which would have been a bulky form. In order to reduce potential landscape

and visual effects, a modification has been made to the less bulky D25 pylon type as described in paragraph 7.2.16 of this document.

9.4.11 National Grid now proposes to use a 'D33' design for pylons 4AP024 and 4ZA028. The change in pylon type is considered to be of benefit in this visually prominent location.

Alignment between Proposed Pylons 4AP028 – 4AP037

- 9.4.12 An amendment was made to the alignment and pylon locations between proposed pylon 4AP028 and 4AP037 following Stage 3 Consultation.
- 9.4.13 Following a PIL request, proposed pylon 4AP030 has moved approximately 36m to the north west to ensure it is closer to the field boundary and would now be synchronised with pylon 4ZA034; this would ensure that more of the field is available to the PIL during the operation of the Proposed Development and the design would be more compliant with Holford Rule 6 and its accompanying note. As a result of the movement of 4AP030, associated amendments to pylon locations have been made to proposed pylons 4AP029, 4AP032, 4AP033, 4AP034 and 4AP035.
- 9.4.14 An amendment was made to proposed pylon 4AP031 following Stage 3 Consultation. Following a PIL request, the proposed pylon has been repositioned approximately 34m to the east to ensure it would be closer to the corner of the field boundary; this would ensure more of the field is available to the PIL during the operation of the Proposed Development.
- 9.4.15 Proposed pylon 4AP036 has moved approximately 100m to the south east following a PIL request and would be located closer to the field boundary to ensure that it would be synchronised with pylon 4ZA040 immediately south east of Bryn Goleu Caravan Park. This would ensure that the design would be more compliant with Holford Rule 6 and its accompanying note.
- 9.4.16 The realignment between proposed pylons 4AP028 and 4AP037 has resulted in a closer paralleling of the existing section of 4ZA OHL. The separation distance between the two OHLs would be reduced from approximately 100m to 80-90m (the greatest reduction being close to proposed pylon 4AP030).
- 9.4.17 The amendment to the alignment between proposed pylons 4AP028 4AP037 are illustrated on Figures B-2 to B-4 in **Appendix A** of this document.

Temporary Works

- 9.4.18 A number of amendments have been made to the construction design since Stage 3 Consultation, resulting in the Proposed Development. These amendments have been made to both address consultation responses and further work by the project team to reduce environmental and socioeconomic effects whilst ensuring the safe and efficient construction of the Proposed Development.
- 9.4.19 Where proposed pylon locations have been amended as described above, this would subsequently have an impact on the location of the associated pylon working areas and pulling positions. Amendments to these working areas and pulling positions have not been outlined in the section below but are illustrated in **Appendix C** of this document.
- 9.4.20 General amendments made to the design of the construction activities include:
 - In several places, in response to ongoing discussions with affected PILs, construction aspects (e.g. working areas, pulling positions, scaffold positions, etc) have been revised with the intention to reduce impacts upon agricultural operations wherever possible;
 - Construction components (e.g. pulling positions, scaffold positions, etc.) and working areas would be away from difficult topography and more sensitive landform wherever possible;
 - Existing agricultural accesses and gaps in hedgerows have been utilised wherever possible, thereby reducing the requirement for additional new access points;
 - The Order Limits and working areas have been reduced as far as possible to take into account the above and to reduce the land required to construct, operate, and maintain the Proposed Development;
 - Permanent design requirements have discussed with a number of Third Parties and amendments have been made to associated accesses as a result.
- 9.4.21 In addition to the above, a number of more specific amendments to the construction design of the Proposed Development have been made since Stage 3 Consultation; these are described below.

Reconductoring between Pylons 4AP037 to 4AP041 and 4ZA034 to 4ZA040

- 9.4.22 Sections of the 4AP and 4ZA OHLs previously required reconductoring between pylons 4AP037 to 4AP041 and 4ZA034 to 4ZA040; however further engineering design work and assessment has indicated that it would be possible to strengthen proposed pylons 4AP037, 4AP041 and 4ZA034 to take the new conductor on one side and the existing conductor on the other, removing the need to re-conductor 4AP037 to 4AP041 and 4ZA034 to 4ZA034.
- 9.4.23 This would result in the retention of the existing conductors and somewhat reduce potential construction effects and cost in this section of the 4AP route.

Bellmouths

9.4.24 11 bellmouth access points are proposed to enable construction traffic to access the Proposed Development. This is a reduction from the 17 bellmouths proposed at the Stage 3 Consultation. This includes a substantial reduction in proposed bellmouth access points off the B5111 in this area from six to two.

Consultation are outlined within Table 9.2.				
Table 9.2: S	Table 9.2: Section B Bellmouth Design Changes			
Bellmouth Location	Function	Design Change and Anticipated Benefits	Location in Appendix C	
Previous Bellmouth B3 (opposite proposed bellmouth B4)	Provided access from an unnamed road north to proposed pylon 4ZA027	No longer required and removed. Due to the amendment to the proposed section of 4ZA OHL following the purchase of Bryn Alaw, the location of proposed pylon 4ZA027 has moved to the north-west. Access to this part of the proposed 4ZA overhead could be suitably achieved via bellmouth B2 to the north.	Figure B-1	
Bellmouth B5	Provide access off an unnamed	Moved approximately 40m to the north west to improve road	Figure B-2	

9.4.25 The amendments to bellmouth locations in Section B since the Stage 3 Consultation are outlined within Table 9.2.

Table 9.2: Section B Bellmouth Design Changes				
Bellmouth Location	Function	Design Change and Anticipated Benefits	Location in Appendix C	
	road to and provides a link through to bellmouths B4 and B1 to the north	visibility.		
Previous Bellmouth B6 and Proposed Bellmouth B7	Provided access via the minor road immediately north of the properties of Cynlas and Dryll and close to proposed pylon 4AP028.	This has been replaced by bellmouth B7, in an alternative location which would be further away from residential properties approximately 400m to the south; Associated internal access tracks to the working areas along the route have been amended accordingly	Figure B-2	
Previous Bellmouth B7	Provided access close to proposed pylon 4ZA033	No longer required and removed. This bellmouth would have been located close to a number of properties. Following a review of all accesses and bellmouths in this area, it was determined to be possible to remove previous bellmouth B7, helping to reduce effects upon residential receptors and access points to the B5111	Figure B-2	
Previous Bellmouth B8	Provided access close to proposed pylon 4ZA034	No longer required and removed. Access to the proposed new section of 4ZA OHL could be achieved via proposed bellmouth B8 (previously referenced as B9) located	Figure B-2	

Table 9.2: Section B Bellmouth Design Changes				
Bellmouth Location	Function	Design Change and Anticipated Benefits	Location in Appendix C	
		approximately 200m to the south, further reducing the number of access points to be constructed on the B5111.		
Previous Bellmouth B8a	Provided access off the B5111 close to proposed temporary pylon 4ZA034T	No longer required and removed. Access could be sufficiently achieved by using a proposed access off proposed bellmouth B9 partially using a farm access track.	Figure B-3	
Previous Bellmouth B10	Provided access to the proposed new section of 4AP OHL, particularly proposed pylons 4AP031, 4AP032 and 4AP033	No longer required and removed. Access would be achieved by utilising proposed bellmouth B9 (previously referenced B11).	Figure B-3	
Previous Bellmouth B12 (now referenced B10) and proposed Bellmouth B11	Provides access to proposed pylons to the north and a link through to bellmouth B9 Bellmouth B11 provides access south to proposed pylons linking through to bellmouth B12	Moved approximately 30m to the west and amended to provide a cross over bellmouth with proposed bellmouth B11 to provide access for LGV traffic both north and south from the minor road.	Figure B-4	
Previous Bellmouths B13 and B13a	Provided access to the proposed new sections of 4AP and 4ZA	No longer required and removed. These have been replaced by Bellmouth B11, removing all	Figure B-4	

Table 9.2: Section B Bellmouth Design Changes			
Bellmouth Location	Function	Design Change and Anticipated Benefits	Location in Appendix C
	OHLs	National Grid construction traffic from the access road to Bryn Goleu Caravan Park. Pylon 4AP035 would be accessed via Bellmouth B11.	

Access Tracks

- 9.4.26 Following Stage 3 Consultation and the review of feedback received, a number of amendments were made to access proposals for both National Grid works and Third Party works in Section B.
- 9.4.27 The amendments to access proposals have originated from multiple sources, including consultation feedback and ongoing design work by the project team. A number of access proposals have also been necessitated by movements to the operational infrastructure.
- 9.4.28 As highlighted in paragraph 9.4.4, the proposed locations of the access tracks would not be fixed through the DCO, however, a number of the changes proposed would result in a reduction in the potential for environmental or socio-economic effects and are highlighted in this section.
- 9.4.29 It is not proposed to describe all changes to the access proposals within this section in detail, however all proposed amendments to National Grid access tracks in Section B are illustrated in **Appendix C** of this document. Amendments to Third Party access tracks in Section B are illustrated in **Appendix E** of this document.
- 9.4.30 The access track amendments that have been made in Section B are:

National Grid Access Tracks

- Access between 4ZA025 (in Section A) 4ZA026: access has been realigned in this location as a result of amendments to proposed pylon locations as outlined in section 9.4 of this document;
- Access between 4AP024 and 4AP025 this access track has been realigned due to the change in route alignment associated with the property Bryn Alaw (as described in in section 9.4 of this document). This track has also been realigned to cross the hedgerow at an

angle as close to 90 degrees as practicable to reduce the potential for loss;

- Access between 4AP025 and 4AP026 this track has been realigned to cross the derelict railway at an angle as close to 90 degrees as practicable to improve constructability;
- Access between 4AP026 and Bellmouth B5 this access has been realigned to the south of the proposed position of 4AP027, continuing into the new position of Bellmouth B5. The realignment of this access track would lead to a repositioning of a bridge required for a WFD watercourse crossing;
- Access between 4AP028 and 4AP029 following PIL feedback, the access in this location has been realigned due to the removal of previous Bellmouth B6 and would facilitate the connection of the track into the relocated Bellmouth B7;
- Access between 4AP029 and 4AP031 & 4ZA033 and 4ZA034 as a result of the amendment to Bellmouth B7, this access track has been amended to Bellmouth B8 (previously referred to as B9). The access into Bellmouth B8 has been amended slightly to reduce the potential impact on a historic pond;
- Access north of 4AP031 and 4ZA035 to 4AP032 and 4ZA036 through discussion with a PIL, access tracks in this location have been amended to better align with the new proposed location of Bellmouth B9 (previously B11). The amendment in this location would also use an existing driveway near the property of Pwll Coch Isaf;
- Access through Gaer Farm (north-east of 4ZA037) following feedback from a PIL, the access in this location has been removed as access to proposed pylon 4AP033 could be achieved from Bellmouth B9. The removal of this access track would move construction traffic away from the residential property, reducing potential disturbance for this receptor;
- Access at 4AP034 this access track has been realigned to facilitate a straighter route to proposed pylon 4AP034 from Bellmouth B10. A length of access track in this location (south of Bellmouth B11) has been removed which would result in construction traffic being routed further away from Boston Cottages;

- Access between 4AP035 and 4AP036 the access in this location has been amended due to the change in pylon positioning and to utilise existing gaps in hedgerows to reduce the potential for loss;
- Access between 4AP036 and 4AP037 following a PIL request, this access has been realigned along the southern and eastern boundaries of a field to reduce the impact on land during construction;
- Access track between Bellmouth B13 and 4ZA042 this access track has been realigned slightly to ensure that it would be perpendicular to a WFD watercourse, facilitating the construction of a clear-span bridge;
- Access between 4ZA026 and Bellmouth B1 this access track has been realigned due to the amendment to the location of proposed pylon 4ZA026 and the relocation of Bellmouth B1;
- Access from 4ZA027 to 4ZA028 the access in this location has been substantially amended due to the proposed alignment change in this location associated with Bryn Alaw (as described in section 9.4 of this document). Proposed pylon would be accessed from Bellmouth B2, reducing the requirement for an additional access point previously proposed at Bellmouth B3;
- Access tracks to pylons 4ZA036, 4ZA038 and 4ZA039 the proposed strengthening of Pylon 4ZA034 (outlined in section 9.4 of this document) would remove the requirement for works at these pylons, subsequently removing the need for working areas and access tracks to them, reducing the scale of works in this area;
- Access between 4ZA042 and 4ZA043 (in Section C) following a PIL request, this access track has been realigned to the north-east of pylon 4ZA042, continuing east along a field boundary before turning south to pylon 4ZA043. The amendment in this location would avoid potential impacts on an important hedgerow.

<u>Third Party Access Tracks</u>

- Access between 4AP023 and 4AP024 this access has been reduced close to the property of Tyn Rhos, reducing potential disturbance to the property, following a review of the engineering requirements by Third Parties;
- Access south of 4AP026 the proposed access in this area has been removed following the confirmation of the engineering

requirements of Third Parties. The removal of this track would move the access further away from the property at Glasgraig Fawr, reducing the potential for disturbance and impacts on an area of potentially important archaeology;

- Access north of 4AP027 this access has been extended north slightly towards the property of Ty Newydd to allow for Third Party requirements in this area;
- Access to the west of 4AP028 this access has been reduced in the area of previous Bellmouth B6;
- Access south of Bellmouth B8 a length of access track has been added in this location to facilitate access to a Third Party asset;
- Access at Gaer Farm this access has been realigned into a field to the south to avoid encroaching onto the northern section of the existing Gear Farm access track. This track has also been realigned to avoid impacts onto a Public Right of Way (PRoW) and has been split into two sections to avoid the need to cross a watercourse;
- Access at Fron Gaer following a PIL request, this access has been relocated north-west at Hafod Y Plas. The amendment to this access track would have the benefits of reducing disturbance on the property at Fron Gaer in terms of the loss of grazing land;
- Access between 4AP034 and 4AP035 Third Party access tracks in this location have been substantially realigned and reduced in this area as a result of the confirmation of engineering requirements. These amendments would see the removal of an access track from four fields to the south-west of 4AP034, reducing the potential impact on the property of Dychwylan. The access has been further reduced to the west of 4AP034 and north-east of 4AP035. The realignment of access tracks in this location would also reduce impacts on hedgerows by utilising existing gaps;
- Access south of 4AP026 the access in this location has been reduced in the vicinity of the property Trigfa due to the reduction in Third Party undergrounding in the area;
- Access east of 4ZA031 a reduction in the Order Limits in this location has removed a section of Third Party asset to be removed, leading to a reduction in the length of access track that would be required and moving construction traffic further away from the property Rhos Dafarn;

 Access track east of 4ZA041 – following a PIL request, a large section of Third Party access has been removed from land to the east of proposed pylon 4ZA041 and relocated south along the access track from Bellmouth B13. This would move the Third Party track further away from the property Bodneithior, reducing potential disturbance to this property.

9.5 SUMMARY

- 9.5.1 It is considered that as a result of consultation feedback, engagement with PILs and continued design work by the project team, the design changes made in Section A have enabled National Grid to improve the design since Stage 3 Consultation.
- 9.5.2 Substantial design changes have been made in Section B including that proposed in relation to the property at Bryn Alaw and the reduction to the number of proposed bellmouth access locations on the B5111. Throughout the route, this larger scale change has been complimented by more localised amendments that offered the opportunity to improve the design.
- 9.5.3 Most of the design changes (either substantial or more localised) made to the permanent and temporary works as described above have helped to reduce the level of potential environmental and/or socio-economic effects and therefore represent further Mitigation by Design.

10 Section C: Llandyfrydog to B5110 North of Talwrn

10.1 INTRODUCTION

- 10.1.1 A summary description of the proposed aspects of the Proposed Development in Section C together with the local design rationale are described below together with a summary of the main amendments to the design following Stage 3 Consultation.
- 10.1.2 As outlined in Chapter 3 of the ES (**Document 5.3**), two options are included within the draft DCO in relation to the 400 kV OHL (Option A and Option B). Within Section C, this would result in proposed pylon locations being slightly different between the two options. Where a proposed amendment would be option specific, this is detailed below.

10.2 OVERVIEW

- 10.2.1 In Section C, the proposed new sections of 4ZA OHL would run parallel to and east of the existing section of 4AP OHL in a south easterly direction; this arrangement would continue until pylon 4AP041 on the existing section of OHL.
- 10.2.2 At this point a transposition would occur (at Maenaddwyn) to allow the new section of 4ZA OHL to continue on an existing section of 4ZA OHL, and the existing section of 4AP OHL to continue on a new section of 4AP OHL. The new proposed section of 4AP OHL would be located to the west of the existing section of 4ZA OHL until the end of Section C, to the B5110 north of Talwrn.
- 10.2.3 The transposition in this location would enable the routeing of new build OHL to largely avoid the Cors Erddreiniog SAC, SSI and NNR (with the exception of drainage works and a small section of conductor oversail), significantly reducing the potential environmental impacts of the Proposed Development.
- 10.2.4 The transposition would occur between proposed pylons 4AP041 and 4AP043 on the 4AP OHL; and proposed pylon 4ZA045 and existing pylon 4ZA047 on the 4ZA OHL. Approximately 680 m of the existing OHL

between these pylons would be dismantled. The existing OHL north and south of this section of OHL would remain in place.

10.2.5	A summary of the pro	posed OHL works	in Section C is within	Table 10.1 ⁴ .
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Table 10.1: Summary of Proposed OHL Works in Section C			
	4AP	4ZA	
Number of New Pylons	22	4	
Number of Retained Pylons	2	18 (1 is Modified)	
Number of Dismantled Pylons 2 (Existing 4		ng 4ZA)	
Route Length of New Line Build	7.3 km (4AP041 – 4AP062)	1.75 km (4ZA042 – 4ZA047)	
Route Length of Existing Line to be Retained	1.04km (Modified (4AP038 – 4AP041))	6.45km (4ZA047 – 4ZA064)	
Route length of existing Line to be Dismantled	0.68 km (4AP041 – 4ZA047)		
Height of Tallest Retained Pylon	57.7m [4AP039]	59.2m [4ZA048, 4ZA051, 4ZA059, 4ZA061 & 4ZA064]	
Height of Tallest Proposed Pylon	61.5m [4AP044]	54.3m [4ZA043]	

10.3 THE ALIGNMENT

- 10.3.1 As the route heads south east at the start of Section C, the two OHLs would generally run at a distance of approximately 70 m to 75 m apart until they reach proposed pylons 4AP041 and 4ZA045 north of Hebron.
- 10.3.2 At this point, the separation distance between the two OHLs would gradually increase to approximately 120 m between proposed pylon 4AP043 and existing pylon 4ZA047 and then gradually increases to

⁴ All measurements contained within this table are approximate only and do not consider conductor sag.

approximately 150m as the two OHLs deviate further to the east and north of Plas Llanfihangel. This proposed section of 4AP OHL would then route around the properties at Pen Llain, Cae Fabli, Maen Goch, Maenaddwyn, and the converted former school house, with the closest pylon being over 120 m away from any property.

- 10.3.3 The two OHLs would then parallel one another at an approximate separation distance of 80m for two spans. Here, at proposed pylon 4AP048, the proposed section of 4AP OHL would deviate away from the existing section of 4ZA OHL in a south westerly direction for four spans to avoid any significant environmental effects that would result from routeing through the Cors Erddreiniog SAC, SSSI, and NNR. At proposed pylon 4AP052, the alignment would deviate to the south east until the two OHLs met up again in close parallel at proposed pylon 4AP056 and existing pylon 4ZA058 having deviated for a distance of approximately 2.6km.
- 10.3.4 East of Maen Eryr at proposed pylon 4AP056, the two OHLs would closely parallel each other at a separation distance of approximately 70 m to 80 m as the route then headed in a south easterly direction over the B5110 towards the end of Section C.

Limits of Deviation

- 10.3.5 The LOD being sought for Section C is 100 m, 50 m either side of the proposed alignment as described at section 7.4 of this document.
- 10.3.6 Restrictions to the LOD are proposed at the following locations.
 - Maen Goch approximately 33 m to avoid any adverse effects of potential oversail of conductors;
 - Proposed pylon 4AP048 approximately 31 m to avoid any adverse effects of potential oversail of conductors on protected habitat of Cors Erddreiniog SAC, SSSI, and NNR.
 - Proposed pylon 4AP060 as set out within the Schedule of Environmental Commitments (**Document 7.4.2.1**) this pylon would be restricted along the alignment to avoid potential increased impacts on views from nearby properties.

Pylon Locations

10.3.7 As described above, the route alignments in Section C would enable the centre-line route alignment in Section C (subject to the LOD) to be predominately routed parallel to one another. The exception to this would

be where the proposed new section of 4AP OHL deviates away from the existing section of 4ZA OHL to reduce potential environmental impacts to the Cors Erddreiniog SAC, SSSI, and NNR.

- 10.3.8 The Proposed Development in Section C would achieve 13 pairs of paired pylons (out of a possible maximum of 22 pairs and based on a maximum difference of 50 m along the centre-line) where it is considered that the two OHLs of the Proposed Development would be synchronised or broadly synchronised.
- 10.3.9 Of the 13 paired pylons, 11 would comprise proposed pylons paired with existing pylons whilst two would comprise proposed pylons only.
- 10.3.10 A further seven proposed pylons on the 4AP OHL would not be paired with an adjacent pylon on the existing 4ZA OHL. These proposed pylons would be located in the section of proposed 4AP OHL diverted away from the existing 4ZA OHL so as to avoid direct effects on the Cors Erddreiniog SAC, SSSI, and NNR.
- 10.3.11 It is not proposed to pair proposed pylon 4AP044 and existing pylon 4ZA048 due to the need to stay within required design specifications.
- 10.3.12 It is not proposed to achieve a pairing of proposed pylon 4AP046 and existing pylon 4ZA050 due to the large change in separation distances required between the two OHLs in the sections immediately north of this point. A larger separation distance was required to avoid conductors oversailing the residential properties east of Plas Llanfihangel.
- 10.3.13 It is not proposed to achieve a pairing of proposed pylon 4AP061 and existing pylon 4ZA063 due to the presence of the B5110 and the requirement to enable scaffold protection measures to be implemented as the Proposed Development crosses the B5110.
- 10.3.14 It is not proposed to achieve the pairing of proposed pylon 4AP062 and existing pylon 4ZA064 to reduce potential impacts on an area of habitat linked to the SAC.

10.4 DESIGN CHANGES SINCE STAGE 3 CONSULTATION

- 10.4.1 A summary of the main amendments to the permanent and temporary design in Section C since Stage 3 Consultation are described below.
- 10.4.2 In some instances, pylon locations and other aspects of the proposed design have been amended a small amount since Stage 3 Consultation (e.g. as a result of an adjacent pylon movement). All amendments to the

design have been reviewed in detail by the project team through the consideration of consultation feedback, engineering and environmental considerations.

- 10.4.3 Within this section, proposed specific locations for pylons are referenced for the purpose of illustrating how design changes have been incorporated to reduce potential effects. It should be noted however that these locations are not secured as referenced in section 7.4 of this document. The proposed alignment of the OHL would be subject to LOD to provide a necessary and proportionate degree of flexibility. Where the LOD would be restricted in certain locations to limit potential effects on a specific receptor, this has been indicated in paragraph 10.3.6 of this document.
- 10.4.4 Descriptions have also been included relating to how amendments since Stage 3 Consultation to construction aspects are proposed to reduce potential effects. It should be noted that the referenced access track locations are not fixed within the Order Limits sought, however the bellmouths that would connect access tracks to the highway network are fixed. Consideration has been given to any areas within the Order Limits where the sensitivity of receptors would be greater and effects of access tracks could be more significant. Where appropriate, the location of access tracks in these areas has been restricted and identified within the Schedule of Environmental Commitments (**Document 7.4.2.1**).

Permanent Works

10.4.5 The proposed amendments to the design in Section B since Stage 3 Consultation, resulting in the Proposed Development, are described below.

Alignment between Proposed Pylons 4ZA043 - 4ZA047

- 10.4.6 An amendment has been made to proposed pylon 4ZA045 since Stage 3 Consultation following PIL feedback. The proposed pylon has been moved approximately 40m to the northwest to ensure the efficient operation of farm machinery following construction. This would result in less agricultural disturbance during operation of the Proposed Development.
- 10.4.7 The relocation of proposed pylon 4ZA045 has resulted in adjacent proposed pylons 4ZA043, 4ZA044, and 4ZA046 being slightly repositioned to retain appropriate span lengths along this section of the proposed of 4ZA OHL and in consideration of Holford Rule 3 where a preference for straight lines is stated where possible.

10.4.8 The amendment to the alignment between proposed pylons 4ZA043 – 4ZA047 are illustrated on Figures C-1 to C-2 in **Appendix A** of this document.

Alignment between Proposed Pylons 4AP041 - 4AP048

- 10.4.9 An amendment was made to the alignment of the proposed section of 4AP OHL between proposed pylons 4AP041 and 4AP048. This amendment originated as from a request to move proposed pylon 4AP043 further away to the north from a residential property. In order to maintain the crossing point across the road and avoid bringing the conductors any closer to the properties in span 4AP045 4AP046, proposed pylon 4AP046 was required to move slightly to the south west.
- 10.4.10 As a result of this amendment, proposed pylons 4AP042, 4AP044, 4AP045 and 4AP047 were required to be moved so that they alignment would stay within the design specifications for the maximum span between adjacent pylons.
- 10.4.11 The separation distance between the two OHLs would be reduced from approximately 160m to 120m (the greatest reduction is close to proposed pylon 4AP043).
- 10.4.12 The realignment of this section of the proposed 4AP OHL would:
 - Take the proposed angle pylon 4AP043 further away (an additional 75 m to the north) from the property at Parc yr Ynys;
 - Enable the amendment of the design of pylon 4AP043. This was previously a D55 design which would have been a bulky form. In order to reduce potential landscape and visual effects, a modification has been made to the less bulky D25 pylon type as described in paragraph 7.2.16 of this document. National Grid now proposes to use a 'D33' design for pylon 4AP043. The change in pylon type is considered to be of benefit in this location;
 - Move proposed pylon 4AP045 slightly to the north, further away from an existing pond.
- 10.4.13 The realignment of the proposed section of 4AP OHL in this location would bring the alignment marginally closer (approximately 12 m) to the properties at Trer Beirdd and Hen Shop close to proposed pylon 4AP046; however, it is considered that this would not result in additional adverse visual effects for those properties.

- 10.4.14 It is not proposed to pair proposed pylon 4AP044 and existing pylon 4ZA048 due to the above amendment being implemented. This is due to the requirement to retain appropriate span lengths along this section of the proposed 4AP OHL and to ensure sufficient clearances of a hill in span 4AP043 and 4AP044.
- 10.4.15 The amendments are illustrated on Figures C-1 to C-3 in **Appendix A** of this document.

Proposed Pylon 4AP049

- 10.4.16 Following a PIL request, this pylon has been moved marginally to the south by approximately 8 m to reduce the potential impact on agricultural operations.
- 10.4.17 The amendment is illustrated on Figure C-4 in **Appendix A** of this document.

Proposed Pylon 4AP050

- 10.4.18 As a result of a PIL request, an amendment was made to proposed pylon 4AP050. The proposed pylon has been moved approximately 23 m to the south to ensure it would be closer to the field boundary. This would result in less agricultural disturbance and maximum ongoing use of the land during operation of the Proposed Development
- 10.4.19 The amendment is illustrated on Figure C-4 in **Appendix A** of this document.

Pylon Locations between Proposed Pylons 4AP053 – 4AP055

- 10.4.20 An amendment was made to proposed pylon 4AP055 following a PIL request. The Stage 3 Consultation design proposed that pylon 4AP055 would have been located in an area of marshy grassland habitat linked to the nearby SAC, although the habitat itself is not directly designated as SAC habitat. The proposed pylon has been moved approximately 70 m to the north west to the edge of the field boundary (and the edge of the marshy grassland habitat). The relocation of proposed pylon 4AP055 has resulted in adjacent proposed pylons 4AP053 and 4AP054 also being repositioned along the alignment to the north west to retain appropriate span lengths and ensure that the alignment is within the design specification for the maximum span between adjacent pylons along this section of the proposed 4AP OHL.
- 10.4.21 None of the habitats present in the field are designated as Annex I related to the nearby SAC designation; however, Annex I habitat is present that is not related to the nearby SAC. The relocation of this pylon would not be

anticipated to have any significant or additional adverse effects on the habitat (see ES Chapter 9 Ecology and Nature Conservation (**Document 5.9**) for further details of likely effects.

- 10.4.22 The relocation of pylon 4AP055 would not be anticipated to have any significant or additional adverse effects on the hydrological pathway from the Anglesey Fens that supports the good status Afon Erddreiniog Water Framework Directive (WFD) water body (see ES Chapter 12 Water Quality, Resources and Flood Risk (**Document 5.12**).
- 10.4.23 The amendments are illustrated on Figure C-5 in **Appendix A** of this document.

Proposed Pylon 4AP056

- 10.4.24 An amendment was made to proposed pylon 4AP056 following Stage 3 Consultation. The proposed angle pylon at this location would be in a visually prominent position and was previously a D55 design which would have been a bulky form. In order to reduce potential landscape and visual effects, a modification has been made to the less bulky D25 pylon type as described in paragraph 7.2.16 of this document.
- 10.4.25 National Grid now proposes to use a 'D33' design for pylon 4AP056. The change in pylon type is considered to be of benefit in this visually prominent location.

Alignment between Proposed Pylons 4AP056 and 4AP062

- 10.4.26 As a result of a proposed amendment to the alignment in Section D relating to the property Dolydd Newydd and the inclusion of the two options A and B. There would be a marginal variation in a number of the locations of proposed pylons in Section C dependent on the option pursued.
- 10.4.27 The proposed amendment at Dolydd Newydd is detailed further in Chapter 11 of this document.
- 10.4.28 The amendments are illustrated on Figures C-6 and C-7 in **Appendix A** (Option A) and **Appendix B** (Option B) of this document.

Proposed Pylon 4AP062

10.4.29 An amendment was made to proposed pylon 4AP062. The Stage 3 Consultation design located the proposed pylon 4AP062 in an area of habitat linked to the nearby SAC, although the habitat itself is not directly designated as SAC habitat. The proposed pylon has been moved approximately 60m to the north to ensure it would be located in a less sensitive habitat, further reducing potential ecological impacts. Previously the pylon was positioned in marshy grassland habitat; it is now proposed in neutral semi-improved grassland. This amendment has resulted in the 'unpairing' of proposed pylon 4AP062 and existing pylon 4ZA064.

10.4.30 The amendment is illustrated on Figure C-7 in **Appendix A** (Option A) and **Appendix B** (Option B) of this document.

Temporary Works

- 10.4.31 A number of amendments have been made to the construction design since Stage 3 Consultation, resulting in the Proposed Development. These amendments have been made to both address consultation responses and further work by the project team to reduce environmental and socioeconomic effects whilst ensuring the safe and efficient construction of the Proposed Development.
- 10.4.32 Where proposed pylon locations have been amended as described above, this would subsequently have an impact on the location of the associated pylon working areas and pulling positions. Amendments to these working areas and pulling positions have not been outlined in the section below but are illustrated in **Appendix C** of this document.
- 10.4.33 General amendments made to the design of the construction activities include:
 - In several places, in response to ongoing discussions with affected PILs, construction aspects (e.g. working areas, pulling positions, scaffold positions, etc) have been revised with the intention to reduce impacts upon agricultural operations wherever possible;
 - Construction components (e.g. pulling positions, scaffold positions, etc.) and working areas would be away from difficult topography and more sensitive landform wherever possible;
 - Existing agricultural accesses and gaps in hedgerows have been utilised wherever possible, thereby reducing the requirement for additional new access points;
 - The Order Limits and working areas have been reduced as far as possible to take into account the above and to reduce the land required to construct, operate, and maintain the Proposed Development;

- Permanent design requirements have discussed with a number of Third Parties and amendments have been made to associated accesses as a result.
- 10.4.34 In addition to the above, a number of more specific amendments to the construction design have been made since Stage 3 Consultation; these are described below.

Bellmouths

10.4.35 10 bellmouth access points are proposed to enable construction traffic to access the Proposed Development. This is a slight reduction to the 11 bellmouths proposed by the Stage 3 Consultation design. The proposed amendments to these bellmouth locations are detailed below in table 10.2.

Table 10.2: Section C Bellmouth Design Changes			
Bellmouth Location	Function	Design Change and Anticipated Benefits	Location in Appendix C
Bellmouth C3	Provides access to the proposed section of 4AP OHL and existing section of 4ZA OHL to working areas south of proposed bellmouths C1 and C2	Bellmouth C3 (and associated access track) have been moved approximately 550m south and would create a crossover bellmouth with proposed bellmouth C4. This amendment would have less potential for disturbance on nearby residential receptors as it would avoid using a stretch of public highway which was deemed unsuitable for HGVs.	Figure C-2
Bellmouth C4	Provides access for a substantial length of Section C and provides a link to bellmouths C5 and C6 to the south	Moved approximately 8m to the south to avoid direct impacts on an Important Hedgerow and ensure that a crossover bellmouth could be created with the relocated bellmouth C3.	Figure C-3
Bellmouth C5	Provides access from an unnamed road to the east	Moved approximately 550m to the north to reduce potential impacts on farmland. The new access track	Figures C-4 and C-5

Table 10.2: Section C Bellmouth Design Changes			
Bellmouth Location	Function	Design Change and Anticipated Benefits	Location in Appendix C
	would provide a link through to bellmouth C4 to the north and C6 to the south.	associated with proposed bellmouth C5 would be aligned close to an existing track. This change would also remove the requirement for one bridge as it would utilise a new bridge crossing to the north.	
Bellmouth C8	Provides access close to proposed pylon 4AP060	Moved approximately 115m to the north into an adjacent field avoid impacts on an Important Hedgerow.	Figure C-7
Bellmouth C10	Provides from the B5110, linking through to bellmouth B7 to the north	Moved approximately 135m into an adjacent field to provide improved visibility, avoid being located directly beneath a proposed scaffold position and to avoid a gas pipeline. The movement of this proposed	Figure C-7
		bellmouth and associated access track would largely avoid routeing through an area of habitat linked to the nearby SAC, although the habitat itself is not designated as a SAC habitat.	
Previous Bellmouth	Provided access to proposed	No longer required and removed.	Figure C-7
C11	pylon 4AP061	Sufficient access could be gained to proposed pylon 4AP061 from proposed bellmouth C9.	

Access Tracks

10.4.36 Following Stage 3 Consultation and the review of feedback received, a number of amendments were made to access proposals for both National Grid works and Third Party works in Section C.

- 10.4.37 The amendments to access proposals have originated from multiple sources, including consultation feedback and ongoing design work by the project team. A number of access proposals have also been necessitated by movements to the operational infrastructure.
- 10.4.38 As highlighted in paragraph 10.4.4, the proposed locations of the access tracks would not be fixed through the DCO, however, a number of the changes proposed would result in a reduction in the potential for environmental or socio-economic effects and are highlighted in this section.
- 10.4.39 It is not proposed to describe all changes to the access proposals within this section in detail, however all proposed amendments to National Grid access tracks in Section C are illustrated in **Appendix C** of this document. Amendments to Third Party access tracks in Section C are illustrated in **Appendix E** of this document.
- 10.4.40 The access track amendments that have been made in Section C are:

National Grid Access Tracks

- Access between 4AP040 and 4AP041 this access has been realigned in multiple places to cross hedgerows at an angle as close to 90 degrees as practicable in order to reduce potential loss. The access has also been realigned to better facilitate a bridge crossing over a WFD watercourse;
- Access form 4AP043 to 4AP045 following a PIL request, the access directly to the south of 4AP043 has been realigned in this location to utilise an existing gate and reduce potential impacts on hedgerows. The previous access to the east of pylon 4AP044 has been removed following the relocation of Bellmouth C3 to the south. The movement of this Bellmouth and subsequent removal of access track would reduce impacts on a farm during construction and would also reduce the number of construction vehicles using the public roads in this area, reducing potential disturbance on residential properties in the area;
- Access between 4AP045 and 4AP046 following a PIL request, an amendment was made to the access in this area to ensure the track would be realigned to the south to be as close to the pond as possible to reduce potential disruption to land;
- Access between 4AP46 and 4AP048 as a result of the realignment to bellmouth C4, the access in this location has been realigned slightly to accommodate this. The access track in this area

has been realigned in five locations to cross hedgerows at an angle as close to 90 degrees as practicable, reducing the scale of potential removal;

- Access between 4AP048 and 4AP051 the access in this location has been realigned slightly to the east to ensure it joins to the pylon working areas;
- Access from new Bellmouth C5 to 4AP051 following a PIL request, the potential area in which the access track could be located in this area has been widened to provide flexibility during construction to avoid a horse grave. The access in this location has also been substantially amended following the relocation of Bellmouth C5 to the north, removing the requirement to install an additional new bridge crossing over a watercourse;
- Access from 4AP052 to 4AP055 following a PIL request, the access track in this area has been realigned to the south of the pylon working areas to reduce the impact on land during construction;
- Access between 4AP055 and 4AP056 the access track in this area has been realigned to the south in this area to avoid an ecologically sensitive habitat, reducing the potential for environmental effects in this location;
- Access between 4AP056 to 4AP059 the access in this area has been realigned in multiple locations in order to cross hedgerows at an angle as close to 90 degrees as practicable, reducing the potential for loss during construction. The access to 4AP058 has also been realigned to reduce potential impacts on an Important Hedgerow;
- Access from Bellmouth C8 access tracks in this location have been amended due to the relocation of Bellmouth C8 to the north and to realign the track to the northern field boundary following a PIL request;
- Access between 4AP061 and 4AP062 as a result of the relocation of Bellmouth C10 to the south, the access track has subsequently been amended in this location to reduce potential impacts on an Important Hedgerow and to remove it from an important habitat, reducing the potential for environmental impacts in the area;

 Access from 4AP062 to 4AP063 (in Section D) – the access in this location has been realigned to the south-west from 4AP062 to utilise an existing gap in the field boundary. The access continues to the south along the field boundary to join into the working area at pylon 4AP063.

<u>Third Party Access Tracks</u>

- Access east of 4AP040 following the confirmation of Third Party engineering requirements, a length of access track to the east of pylon 4AP040 has been removed, reducing the potential for disturbance in this area;
- Access east of 4AP042 following feedback from a PIL, this access has been removed from the exiting access at Clorach-Fawr to avoid adversely impacting on a 19th Century bridge;
- Access south-west of 4AP045 an area of access track has been removed close to Plas-Llanfihangel, reducing potential disturbance in this area. A length of access track has been added but would utilise an existing gate in the area;
- Accesses to the east of 4AP045 and to the north and east of 4AP046 – following confirmation of the required level of Third Party undergrounding in this area, although some additional lengths of access track have been added, the overall requirement for access tracks has been substantially reduced in this area. This amendment would decrease the potential for disturbance in this location;
- Access south-west of pylons 4AP053 and 4AP055 a substantial length of Third Party access track has been removed from this location following the confirmation that the previously anticipated scale of Third Party undergrounding would no longer be required;
- Access south-west of 4AP060 and north-west of 4AP061 following the reduction in Third Party undergrounding in this area, these access tracks have been removed, reducing the potential for disturbance in this location;
- Access east of 4ZA045 a length of access track in this location has been removed following the confirmation of Third Party undergrounding requirements;
- Access east of 4ZA046 a length of access track has been added in this area to utilise an existing track near Capel Hebron;

 Access north-east of 4ZA047 – following the removal of an area of Third Party undergrounding, the access track in this location has been removed in the vicinity of the property Refail Newydd, potentially reducing disturbance in this area;

10.5 SUMMARY

- 10.5.1 It is considered that as a result of consultation feedback, engagement with PILs and continued design work by the project team, the design changes made in Section C have enabled National Grid to improve the design since Stage 3 Consultation.
- 10.5.2 A substantial proportion of the pylon location have been amended in Section C since Stage 3 Consultation, resulting in amendments to the alignment. Throughout the route, larger scale changes have been complimented by more localised amendments that offered the opportunity to improve the design.
- 10.5.3 Most of the design changes (either substantial or more localised) made to the permanent and temporary works as described above have helped to reduce the level of potential environmental and/or socio-economic effects and therefore represent further Mitigation by Design.

11 Section D: B5110 North of Talwrn to Ceint

11.1 INTRODUCTION

- 11.1.1 A summary description of the proposed aspects of the Proposed Development in Section D together with the local design rationale are described below together with a summary of the main amendments to the design following Stage 3 Consultation.
- 11.1.2 As outlined in the ES Chapter 3 (**Document 5.3**), two options are being applied for in relation to the 400 kV OHL (Option A and Option B). Within Section D, this would result differences in proposed pylon locations between the two options. Where a proposed amendment would be option specific, this is detailed within section 11.4 of this document.

11.2 OVERVIEW

- 11.2.1 In Section D, the proposed section of 4AP OHL would run parallel to and west of the existing section of 4ZA OHL in a south easterly direction; this arrangement would continue for the entirety of Section D for a distance of approximately 3.5 km.
- 11.2.2 A summary of the proposed OHL works in Section D is summarised in Table 11.1^5 .

Table 11.1: Summary of the Proposed Development in Section D				
4AP 4ZA				
Number of New Pylons	10 (Option B = 11)	None		

⁵ All measurements contained within this table are approximate only and do not consider conductor sag.

Number of Retained Pylons		10
Number of Dismantled Pylons		
Route Length of New Line Build	3.59 km (4AP062 – 4AP073)	
Route Length of retained OHL		3.52km (4ZA064 – 4ZA074)
Height of Tallest Retained Pylon		59.2m [4ZA071]
Height of Tallest Proposed Pylon	58.5m [4AP069]	

11.3 THE ALIGNMENT

- 11.3.1 As the proposed sections of new OHL head south east, the two OHLs would generally run at a distance of approximately 65 m to 70 m apart for the entirety of Section D. The minimum distance that could be achieved between the two OHLs is 65m and is proposed to reduce environmental and socio-economic effects on receptors further to the west as far as practicable.
- 11.3.2 In the northern part of Section D, this 65m separation distance would allow the proposed section of 4AP OHL to pass as far to the east of the property at Ty Mawr as possible, reducing the impact on this property.
- 11.3.3 The proposed section of OHL would be on the far (western) side of the existing section of OHL; this would reduce the visual effects as the Proposed Development passes Talwrn on its western side.
- 11.3.4 Two route options are proposed for the Proposed Development in the vicinity of the property of Dolydd Newydd close to the B5109 and west of Talwrn. The two potential route options are as follows:
 - Option A is based on an agreement being entered into with the current owners to facilitate an easement and associated arrangement in respect of the dwelling. The property of Dolydd Newydd would be oversailed by the proposed section of 4AP OHL. The proposed section of OHL would retain a parallel alignment and approximate separation distance of 65m with the existing section of 4ZA OHL. Option A would result in one less proposed pylon than Option B (10 pylons compared to 11 pylons);

- Option B would follow the same principles as the Stage 3 Consultation design with the proposed section of 4AP OHL deviating slightly further away from the existing section of 4ZA OHL to ensure it would be routed around the property of Dolydd Newydd, rather than oversailing it. This option would increase the separation distance between the two OHLs to approximately 100m and would result in the property of Dolydd Newydd being located between the two OHLs. Option B would result in one additional pylon compared to Option A (11 pylons compared to 10 pylons) and would result in three tension pylons in this section of the proposed 4AP OHL.
- 11.3.5 The proposed 4AP OHL span between pylons 4AP068 and 4AP069 would pass through the eastern edge of Gylched Covert. The minimum 65 m separation distance between the proposed and existing OHLs could assist with potentially reducing the extent of vegetation clearance that could be required within the Covert.

Limits of Deviation

- 11.3.6 The LOD being sought for Section D is 100m, 50m either side of the proposed alignment as described at section 7.4 of this document.
- 11.3.7 Restrictions to the LOD are proposed at the following locations:
 - Madryn here the LOD would be restricted to approximately 13 m to ensure that the OHL would not be constructed where the conductors could oversail the residential curtilage;
 - Dolydd Newydd here the LOD would be restricted to approximately 27 m to ensure that the OHL would not be constructed where the conductors could oversail the residential curtilage.
 - Proposed pylon 4AP065 as set out within the Schedule of Environmental Commitments (**Document 7.4.2.1**) this pylon would be restricted along the alignment to avoid increased impacts on views from nearby properties.
 - Proposed pylon 4AP066 as set out within the Schedule of Environmental Commitments (**Document 7.4.2.1**) this pylon would be restricted along the alignment to avoid increased impacts on views from nearby properties.
- 11.3.8 The proposed LOD restrictions at Dolydd Newydd and pylons 4AP065 and 4AP066 would only apply in the event that Option B is pursued.

Pylon Locations

- 11.3.9 As described above, the centre-line route alignment (subject to the LOD) in Section D would enable the two OHLs to be routed parallel to one another.
- 11.3.10 For Option A, the Proposed Development would achieve 10 pairs of paired pylons (out of a possible maximum of 10 pairs and based on a maximum difference of 50 m difference along the centre-line) where it is considered that the two OHLs would be synchronised or broadly synchronised.
- 11.3.11 For Option B, the Proposed Development would achieve nine pairs of paired pylons (out of a possible maximum of 10 pairs and based on a maximum 50 m difference in longitudinal alignment) where it would be considered that the two OHLs would be synchronised. There are two locations where it would not be proposed to achieve a pairing of pylons and these are described below.
- 11.3.12 For Option B, it is not proposed to pair up proposed pylons 4AP064 and 4AP065 with any corresponding pylons on the existing 4ZA OHL. Proposed pylon 4AP064 would be positioned further to the north of the existing pylon 4ZA066 to enable proposed angled pylon 4AP065, positioned immediately north of (and to the rear of) the barn, to begin the deviation of the proposed 4AP OHL around the property at Dolydd Newydd. As there are 10 existing pylons and 11 proposed pylons for Option B, one proposed pylon would always be 'unpaired' (4AP065 in this case).
- 11.3.13 All paired pylons would consist of proposed pylons on the proposed section of 4AP OHL paired with existing pylons on the existing section of 4ZA OHL.

11.4 DESIGN CHANGES SINCE STAGE 3 CONSULTATION

- 11.4.1 A summary of the main amendments to the permanent and temporary design of the Proposed Development in Section A since Stage 3 Consultation is provided below.
- 11.4.2 In some instances, pylon locations and other aspects of the proposed design have been amended a small amount since Stage 3 Consultation (e.g. as a result of an adjacent pylon movement). All amendments to the design have been reviewed in detail by the project team through the consideration of consultation feedback, engineering and environmental considerations.
- 11.4.3 Within this section, proposed specific locations for pylons are referenced for the purpose of illustrating how design changes have been incorporated to reduce potential effects. It should be noted however that these locations are

not secured as referenced in section 7.4 of this document. The proposed alignment of the OHL would be subject to LOD to provide a necessary and proportionate degree of flexibility. Where the LOD would be restricted in certain locations to limit potential effects on a specific receptor, this has been indicated in paragraph 11.3.7 of this document.

11.4.4 Descriptions have also been included relating to how amendments since Stage 3 consultation to construction aspects of the Proposed Development are proposed to reduce potential effects. It should be noted that the referenced access track locations are not fixed within the Order Limits sought, however the bellmouths that would connect access tracks to the highway network are fixed. Consideration has been given to any areas within the Order Limits where the sensitivity of receptors would be greater and effects of access tracks could be more significant. Where appropriate, the location of access tracks in these areas has been restricted and identified within the Schedule of Environmental Commitments (**Document 7.4.2.1**).

Permanent Works – Option A

11.4.5 The proposed amendments to the design in Section D (Option A) since Stage 3 Consultation, resulting in the Proposed Development, are described below.

Proposed Pylons 4AP064 - 4AP067

- 11.4.6 An amendment to a section of the proposed 4AP OHL between proposed pylons 4AP064 and 4AP067 was made following Stage 3 Consultation.
- 11.4.7 To enable Option A to be achieved, the following amendments have been made:
 - Proposed pylon 4AP064 has moved approximately 10 m to the south to ensure it would be synchronised with existing pylon 4ZA066;
 - Proposed pylon 4AP065 has been removed;
 - Proposed pylon 4AP066 has moved approximately 75m to the north east (now approximately 60 m north west of Dolydd Newydd where it was previously approximately 35 m west of Dolydd Newydd);
 - Proposed pylon 4AP066 has been amended to a tension pylon from a suspension pylon.

11.4.8 The amendment can be viewed at Figures D-1 and D-2 in **Appendix A** of this document.

Permanent Works – Option B

11.4.9 The proposed amendments to the design in Section D (Option B) since Stage 3 Consultation, resulting in the Proposed Development, are described below.

Proposed Pylons 4AP064 – 4AP065

- 11.4.10 An amendment has been made to proposed pylon 4AP064 following Stage 3 Consultation. The proposed pylon has been moved approximately 75 m to the north west along the alignment of the proposed 4AP OHL into the adjacent field. The repositioning of the pylon would ensure it is outside of direct views from the property at Ty Mawr, reducing the potential effects on this property, however it would also result in the 'unpairing' of proposed pylon 4AP064 and existing pylon 4ZA066. The localised, reduced visual effects for the property at Ty Mawr is considered to be of greater overall benefit than the lack of synchronisation of the 4AP OHL in views from the wider landscape.
- 11.4.11 An amendment has been made to proposed pylon 4AP065 following Stage 3 Consultation. The proposed pylon has been moved approximately 65 m to the north west to the rear of the barn in the adjacent field. The repositioning of the pylon would result in the conductors oversailing the garden at the property of Madryn, however, the likely effects on views to the east from the property would be reduced. The repositioned pylon would be closer to the field boundary, resulting in an increase the amount of productive land available and would enable easier use and management of the land during operation of the Proposed Development
- 11.4.12 The amendment can be viewed at Figure D-1 in **Appendix B** of this document.

Temporary Works

11.4.13 A number of amendments have been made to the construction design since Stage 3 Consultation, resulting in the Proposed Development. These amendments have been made to both address consultation responses and further work by the project team to reduce environmental and socioeconomic effects whilst ensuring the safe and efficient construction of the Proposed Development.

- 11.4.14 Where proposed pylon locations have been amended as described above, this would subsequently have an impact on the location of the associated pylon working areas and pulling positions. Amendments to these working areas and pulling positions have not been outlined in the section below but are illustrated in **Appendix C** (Option A) and **Appendix D** (Option B) of this document.
- 11.4.15 General amendments made to the design of the construction activities include:
 - In several places, in response to ongoing discussions with affected PILs, construction aspects (e.g. working areas, pulling positions, scaffold positions, etc) have been revised with the intention to reduce impacts upon agricultural operations wherever possible;
 - Construction components (e.g. pulling positions, scaffold positions, etc.) and working areas would be away from difficult topography and more sensitive landform wherever possible;
 - Existing agricultural accesses and gaps in hedgerows have been utilised wherever possible, thereby reducing the requirement for additional new access points;
 - The Order Limits and working areas have been reduced as far as possible to take into account the above and to reduce the land required to construct, operate, and maintain the Proposed Development;
 - Permanent design requirements have discussed with a number of Third Parties and amendments have been made to associated accesses as a result.
- 11.4.16 In addition to the above, a number of more specific amendments to the construction design have been made since Stage 3 Consultation; these are described below.

Bellmouths

- 11.4.17 Four bellmouth access points are proposed to enable constructions traffic to access the Proposed Development. This would be a reduction from the six bellmouths that were proposed in the Stage 3 Consultation design.
- 11.4.18 The proposed amendments to these bellmouth locations are detailed in Table 11.2.

Table 11.2: Section D Bellmouth Design Changes			
Bellmouth Location	Function	Design Change and Anticipated Benefits	Location in Appendix C
Bellmouths D1 and D2	Provide a crossover bellmouth off the B5109 to link through to bellmouth C10 to the north and bellmouth D3 to the south	Moved approximately 60m to the east to ensure that the associated access track would not be routed in a field that would otherwise not be directly affected by the Proposed Development.	Figure D-2
Bellmouth D3	Provides access from the B5420 and link through to bellmouth D2 to the north	Moved approximately 10m to the south east to ensure only one of two existing access gates would be required to be used for access. This amendment would also avoid impacts on an Important Hedgerow.	Figure D-4
Previous Bellmouth D4	Provided access north to proposed pylon 4AP072	No longer required and removed. Access proposed from bellmouth D3 and the spur from the associated amended access track.	Figure D-4
Previous Bellmouth D6	Provided access to proposed pylon 4AP073	No longer required and also removed due to difficulties in achieving appropriate visibility splays. Sufficient access could be gained to proposed pylon 4AP073 from proposed bellmouth D4 (previously referenced D5) and associated access track.	Figure D-4

Access Tracks

- 11.4.19 Following Stage 3 Consultation and the review of feedback received, a number of amendments were made to access proposals for both National Grid works and Third Party works in Section D.
- 11.4.20 The amendments to access proposals have originated from multiple sources, including consultation feedback and ongoing design work by the project team. A number of access proposals have also been necessitated by movements to the operational infrastructure.
- 11.4.21 As highlighted in paragraph 11.4.4, the proposed locations of the access tracks would not be fixed through the DCO, however, a number of the changes proposed would result in a reduction in the potential for environmental or socio-economic effects and are highlighted in this section.
- 11.4.22 It is not proposed to describe all changes to the access proposals within this section in detail, however all proposed amendments to National Grid access tracks in Section D are illustrated in **Appendix C** (Option A) and **Appendix D** (Option B) of this document. Amendments to Third Party access tracks in Section D are illustrated in **Appendix E** (Option A) and **Appendix F** (Option B) of this document.
- 11.4.23 The access track amendments that have been made in Section D are:

National Grid Access Tracks

- Access from 4AP062 (in Section C) to 4AP063 the access in this location has been realigned to the south-west from 4AP062 to utilise an existing gap in the field boundary. The access continues to the south along the field boundary to join into the working area at pylon 4AP063.
- Access between 4AP063 and 4AP064 at the request of a PIL, this has been realigned slightly to the west to avoid a steep bank and to remove the track from a field that would otherwise be unaffected by the Proposed Development (except for oversailing) during operation. This realignment would also facilitate the use of an existing track.
- Access between 4AP64 and Bellmouth D1 this access has been realigned to reflect amended pylon positions in this location and to utilise an existing gap in a hedgerow and avoid a parcel of land to the east of Bellmouth D1.
- Access from Bellmouth D2 to 4AP070 access from the repositioned Bellmouth D2 has been realigned to the east to avoid
an archaeological enclosure located to the north-west of 4AP067. North of pylon 4AP068, this access track has been amended to deviate to the east in order to avoid impacting on a nearby spring. The realignment of this access to the east would move it further away from the Gylched Covert County Wildlife Site (CWS) following a PIL request to the south of 4AP068 and continues south to 4AP069 where it would deviate east to avoid impacting on a PIL's field and reduce the impact on hedgerows. The realigned access track would then link in with the eastern side of the working area at pylon 4AP070.

- Access from Bellmouth D3 to 4AP072 following a PIL request to remove previous bellmouth D4 and the associated access track combined with the relocation of Bellmouth D3 to avoid impacting on important hedgerows, pylon 4AP072 would be accessed from a spur through the Construction Compound which has been aligned to ensure it would avoid important archaeological remains. The previously proposed access to the south of 4AP072 has been removed as a result of this amendment.
- Access from Bellmouth D4 to Bellmouth E2 (in Section E) this access has been realigned to avoid a road considered unsuitable for HGVs and create 'along-line' access between the two bellmouths in this area. This realignment would involve the installation of a bridge crossing over a WFD watercourse. The working area at pylon 4AP073 would be accessed through a spur to the east.

Third Party Access Tracks

- Access east of 4ZA066 an existing private track from Gwastad-Gwyn to Ty Mawr has been included within the order limits to facilitate access in this area.
- Access at Bellmouth D2 following a PIL request, the previously proposed access which would have utilised the existing access at Hendre Hywel has been removed and the access repositioned to use the new proposed access track at Bellmouth D2. This amendment would take construction traffic further away from the residential receptor, potentially reducing disturbance during construction.

11.5 PENMYNYDD ROAD CONSTRUCTION COMPOUND

Overview

- 11.5.1 A temporary construction compound is required for the duration of the construction of the OHL aspects of the Proposed Development. The construction compound would accommodate construction offices, welfare facilities, parking areas, and laydown areas for the storage of materials; water, electricity and telecommunications would also be available in the construction compound. Some construction materials, such as cable drums would be delivered to the construction compound where it would then be dispatched to other working areas along the route of the Proposed Development as required. Other construction materials (such as steelwork) would typically be delivered directly to required sites to avoid double handling.
- 11.5.2 The construction compound would be securely fenced around its perimeter and would be permanently manned during the construction of the Proposed Development.

Site Selection

- 11.5.3 National Grid's Substations and the Environment: Guidance on Siting and Design (The Horlock Rules) (see section 2.2 of this document) are internal National Grid guidelines for the sensitive siting and design of permanent facilities so as to reduce or avoid the environmental effects of such developments. Although the proposed construction compound would not be a permanent facility, it would be present for the duration of the OHL construction works and would occupy a large site. It is considered that the siting and design principles of these guidelines were appropriate to apply to the siting of the proposed construction compound.
- 11.5.4 As well as applying the guidelines contained in the Horlock Rules, the main considerations for the selection of the site for the construction compound area as follows:
 - The site should ideally be broadly square or rectangular in shape (i.e. a uniform shape);
 - The site should be strategically positioned to enable it to be able to serve all required aspects of the Proposed Development i.e. close to the centre of the Proposed Development route;
 - The site should ideally be on flat ground and close to the strategic road network to enable it to be accessed by HGVs from the A55.

11.5.5 Further details relating to the site selection of the Penmynydd Road Construction Compound are contained within the Draft Route Alignment Report Wylfa to the Menai Crossing Area (September 2016) (**Document** 9.5).

Site Location and Layout

- 11.5.6 Following the identification and appraisal of a range of potential sites for the construction compound for the OHL works, the construction compound is proposed to be located on a site immediately north of the B5420 and east of Llangefni, close to proposed pylon 4AP072. The construction compound would be accessed via proposed bellmouth D3 off the B5420.
- 11.5.7 The proposed site meets all of the siting criteria set out in the Horlock Rules. The site is in close proximity to the road network, with construction traffic being able to access the site from the A55 via the Llangefni Relief Road which is currently under construction. If this road is completed at the time of the construction of the Proposed Development, it would allow construction vehicles to avoid passing through local residential areas. If the road is not completed by this time, the existing roads would be used.
- 11.5.8 The site is located east of Llangefni, north of the A55 which would be the main arterial route for deliveries onto the island. The site would prove an effective logistics centre to receive bulk deliveries and consolidate loads for onwards distribution to local construction sites.
- 11.5.9 The site, whilst not naturally screened, is relatively remote from sensitive receptors. The large area of open land would allow flexibility to sympathetically locate the main compound so as to further reduce any temporary effects.
- 11.5.10 Towards the north of the field the site is relatively flat and there are no expected engineering challenges in establishing the construction compound in this location. The presence of features of archaeological importance would require the development to be towards the south of the field which has more of a gradient and a high-pressure gas main located within it.

Design Changes following Stage 3 Consultation

11.5.11 At Stage 3 Consultation, two adjacent fields were previously proposed to accommodate the construction compound. That consisted of the field now taken forward as the proposed construction compound site for the DCO

application, plus the field immediately adjacent to the west (immediately adjacent the property of Ty'n y Felin).

- 11.5.12 Following Stage 3 Consultation, National Grid considered a refinement to the proposed site of the construction compound. The western field was subsequently removed from the design, leaving only the eastern field to accommodate the proposed construction compound for the DCO application. The eastern field was selected as the construction compound would:
 - Be further away from the property at Ty'n y Felin;
 - Avoid the potential for additional effects on important hedgerow forming the north western and south eastern boundaries of the western field;
 - It is flatter and more suitable for construction.
- 11.5.13 The refinement to the area for the construction compound is shown at Figure D-4 in **Appendix C** of this document.

11.6 SUMMARY

- 11.6.1 It is considered that as a result of consultation feedback, engagement with PILs and continued design work by the project team, the design changes made in Section A have enabled National Grid to improve the design since Stage 3 Consultation.
- 11.6.2 Substantial design changes are proposed in Section D including the potential change in relation to the property at Dolydd Newydd and the proposed change at the Penmynydd Road Construction Compound. Throughout the route, these larger scale changes have been complimented by more localised amendments that offered the opportunity to improve the design.
- 11.6.3 Most of the design changes (either substantial or more localised) made to the permanent and temporary works as described above have helped to reduce the level of potential environmental and/or socio-economic effects and therefore represent further Mitigation by Design.

12 Section E: Ceint to the Afon Braint

12.1 INTRODUCTION

12.1.1 A summary description of the proposed aspects of the Proposed Development in Section E together with the local design rationale are described below together with a summary of the main amendments to the design following Stage 3 Consultation.

12.2 OVERVIEW

- 12.2.1 In Section E, the proposed section of 4AP OHL would run parallel to and west of the existing section of 4ZA OHL in a south easterly direction; this arrangement would continue for the first part of Section E for four spans over a distance of approximately 1.5 km.
- 12.2.2 At proposed pylon 4AP077, the proposed OHL deviates away from the existing 4ZA OHL and heads towards the A55 west of the village of Star. The crossing of the A55 is proposed in as close a perpendicular manner as possible to reduce the amount of scaffolding that would be required and reduce construction disturbance as far as possible. The proposed section of 4AP OHL would then head back in a south easterly direction towards the proposed operational compound at Braint where the transition to an underground cable tunnel commences in Section F.
- 12.2.3 The length of the remainder of the proposed 4AP OHL between the start of the deviation away from the existing 4ZA OHL at proposed pylon 4AP077 to the end of Section E is approximately 2.8 km. The section of existing 4ZA OHL in Section E would remain in place.

12.2.4 A summary of the proposed OHL works in Section E is summarised in Table 12.1⁶.

Table 12.1: Summary of the Proposed Development in Section E				
	4AP	4ZA		
Number of New Pylons	13	None		
Number of Retained Pylons		12		
Number of Dismantled Pylons				
Route Length of New Line Build	4.36km (4AP073 – 4AP086)			
Route Length of Existing Line Retained		4.29km (4ZA074 – 4ZA086)		
Height of Tallest Retained Pylon		56.1m [4ZA077 & 4ZA086]		
Height of Tallest Proposed Pylon	52.5, [4AP076 & 4AP081]			

12.3 THE ALIGNMENT

- 12.3.1 As the route heads south east at the start of Section E, the separation distance of the two OHLs up to proposed pylon 4AP077 would be the minimum 65 m allowable for safe construction and operation. In this part of the route, the proposed 4AP OHL would pass the curtilage of the property of Fron Isaf at a distance of approximately 30 m.
- 12.3.2 In the northern part of Section E, the proposed 4AP OHL and the existing 4ZA OHL would closely parallel each other, reducing potential visual effects. The pairing of pylons would be achieved here to further reduce the

⁶ All measurements contained within this table are approximate only and do not consider conductor sag.

visual effect, with the exception of proposed pylon 4AP077 where the proposed OHL begins to deviate away from the existing OHL (see 'Pylon Locations' section below).

12.3.3 South of proposed pylon 4AP077, the proposed 4AP OHL would head in a south easterly direction with pylon 4AP078 being positioned to enable the proposed OHL to be routed between the properties of Fron Deg and Tyn Cae. At a distance of approximately 190 m south west of the property of Paradwys, the proposed 4AP OHL would deviate more to the east where it continues in a straight line for three spans up to proposed pylon 4AP082. At this point, tension pylon 4AP082 immediately south west of Garnedd Fawr would be the starting point for the crossing of the OHL over the A55, the A5, and the railway line in a more southerly direction. The proposed 4AP OHL would then continue in a more south easterly direction again, approximately 35 m to the south of the curtilage of Dolfeirig and approximately 90 m south of the curtilage of Rhosbothan and onwards to the end of Section E at the Afon Braint.

Limits of Deviation

- 12.3.4 The LOD being sought for Section E is 100 m, 50 m either side of the proposed alignment as described at Section 4.4 of this document.
- 12.3.5 Restrictions to the LOD are proposed at the following locations:
 - Garnedd Fawr approximately 32 m to avoid any adverse effects of potential oversail of conductors;
 - Dolfeirig approximately 29 m to avoid any adverse effects of potential oversail of conductors;
 - Proposed pylon 4AP086 as set out within the Schedule of Environmental Commitments (**Document 7.4.2.1**) this pylon would be restricted along the alignment to enable the existing woodland to screen the proposed pylon from views from properties to the north, including Rhosbothan.

Pylon Locations

- 12.3.6 The centre-line route alignment (subject to the LOD) in Section E would partially enable the two OHLs to be routed parallel to one another for three spans up to proposed pylon 4AP077.
- 12.3.7 The Proposed Development would achieve paired pylons at three locations (proposed pylons 4AP074, 4AP075, and 4AP076 would be paired with

existing pylons 4ZA075, 4ZA076 and 4ZA077). It is not proposed to achieve paired pylons at proposed pylon 4AP077 and existing pylon 4ZA078 due to the requirement to position proposed pylon 4AP078 to enable the proposed OHL to be routed between the properties of Fron Deg and Tyn Cae.

12.3.8 For the remainder of the Proposed Development in Section E, it is not proposed to achieve paired pylons due to the deviation of the proposed section of 4AP OHL away from the existing section of 4ZA OHL to reach the THH/CSEC site at Braint.

12.4 DESIGN CHANGES SINCE STAGE 3 CONSULTATION

- 12.4.1 A summary of the main amendments to the permanent and temporary design in Section E since Stage 3 Consultation are described below.
- 12.4.2 In some instances, pylon locations and other aspects of the proposed design have been amended a small amount since Stage 3 Consultation (e.g. as a result of an adjacent pylon movement). All amendments to the design have been reviewed in detail by the project team through the consideration of consultation feedback, engineering and environmental considerations.
- 12.4.3 Within this section, proposed specific locations for pylons are referenced for the purpose of illustrating how design changes have been incorporated to reduce potential effects. It should be noted however that these locations are not secured as referenced in section 7.4 of this document. The proposed alignment of the OHL would be subject to LOD to provide a necessary and proportionate degree of flexibility. Where the LOD would be restricted in certain locations to limit potential effects on a specific receptor, this has been indicated in paragraph 12.3.5 of this document.
- 12.4.4 Descriptions have also been included relating to how amendments since Stage 3 Consultation to construction aspects are proposed to reduce potential effects. It should be noted that the referenced access track locations are not fixed within the Order Limits sought, however the bellmouths that would connect access tracks to the highway network are fixed. Consideration has been given to any areas within the Order Limits where the sensitivity of receptors would be greater and effects of access tracks could be more significant. Where appropriate, the location of access tracks in these areas has been restricted and identified within the Schedule of Environmental Commitments (**Document 7.4.2.1**).

Permanent Works

12.4.5 The proposed amendments to the design in Section E since Stage 3 Consultation, resulting in the Proposed Development, are described below.

Proposed Pylon 4AP076

- 12.4.6 Following a PIL request, an amendment was made to proposed pylon 4AP076 following Stage 3 Consultation. The proposed pylon has been moved approximately 15 m to the south to ensure it would be closer to the field boundary. This would result in less agricultural disturbance and maximum ongoing use of the land during operation of the Proposed Development. The amendment would also enable greater synchronisation with the adjacent existing pylon 4ZA077.
- 12.4.7 The amendment is illustrated at Figure E-1 in **Appendix A** of this document.

Alignment between Proposed Pylons 4AP078 - 4AP082

- 12.4.8 A substantial amendment has been made to the alignment of the proposed OHL between proposed pylons 4AP078 and 4AP082 following PIL feedback received at Stage 3 Consultation. The proposed 4AP OHL has been amended to reduce the potential visual effects on the properties at Fron Deg, Tyn Cae, and Paradwys.
- 12.4.9 Previously, proposed pylon 4AP078, positioned between Fron Deg and Tyn Cae, was a tension pylon. The pylon has now been amended to a suspension pylon and the proposed 4AP OHL would now continue its previous alignment for one more span to the next proposed pylon 4AP079. At this location, pylon 4AP079 has been repositioned approximately 120m to the south west and changes from a suspension pylon to a tension pylon.
- 12.4.10 The result of the amendment is that the proposed section of 4AP OHL between proposed pylons 4AP078 and 4AP082 would be further away from the properties to the north, notably the properties at Tyn Cae and Paradwys. The amendment also reduces the angle (from a proposed D55 pylon type to a D33) of proposed pylon 4AP082 closest to the properties at Fron Deg and Tyn Cae, potentially reducing the visual effect on those properties, and ensuring the tension pylon required to necessitate the change in direction towards proposed pylon 4AP082 would be as far away from those properties as possible.
- 12.4.11 The amendment is illustrated at Figures E-2 and E-3 in **Appendix A** of this document.

Proposed Pylon 4AP083

- 12.4.12 An amendment was made to proposed pylon 4AP083 following Stage 3 Consultation. The proposed tension pylon at 4AP083 would be in a visually prominent position approximately 60m from the curtilage of the property at Tyddyn Isaf. The proposed pylon was previously a D55 design which would have been a bulky form. In order to reduce potential landscape and visual effects, a modification has been made to the less bulky D25 pylon type as described in paragraph 7.2.16 of this document.
- 12.4.13 National Grid now proposes to use a 'D33' design for pylon 4AP083. The change in pylon type is considered to be of benefit in this visually prominent location.

Proposed Pylons 4AP084, 4AP085 and 4AP086

- 12.4.14 An amendment has been made to proposed pylons 4AP085 and 4AP086 following Stage 3 Consultation to change the pylon types to low height pylons. The proposed 4AP OHL has been amended at this section to potentially reduce the potential visual effects on the village of Star to the north and views towards Snowdonia and the Llyn Peninsula.
- 12.4.15 To accommodate the change to low height pylons, proposed pylon 4AP084 was required to be amended to a tension pylon.

Temporary Works

- 12.4.16 A number of amendments have been made to the construction design since Stage 3 Consultation, resulting in the Proposed Development. These amendments have been made to both address consultation responses and further work by the project team to reduce environmental and socioeconomic effects whilst ensuring the safe and efficient construction of the Proposed Development.
- 12.4.17 Where proposed pylon locations have been amended as described above, this would subsequently have an impact on the location of the associated pylon working areas and pulling positions. Amendments to these working areas and pulling positions have not been outlined in the section below but are illustrated in **Appendix C** of this document.
- 12.4.18 General amendments made to the design of the construction activities include:
 - In several places, in response to ongoing discussions with affected PILs, construction aspects (e.g. working areas, pulling positions,

scaffold positions, etc) have been revised with the intention to reduce impacts upon agricultural operations wherever possible;

- Construction components (e.g. pulling positions, scaffold positions, etc.) and working areas would be away from difficult topography and more sensitive landform wherever possible;
- Existing agricultural accesses and gaps in hedgerows have been utilised wherever possible, thereby reducing the requirement for additional new access points;
- The Order Limits and working areas have been reduced as far as possible to take into account the above and to reduce the land required to construct, operate, and maintain the Proposed Development;
- Permanent design requirements have discussed with a number of Third Parties and amendments have been made to associated accesses as a result.
- 12.4.19 In addition to the above, a number of more specific amendments to the construction design have been made since Stage 3 Consultation; these are described below.

Working Area at Proposed Pylon 4AP086

12.4.20 The working area at proposed pylon 4AP086 has been restricted to ensure there would be no effects on the woodland to the north.

Bellmouths

12.4.21 Eight bellmouth access points are proposed to enable construction traffic to access the Proposed Development. This is a slight reduction from the nine bellmouths that were proposed at the Stage 3 Consultation design. The proposed amendments to these bellmouth locations are detailed in table 12.2.

Table 12.2: Section E Bellmouth Design Changes					
Bellmouth Location	Function	Design Change and Anticipated Benefits	Location in Appendix C		
Bellmouth E1	Provide access close to proposed pylon 4AP074	Amended to a crossover bellmouth with proposed bellmouth new E2 to the north.	Figure E-1		

Table 12.2: Section E Bellmouth Design Changes				
Bellmouth Location	Function	Design Change and Anticipated Benefits	Location in Appendix C	
Previous Bellmouth E2	Provided access south from an unnamed road to pylon 4AP075	Following the proposed change to bellmouth E1 and the addition of bellmouth E2 to provide a crossover bellmouth over the road, previous bellmouth E2 has been removed.	Figure E-1	
New Proposed Bellmouth E2	Provides access from an unnamed road and a link through to proposed bellmouth D4 to the north	Proposed bellmouth has been added to form a crossover bellmouth with proposed bellmouth E1. Proposed bellmouth E2 and the associated access track would now provide a link through and crossover north to proposed bellmouth D4.	Figure E-1	
Bellmouths E3 and E4	Provide a crossover bellmouth and a link through to bellmouths E1 to the north and E5 and E5a to the south	Moved approximately 195m to the south east following a PIL request to reduce potential impacts on land.	Figure E-2	
New Proposed Bellmouth E5a	Provide access off the A5152, close to the A55	The addition of this proposed bellmouth would enable construction vehicles to access the Proposed Development working areas north of the A55. This amendment would alleviate construction traffic at proposed bellmouth E5 (previously	Figure E-3	

Table 12.2: Section E Bellmouth Design Changes					
Bellmouth Location	Function	Design Change and Anticipated Benefits	Location in Appendix C		
		referenced E7) as it would allow working areas to be accessed from two areas as opposed to one.			
Previous Bellmouths E5 and E6	Provided access north to proposed pylon 4AP077 and south to proposed pylon 4AP078	No longer required and removed due to the repositioning of proposed crossover bellmouth E3 and E4.	Figure E-2		
Bellmouth E5 (previously referred to as E7)	Provided access to the proposed section of 4AP OHL north of the A55 and past the property of Garnedd Isa.	Repositioned approximately 410 m to the north west to create a revised bellmouth (now referenced as bellmouth E5). The repositioned bellmouth and associated access track would reduce the amount of temporary works and potential vegetation loss and also reduce the number of hedgerow crossings required.	Figure E-3		
Bellmouth E7 (previously referred to as E9)	Provides south from Llanddaniel Road to the Braint THH/CSEC	Moved approximately 20m to the north to avoid a horse grave and a paddock in this area.	Figure E-4		

Access Tracks

12.4.22 Following Stage 3 Consultation and the review of feedback received, a number of amendments were made to access proposals for both National Grid works and Third Party works in Section E.

- 12.4.23 The amendments to access proposals have originated from multiple sources, including consultation feedback and ongoing design work by the project team. A number of access proposals have also been necessitated by movements to the operational infrastructure.
- 12.4.24 As highlighted in paragraph 12.4.4, the proposed locations of the access tracks would not be fixed through the DCO, however, a number of the changes proposed would result in a reduction in the potential for environmental or socio-economic effects and are highlighted in this section.
- 12.4.25 It is not proposed to describe all changes to the access proposals within this section in detail, however all proposed amendments to National Grid access tracks in Section E are illustrated in **Appendix C** of this document. Amendments to Third Party access tracks in Section E are illustrated in **Appendix E** of this document.
- 12.4.26 The access track amendments that have been made in Section E are:

National Grid Access Tracks

- Access from Bellmouth D4 (in Section D) to Bellmouth E2 this access has been realigned to create 'along-line' access between the two bellmouths in this area. This realignment would involve the installation of a bridge crossing over a WFD watercourse. The working area at pylon 4AP073 would be accessed through a spur to the east.
- Access between 4AP074 and 4AP075 in response to feedback received from a PIL (and following the removal of previous Bellmouth E2), this access has been realigned to the east to run alongside field boundaries before continuing south to pylon 4AP075.
- Access between 4AP077 and 4AP078 as a result of the relocation of Bellmouths E3 and E4 (to avoid impacting on important hedgerows), the access tracks in this location have been realigned to the east. The amendments to the bellmouths and access tracks in this location has also removed the requirement for previous Bellmouths B5 and B6, reducing the number of accesses connecting to the local highway network in this area.
- Access track associated with new Bellmouth E5a as a result of the inclusion of new proposed Bellmouth E5a, a length of access track has been added to the design to provide access to pylons 4AP078 and 4AP079 from the A55.

- Access from 4AP079 to 4AP082 as a result of the amendment to proposed locations of pylons 4AP078 to 4AP082 and following feedback from a PIL, the access track in this location has been realigned to the south in order to follow the field boundary. The access tracks in this area have also been realigned to cross hedgerows at an angle as close to 90 degrees as practicable to reduce potential loss. This amendment would require the installation of a clear-span bridge to facilitate a crossing over a WFD watercourse directly to the south of proposed pylon 4AP081.
- Access from Bellmouth E7 (previously E9) following feedback from a PIL and the amendment of Bellmouth E7 to avoid impacts on land, a stone wall and a buried horse, the access track in this location has also been realigned from this new location.
- Access between 4AP086 and 4AP087 (in Section F) a bridge crossing has been added to the access track in this area to facilitate the crossing of a WFD watercourse.

Third Party Access Tracks

- Accesses to the north-east and south-west of 4AP074 following the confirmation of engineering requirements, sections of previously proposed Third Party undergrounding has been removed, subsequently removing the requirement for access tracks in this area.
- Access to the east of 4AP078 following the confirmation of engineering requirements, sections of previously proposed Third Party undergrounding has been removed, subsequently removing the requirement for access tracks in this area. This amendment has reduced the order limits in the vicinity of the property Tyn Cae, moving works slightly further away from this receptor.
- Access to the east of 4AP079 following the realignment of pylons 4AP078 to 4AP082, this area of previously proposed Third Party undergrounding would fall outside the Order Limits and therefore no longer be required, subsequently removing the requirement for accesses in this area. This amendment would see construction activities moving further from the properties Paradwys, Garnedd Newydd and Keeper's Lodge.
- Access to the east of 4AP084 an area of Third Party undergrounding has been removed in this location, slightly reducing the required access track in the vicinity of the property Dolfeirig.

- Access track from Bellmouth E7 (previously E9) a length of access track has been added from Bellmouth E7 to the south of 4AP085.
- Access track north of 4AP086 the access track in this location has been realigned and shortened in multiple locations to avoid the necessity to cross field boundaries.

12.5 SUMMARY

- 12.5.1 It is considered that as a result of consultation feedback, engagement with PILs and continued design work by the project team, the design changes made in Section A have enabled National Grid to improve the design since Stage 3 Consultation.
- 12.5.2 Substantial design changes have been made in Section E to move the alignment further away from properties and to introduce low height pylons along a section of the route. Throughout the route, this larger scale change has been complimented by more localised amendments that offered the opportunity to improve the design.
- 12.5.3 Most of the design changes (either substantial or more localised) made to the permanent and temporary works as described above have helped to reduce the level of potential environmental and/or socio-economic effects and therefore represent further Mitigation by Design.

13 Section F: Afon Braint to Pentir

13.1 INTRODUCTION

13.1.1 A summary description of the proposed aspects of the Proposed Development in Section F together with the local design rationale are described below together with a summary of the main amendments to the design following Stage 3 Consultation.

13.2 OVERVIEW

- 13.2.1 In Section F, the proposed section of 4AP OHL is located a little under 1 km to the south-west of the existing 4ZA OHL and continues from Section E in a south easterly direction for approximately 450m (one and a half spans) to a proposed THH/CSEC at Braint where the transition to an underground cable tunnel would commence.
- 13.2.2 The proposed underground cable tunnel would continue in a south easterly direction beneath the Menai Strait for a distance of approximately 4km, at which point the transition back to an OHL connection is proposed at a THH/CSEC at Tŷ Fodol, Gwynedd, approximately 500m south east of the A487 and approximately 2.5km south-east of the Menai Strait. From the operational compound, the proposed OHL connection would continue in a south easterly direction for approximately 1.5km before connecting to Pentir Substation.
- 13.2.3 At Pentir Substation, the connection of the proposed 4AP OHL would be made by constructing an extension on both sides (north western and south eastern extents) of the substation.

13.2.4 A summary of the proposed OHL works in Section F is summarised in table 13.1^7 .

Table 13.1: Summary of the Proposed Development in Section F				
	4AP	4ZA		
Number of New Pylons	5 (+6xFLT Gantries)	None		
Number of Retained Pylons		23 (+2x Gantries at Pentir)		
Number of Dismantled Pylons				
Route length of New Line Build	1.84km (4AP086 – Braint & Tŷ Fodol – Pentir)			
Route Length of Existing Line to be Retained		6.63km (4ZA086 – 4ZA109) 55m Downleads (4ZA109 – Pentir)		
Height of Tallest Retained Pylon		62.2m [4ZA095 & 4ZA096]		
Height of Tallest Proposed Pylon	55.5m [4AP090]			
Height of FLT Gantries	14.9m [Braint, Tŷ Fodol & Pentir]			

13.3 TUNNEL AND ROUTE ALIGNMENTS

13.3.1 To enable the Proposed Development to cross the Menai Strait, a THH/CSEC compound would be required on the Anglesey side of the Menai Strait to enable the transition from OHL to an underground cable tunnel. The identification of a number of different locations for the THH/CSEC north of the Menai Strait and alternative route options to these locations is outlined in Chapter 6 of this document and detailed in the Menai Strait Crossing Report (September 2016) (**Document 9.6**). This document concluded that on balance the Anglesey Central zone, and specifically site

⁷ All measurements contained within this table are approximate only and do not consider conductor sag.

AC6 would be the most appropriate location together with a preference for Menai Strait Crossing Zone 2 as these areas are considered to have fewer potential impacts and provide the best balance between effects on receptors.

- 13.3.2 Of the two possible route options (Option 5B and Option 5C) identified for the proposed 4AP OHL to the proposed location for the THH and CSEC, Option 5C was on balance considered the preferred route option; this is due to the location where the proposed OHL would cross the A55, the A5, and the railway line (this location is at a slightly lower elevation at 48m above ordnance datum (AOD) than Option 5B at 64 m AOD) which would be preferable in views towards Snowdonia for those travelling east on the A55. There was also concern regarding the visual effect of a large angle pylon required south of the railway line for Option 5B.
- 13.3.3 South of the Menai Strait, the Menai Strait Crossing Report (September 2016) (**Document 9.6**) identified a number of potential locations for a second THH/CSEC in Gwynedd; the report concluded that on balance the Gwynedd South zone, and specifically site GS1 would be the most appropriate location for the THH/CSEC. This site is north of the former Nant y Garth landfill would be located within a more wooded landscape.
- 13.3.4 For the short (approximately 1.5km), onward connection from the proposed Tŷ Fodol THH/CSEC to Pentir Substation, the alignment selected would be a direct route; pylon positions have been selected to ensure visual effects would be reduced as far as possible and have also taken technical and other environmental considerations into account.

The Tunnel Alignment

- 13.3.5 The proposed installation technique for the connection is a cable tunnel beneath the Menai Strait between the THH/CSECs at Braint on the northern side of the Menai Strait, and at Tŷ Fodol at the southern side of the Menai Strait.
- 13.3.6 As outlined in Chapter 6, a number of crossing techniques were considered for the crossing of the Menai Strait. These were:
 - Tunnelling;
 - Large Bore Tunnel (sufficient to house two cable circuits plus additional supporting infrastructure);
 - Small Bore Tunnel (sufficient to house a single circuit therefore requiring two separate tunnels);

- Horizontal Directional Drill; and
- Seabed installation (laid either on or in the seabed).
- 13.3.7 Full details in relation to the consideration of crossing techniques are contained within the Menai Strait Crossing Report 2016 (September 2016) (Document 9.6), however a preference for a large bore tunnel was presented at Stage 3 Consultation as it would provide substantial benefits in relation to the potential to reduce environmental and socio-economic effects. In summary, despite being the highest cost solution and the associated technical challenges, the benefits of a long tunnel are considered to be that it would:
 - facilitate the connection being under the AONB;
 - would reduce potential impacts on the SAC that would have been associated with seabed installation in the Menai Strait;
 - would reduce potential impacts on the Registered Parks and Gardens at Plas Newydd and Vaynol;
 - would reduce potential impacts on the socio-economic receptor of the National Trust property at Plas Newydd;
 - protect the iconic view both along the Menai and towards Snowdonia;
 - would result in the least amount of vegetation loss and ancient woodland in this highly sensitive area;
 - would remove the need for groundworks associated with the direct burial of cables and would therefore have the least potential effects on the historic environment, soils and agriculture, and ecology.
- 13.3.8 The cable tunnel and associated shafts would be constructed using one of the primary methods as follows:
 - Using a tunnel bore machine (TBM);
 - Excavation by drill and blast.
- 13.3.9 Further details regarding the installation method for the cable tunnel and associated shafts is provided at within Chapter 3 of the ES (**Document 5.3**) and Chapter 4 of the ES (**Document 5.4**).

13.4 LIMITS OF DEVIATION

OHL

- 13.4.1 The OHL LOD being sought for Section F is 100 m, 50 m either side of the proposed alignment as described at Section 7.4 of this document.
- 13.4.2 A restriction to the LOD at proposed pylon 4AP091 near Pentir Substation has been incorporated to the north to approximately 25 m. This would avoid potential impacts on a Planted Ancient Woodland Site (PAWS).

Tunnel

13.4.3 As described in section 7.4 of this document, the tunnel would be subject to below ground LOD which would provide a necessary and proportionate degree of flexibility to the final alignment of the works. The associated shafts and service tunnels would sit within the parameters of the THH and CSEC sites at Braint and Tŷ Fodol.

Pylon Locations

13.4.4 The centre-line route alignment in Section F (subject to the LOD) would mean that the pairing of pylons in Section F would not be possible due to the distance between the two OHLs.

13.5 DESIGN CHANGES SINCE STAGE 3 CONSULTATION

- 13.5.1 A summary of the main amendments to the permanent and temporary design in Section F since Stage 3 Consultation are described below.
- 13.5.2 In some instances, pylon locations and other aspects of the proposed design have been amended a small amount since Stage 3 Consultation (e.g. as a result of an adjacent pylon movement). All amendments to the design have been reviewed in detail by the project team through the consideration of consultation feedback, engineering and environmental considerations.
- 13.5.3 Within this section, proposed specific locations for pylons are referenced for the purpose of illustrating how design changes have been incorporated to reduce potential effects. It should be noted however that these locations are not secured as referenced in section 7.4 of this document. The proposed alignment of the OHL would be subject to LOD to provide a necessary and proportionate degree of flexibility
- 13.5.4 Descriptions have also been included relating to how amendments since Stage 3 consultation to construction aspects of the Proposed Development

are proposed to reduce potential effects. It should be noted that the referenced access track locations are not fixed within the Order Limits sought, however the bellmouths that would connect access tracks to the highway network are fixed. Consideration has been given to any areas within the Order Limits where the sensitivity of receptors would be greater and effects of access tracks could be more significant. Where appropriate, the use of access tracks in these areas has been restricted and identified within the Schedule of Environmental Commitments (**Document 7.4.2.1**).

Permanent Works on Anglesey

13.5.5 The proposed amendments to the design in Section F on Anglesey since Stage 3 Consultation, resulting in the Proposed Development, are described below.

Pylon Locations

Proposed Pylon 4AP087

13.5.6 An amendment has been made to proposed pylon 4AP087 following Stage 3 Consultation to change the pylon type to a low height lattice pylon. The proposed 4AP OHL has been amended at this section to reduce the visual effects on the village of Star to the north and views towards Snowdonia and the Llyn Peninsula.

Braint THH/CSEC

- 13.5.7 Indicative designs, including layouts and elevations, of the THH/CSEC at Braint were provided at Stage 3 Consultation. Since that time, the design has been developed from an engineering perspective; consideration has also been given to layout, levels, building form and design, landscaping and access. This has been considered alongside consultation responses.
- 13.5.8 The proposed maximum height of the Braint THH/CSEC has been substantially reduced. Further detailed design has concluded that air should be drawn through the tunnel from the Tŷ Fodol shaft in Gwynedd, this being more elevated than Braint. As a result, National Grid does not propose to site ventilation fans at Braint, allowing a reduction in the maximum height of the THH from 12 metres (as originally proposed) down to 8 metres. This design change would substantially help to better accommodate the building in the rural landscape, and increase the effectiveness of screening.
- 13.5.9 In support of the DCO, National Grid has prepared a Design Guide (**Document 7.19**) for the proposed THH/CSEC and permanent site landscaping. This provides details of the design principles that would be followed when finalising the detailed architectural design of the THH at Braint. The Guide provides information on suitable materials and built form,

seeking to reflect local building styles. As a result of this further design development the THH would be better assimilated into the local landscape. The Guide also provides details of the landscaping scheme at the compound site, which would, in the medium and long term, help to visually soften and screen the THH/CSEC.

Permanent Works on Gwynedd

13.5.10 The proposed amendments to the design in Section F in Gwynedd since Stage 3 Consultation, resulting in the Proposed Development, are described below.

Pylon Locations

Proposed OHL Alignment between the Tŷ Fodol Operational Compound and Proposed Pylon 4AP091

- 13.5.11 The alignment of the proposed OHL between the proposed at Tŷ Fodol THH/CSEC has been amended to reduce the visual impact of the connection into Pentir Substation and to facilitate the entry into Tŷ Fodol. Proposed pylons 4AP088 and 4AP089 have been repositioned to the south (by approximately 38 m and 22 m respectively); proposed pylon 4AP090 has been repositioned approximately 22 m to the north; this ensures the alignment of the proposed 4AP OHL would remain as straight as possible in accordance with Holford Rule 3.
- 13.5.12 The realigned 4AP OHL would be closer to the wooded valley to the south and would bring the OHL further away from the residential properties to the north, namely Fodol and Hafodol Uchaf. The realignment would also reposition proposed pylon 4AP090 further away from Garth Farm to the south and alter the pylon design from a bulkier tension pylon to a suspension pylon.
- 13.5.13 An amendment has been made to proposed pylon 4AP088 following Stage 3 Consultation to change the pylon type to a low height lattice pylon. The proposed 4AP OHL has been amended at this section to reduce the effects on views, particularly from the north. The remaining OHL to Pentir have closer public viewpoints (crossing Fodolydd Lane) and additional nearby residential properties. Therefore, the use of low height pylons in those locations, with more conductors at a lower height in a horizontal formation, could result in increased effects in near-distance views.
- 13.5.14 The amendment is illustrated at Figures F-4 and F-5 in **Appendix A** of this document.

<u>Tŷ Fodol THH/CSEC</u>

- 13.5.15 Indicative designs, including layouts and elevations, of the THH and CSEC at Tŷ Fodol were provided at Stage 3 Consultation. Since that time, the design has been developed further from an engineering perspective; consideration has also been given to layout, levels, building form and design, landscaping and access. This has been considered alongside consultation responses.
- 13.5.16 In order to better accommodate the THH/CSEC in the local landscape and help to reduce wider visual effects, the indicative design now proposed includes the creation of reduced development site levels, stepping finished levels from the surrounding ground to the CSEC, and again to the site level for the THH compound. This is illustrated in the Design Plans (**Document 4.13**). By cutting into the existing slope in this way the apparent height of external equipment and the THH (above ordnance datum) would be reduced, and the extent and magnitude of effects upon views reduced.
- 13.5.17 In support of the DCO, National Grid has prepared a Design Guide (Document 7.19) for the Proposed Tunnel Head Houses & Permanent Site Landscaping. This provides details of the design principles that would be followed when finalising the detailed architectural design of the THH at Tŷ Fodol. The Guide provides information on suitable materials and built form, seeking to reflect local building styles.
- 13.5.18 Whilst the maximum height of the THH building at Tŷ Fodol can only be reduced to 11 metres due to the need to accommodate ventilation fans, the Design Guide proposes that the built form should comprise four elements, largely defined by varied roof profiles, so as to reduce the apparent mass of the building. This effect would be further enhanced through the use of varied external cladding materials, to visually break up the larger elevations. As a result of this further design development the THH would be a less significant feature in the local landscape.
- 13.5.19 The Guide also provides details of the landscaping scheme at the compound site, which would, in the medium and long term, would help to visually soften and screen the THH/CSEC.

Pentir Substation

13.5.20 At Pentir Substation, the connection of the proposed 4AP OHL is proposed to be made by constructing an extension on both sides (north western and south eastern extents) of the substation. Extensions on both sides of the substation are preferred to a single large extension as this would enable some of the existing vegetation on either side of the substation to be used for screening. The equipment proposed as part of the substation extension would be supported from below on insulated columns rather than suspended from gantries above, as much of the older substation equipment is. In this way the overall profile of the substation extensions would be substantially lower than that of the existing substation, allowing landscape screening to be effective in a shorter timeframe.

- 13.5.21 The extent of the north-western extension to the substation has been reduced from approximately 141 metres to approximately 52 metres due to an alternative solution that provides system security without the requirement to add an additional bus section and relocate one of the existing transmission circuits to this new section to the north west of the existing substation. The smaller extension required to the north west fits within the land plot more efficiently, removing the need to alter the direction of the busbars which lengthened the extension required. The reduced length of the extension would result in reduced construction effects and release additional areas for the implementation of peripheral screen planting.
- 13.5.22 As set out in the Design Guide (**Document 7.19**) that accompanies National Grid's application for development consent, National Grid proposes to implement a landscaping scheme around the extended substation, so as to better assimilate the site within the landscape, and screen views of the site from nearby properties and public viewpoints. This would also give rise to important local nature conservation benefits.

Temporary Works

- 13.5.23 A number of amendments have been made to the construction design since Stage 3 Consultation, resulting in the Proposed Development. These amendments have been made to both address consultation responses and further work by the project team to reduce environmental and socioeconomic effects whilst ensuring the safe and efficient construction of the Proposed Development.
- 13.5.24 Where proposed pylon locations have been amended as described above, this would subsequently have an impact on the location of the associated pylon working areas and pulling positions. Amendments to these working areas and pulling positions have not been outlined in the section below but are illustrated in **Appendix C** of this document.
- 13.5.25 General amendments made to the design of the construction activities include:

- In several places, in response to ongoing discussions with affected PILs, construction aspects (e.g. working areas, pulling positions, scaffold positions, etc) have been revised with the intention to reduce impacts upon agricultural operations wherever possible;
- Construction components (e.g. pulling positions, scaffold positions, etc.) and working areas would be away from difficult topography and more sensitive landform wherever possible;
- Existing agricultural accesses and gaps in hedgerows have been utilised wherever possible, thereby reducing the requirement for additional new access points;
- The Order Limits and working areas have been reduced as far as possible to take into account the above and to reduce the land required to construct, operate, and maintain the Proposed Development;
- Permanent design requirements have discussed with a number of Third Parties and amendments have been made to associated accesses as a result.
- 13.5.26 In addition to the above, a number of more specific amendments to the construction design have been made since Stage 3 Consultation; these are described below.

Pentir Construction Compound

- 13.5.27 A temporary construction compound would be required in Section F to facilitate the construction of the OHL elements of the construction. This compound would be located in Gwynedd directly south of Pentir Substation.
- 13.5.28 The location of the Pentir OHL Construction Compound has remained the same as at the Stage 3 Consultation. The size of the Pentir OHL Construction Compound remains broadly similar to that shown at Stage 3 Consultation, however an amendment is proposed to also locate the Substation Compound (previously proposed to the east of Pentir Substation) to be within the OHL Compound to the south.
- 13.5.29 This amendment would have the benefit of no longer using the area to the east of Pentir Substation for the Substation Compound, allowing it to be used as additional space for bunding and landscaping early in the construction phase, allowing planting to become established and reducing potential environmental effects.

Bellmouths

- 13.5.30 13 bellmouth access points are proposed to enable construction traffic to access the proposed development. Three of these bellmouths would be located on the Anglesey side of Section F and 10 would be located in Gwynedd. This is a slight reduction from the 15 bellmouths that were proposed at the Stage 3 Consultation design.
- 13.5.31 The proposed amendments to these bellmouth locations are detailed in Table 13.2.

Table 13.2: Section F Bellmouth Design Changes				
Bellmouth Location	Function	Design Change and Anticipated Benefits	Location in Appendix C	
Bellmouth F1	Provide access south from Pont Ronwy to Braint THH/CSEC	Bellmouth F1 has been slightly to the north west to improve visibility	Figure F-1	
New Proposed Bellmouth F1c	Provide an alternative access point for HGV and LGV construction vehicles, including HGV and LGV vehicle movements for the Braint operational compound/tunnel enabling works.	A new proposed bellmouth (F1C) is proposed approximately 260m north of bellmouth F1. This proposed bellmouth would alleviate pressure at proposed bellmouth F1 and ensure construction vehicles would be able to access the Braint Construction Compound from the A5 and A55 to the north and the A4080 to the south. A substantial benefit of the inclusion of bellmouth F1c would be the removal of construction traffic past properties at Pont Ronwy, reducing potential disturbance on these receptors.	Figure F-1	
Previous Bellmouth	Provide access close to proposed	No longer required and removed as suitable	Figure F-5	

Table 13.2: Section F Bellmouth Design Changes					
Bellmouth Location	Function	Design Change and Anticipated Benefits	Location in Appendix C		
F12	pylon 4AP091	access could be achieved from alternative bellmouths F9 or F14.			
Previous Bellmouth F13	Provide access to Proposed Development north from the B4547	No longer required and removed. The extent of spoil removal arrangements associated with drilling works at the Tŷ Fodol Construction Compound and associated traffic movements have confirmed that the access route would no longer be required; the other bellmouths proposed in this location provide sufficient capacity. The removal of this bellmouth and its associated access track would reduce the level of disturbance during construction and reduce the amount of habitat affected by works.	Figure F-5		
Bellmouth F15	Provide access to the works at Pentir substation	No longer required and removed. Suitable access could be achieved from Bellmouth F14	Figure F-5		

Access Tracks

13.5.32 Following Stage 3 Consultation and the review of feedback received, a number of amendments were made to access proposals for both National Grid works and Third Party works in Section F.

- 13.5.33 The amendments to access proposals have originated from multiple sources, including consultation feedback and ongoing design work by the project team. A number of access proposals have also been necessitated by movements to the operational infrastructure.
- 13.5.34 As highlighted in paragraph 13.5.4, the proposed locations of the access tracks would not be fixed through the DCO, however, a number of the changes proposed would result in a reduction in the potential for environmental or socio-economic effects and are highlighted in this section.
- 13.5.35 It is not proposed to describe all changes to the access proposals within this section in detail, however all proposed amendments to National Grid access tracks in Section F are illustrated in **Appendix C** of this document. Amendments to Third Party access tracks in Section F are illustrated in **Appendix E** of this document.
- 13.5.36 The access track amendments that have been made in Section F are:

National Grid Access Tracks

- Access between 4AP086 (in Section E) and 4AP087 a bridge crossing has been added to the access track in this area to facilitate the crossing of a WFD watercourse.
- Access associated with Bellmouth F1C as a result of the addition of Bellmouth F1C, an additional length of access track has been included in the Proposed Development design to connect into the Braint THH/CSEC which would have the substantial benefit of removing the requirement for construction traffic to be routed past the properties at Pont Ronwy. This access track has also been aligned to avoid a wooded area north-west of Llwyn-Ogan.
- Access from Bellmouth F2 to Braint THH and CSEC this access has been realigned slightly to the north-east to avoid potential impacts on a Category A tree in the area.
- Access between 4AP090 and Pentir Substation this access has been amended following a PIL request to remove the track from a field to the south and realign to follow the route of an existing track through an area of woodland. To enable sufficient access, some tree loss and soil disruption loss would be required, however upon consideration of the benefits associated with the realignment (including those attributed with the removal of bellmouth F13 and its associated access track – see Table 13.2) and the implementation of mitigation planting to compensate for the loss of trees in this area

would mean that the realignment would be, on balance, preferable. The loss of any ancient woodland would be restricted to the extent of the temporary access track as set out in the Schedule of Environmental Commitments (**Document 7.4.2.1**).

Third Party Access Tracks

- Access near Bellmouth F1c an additional area of Third Party undergrounding has been incorporated which has necessitated the inclusion of an additional access track in this area.
- Access near Bellmouth F2 an area of Third Party undergrounding has been added in this area which has led to the requirement for the addition of an associated access track.
- Access in area between Tŷ Fodol THH/CSEC and Pentir Substation – a substantial number of changes have been made to the Third Party works in this area. These amendments have been made to facilitate extensions to the proposed undergrounding of Third Party assets. As part of these amendments, a section of previously proposed undergrounding and associated access track has been removed from the ravine, the removal of these works would avoid potential impacts associated with trenching through a watercourse and woodland.

13.6 SUMMARY

- 13.6.1 It is considered that as a result of consultation feedback, engagement with PILs and continued design work by the project team, the design changes made in Section A have enabled National Grid to improve the design since Stage 3 Consultation.
- 13.6.2 Substantial design changes have been made in Section A including changes to the Braint and Tŷ Fodol THH/CSECs and Pentir Substation. Throughout the route, this larger scale change has been complimented by more localised amendments, including the introduction of low height lattice pylons that offered the opportunity to improve the design.
- 13.6.3 Most of the design changes (either substantial or more localised) made to the permanent and temporary works as described above have helped to reduce the level of potential environmental and/or socio-economic effects and therefore represent further Mitigation by Design.

14 Conclusion

14.1 CONCLUSION

- 14.1.1 As outlined in the early chapters of this document, the form and design of the Proposed Development has evolved throughout the life of the project and has been influenced by feedback received during and following all consultation undertaken including Stage 1, Stage 2, and Stage 3 Consultation. The project team has continually reviewed the design to identify opportunities to reduce potential environmental and socio-economic effects.
- 14.1.2 This document has intended to show that as a result of consultation feedback, engagement with PILs and continued design work by the project team, the design changes along the whole route have enabled National Grid to incorporate Mitigation by Design to considerably improve the design since Stage 3 Consultation.
- 14.1.3 Some of the more substantial changes proposed since Stage 3 Consultation which would reduce potential significant effects on multiple receptors include:
 - the amendment to the alignment as a result of the purchase of the property at Cae Adda Fach in Section A;
 - the amendment to the alignment as a result of the purchase of the property at Bryn Alaw in Section B;
 - the potential to amend to the alignment as a result of the inclusion of options A and B and discussions in respect of the property at Dolydd Newydd in Section D;
 - the production of the Design Guide (Document 7.19) and the proposed amendments to the design of Braint and Tŷ Fodol THH/CSECs;
 - the reduction in the scale of previously proposed extensions at Wylfa and Pentir Substations.
- 14.1.4 In addition to these proposed changes, opportunities to improve the potential synchronisation of the route have been identified which would

result in a more parallel and more synchronised design than that proposed at Stage 3 Consultation.

14.1.5 Most of the design changes (either substantial or more localised) made to the permanent and temporary works as described above have helped to reduce the level of potential environmental and/or socio-economic effects and therefore represent further Mitigation by Design.

Appendix A

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	This plan is illustrative and comines data from the S42 and DCO design phases. Any dimensions are typical or illustrative dimensions. Actual apparatus may differ in style model and size					
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	will affect accuracy of the measurement units and should not be scaled against. The OS Boundary Line (Local Authority Boundary) data has been mapped against
	the US 1:10,000 Scale Raster mapping and therefore will not be accurate when displayed at a different scale.
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	For further explanation please see DCO plans guidance document.
	Coordinate System: British National Grid
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	A JUL 2018 DESIGN REPORT - APP B DT MF RP
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	FROM THE ORDNANCE SURVEY MAP BY PERMISSION OF ORDNANCE SURVEY ON BEHALF OF THE CONTROLLER OF HER MALESTY'S
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FOR CONTINUATION SEE SHEET 1

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	A JUL 2018 DESIGN REPORT - APP C DT MF RP
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	THE NATIONAL GRID
	(NORTH WALES CONNECTION PROJECT) ORDER COMPARISON OF PROPOSED DEVELOPMENT AND
	STAGE 3 CONSULTATION DESIGN
	FIGURE C-1
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	"X' prefix on pylon number denotes an existing pylon to be removed.
	T' suffix on pylon number denotes a temporary pylon. New Bellmouths onto Public Highways are labelled by section (e.g.A1).
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	THE NATIONAL GRID (NORTH WALES CONNECTION PROJECT) ORDER
	COMPARISON OF PROPOSED DEVELOPMENT AND STAGE 3 CONSULTATION DESIGN
	NATIONAL GRID CONSTRUCTION - OPTION A FIGURE C-2
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	Application Number EN020015
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THE NATIONAL GRID (NORTH WALES CONNECTION PROJECT) ORDER COMPARISON OF PROPOSED DEVELOPMENT AND STAGE 3 CONSULTATION DESIGN NATIONAL GRID CONSTRUCTION - OPTION A FIGURE C-3 ISLE OF ANGLESEY COUNTY COUNCIL

nationalgrid

FIGURE C-3 1:2,500



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	EXISTING LATTICE PYLON TO BE REMOVED EXISTING LATTICE PYLON TO BE MODIFIED EXISTING LATTICE PYLON NOT AFFECTED
	CONDUCTOR PULLING POSITION
	PYLON WORKING AREA SCAFFOLD WORKING AREA
Sec. 19	
	CONSTRUCTION COMPOUND
	Notes
	This drawing is scaled at paper size A1, therefore any prints taken at smaller sizes will affect accuracy of the measurement units and should not be scaled against.
	Inte US boundary Line (Local Authority Boundary) data has been mapped against the OS 1:10,000 Scale Raster mapping and therefore will not be accurate when displayed at a different scale.
	'X' prefix on pylon number denotes an existing pylon to be removed. 'T' suffix on pylon number denotes a temporary pylon.
A	New Bellmouths onto Public Highways are labelled by section (e.g A1). This plan is illustrative and comines data from the S42 and DCO design phases.
	Any dimensions are typical or illustrative dimensions. Actual apparatus may differ in style, model and size.
11/6	
11	Coordinate System: British National Grid
All -	Sheet X Centroid Coordinate: 255904 Sheet Y Centroid Coordinate: 367783 0 50 100 200
	BACKGROUND MAPPING INFORMATION HAS BEEN REPRODUCED FROM THE ORDNANCE SURVEY MAP BY PERMISSION OF ORDNANCE SURVEY ON BEHALF OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE @ CROWN COPYRIGHT ORDNANCE SUBJECT
	NATIONAL GRID ELECTRICITY - 100024241. NATIONAL GRID ELECTRICITY - 100024241. NATIONAL GRID GAS - 100024886.
ฟกา	A JUL 2018 DESIGN REPORT - APP C DT MF RP Issue Date Remarks Drawn Checked Annroved
	Title
. /	THE NATIONAL GRID (NORTH WALES CONNECTION PROJECT) ORDER COMPARISON OF PROPOSED DEVELOPMENT AND
1	STAGE 3 CONSULTATION DESIGN NATIONAL GRID CONSTRUCTION - OPTION A
	FIGURE F-5 GWYNEDD COUNCIL
	nationalarid
	Application Number
	EN020015 National Grid Drawing Reference
\$12/	

 Scale
 Street
 Street
 Izon

 12,500
 A1
 FIGURE F-5
 A