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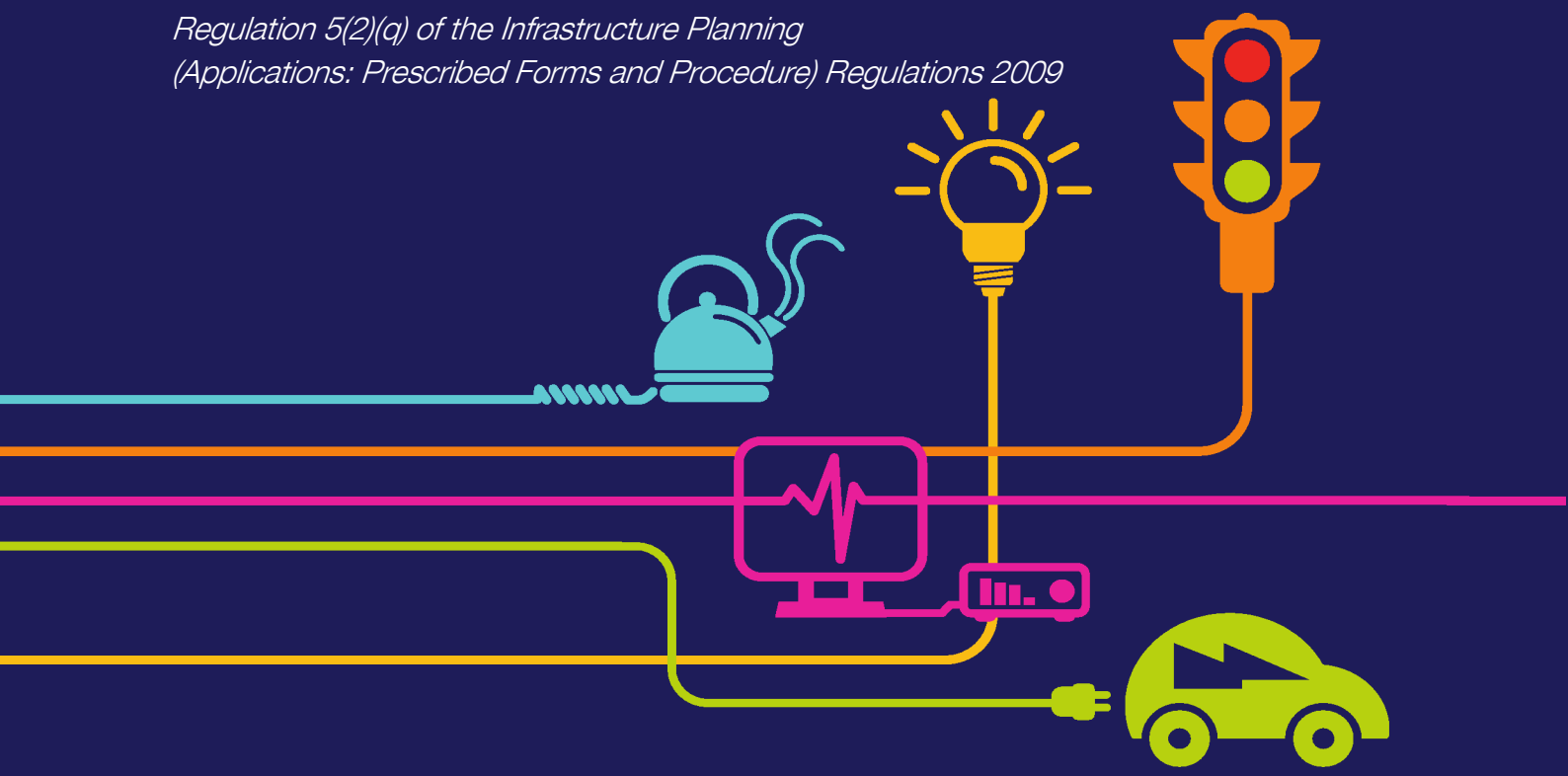
DOCUMENT 7.18

Back Check of Wylfa-Pentir Design Decisions

National Grid (North Wales Connection Project)

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



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North Wales Connection Project

Back-Check of Wylfa Pentir

Design Decisions

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Contents

1 Introduction

1.1 PURPOSE OF THE REPORT

1.1.1 National Grid is currently seeking a Development Consent Order to allow the construction of a new electricity transmission connection between existing electricity substations at Wylfa and at Pentir, in north west Wales. As this comprises the development of a new 400kV overhead electricity line (OHL) it constitutes a Nationally Significant Infrastructure Project (NSIP) as defined by the Planning Act 2008. The connection is referred to throughout this Report as the Proposed Development.

1.1.2 The design for the Proposed Development has been progressively refined since design options were first presented to the public in 2012.

1.1.3 Throughout the design and consultation process National Grid has committed to back-check the decisions taken at earlier stages. With the support of environmental and technical advisers, National Grid has considered whether policy changes, additional information and the detailed assessment of likely effects from the final design proposal would alter earlier design decisions.

1.1.4 This Report summarises the main conclusions from that review, and supports the application for a Development Consent Order, needed to allow the construction and operation of the Proposed Development.

1.2 STRUCTURE OF REPORT

1.2.1 This Back-Check Report is divided into four main Parts.

1. Introduction & Background

1.2.2 Chapter 1 of the Report explains the purpose of the Report, and describes the significant design decisions that it addresses. It also references other documents submitted in support of the DCO application, where aspects of the design back-check process are reported. It concludes with an explanation of the approach adopted for the back-check.

2. Information Considered

1.2.3 Chapter 2 of the Report provides an overview of potentially material changes since previous design decisions were taken. These changes fall under five main areas:

- the nature and location of existing and new contracted connections to the electricity transmission system in North Wales;
- consultation feedback.
- planning policy, statute and planning precedent;
- the availability of more detailed baseline and design information (from environmental, socio-economic and geological surveys and the emerging assessment findings based on the final DCO design and proposed mitigation measures);
- National Grid acquisition of land; and
- significant developments by third parties.

3. Back-Check Outcomes

1.2.4 Chapters 3 to 6 of the Report summarise the outcome of the back-check process in light of the changes detailed in Chapter 2. Design decisions are addressed in reverse chronological order, with the outcome of the back-check of more recent decisions being reported first. In this way it can be better understood how the outcome of more detailed design decisions has helped to inform the back-check of higher-level design decisions such as the choice of route corridor.

4. Summary

1.2.5 Finally, Chapter 7 of the Report provides a summary of the main conclusions.

1.3 BACKGROUND INFORMATION

1.3.1 National Grid owns the electricity transmission system in England and Wales, and operates the system throughout Great Britain. As the holder of the transmission licence in Wales, National Grid has a statutory duty to offer to connect any new power station operator which applies to connect to the transmission system.

1.3.2 Having received an application to connect to the transmission system, National Grid has been contracted to connect Horizon Nuclear Power's proposed Wylfa Newydd nuclear power station to the system at Wylfa, on the north coast of the island of Anglesey. The capacity of the existing system between Wylfa and the main interconnected system is insufficient to allow the connection of the power station without the development of a further connection from Wylfa.

1.3.3 National Grid has set out how it develops proposals for new connections in the published document "Our approach to the design and routeing of new electricity transmission lines". This document explains the main development stages for any new connection. These include:

- The identification of 'strategic options' and selection of a preferred strategic option detailing where and how the power might be transmitted
- The identification of broad 'route corridors' and selection of a preferred corridor within which the connection might be routed
- The identification of narrower 'routes' within the preferred 'corridor' and the selection of a preferred route for the connection
- The appraisal and selection of appropriate technologies for the transmission of power, whether by overhead line or underground (or subsea) cables, is considered at each of the design stages, informed by appraisal of the environmental, socio-economic, technical and cost considerations, community and stakeholder feedback.

1.4 PREVIOUS DESIGN DECISIONS AND SCOPE OF THIS REPORT.

1.4.1 As mentioned in the opening paragraphs, the design for the new connection has been progressively refined since design options were first presented in 2012. The main design decisions and the appraisals that supported them have been set out in a range of design-related Reports that have been published by National Grid since 2012. These Reports have supported public and stakeholder consultation at three main stages of the project's development.

1.4.2 The main design decisions and the Reports that explained them are detailed in the following paragraphs. The document that contains the outcome of the back-check of each design decision is also described.

Initial Selection of a Preferred Technology and Route Corridor

1.4.3 In 2012 National Grid undertook a first stage of public consultation. To inform the consultation National Grid published a Strategic Options Report (**Document 9.8**). This Report identified a preliminary preferred design that involved the creation of a new onshore connection between Wylfa and Pentir Substations. At the time of publication the preferred option assumed the connection between the two sites would comprise an 'overhead line (with appropriate mitigation, potentially including the use of underground technologies)'. The conclusions outlined in the Strategic Options Report have been back-checked in 2015, 2016 and in 2018, and an updated version of the Report forms part of the current application for Development Consent.

1.4.4 In 2012, in addition to the strategic options, National Grid also presented a number of potential route corridors between Wylfa and Pentir within which the new connection might be routed. The location and extent of these corridors is shown in Figure 1.1 below. Consultation feedback and further appraisal informed the identification in 2015 of a preferred corridor for the new connection; the 'orange' corridor in Figure 1.1. This corridor broadly followed the route of an existing overhead electricity transmission line between the two substations (also shown on Figure 1.1) and varied in width according to local sites or features that might constrain the routeing of an overhead line. National Grid has reviewed whether the selection of this preferred corridor remains appropriate in light of changes and information received since 2015. The main conclusions from this review are set out in Section 6 of this Report.

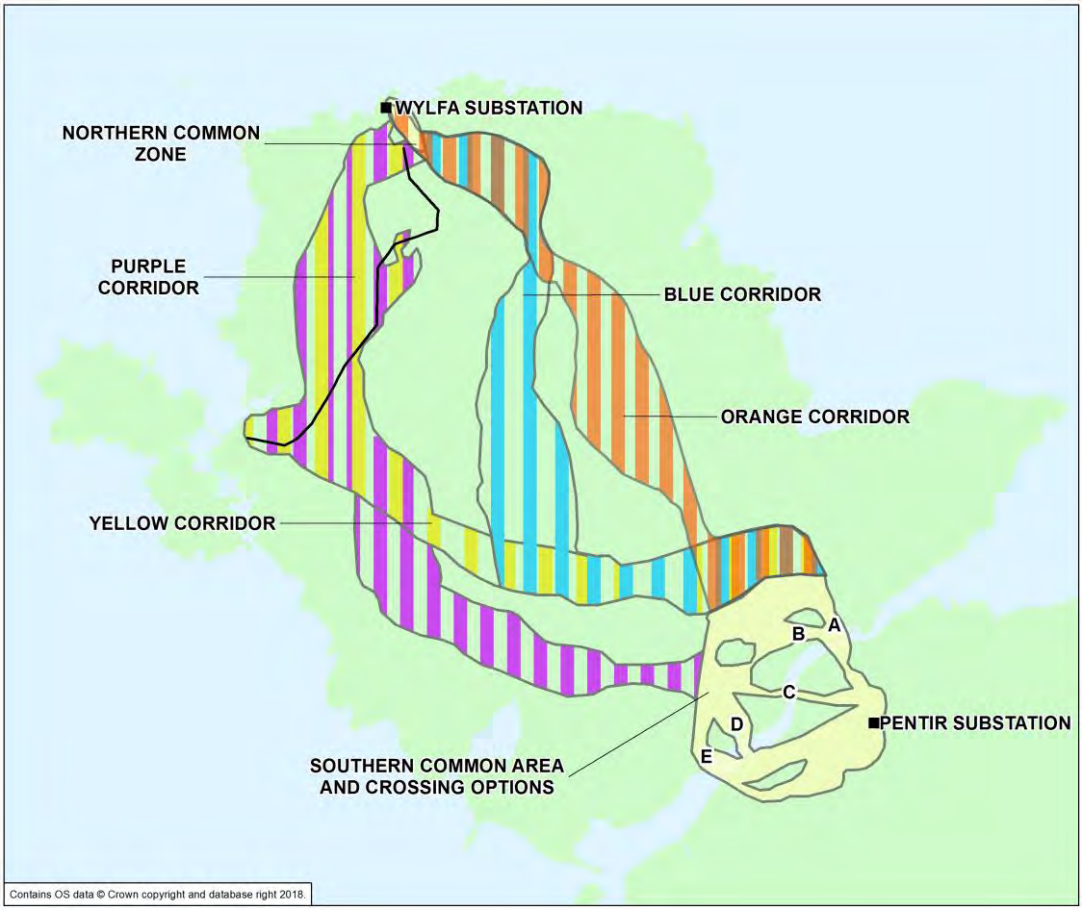

Figure 1.1. Route Corridor Options

Initial Selection of a Preferred Route and Review of Technology

1.4.5 In 2015 National Grid undertook a second round of public consultation to seek comments on possible alignments for the new connection within the preferred corridor. To support the consultation National Grid published two documents. The first document set out the reasons for the selection of the preferred route corridor (Wylfa to Pentir Preferred Route Corridor Selection Report. (**Document 9.2**)). That Report also considered the need for revisions to the proposed use of an overhead line that might mitigate the effects of the connection, especially in those areas where the potential adverse landscape and visual effects were of more serious concern; for example, in the vicinity of the AONB and Menai Strait.

1.4.6 The appraisal work (summarised in the Wylfa to Pentir Preferred Route Corridor Selection Report) and the feedback received in 2012 led National Grid to conclude that an overhead line route through the Anglesey Area of Outstanding Natural Beauty (AONB) and across the Menai Strait would not comply with National Planning policies relating to overhead electricity lines, and would conflict with National Grid's duties to have regard to the

preservation of amenity. Hence National Grid advocated the use of underground cables (UGC) beneath the AONB in the vicinity of the Strait, and this is reflected in the final design for which Development Consent is being sought. The location and extent of the AONB and Menai Strait in relation to the Orange Route corridor and original Menai Crossing corridors is illustrated at Figure 1.2 below.

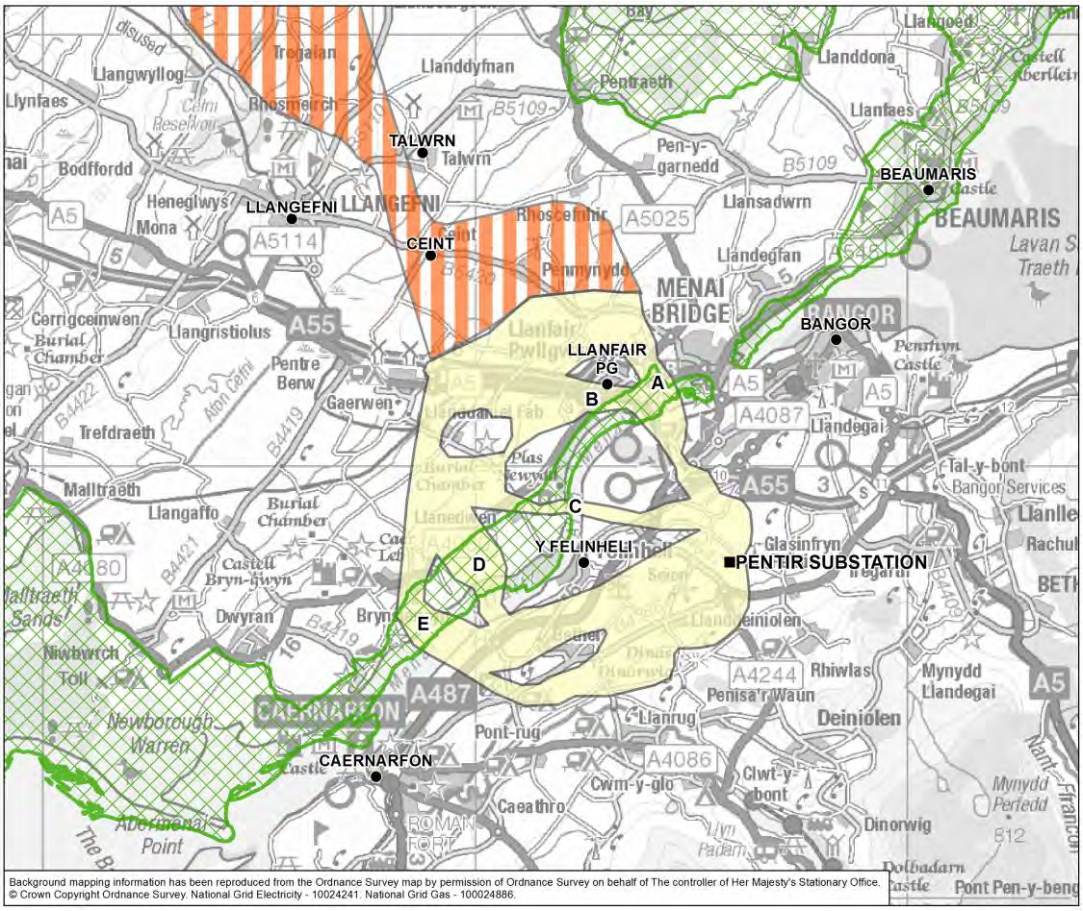

Figure 1.2. Preferred Route Corridor and Anglesey AONB at Menai

1.4.7 The decision not to seek Development Consent for a new overhead line crossing in the Menai area has also been reviewed in light of changes since 2015, especially the further geological, technical and cost information now available. The main conclusions from the review are also summarised in this Report.

1.4.8 The Wylfa to Pentir Preferred Route Corridor Selection Report considered three further areas where sensitive sites or features might potentially have experienced significant adverse landscape and visual effects as a result of any connection. These areas ran between: Wylfa and Llanfechell; Rhosgoch and Rhosybol and; in the Maenaddwyn and Capel Coch area and are illustrated in Figure 1.3 below.

Figure 1.3. Preferred Route Corridor and Technology Choice

1.4.9 In all three locations, National Grid concluded that an overhead line route could be identified that would comply with all relevant legislation and planning policies. Whilst no environmental, socio-economic or technical considerations appeared to preclude the use of buried cables, it was considered that the significant additional cost associated with this mitigation would not be justifiable in the context of National Grid's statutory duties. National Grid has reviewed whether the earlier conclusions relating to the use of underground cable in these areas remains appropriate in light of changes and information received since 2015. The main conclusions from this review are set out in this Report.

1.4.10 The second document published in support of the 2015 consultation (the 'Wylfa to Pentir Route Options Report October 2015') set out a range of potential overhead line route options within five sections of the preferred corridor. That Report also set out broad search areas for the installation of underground cables through the Anglesey AONB in the vicinity of the Menai Strait. These Sections of the Route corridor and the UGC Search Area in the vicinity of the Menai Strait are illustrated in Figure 1.4 below. The back-

check of the Route Option selection in each of these sections of the route is provided at Section 5 of this Report.

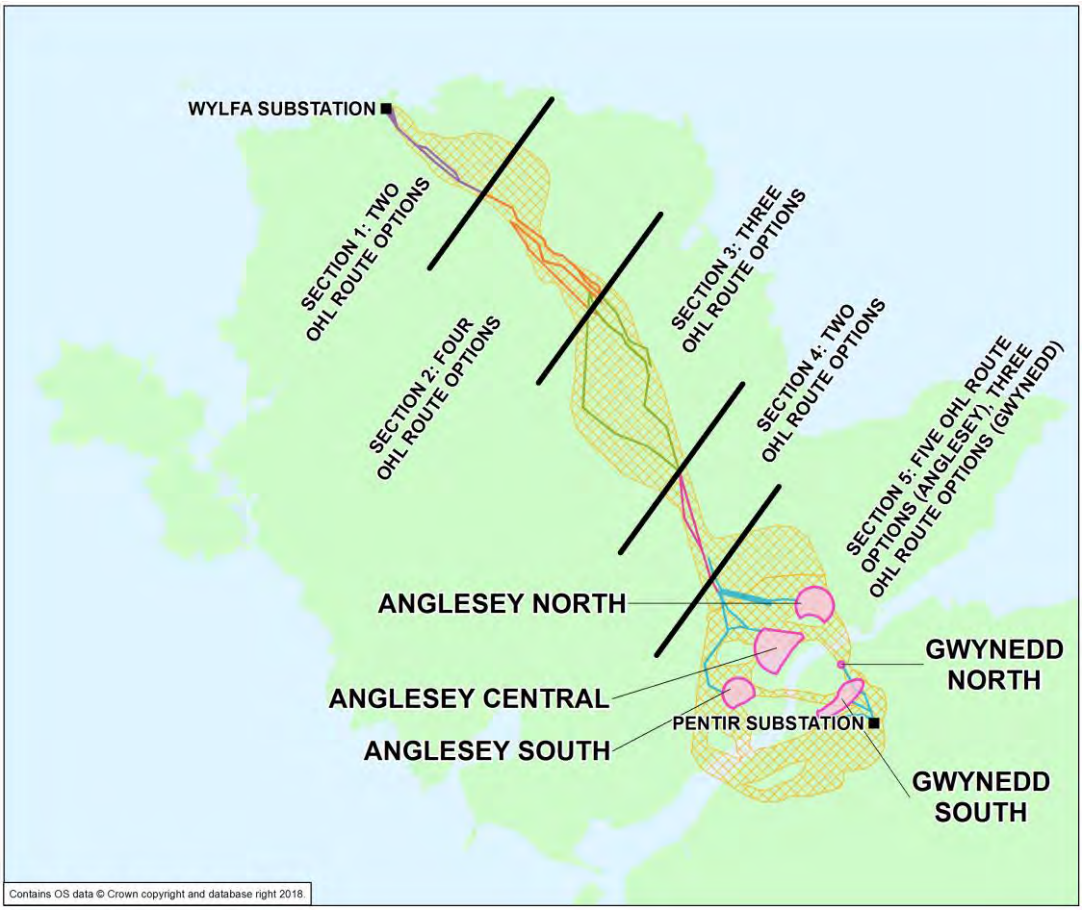

Figure 1.4. OHL Route Options within the Preferred Corridor.

1.4.11 The community and stakeholder feedback received in response to the 2015 consultation, together with the results of further appraisal, informed the selection of a preferred alignment for both the overhead line and underground cable sections of the new connection.

Detailed Design Proposal.

1.4.12 In October 2016 National Grid undertook a third stage of consultation in accordance with the statutory requirements set out in sections 42, 47 and 48 of the Planning Act 2008. At this time National Grid presented a detailed design proposal for community and stakeholder review and feedback. This consultation was supported by the publication of three further Reports.

1.4.13 The Preferred Route Option Selection Report (**Document 9.4**) explained the rationale for the selection of a preferred route for the new overhead line between Wylfa and the point where the line transitions onto underground

cables to cross the AONB and Menai Strait, south west of Llanfairpwll. This preferred route is illustrated in Figure 1.5 below. National Grid has reviewed whether the earlier conclusions relating to the selection of the preferred route remains appropriate in light of changes and information received since 2016. The main conclusions from this review are set out in this Report.

Figure 1.5. Preferred OHL Route Option.

1.4.14 The Draft Route Alignment Report (**Document 9.5**) set out the detailed design rationale that had been applied to arrive at a final proposed design for consultation, and how environmental and socio-economic considerations had influenced that design. Since this final period of consultation National Grid has had regard to all feedback received, and as a result many localised changes to the proposed design have been made. These changes are described in the Design Report (**Document 7.17**) that accompanies the DCO submission. This iterative process of design refinement since the last stage of consultation has acted as a back-check of the detailed design (e.g. final alignment, pylon types and positions, construction and access design)

within the preferred route. These detailed design considerations are therefore not addressed as part of this Report.

1.4.15 The Menai Strait Crossing Report (**Document 9.6**) was the third design–related Report published at the time of the 2016 consultation. That Report set out earlier consultation feedback and more recent appraisal work and explained how these had influenced the selection of a proposed design for the crossing of the Anglesey AONB and the Menai Strait. The location and extent of this underground crossing is illustrated in Figure 1.5 above The Report also considered the various means of installing underground transmission cables in the area and concluded that the construction of a deep tunnel was likely to be the most appropriate means of doing so. National Grid has reviewed whether the proposed design for the crossing remains appropriate in light of changes and information received since 2016. The main conclusions from this review are set out in this Report.

Scope of the Back-Check

1.4.16 Throughout the development of the North Wales Connection Project National Grid has considered whether the results of further appraisal and engineering design, combined with stakeholder feedback and changes to relevant planning policy and statute, alter the earlier design decisions taken. Prior to the submission of an application for a DCO, National Grid has undertaken a final review of these earlier design decisions.

1.4.17 In the case of the selection of a preferred strategic option this final review is documented in the form of a revised and updated Strategic Options Report that accompanies the application. Consideration of alternative Strategic Options therefore falls outside the scope of this Back-Check Report. However, in respect of a fully underground connection between Wylfa and Pentir (considered as Strategic Option 3 in the SOR), the back-check on the localised extent of underground cables, as summarised in this Report, serves to underpin the conclusions set out in the SOR.

1.4.18 Where some of the earlier design decisions have been challenged or previously dismissed design options have been suggested in the most recent round of consultation feedback, National Grid has had regard to these comments. This feedback is documented in the Consultation Report (**Document 6.1**) which reports the outcome of what is a consultation-led back-check of these design decisions. Where National Grid has amended the design in response to feedback, this design change is also described and the supporting appraisal summarised in the Design Report (**Document 7.17**).

1.4.19 Where this consultation feedback addressed in the Consultation Report relates to significant design decisions, the outcome of the back-check is also summarised in this Back-Check Report. However, this Report summarises the outcome of a wider back-check of all significant design decisions i.e. including those decisions which weren't raised or challenged in feedback.

1.4.20 For ease of reference, a summary of the significant design decisions and the document in which the back-check of each is reported is set out in Table 1.1 below.

Table 1.1: Summary of Reporting of Back-Check Outcomes

Design Decision	Where Outcome of Back-Check is Reported
Selection of Strategic Option (Wylfa – Pentir)	Strategic Options Report (**Document 7.2**)
Selection of Preferred Route Corridor (Orange corridor within Anglesey)	Back-Check of Wylfa – Pentir Design Decisions Report (this Report)
Selection of Preferred Route (within the preferred corridor)	Back-Check of Wylfa – Pentir Design Decisions Report (this Report) and Consultation Report (**Document 6.1**) (in part)
Choice of transmission technology between Wylfa and Pentir (extent of overhead line and underground cables proposed)	Back-Check of Wylfa – Pentir Design Decisions Report (this Report) and Strategic Options Report (**Document 7.2**) and Consultation Report (**Document 6.2**) (in part)
Detailed Design along the preferred route (Wylfa – Pentir) (e.g. final alignment, pylon types and positions, construction and access design)	Consultation Report (**Document 6.2**) and Design Report (**Document 7.17**). (Outside the scope of this Report)

1.5 APPROACH

Design Revisions

1.5.1 During all three stages of consultation National Grid has received many responses that suggested amendments to the proposed design of the connection between Wylfa and Pentir. Where a design change was called for, a design response was drafted and then subject to appraisal to identify whether, on balance, it was appropriate to adopt the change.

1.5.2 Where adopted these individual design choices and the reduced effects that they give rise to are detailed in the Design Report (**Document 7.17**) and previously published design-related reports as follows:

- Preferred Route Corridor Selection Report. (**Document 9.2**)
- Route Options Report (**Document 9.3**) and Preferred Route Options Selection Report (**Document 9.4**)
- Draft Route Alignment Report (**Document 9.5**) and Menai Strait Crossing Report (**Document 9.6**)

1.5.3 This Report draws on the conclusions reached in the Design Report and earlier Reports where they relate to the review of the main design decisions considered herein.

1.5.4 The DCO design for which consent is being sought contains embedded mitigation resulting from the changes made to the designs proposed during the three stages of consultation. These changes may serve to confirm assumptions about mitigation or reduce effects below those that were anticipated at the time previous design decisions were made.

Environmental & Socio-economic Assessment

1.5.5 In addition to considering whether design changes have served to alter previous design decisions, National Grid has now completed a detailed Environmental Impact Assessment, Habitat Regulations Assessment and other studies in support of the final DCO application. The greater level of knowledge and confidence surrounding the likely effects of the Proposed Development have also been used to inform the back-check of previous design decisions.

1.5.6 As well as more detailed environmental and socio-economic information, National Grid also has more detailed information concerning the anticipated costs of the proposed connection as a result of more detailed engineering

design work and survey data. This greater understanding of likely costs, particularly as it relates to the crossing of the Anglesey AONB and Menai Strait have also been considered as part of the back-check process.

Legislation and Policy Review.

1.5.7 In addition to updated cost, environmental and social-economic information, National Grid has undertaken a review of potentially relevant legislative and policy changes since the previous design decisions were made. On review, judgements were made as to whether any of these changes were potentially material to the back-check of previous design decisions.

Review of Environmental and Socio-economic sites and features.

1.5.8 National Grid has undertaken a review of designated and allocated sites and features across the wider study area between Wylfa and Pentir, first considered when identifying potential route corridors for the connection in 2012. Both the extent and reasons for designation of new and existing sites were considered.

Multi-Disciplinary Challenge and Review.

1.5.9 A review was undertaken with inputs from National Grid's technical and environmental advisors, to consider whether any of the changes identified as part of the above reviews should cause the earlier design decisions to be altered or whether those changes serve to further support those decisions.

1.5.10 In addition to undertaking this review in relation to design options considered at the time a previous design decision was taken, National Grid has considered whether any of the more significant design changes requested during consultation might also alter the design decision made.

1.5.11 These requests specifically relate to the localised use of underground cables in areas where concerns were raised or alternative Overhead Line (OHL) route options. National Grid appraised the environmental, socio-economic, cost and technical performance of these alternative designs and considered whether, on balance, they offered a more appropriate design than that which now forms the basis for the design of the Proposed Development.

Summary Reporting.

1.5.12 The outcome of the review of previous design decisions is summarised in this Report, which explains whether changes since those decisions were first taken would lead to those decisions being altered. National Grid

believes that this approach to the review and back-check of previous design decision is robust and proportionate. This review and back-check exercise has helped National Grid to confirm that the design for which a DCO is now sought is the most appropriate means of addressing the project need case, having regard to the relevant matters including consultation feedback, planning policy and National Grid's statutory duties.

2 Summary of Information Considered.

2.1 INTRODUCTION

2.1.1 Consideration has been given to potentially material matters and changes that have occurred since the previous design decisions were taken.

2.1.2 These potentially material matters and changes are reported in this Chapter of the Report together with brief commentary about the status of some of the more significant policy tests against which the Proposed Development should be judged.

2.1.3 Where information has not altered, National Grid has had regard to the appraisal findings published in previous documents relating to design decisions when undertaking the back-check exercise. These documents include the Route Corridor Identification Report (**Document 9.1**), the Preferred Route Corridor Selection Report (**Document 9.2**), the Route Options Report (**Document 9.3**), the Preferred Route Option Selection Report (**Document 9.4**) and the Menai Strait Crossing Report (**Document 9.6**).

2.2 NATIONAL GRID'S STATUTORY DUTIES

2.2.1 National Grid has several statutory duties which it must satisfy when developing the national electricity transmission system. Some of the main considerations are summarised below.

2.2.2 None of these statutory duties have changed since previous design decisions were taken and therefore, whilst all design decisions back-checked in this Report have been considered in the context of these duties, the influence of these duties on those earlier decisions has not changed.

Economic Duties

2.2.3 Section 9(2) of the Electricity Act 1989 requires National Grid to "*develop and maintain an efficient, co-ordinated and economical system of electricity transmission*".

2.2.4 National Grid is regulated by the Office of Gas and Electricity Markets (OfGEM), which sets the level of charges that National Grid is allowed to

make for the use of the transmission system. These charges are indirectly passed on to consumer bills, so OfGEM also seeks to prevent unnecessarily high levels of cost when developing the transmission system.

2.2.5 These statutory and licence obligations to develop the transmission system economically and efficiently are important considerations for National Grid. It is generally considered that bringing forward development proposals that are materially more costly than alternatives for which consent could reasonably be secured would be uneconomic and contrary to this duty.

Duty to Protect the Environment

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

"have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and or protecting sites, buildings and objects of architectural, historic or archaeological interest; and shall do what it reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside on such flora, fauna, features, sites, buildings or objects."

2.2.7 As a statutory undertaker, National Grid also has other duties relating to amenity and environmental considerations.

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

2.2.9 These statutory duties have not altered since previous design decisions were taken, and continue to form an important framework for the back-check of those decisions.

Stakeholder, Community and Amenity Policy

2.2.10 National Grid's Stakeholder, Community and Amenity Policy sets out how the company will work with stakeholders and communities to meet the environmental duties placed on it by Schedule 9 of the Electricity Act. National Grid has reviewed and re-published this Policy since the earlier design decisions considered in this Report were taken. The back-check exercise has been undertaken having regard to the latest version of the Policy document.

2.3 LEGISLATION AND PLANNING POLICY

2.3.1 A review of the planning policy considered previously has been undertaken and a summary is provided below. A number of legislative changes made since previous design decisions were taken have also been considered, but these have largely been reflected in the analysis of planning policy and are therefore not explicitly referred to below.

National Planning Policy Analysis

2.3.2 National Policy Statements (NPS) set out Government policy for the delivery of Nationally Significant Infrastructure Projects (NSIPs) and are of primary importance to the decision-making process. NPSs for Energy set out the Government's policy for delivery of major energy infrastructure under the Planning Act 2008.

2.3.3 Six NPSs for energy infrastructure were designated by the Secretary of State in July 2011. The relevant NPSs for transmission infrastructure are the Overarching NPS for Energy (EN-1) and the NPS for Electricity Networks Infrastructure (EN-5). Together they provide the primary basis for decision making on an application for development consent.

2.3.4 NPS EN-1 and EN-5 have not been amended since previous design decisions were taken and therefore, whilst all design decisions back-checked in this Report have been considered in the context of these national planning policies, the influence of these Policy Statements on those earlier decisions has not altered.

2.3.5 The following changes to Welsh national planning policy have been made since the earlier design decisions were made, and the back-check exercise has had regard to these updated policies:

- Wales Spatial Plan 2008;

- Planning Policy Wales Edition 9 November 2016 superseded editions referred to in the Options and Routeing Reports;
- Technical Advice Notes (TAN) TAN12; Design, (March 2016) and TAN24; The Historic Environment (May 2017) have been published in Wales since earlier design decisions were taken. Welsh Government advice set out in these Notes has been considered as part of the back-check exercise.

Local Planning Policy Analysis

2.3.6 There has been no change to the following documents since previous design decisions referenced in this Report were taken:

- New Nuclear Build at Wylfa: Supplementary Planning Guidance - Adopted July 2014;
- Môn a Menai Action Plan (Welsh Assembly Government, 2008);
- Increasing the Economic Benefits of the Môn-Menai Coast: An Action Plan (Scott Wilson, 2007); and
- Wind Turbines and Pylons. Guidance on the Application of Separation Distances from Residential Properties (Gillespies, 2014).

Development Plan Status

2.3.7 In determining applications for Development Consent for nationally significant infrastructure projects, the adopted Local Development Plan may be a relevant consideration. The Anglesey and Gwynedd Joint Local Development Plan (JLDP) 2011-2026 has been adopted by both planning authorities, coming into effect on 31st July 2017. This new plan has superseded a number of increasingly dated development plans: the Gwynedd Structure Plan 1993 (as it applied to Anglesey); Ynys Môn Local Plan (adopted December 1996); (the Stopped) Ynys Môn Deposit Unitary Development Plan (unadopted 2005); and the Gwynedd Unitary Development Plan 2001 – 2016 (adopted 2009).

2.3.8 This single development plan has provided a more relevant development framework against which previous design decisions for the North Wales Connection have been reviewed. The development plan has updated site allocations: to direct development proposals; afford protection from development for nationally and internationally designated sites and; provide greater definition of locally important sites and areas where development proposals should be subject to greater scrutiny.

2.3.9 No significant new development sites considered material to previous design decisions have been adopted in the new Local Development Plan.

2.3.10 However, within Gwynedd and Anglesey the designation of a number of Special Landscape Areas (SLA) (where previously much of Anglesey was so designated) was considered material to the back-check. The designated SLAs were identified by the authorities using a clear set of criteria, informed by both desktop analysis and field survey. This provided a robust evidence base for the selection of sensitive areas of landscape where local development proposals should be subject to greater control. Although the Secretary of State should pay particular attention to SLAs in determining an application for Development Consent, 'local landscape designations should not be used in themselves to refuse consent, as this may unduly restrict acceptable development' (paragraph 5.9.14 of NPS EN1).

AONB Management Plan

2.3.11 The Anglesey AONB Management Plan Review 2015 – 2020, completed in late 2015, has reviewed and updated the AONB Management Plan 2009 - 2014. The Vision and Strategy for Anglesey AONB identifies the objectives, policies and management required to attain the Vision for the AONB by steering change in a positive and sustainable way.

2.3.12 The objectives are designed to direct management across the whole AONB and form the strategic framework for the designation between 2015 and 2020. The Vision and Strategy for the AONB are broken down into six themes within which policies and sub policies have been developed.

- Enhancing Countryside and Coastal Character
- Maintaining Nature and the Environment
- Supporting Opportunities for Visiting and Enjoying the AONB
- Maintaining the Living and Working Landscape
- Raising Awareness and Appreciation
- Developing the Ecosystem Approach

2.3.13 Under the 'Enhancing Countryside and Coastal Character' theme, 'Management Objective 3: Development' states '*Planning Policies will ensure that all development within and adjacent to the boundary of the AONB is compatible with the aims and objectives of the designation and that new developments enhance local character'.* Detailed policies include:

- **CCC 3.1** All development proposals within and up to 2 km adjacent to the AONB will be rigorously assessed to minimise inappropriate development which might damage the special qualities and features of the AONB or the integrity of European designated sites

- **CCC 3.2** All new developments and re-developments within and up to 2 km adjacent to the AONB will be expected to adopt the highest standard of design, materials and landscaping in order to enhance the special qualities and features of the AONB. Proposals of an appropriate scale and nature, embodying the principles of sustainable development, will be supported

- **CCC 3.3** Ensure that planning policies reflect the statutory duty of the Council to conserve and enhance the special qualities and features of the AONB

- **CCC 3.4** Continue to encourage the under grounding of existing and proposed power and telephone lines.

2.3.14 The Anglesey AONB Management Plan Review 2015 – 2020 has been considered as part of the back-check exercise. Policies relating to the control of development that might affect the AONB are reflected in the JLDP.

Other Legislative Changes

2.3.15 The following changes to Welsh legislation have been made since the earlier design decisions were made, and where relevant the back-check exercise has had regard to this updated legislation:

- Planning (Wales) Act 2015

- Historic Environment (Wales) Act 2016

- Environment (Wales) Act 2016 The Act requires National Grid as a statutory undertaker to maintain and enhance biodiversity in the exercise of its work within Wales, so far as this is consistent with National Grid's works.

- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

2.3.16 In addition, a number of stakeholders have queried National Grid's approach to considering the Well-being of Future Generations (Wales) Act 2015. National Grid's approach to this legislation is summarised below.

The Well-being of Future Generations (Wales) Act 2015

2.3.17 The Well-being of Future Generations (Wales) Act was introduced by the Welsh Government in 2015. The Welsh Government has identified a number of challenges facing Wales, including climate change, poverty, health inequality, jobs and economic growth. The Act aims to improve the social, economic, environmental and cultural well-being of the people of Wales, as well as Wales as a Country. It requires certain public bodies in Wales to place the well-being of society and sustainable development at the heart of decision-making and long-term planning.

2.3.18 The Act does not apply to private businesses which operate in Wales, including National Grid. Nevertheless, National Grid has considered the objectives and goals set out in the Act whilst undertaking the back-check of previous design decisions, and has published a Well-being Report (**Document 5.27**) explaining how the Proposed Development accords with the spirit and goals of the Act.

2.3.19 The Report concludes that the Proposed Development would have no adverse significant effects related to the well-being goals. It also finds that the Proposed Development would have a positive effect related to the globally responsible Wales (energy security) goal as a result of the reinforcement of the transmission network and enabling the connection of new low carbon generation and renewable energy.

2.4 RECENT DEVELOPMENT CONSENT DECISIONS

2.4.1 Since a number of the main design decisions were taken on the North Wales Connection, the Secretary of State has confirmed Development Consents Orders for four new overhead electricity lines that are Nationally Significant Infrastructure Projects. These decisions have been reviewed to confirm National Grid's understanding and interpretation of the policies set out in NPS EN-1 and EN-5. This has helped when confirming whether the design of the Proposed Development can reasonably be shown to comply with national planning policy when judged against other design options.

2.4.2 A summary of each of the four projects and of the consent decisions is set out below.

Hinkley Connection; Development Consent granted January 2016

2.4.3 This DCO granted consent for a new connection to allow the proposed new nuclear power station at Hinkley Point in Somerset to connect to the transmission system. The connection comprises the construction of a 48 kilometre 400 kV overhead line between Bridgwater and Seabank. This line

is being constructed using a combination of both lattice steel and T-pylon designs. In addition, approximately eight kilometres of the new connection is being buried within and either side of the Mendip Hills Area of Outstanding Beauty (AONB). Parts of the new overhead line are predicted to give rise to significant adverse visual effects.

2.4.4 As part of the Connection, some 65 km of existing 132 kV overhead line owned by the Distribution Network Operator will be removed between Bridgwater and Avonmouth and a further eight kilometres of 132 kV overhead line from Nailsea to Portishead will be put underground.

2.4.5 The decision letter confirming the decision to grant Development Consent for the project, stated:

the Secretary of State considers that there is a compelling case for authorising the Application given the national need for the proposed Development and that the potential adverse local impacts of the Development do not outweigh the benefits of the proposed scheme. The Secretary of State is content that making the Order would be consistent with NPS EN-1 and EN-5.

North Wales Windfarm Connection Development Consent granted July 2016

2.4.6 The Development would provide a new 17.4km 132kV overhead electricity distribution connection, comprising a new OHL of double wood poles, between the North Wales Wind Farms collector substation near Clocaenog Forest and SP Manweb's existing St Asaph Substation. The Development is located within the counties of Conwy and Denbighshire.

2.4.7 The decision letter confirming the decision to grant Development Consent for the project, commented on the judgement that had been reached regarding the relative costs of OHL and alternative UGC options, and the weighing of these considerations against the predicted adverse landscape and visual effects:

The Secretary of State notes that the Applicant concluded that the summary ratio is estimated to be in the range of 1.94 to 2.43 so that the value of lifetime costs for the underground option was seen by the Applicant to be approximately twice that of the overhead line [ER 4.5.44]. The ExA identified that for a 25 year connection this would equate to approximately an additional £16.6m [ER 4.5.93].

The Secretary of State notes the ExA's conclusion that moderate (and therefore significant) adverse effects would arise in relation to landscape

and visual impact from the Development [ER 5.2.102], and agrees with this conclusion. However, the Secretary of State agrees with the ExA's conclusion that the adverse landscape and visual impact effects would not lead to a level of harm which is sufficient to outweigh the need for the Development [ER 5.2.102] and is not satisfied that the benefits of undergrounding the connection would clearly outweigh the extra economic impacts. The Secretary of State agrees with the ExA's conclusion that the requirements of EN-1 and EN-5 have been met and agrees with the ExA's recommendation that there are no reasons on landscape and visual impact grounds not to make the Order.

Brechfa Windfarm Connection; Development Consent granted October 2016

2.4.8 This connection would connect the consented Brechfa Forest West Wind Farm southwards to an existing overhead line located approximately 10km south of Carmarthen. The connection comprises the construction of approximately 25.3km of 132kV overhead line supported by wooden poles and approximately 3.6km utilising underground cables. The route passes through the Towy Valley Special Landscape Area, where Western Power Distribution proposed to largely employ underground cables.

2.4.9 The decision letter confirming the decision to grant Development Consent for the project, commented on calls for the whole of the route to be placed underground;

The Secretary of State agrees with the ExA's conclusion that, given the evidence presented, undergrounding of the whole route would not be justified. The ExA considered that the undergrounding of the whole route would not be justified because the associated additional costs (>3 times) of undergrounding would not be proportionate or a cost effective option and the proponents were not persuasive in the evidence they provided in making a case for the suitability of undergrounding in terms of "serious concerns" on landscape and visual impacts.

Richborough Connection; Development Consent granted August 2017

2.4.10 The Richborough Connection project involves the construction of a new 400kV overhead electricity line between Richborough and Canterbury in Kent. It will connect the Nemo Link® (an electricity link between Belgium and the UK) to the electricity transmission system. The project includes the following main works: construction of a 20km 400kV overhead line comprising lattice steel pylons and the associated removal of UK Power Networks' existing 132kV line. The route does not cross any nationally designated landscapes, but in part runs adjacent to a locally designated

Special Landscape Area. Parts of the new line were assessed as giving rise to significant adverse visual effects.

2.4.11 The decision letter confirming the decision to grant Development Consent for the project, stated:

the Secretary of State is satisfied that the decision to make the Order would be consistent with the Government's policy objectives, as set out in EN-1 and EN-5, and that there is a national need for the Development – as it would enable delivery of the Nemo Link interconnector and the development of new electricity transmission infrastructure of the type proposed in the NPSs

The ExA [Examining Authority] (ER 5.2.138 – 5.2.142) did not consider that there were arguments to support the undergrounding of the Development along any parts of the proposed route. The Secretary of State agrees that the arguments put forward by the Applicant and endorsed by the ExA show that the undergrounding of the proposed Development either in whole or in part was not required.

2.5 CONSULTATION FEEDBACK

2.5.1 National Grid has received substantial feedback from stakeholders and local communities to all three stages of consultation undertaken during the evolution of the Proposed Development.

2.5.2 All feedback received throughout the development of the project has been reviewed and National Grid has had regard to the outcome of these reviews when undertaking the back-check exercise.

2.5.3 The consultation process and feedback received is summarised below and more detail is provided in the Consultation Report (**Document 6.1**).

Process of reviewing and responding to consultation feedback

2.5.4 The process of reviewing and responding to consultation feedback is explained in the Consultation Report (**Document 6.1**) at section 3.14 of the report. This process is summarised briefly below.

2.5.5 Once consultation responses were received they were logged, then analysed and reported upon by Dialogue by Design (DbyD). DbyD is a specialist data analysis company that works with many organisations in the public and private sectors to handle responses to large or complex consultations.

Thematic Approach to Analysing Feedback

2.5.6 National Grid received a significant amount of feedback in response to the three stages of consultation, and as a result, adopted a thematic approach to analysing feedback for each stage of consultation. 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 feedback received. Following the identification and categorisation of the comments, National Grid reviewed how the feedback received might influence the development of the Project. This involved a multi-disciplinary review of feedback including having regard to engineering, planning, environmental, property and community considerations.

2.5.7 Consultation Feedback Reports published after Stage 1 and Stage 2 consultation, together with the final Consultation Report (**Document 6.1**) that supports the DCO application, summarise the feedback received during consultation under themes and sub-themes and provides a response under each feedback summary.

How Changes Suggested through Consultation Feedback were Considered

2.5.8 Some feedback contained specific requests to change or amend the proposals. In addition to the analysis undertaken by DbyD, consultation responses were also read by dedicated members of the Project team to ensure that all specific requests to change or amend the proposals were identified for consideration. Many of these types of requests came from landowners and tenants, referred to as Persons with an Interest in Land (PILs) under the Planning Act 2008.

2.5.9 These requests to change or amend the proposals were fed back to the Project design team who reviewed options available to amend the proposals in response to the feedback received. The design team established if the amendments were technically achievable and considered associated potential effects which could occur from changing the proposals. The design team considered each of the suggested amendments and where appropriate the suggested amendments were made.

2.5.10 The Consultation Report considers feedback received during the Stage Three 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. As explained above, National Grid has set out its response to feedback and any suggested changes under each of the feedback

summaries within the relevant chapter of the Consultation Report. Where a specific change has been suggested, National Grid explains how it has 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 in the Consultation Report.

How Feedback on Earlier Stages in the Project Development Process was considered

2.5.11 Some consultation feedback received during the Stage Three Consultation also commented on earlier decisions, for example requesting that National Grid reconsiders decisions on the strategic options, route corridor or route options or suggesting localised changes to the technology proposed, including the use of buried cables or different designs of pylon. Of particular note in the context of this review of previous Wylfa – Pentir design decisions are the following themes and comments:

- Respondents (including a petition signed by 21 people) called for the whole of the connection to be placed underground due to the landscape and visual effects that a new overhead line would give rise to together with potential socio-economic and health impacts. Respondents add that burying cables has been affordable elsewhere, that the additional cost per householder over time would not be much, and that the longer-term costs to the environment, tourism industry and local community should be taken into account.

2.5.12 Some respondents requested specific sections of the route to be underground. This included:

- Calls for the use of underground cable between Wylfa and Llanfechell, partly to reduce the cumulative impacts of the Wylfa Newyddd and the North Wales Connection projects.
- Calls for the use of underground cable in the vicinity of Rhosgoch and Rhosybol
- Calls for the use of underground cable to the north and east of Capel Coch
- Calls to extend the length of underground cabling in the vicinity of the Anglesey AONB and Menai Strait, to avoid overhead transmission lines running to the north and south of the village of Star, and to continue the underground cables to Pentir rather than

develop a section of overhead line between a new compound and the existing Pentir Substation.

2.5.13 National Grid has had regard to this feedback in reaching the conclusions set out in the updated SOR (**Document 7.2**), supported by the conclusions set out in this back-check Report relating to more localised use of underground transmission cables.

2.5.14 Other issues raised by respondents included:

- A number of respondents called for previously considered route options within the preferred corridor to be adopted.
- Many respondents challenged the current overall route proposals. In some cases, respondents expressed general opposition or queried the decision-making process, in particular what they perceive to be the overriding focus on cost.
- A small number of respondents stressed the need for National Grid to consider future developments in local energy generation and to design a scheme that would have capacity to cope with additional transmission demands, to avoid the need for further new lines in the future.

2.5.15 Other specific routeing suggestions included:

- use the existing 132kV line from Wylfa towards Holyhead and then down to Penrhos or build a new route from Wylfa to Holyhead
- follow a main highway from Wylfa to Valley and then along the A55, since this route would provide easy access to all pylons;

2.5.16 The requests received through consultation feedback were passed onto the design team and fed into the back-checks of previous design decisions referenced in this Report to ensure that National Grid had due regard to all feedback received to arrive at the most appropriate overall design solution.

2.5.17 More detail regarding the feedback received in response to the Stage Three Consultation (together with the Stage One and Two non-statutory consultations) is included in the Consultation Report (**Document 6.1**) and is therefore not repeated here.

2.6 OTHER DEVELOPMENTS

2.6.1 A number of other developments have been considered as part of the Inter-Project Cumulative Effects assessment (**Document 5.20**). Those of particular note in respect of the back-check of design decision discussed in this Report are summarised below and their locations are shown at Figure A2.1 in Appendix A of this Report.

Llanbadrig Solar Farm

2.6.2 This is a proposed solar photovoltaic plant located on land adjacent to Rhyd Y Groes, Rhosgoch in the north of Anglesey. The plant together with associated equipment, infrastructure and ancillary works was granted consent in 2017. It has a consented capacity of 49.99 MW with a 100MWH battery storage capacity. Whilst close to the northern boundary of the Orange and Blue Route Corridors, it is considered that this development would have little influence on the back-check of Route Corridor or Route Option choice because it falls beyond both of the identified route corridor boundaries and the Solar Farm would therefore not restrict the Proposed Development nor vice versa.

Rhyd-y-Groes Windfarm Repowering

2.6.3 Planning permission has been granted to repower Rhyd-y-Groes Wind Farm located between Cemaes and Amlwch. This would involve the replacement of the current 24 turbines with 11 new turbines. The repowered site would have a slightly increased output of 9.9MW. Whilst close to the northern boundary of the Orange and Blue Route Corridors, it is considered that this development would have little influence on the back-check of Route Corridor or Route Option choice because it is sited far enough from the edge of both route corridors. The Wind Farm would therefore not restrict the Proposed Development nor vice versa. The removal of redundant turbines has been considered as part of the inter-project cumulative effects assessment.

Llangefni Relief Road

2.6.4 This is a strategically important infrastructure scheme designed to help facilitate major developments in Anglesey and to mitigate the impact of traffic in Llangefni town centre. The location of the Link Road is shown on Figure A.2.1 in Appendix A, together with the location of the proposed main OHL construction compound which forms part of the Proposed Development.

2.6.5 The scheme consists of four sections. Sections 1 and 2 were begun in March 2016 and completed in March 2017. They consist of the construction of a new 1.5 km road from Coleg Menai Llangefni Campus to the B5420 Lon Penmynydd linking through to the existing Bryn Cefni Business Park Road.

2.6.6 Section 4 (a new roundabout junction for the A5114 and the Bryn Cefni Industrial Estate Road) was the next stage to be constructed. Construction was started in May 2017 and it was opened to traffic in December 2017.

2.6.7 Funding to enable the delivery of Section 3 (from the Bryn Cefni Industrial Estate Entrance Roundabout off the A5114 to section 1 and 2 of the link road) was announced in January 2018 and construction of this final section began in March 2018. All sections of the Link Road will therefore be open for use by construction traffic prior to commencement of National Grid's proposed development.

2.6.8 The completion of the Link Road has the potential to influence the selection of the preferred route corridor as it provides an improved route for commercial vehicles travelling to the centre of Anglesey from the A55. Both the Blue and preferred Orange corridors pass through the centre of the island north of the A55.

A5025 Upgrades

2.6.9 Associated with the development of the Wylfa Newydd Power Station are proposed on and off -line highways improvements to the existing A5025 'A' road. These works include local diversions, widening, reconstructing and resurfacing the road from Valley to the Power Station Site.

2.6.10 The completion of the A5025 upgrades has the potential to influence the selection of the preferred route corridor as it provides an improved route for commercial vehicles travelling from the A55 at Valley, north to Wylfa. Whilst this would clearly provide enhanced HGV access to Wylfa for all route corridor options, the upgrades also have the potential for improved HGV access to those sections of the Purple and Yellow Route Corridor Options in the west of the island.

Holyhead Waterfront Redevelopment

2.6.11 Outline planning permission has been granted for a mixed-use development consisting of a new marina, residential properties, a hotel, commercial, leisure and retail uses together with associated land reclamation and service infrastructure at Holyhead Waterfront, Holyhead. This is likely to

lead to an increase in visitor numbers to this part of Anglesey, potentially increasing the number of tourists who might experience effects from any new connection routed through the Purple and Yellow Route Corridors, which are located closest to this site.

Penrhos Leisure Village

2.6.12 Also on Holy Island, planning permission has been granted for the development of a leisure village at Penrhos Coastal Park; a leisure village at Cae Glas, Parc Cybi; and a residential development of up to 320 new houses at Kingsland, on Holy Island.

2.6.13 In May 2018 resort developer Bluestone announced it was to develop the leisure village element of the scheme at Penrhos. The 500 holiday lodges and related tourist facilities are expected to open in 2021 and to attract up to 200,000 visitors a year. This would also increase the number of tourists to this part of Anglesey who might experience effects from any new connection routed through the Purple and Yellow Route Corridors, which are located closest to this site.

Menai Science Park

2.6.14 The first phase of the Menai Science Park, Wales' first dedicated Science Park, opened in March 2018 on a 7.6 Hectare site immediately south of the A55 at Gaerwen, on Anglesey.

2.6.15 The location and development of the land at Menai Science Park would impose a minor constraint to the routeing of a new connection immediately within the southern boundary of the Blue and Yellow Rote Corridors appraised in 2015. The Science Park falls outside the Purple and preferred Orange Route Corridors (although OHL connections constructed within it may have been visible from the Science Park).

Third Menai Crossing

2.6.16 The Welsh Government has recently consulted on proposals to increase the capacity of the A55 trunk road across the Menai Strait for motorists, walkers and cyclists. Early in 2018 consultation was undertaken on four options for this 'Third Menai Crossing' within a narrow corridor either side of the Britannia Bridge. The proposed location for the Third Menai Crossing is shown on Figure A.2.1 in Appendix A. Consultation ended in March 2018 and responses are currently being reviewed. Details of the outcome will be published in due course.

2.6.17 As no consents or funding are yet in place for the Third Menai Crossing the proposal has not been considered as part of the back-check of National Grid's previous design decisions undertaken to date. However National Grid is currently working with the Welsh Government on a feasibility study to look at the potential for the North Wales Connection Project to use the new bridge to carry a connection across the Menai Strait, and this is discussed in more detail at Section 3.3.

2.7 ENGINEERING INFORMATION

2.7.1 A significant amount of engineering assessment and design has been undertaken over the past six years, since the broad route corridor options between Wylfa and Pentir were first identified. To support this design and assessment work a number of site based surveys have also been undertaken. Details of the engineering design and survey work is summarised below.

Engineering Surveys

2.7.2 To support design work a number of site based surveys have been undertaken over the course of the past six years. These have provided greater knowledge and confidence about local conditions that could influence engineering design, including; ground profile, ground conditions and underlying geology. A summary of the engineering surveys undertaken is set out in Table 2.1 below.

Table 2.1: Summary of Engineering Surveys Undertaken

Nature of Engineering Survey	Purpose	Extent of Survey
Aerial laser survey (Lidar) to establish detailed ground profiles.	To establish detailed ground profiles.	Corridor Wide (Orange corridor only)
Site Walkover surveys	To assess access track viability.	Locality of the Preferred alignment
Menai Strait Marine Surveys (bathymetry and geology).	To assess seabed profile/depths and underlying geological structure.	Refined Crossing Zones at Menai Strait
Terrestrial	To assess geological	Proposed alignment

boreholes.	structure and rock characteristics and confirm ground conditions.	/compound sites
Trial Pit Excavation.	To assess ground conditions informing foundation strategy.	Proposed alignment /compound sites
Localised land surveys	To inform localised highway design and OHL clearances.	Selected locations along the proposed alignment where detailed designs might be required to inform assessment.

2.7.3 To ensure that the project development has been undertaken in an economic and efficient manner, detailed engineering surveys have been undertaken in a staged manner, with more technical, expensive or disruptive surveys being undertaken at later stages. This allows survey extents to be more focused, based on emerging design proposals. As a result, the data has primarily been used to validate and increase confidence in the detailed design proposal, rather than informing early stage design choices.

2.7.4 Whilst not providing an equivalent level of survey data across all route corridors or route alignments as presented at earlier design stages, the detailed survey data that has been gathered since early design decisions were taken is relevant to the back-check of those decisions. This increased knowledge, especially as it relates to the geology underlying the Menai Strait, has therefore been used to inform the back-check of earlier design decisions.

Engineering Design.

Overhead Line Design Evolution

2.7.5 No detailed engineering designs were presented at Stage 1 public consultation in 2012. Instead broad corridors were presented within which it might prove possible to design an appropriate transmission connection. Generic design information relating to OHLs and underground cables was also presented at this stage.

2.7.6 At Stage 2 consultation in 2015 a number of possible OHL routes were presented, based on broad alignments within the preferred corridor. The options presented at this stage included alignments that were both closely parallel to the existing Wylfa to Pentir OHL and deviated away from the

existing line. Again, generic design information was presented including information regarding pylon types, how the new OHL alignment might be transposed from one side of the existing line to the other, and the potential design benefits of developing a closely synchronised solution, especially in consideration of the relationship of individual new and existing pylons.

2.7.7 A detailed design was presented at Stage 3 consultation, including individual pylon locations and anticipated pylon heights, how the existing and new OHL routes might be transposed and localised replacement and realignment of the existing OHL. The consultation also presented details about the nature and location of the underground section beneath the Anglesey AONB and the Menai Strait. In addition, details were provided concerning construction effects including access routes, scaffold positions and working areas.

2.7.8 Since Stage 3 consultation considerable engineering work has been undertaken to further refine the design, much of this work being undertaken in response to consultation feedback received, as set out in the Consultation Report (2016) (**Document 6.1**). Other design work has provided additional engineering detail concerning the final design proposal, including information such as indicative OHL profiles, construction material quantities and construction programme. This work has helped to increase overall confidence in the deliverability of the detailed design now presented and has provided data to inform the detailed environmental impact assessment of the project.

2.7.9 As part of the design refinement detailed consideration has been given to whether and how best to transpose the route of the new OHL from one side of the existing OHL to the other in order to reduce environmental and socio-economic effects. In the vicinity of the settlements of Rhosgoch and Rhosybol in the north of Anglesey this has led to proposals to remove and replace approximately 2.6m of the existing OHL in order to optimise the design and alignment of the new OHL in this area.

2.7.10 Also of note is the degree of design synchronisation achieved between the final design of the new OHL as now proposed and the existing OHL that will be retained. The Note to Holford Rule 6 is of particular relevance in this respect. This advises:

Arrange wherever practicable that parallel or closely related routes are planned with pylon types, spans and conductors forming a coherent appearance

2.7.11 One of the more important considerations in determining the degree of benefit afforded by the preferred close parallel route option is the relationship of the new pylons with the existing pylons.

2.7.12 The indicative design for Option A of the Proposed Development would see 150 proposed or existing pylons in that part of the route between Wylfa and the point at which the routes of the existing and proposed OHLs would finally diverge at pylon 4ZA78, north west of Star. Of these, 86 pylons would be new additional or replacement pylons.

2.7.13 In this section of the route 122 (i.e. 61 pairs) of the 150 pylons have been referred to as 'synchronised' or 'broadly synchronised'. Of these 9 pairs would comprise two new pylons, with the remaining 52 pairs comprised of one new and one existing pylon. This represents a high degree of design synchronisation when taking into account the 12 pylons (5 existing and 7 proposed) located in the section of the route where the proposed new OHL diverts away from the existing line to avoid causing significant effects upon the designated nature conservation sites at Cors Erddreiniog.

2.7.14 The engineering design changes are described in detail in the Design Report (**Document 7.17**).

Pylon Design.

2.7.15 The lattice steel pylon proposed for use in the North Wales Connection has a suite of pylon designs capable of supporting up to a 90^0 change in route direction. The larger tension pylons needed to support a change in route direction come in four classes, supporting angles of up to 10^0, 25^0, 55^0 and 90^0, with each pylon being progressively larger and bulkier than the preceding design, to accommodate the greater tensions involved.

2.7.16 As many of the changes in route direction on the North Wales Connection are only a few degrees greater than 25^0, additional engineering design work has been undertaken to consider whether the 25^0 pylon could be strengthened to accommodate these changes in route direction. This has confirmed that modest oversizing of some structural members would allow this pylon type to be used in these locations, avoiding the need to employ a larger pylon design capable of supporting changes in route direction of up to 55^0. A comparison of these pylon types can be found at Appendix C of the Draft Route Alignment Report (**Document 9.5**) and is explained in the Design Report (**Document 7.17**).

2.7.17 This further structural design information, not available at the earlier stages of decision making, is again relevant to the back-check of previous design

decisions, as it represents a form of embedded design mitigation not previously considered.

Underground Cable Design Evolution.

2.7.18 In addition to aspects of the OHL design, significant engineering design effort has been applied to the proposed crossing of the Anglesey AONB and Menai Strait. During earlier design and consultation stages a range of potential crossing technologies were considered, including direct installation of cables on the seabed, installation of buried ducts installed via horizontal directional drills from the shore and a number of possible tunnelling techniques. This detailed design work, informed by geological and other surveys, has led to the current proposal for a deep tunnel, installed using either traditional tunnelling techniques or a tunnel boring machine, linked to the surface via vertical shafts. It has also helped inform and confirm the location of the above ground compounds and the length and likely depth of the proposed tunnel. In turn this has provided greater detail concerning the anticipated capital costs for the tunnel construction and cable installation works, now estimated to be in the order of £194 Million.

2.7.19 The greater design definition and confidence arising from this tunnel design work is relevant to the back-check of previous routeing and design decisions. It has also helped inform a back-check of the earlier design decision that an overhead connection through the Anglesey AONB and across the Menai Strait was likely to conflict with national policy and National Grid's statutory obligations and should be avoided.

2.8 ENVIRONMENTAL INFORMATION

Environmental Data Desktop Analysis

2.8.1 A review of the plans and data that were used at the time that the earlier design decisions were made has been undertaken. The data sets described in Appendix B were reviewed. (This current data has also been used to prepare the application documents for the Development Consent Order now being sought).

2.8.2 Where changes in the data have occurred since earlier design decisions were taken these were examined in more detail to determine if they would have influenced the previous design decisions. These changes have been considered as part of the back-check exercise.

Environmental Survey Data

Ecological Survey Data

2.8.3 The ecological assessment that forms part of the EIA has involved a phased programme of data collection and survey to inform a detailed understanding of the baseline position relating to habitats and species throughout the route of the Proposed Development. These surveys have been undertaken from 2015 onwards.

2.8.4 Wider habitat surveys have been undertaken throughout the route of the Proposed Development. These included Phase 1 Habitat Surveys, more detailed National Vegetation Classification surveys, Hedgerow and Arboricultural Surveys.

2.8.5 Specialist surveys have also been undertaken to identify the distribution of several protected species including: Great Crested Newt, Bats, Otter, Reptiles, Red Squirrel, Water Vole and Badger. In addition, a range of surveys have been undertaken to better understand bird populations throughout the route of the Proposed Development. Other specialist surveys have been undertaken to identify terrestrial and aquatic invertebrates and to survey marine environments in the Menai Strait.

2.8.6 The outcomes of the Ecology and Nature Conservation Assessment (**Document 5.9**), which has been informed by the findings of these extensive ecological surveys undertaken since previous design decisions were taken, have been considered as part of the back-check exercise.

Cultural Heritage Survey Data

2.8.7 The historic environment assessment of the EIA has involved a phased programme of data collection in order to inform the baseline. This involved an initial desk study which covered a study area encompassing the Order Limits and a minimum of 1 km surrounding this. The desk study involved a review of available information including, records of designated assets, Historic Environment Record (HER) data, aerial photographs, LiDAR data, historic maps, published sources and records of previous archaeological investigations. A site walkover was also undertaken to note the ground conditions and to identify any visible features of historic environment interest.

2.8.8 Further field survey has involved a geophysical survey (**Document 5.10**) covering an extensive sample of the Order Limits in order to identify possible sub-surface archaeological remains. This has been followed up by a targeted programme of trial trenching to confirm the presence of absence

of remains and to obtain further information on their nature and significance. The geophysical survey and trial trenching have been completed in accordance with a scope agreed with Gwynedd Archaeological Planning Service.

2.8.9 The EIA also includes an assessment of effects on the significance of historic assets. This has been completed in accordance with relevant Cadw guidance. The assets included in the assessment were agreed in advance with stakeholders and in each case site visits have been completed to support a baseline description of the assets, their settings, and how these contribute to their significance. The assessment of effects has been completed with reference to this baseline, and informed by the ZTV and by wireframe illustrations and photomontage where required. Effects on the Dinorwig Landscape of Outstanding Historic Interest have been assessed through the completion of an Assessment of the Significance of Development on Historic Landscape (ASIDOHL (**Document 5.10.3**)), which was undertaken in accordance with relevant Cadw guidance.

2.8.10 The outcomes of the Historic Environment Assessment (**Document 5.10**), which has been informed by the findings of cultural heritage surveys undertaken since previous design decisions were taken, have been considered as part of the back-check exercise.

Noise Survey Data

2.8.11 Most of Anglesey is rural, with only limited sources of noise. Construction and operational noise effects from the Proposed Development have been assessed as part of the EIA process. These assessments have been informed by baseline sound measurements, which have therefore been a consideration supporting the back-check exercise.

2.8.12 Baseline sound measurements were undertaken to determine the baseline sound environment near selected receptors within the study areas. The approach to the determination of baseline, including the selection of the most appropriate monitoring locations and the methods for calculation of representative baseline values across the study areas was discussed and agreed with Isle of Anglesey Count Council and Gwynedd Council during consultation.

2.8.13 A description of the baseline survey methodology, as well as the survey results, is presented in the Baseline Sound Monitoring Report in Appendix 15.2 (**Document 5.15.2.2**).

2.8.14 Following determination of the representative baseline values back-check was undertaken to ensure the emerging outcomes of the Construction Noise and Vibration and Operational Noise assessments remained appropriate and correct. Where appropriate, mitigation measures have been put in place to reduce effects as far as practicable during construction, while design mitigation measures have been introduced or refined to ensure there would no significant effects due the operation of the project.

2.8.15 The outcomes of the Construction Noise (**Document 5.15**) and Operational Noise (**Document 5.16**) Assessments, informed by the survey of baseline noise conditions undertaken since previous design decisions were taken, have been considered as part of the back-check exercise.

Traffic Survey Data

2.8.16 Given the rural nature of much of the road network between Wylfa and Pentir, considerable traffic survey and assessment work has been undertaken to support the final application for a development consent order. Survey work has included Speed surveys, Automatic Traffic Counts, and Manual Junction Turning Counts, ground (Lidar) surveys of highway geometry and numerous site inspections.

2.8.17 This work has contributed to a detailed understanding of existing traffic and highway conditions across the area between Wylfa and Pentir. This baseline information has informed the development of an Outline Construction Traffic Management Plan (CTMP) (**Document 7.5**) which includes identified access routes and access points and potential control measures such as speed or timing restrictions and other traffic management measures such as the use of signage or physical junction improvements. The Traffic Assessment that forms part of the submitted EIA has helped to inform the back-check exercise.

Emerging EIA Outcomes

2.8.18 As a Nationally Significant Infrastructure Project the Proposed Development constitutes EIA development. Therefore, in support of the application for Development Consent, National Grid has prepared and submitted an Environmental Statement (**Documents 5.1** to **5.21**) which provides a clear, objective and realistic description of the likely significant effects of the Proposed Development. The outcomes of the Environmental Impact Assessment as reported in the Environmental Statement have been considered as part of the back-check exercise.

Emerging HRA Outcome

2.8.19 The Conservation of Habitats and Species Regulations 2017 (England and Wales) (as amended) enable the protection of sites that host habitats and species of European Importance. These sites are collectively referred to as Natura 2000 Sites. As an NSIP the Regulations apply to the Proposed Development and therefore were it likely to have a significant effect on one or more Natura 2000 sites then the Secretary of State would need to make an 'appropriate assessment' of the implications for that site before confirming the Development Consent. If this were to conclude that the development may affect the integrity of a Natura 2000, then consent could not be issued unless there were no alternatives and the project was necessary for 'imperative reasons of overriding public importance'.

2.8.20 Three Natura 2000 sites, Corsydd Mon/Anglesey Fens SAC, Corsydd Mon/Anglesey Fens Ramsar site and the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC, are located partially within the Order Limits of the Proposed Development and a number of other sites have been identified as having potential to be affected through effects on transient species or through effects on supporting habitat located outside of the boundaries of the designations.

2.8.21 National Grid has therefore undertaken an assessment in accordance with the requirements of the Habitat Regulations. The early stage of this Habitat Regulations assessment concluded that. if no mitigation measures were employed, significant effects upon the interest features of a number of Natura 2000 sites could arise as a result of the Proposed Development. Therefore, the Secretary of State would need to consider more information to determine whether the Proposed Development could affect the integrity of any Natura 2000 site before confirming Development Consent.

2.8.22 To inform this Assessment National Grid has prepared and submitted a Habitat Regulations Assessment Report (**Document 5.23**). The later stages of assessment contained within the Report considered the wide range of mitigation measures proposed that would avoid or reduce effects on Natura 2000 sites and their interest features. Taking these measures into account the Report concludes that the Proposed Development would not result in a likely significant effect on any Natura 2000 site. The forecast absence of significant effects upon any Natura 2000 sites once mitigation measures are applied has been considered as part of the back-check of previous design decisions.

2.9 ACQUISITION OF PROPERTY BY NATIONAL GRID

2.9.1 Over the course of the project's development, National Grid has held ongoing discussions with people with an interest in land that might be affected by the Proposed Development. It has enabled National Grid to reach initial land agreements with many of those affected. In most instances this has taken the form of agreed terms for an option agreement to enter into a Deed of Easement, should the Proposed Development proceeds.

2.9.2 In four locations the route presented at Stage 3 consultation deviated away from the existing OHL in otherwise parallel sections of the route in order to avoid residential properties. In three of these locations the proposed new OHL route deviated away from the existing OHL to avoid a single property and larger angle pylons would be required to achieve these deviations. These were located south of Cemaes, at Rhosgoch, and at Talwrn.

2.9.3 The fourth location where the route deviates away from the existing OHL in otherwise parallel sections is to the north of Capel Coch where the route geometry and distribution of properties and other constraints allows a wide parallel alignment without the need to introduce additional angle pylons. Here the proposed new OHL route passes to the west of five residential properties, whilst the existing OHL is located to the east.

2.9.4 Discussions have been held with all of these residents as the design has evolved. In the case of the three single residential properties National Grid has identified opportunities to improve the local design of the Proposed Development by routeing across the properties concerned. This would remove localised 'dog-legs' in the route, reducing the number of pylons and/or number of tension pylons and increasing design synchronisation.

2.9.5 In the case of the properties at Cemaes and at Rhosgoch, National Grid has now purchased the properties and has amended the design of the Proposed Development which now reflects the design enhancements envisaged, serving to both avoid significant effects upon the residents concerned, as well as reducing effects on the wider community and local environment.

2.9.6 The acquisition of the properties and subsequent design changes have been made since previous design decisions were taken and are considered relevant to the back-check of those design decisions, including the selection of preferred route corridors and route alignment and the choice of appropriate transmission technology (for example OHL, UGC or Gas Insulated Line (GIL))

2.9.7 In the case of the route deviation at Talwrn, the option to modify the route of the Proposed Development has been retained through the inclusion of two alternative designs in the draft Development Consent Order. National Grid considers that either option would comply with National Grid's statutory duties and that either would comply with relevant national planning policy. As voluntary agreements have not yet been reached to secure either option, the availability of the alternative alignment identified since Stage 3 consultation was not considered relevant to the back-check of previous design decisions, although the predicted effects of both options, as identified in the environmental impact assessment findings, has been considered.

2.10 MITIGATION AND CONTROL MEASURES

Mitigation Measures

2.10.1 The technical assessments contained within the Environmental Statement (ES) (**Documents 5.7 to 5.18**) set out the relevant mitigation by design, control and management measures and mitigation measures the assessment relies upon.

2.10.2 A Schedule of Mitigation (**Document 5.28**), which provides a summary of the measures proposed to mitigate potential environmental effects identified in the ES, has been submitted in support of the application for Development Consent. This Schedule sets out where within the Development Consent Order (DCO) the mitigation is secured.

2.10.3 Specific mitigation measures are also set in the Biodiversity Mitigation Strategy (**Document 7.7**) and the Archaeological Strategy (**Document 7.8**)

2.10.4 Regard has been had to the full range of proposed mitigation measures when undertaking the back-check exercise.

Management Plans

2.10.5 Control and Management Measures are included within the Construction Environmental Management Plan (CEMP) and other control and management plans to ensure that the effects of the Proposed Development can be limited and controlled.

2.10.6 Management Plans submitted in support of the application for Development Consent include: Outline Construction Traffic (**Document 7.5**), Waste (**Document 7.11**) and Materials Management (**Document 7.12**) Plans, Noise and Vibration Management Plan (**Document 7.9**), Soil Management

Plan (**Document 7.10**) and Public Rights of Way Management Plan (**Document 7.6**).

2.10.7 In undertaking the back-check exercise regard has been had to the measures set out in these Management Plans.

2.11 CHANGES TO PROPOSED TRANSMISSION-CONNECTED GENERATION

2.11.1 The location and amount of power that the new connection needs to accommodate has the potential to influence some of the design decisions relating to the new connection between Wylfa and Pentir. Of particular note is the choice of pylon design or the decision to employ underground cables, with larger pylons or more numerous cables potentially being needed to transmit larger amounts of power, if capacities would be exceeded. Similarly, the location of power generation has the potential to influence routeing decisions should this result in a more efficient and co-ordinated electricity transmission system.

2.11.2 The need for the North Wales Connection project is set out in the published Needs Case document (**Document 7.1**). An up to date Needs Case document has been published at each stage of public consultation in 2012, 2015 and 2016. The application for DCO is supported by a further revision of the Needs Case. Whilst the need for the North Wales Connection continues to be driven by the contracted connection of new sources of generation on Anglesey, the location and power output of those generators have varied over the course of the project's development. These changes are summarised in Table 2.2 below.

Table 2.2: Summary of Changes to Contracted Generation

Proposed Generator	Generation Capacity (megawatts (MW)) and Connection Dates at Date of Needs Case.			
	2012	2015	2016	2018
Horizon Nuclear Power (Wylfa Newydd). Connecting at Wylfa in the north of Anglesey.	3,600 MW (2020 - 22)	2,800 MW (2024 - 25)	2800 MW (2024 - 25)	2940 MW (2026 - 27)
Celtic Array Ltd. Connecting at Wylfa	2,000 MW	Nil (Contract	-	-

or at a new substation in the vicinity of Amlwch/Rhosgoch in the north of Anglesey.	(2017 - 21)	terminated)		
Orthios. Connecting at Penrhos, Holy Island, with power transmitted to Wylfa via existing cables and overhead line.	-	-	299 MW (2019 - 20)	299 MW (2019 - 20)
Mentor Mon (Morlais Energy). Connecting tidal power in the West Anglesey Demonstration Zone at Penrhos. with power transmitted to Wylfa via existing cables and overhead line.	-	-	-	180 (2019 & 2024)
TOTAL	5,600 MW	2,800 MW	3,099 MW	3,419 MW

2.11.3 As can be seen the level of new generation proposed at Wylfa has fallen since 2012 from 3,600 MW to 2940 MW and the first connection date has moved back six years to 2026. In addition, the Celtic Array offshore wind project has terminated its contract to connect to the transmission system in the north of Anglesey. During the same period a new biomass power station; Orthios, has contracted to connect 299 MW of generation at Penrhos on Holy Island, west of Anglesey and Mentor Mon have contracted to connect up to 180 MW of offshore tidal power within the West Anglesey Demonstration Zone. The location of both additional generators is shown at Figure A2.1 in Appendix A.

2.11.4 As explained in the Need Case 2018 (**Document 7.1**) and in the Strategic Options Report 2018 (**Document 7.2**) the scale of the proposed output from the Wylfa Newydd power station is such that a new connection is still required from Wylfa to the main interconnected transmission system. The reduction in contracted generation output between 2012 and 2015 allowed

a wider range of potential pylon types to be considered as part of the design process. This output has increased by 140 MW since 2015 when the anticipated pylon design was selected, but this increase is not significant enough to have affected the range of pylon designs that could meet the capacity required and therefore is not material to a back-check of the pylon design.

2.11.5 Similarly, the modest increase of 479 MW in total directly-connected generation on Anglesey between the second and third stages of consultation (arising from the contracted connection of Orthios and Morlais) was considered in 2016 at the time of confirming the proposed extent of underground cables as part of the connection. The additional output, even with the increase in proposed output from Wylfa Newydd, would not breach the threshold at which the installation of additional underground cables would be required. Therefore this change is not material to the back-check of the decision to employ sections of underground cable as part of the North Wales connection.

2.11.6 The Orthios power station connection has been contracted after the preferred route corridor was identified. If a new connection were required from Penrhos in order to allow the Orthios power station to connect then this may have been a material consideration in the selection of a preferred route corridor for the North Wales Connection, becoming a material consideration in the back-check of the route corridor selection. For example, a route that ran to the west of Anglesey could have provided connections for both Orthios and Wylfa. However, the existing 132kV overhead line between Penrhos and Wylfa has sufficient capacity to allow the power to be transmitted to Wylfa without further reinforcements, and therefore the Orthios connection is not a material consideration in the route corridor selection.

2.11.7 In summary, the changes to the project drivers since the commencement of the project's development, as set out in successive Need Case documents, are not considered material to the design decisions reviewed in this Back-Check Report.

2.12 PROPOSED DISTRIBUTION-**CONNECTED ('EMBEDDED')** GENERATION

2.12.1 In addition to the three contracts that National Grid has for new generation to connect directly into the transmission system on Anglesey, there are also several smaller scale generation proposals on Anglesey that would connect

into the local electricity distribution network owned and operated by SP Manweb.

2.12.2 Large scale embedded generation, if triggering the need for substantial development of the local distribution network, could potentially be material to the design of any local transmission system reinforcements given National Grid's statutory requirement to develop an efficient and co-ordinated system.

2.12.3 Currently there are 80 megawatts (MW) of generation connected into SP Manweb's network on Anglesey.

2.12.4 The more significant embedded generation proposals on Anglesey are as follows:

- **Llanbadrig Solar Farm**. This is a proposed solar photovoltaic plant located in the north of Anglesey that was granted consent in 2017. It has a consented capacity of 49.99 MW with a 100MWH battery storage capacity.

- **Rhyd-y-Groes Windfarm Repowering**. This is also a consented scheme that comprises the replacement of the 22 existing wind turbines located at Rhyd Y Groes, between Cemaes and Amlwch in the north of Anglesey, with 11 larger turbines. The nett result would be an increase in maximum generation output from the current 6.6MW to 9.9 MW.

- **West Anglesey Demonstration Zone** (Morlais Power). The Crown Estate has licenced an area of the seabed west of Holyhead as a zone for the deployment of tidal current generating devices. Presently Morlais Power is the only developer with consent to site devices in the zone with a capacity of 20 MW. If this level of generation were to be connected into the electricity distribution network, then it is likely to reduce the level of transmission-connected generation from the Demonstration Zone (as shown in Table 2.1 above) by a similar amount.

- **Holyhead Deep**. This is a further area of sea bed located to the west of Holy Island. The company Minesto has been granted a sea bed lease allowing the installation of deep water tidal stream devices with a maximum generating capacity of 10 MW. To date full consent has been received for an initial deployment of a 0.5MW demonstration device, which would not export power. Minesto has

plans to deploy further devices and has stated that the area has the potential for a total output of 80MW.

2.12.5 Summarising the above, consents exist for the addition of around 54 MW of generation on the north of Anglesey and 20 MW off the west coast of the island. Taking into account other consented and potential generation projects, SP Manweb has around 84MW of contracted generation on and around Anglesey.

2.12.6 In response SP Manweb has proposed a reinforcement that will resolve capacity constraints on the distribution network in full and will provide capacity headroom for the forecast demand growth detailed.

2.12.7 The proposed Reinforcement comprises the installation of a new transformer at Caergeiliog 132kV substation, supplied by a new 1.5 km 132kV connection (partially overhead and partially underground) to be constructed between the substation and National Grid's existing 132kV overhead line to the north. Consent has been sought for this work, which SP Manweb expects to complete in 2019.

2.12.8 The modest scale and early delivery of these works to address future embedded generation on Anglesey is such that the nature and location of this generation is not considered material to the back-check of decisions relating to the transmission design of the North Wales Connection project.

2.13 STATUS OF EXISTING NATIONAL GRID INFRASTRUCTURE ON ANGLESEY

2.13.1 National Grid owns and operates two OHLs on Anglesey: the 4ZA 400kV OHL between Wylfa and Pentir, and the 'EV' OHL operating at a voltage 132kV between Wylfa and Penrhos (on Holy Island).

2.13.2 No substantive changes have been made to the existing 400kV line since the time that earlier design decisions were made, and therefore assumptions at the time relating to the long-term retention of the line remain valid and are not material to the back-check of previous design decisions.

2.13.3 Turning to the EV 132kV OHL, the selection of a preferred route corridor for the new North Wales Connection was taken in 2015 having regard to the assumed long term retention of the EV line, affording opportunities to reconfigure the transmission system and remove the EV OHL between Wylfa and the Valley area if either of two route corridor options were

selected. In this way, the removal of the EV OHL might provide partial mitigation / offsetting of the effects of a new 400kV OHL in two of the four route corridors considered. The route of the EV OHL is shown in Figure A2.1 at Appendix A. Despite this assumption, at the time that early design decisions were taken the future need to retain the EV line was in some doubt, following the closure of the Anglesey Aluminium plant at Penrhos (although a contractual requirement to maintain the line remained).

2.13.4 Since taking the early design decisions two new customers; Orthios and Mentor Môn, have contracted with National Grid for the export of up to 479 MW of power from the Penrhos Substation. These contracts require the retention of the EV line. In addition, the EV line has been subject to a programme of refurbishment works (completed in 2017) and, in the vicinity of Wylfa, the diversion and replacement of the buried section of the route to facilitate early works associated with the Wylfa Newydd project.

2.13.5 As a consequence of the contractual changes and engineering works undertaken on the EV route, the assumptions pertaining to the EV line remain unchanged from those at the time that previous design decisions were taken i.e. the OHL needs to be retained over the long-term. Therefore these changes are not considered material to the back-check of those design decisions.

2.14 REPORTING OF BACK-CHECK OUTCOMES BASED ON INFORMATION CONSIDERED

2.14.1 As discussed in the earlier part of this Report, the main conclusions of the back-check of previous design decisions are reported in the following Sections of the Report in the reverse order in which they were taken originally. In this way the findings of the more detailed aspects of the back-check can inform a judgement on the validity of the more high-level design decisions. For example, the appropriateness of using either OHL or UGC in a section of one of the Route Options may in turn raise further concerns about the selection of that Route Option, which in turn may also add weight to the selection of one of the previously less preferred Route Corridors.

2.14.2 The following Sections provide a summary of the back-check outcomes relating to previous design options that have been considered and were parked in favour of the design option taken forward to the next stage of design development. For example, it refers to the three previously less favoured Route Corridors, and the identified siting and crossing areas considered at the Menai Strait area, in addition to alternative Route Options in other sections of the route.

2.14.3 In addition, several alternative design options have been requested in feedback during all three stages of consultation. Where these represented discrete alternatives, whether in the form of localised use of UGC or significant and discrete new routes for a section of OHL, National Grid considered an appropriate design response. These requested alternative design options were subject to appraisal and review by environmental, socio-economic and technical advisors within the multi-disciplinary project team. The results of this process are summarised in the following Sections of this Report.

3 Back-Check of Technology Choice Design Decisions

3.1 INTRODUCTION

3.1.1 This Chapter considers the potential benefits of underground cable alternatives to the Proposed Development in a number of locations along the route. It considers the environmental and socio economic effects, and the technical difficulties and costs of each alternative UGC design.

National Planning Policy Context

3.1.2 The National Policy Statement for Electricity Networks Infrastructure (EN-5) provides some guidance as to when consideration should be given to alternative means of making a connection. Para 2.8.4 of EN-5 states that

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

3.1.3 It goes on (para 2.8.8):

'Although Government expects that fulfilling this need through the development of overhead lines will often be appropriate, it recognises that there will be cases where this is not so. Where there are serious concerns about the potential adverse landscape and visual effects of a proposed overhead line, the IPC will have to balance these against other relevant factors, including the need for the proposed infrastructure, the availability and cost of alternative sites and routes and methods of installation (including undergrounding)'.

3.1.4 Para 2.8.9 continues:

'The impacts and costs of both overhead and underground options vary considerably between individual projects (both in absolute and relative terms). Therefore, each project should be assessed individually on the basis of its specific circumstances and taking account of the fact that Government has not laid down any general rule about when an overhead

line should be considered unacceptable. The IPC should, however only refuse consent for overhead line proposals in favour of an underground or sub-sea line if it is satisfied that the benefits from the non-overhead line alternative will clearly outweigh any extra economic, social and environmental impacts and the technical difficulties are surmountable. In this context it should consider:

• the landscape in which the proposed line will be set, (in particular, the impact on residential areas, and those of natural beauty or historic importance such as National Parks, AONBs and the Broads);

• the additional cost of any undergrounding or sub-sea cabling (which experience shows is generally significantly more expensive than overhead lines, but varies considerably from project to project depending on a range of factors, including whether the line is buried directly in open agricultural land or whether more complex tunnelling and civil engineering through conurbations and major cities is required. ……

• the environmental and archaeological consequences (undergrounding a 400kV line may mean disturbing a swathe of ground up to 40 metres across, which can disturb sensitive habitats, have an impact on soils and geology, and damage heritage assets, in many cases more than an overhead line would)

General Construction Considerations

3.1.5 In considering the appropriateness of different transmission technologies it is important to have an appreciation of the effects associated with the installation of underground cables in order to allow an informed comparison to be made. Set out below is a summary of some of the issues associated with the installation and operation of underground transmission cables. More information can be found in the Menai Strait Crossing Report (**Document 9.6**).

3.1.6 In the case of the Proposed Development in order to meet the power transmission capacity required for the connection, it has been assumed that each of the three phases of both electrical circuits would require two cables; i.e. a total of twelve cables. These would each have a conductor cross sectional area of 2500 mm^2.

3.1.7 Three cables would be directly buried in each trench, requiring a total of four trenches. With space allowed for access tracks, working areas, soil storage and drainage works a typical construction swathe extends up to

60 m in width. Where local constraints exist along the route this can be reduced for short distances. This is illustrated at Figure 3.1 below.

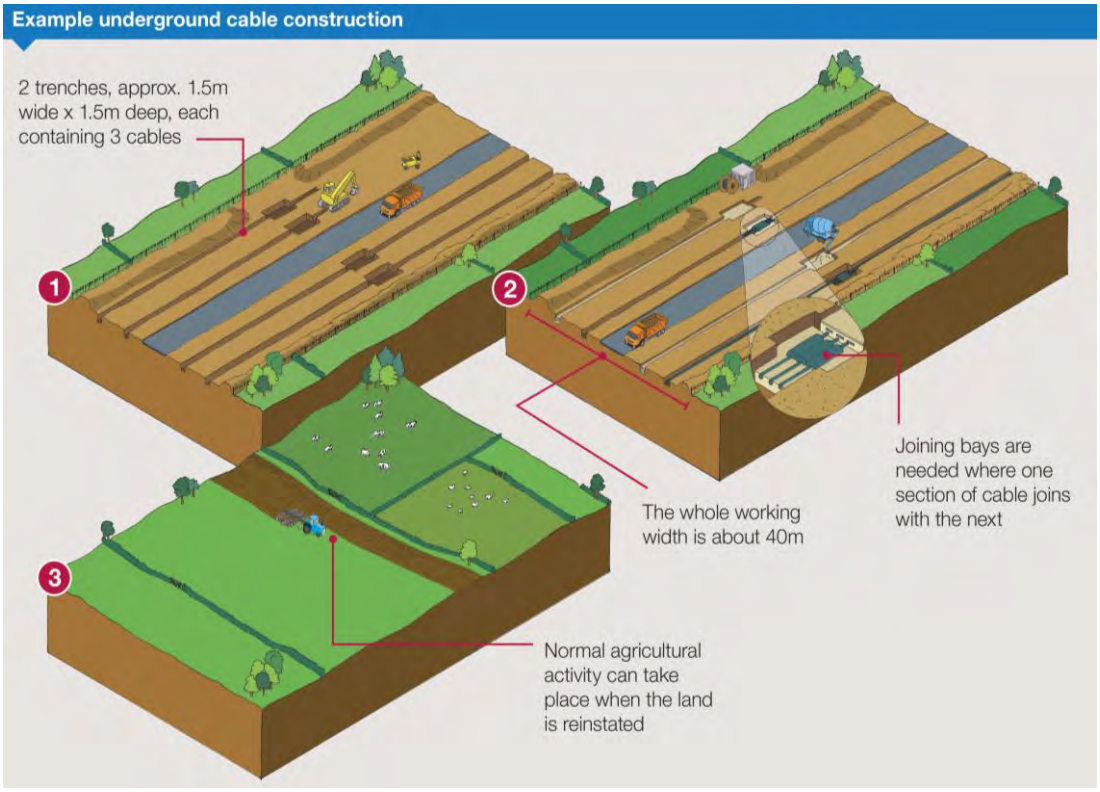

Figure 3.1. Illustration of Buried Cable Installation.

3.1.8 Where local ground conditions include shallow subsurface rock, more extensive civil engineering works would be required to excavate the four trenches needed. Specialist sand for cable bedding (cement bound sand) would also need to be brought in to provide a secure and thermally reliable substrate for the cables. Additional top soil might also be needed to back fill the trenches.

3.1.9 The generally poor road infrastructure along the route for the Proposed Development would mean that permanent widening of minor roads will be required to allow access for the delivery of large cables drums. These road modifications would need to remain in place in case of cable faults.

3.1.10 The major environmental issues associated with the installation of direct buried cables are the disruption to traffic, noise, vibration, visual intrusion and dust generation and deposition due to the excavation of trenches along the route. Heavy goods vehicle traffic will also be generated by the work, removing spoil and bringing in plant and materials, including backfill, to trenches.

3.1.11 As a result of the installation works described above, the adverse effects experienced during the installation of underground cables will generally be greater than those associated with an equivalent OHL.

3.1.12 Above ground Link Pillars will be required approximately every 700m along the UGC route. Vehicle access would be needed to these locations.

3.1.13 The point at which the underground cables connect to any OHL needs to be located within a permanent, secure compound. These Sealing End Compounds (CSEC) accommodate the 12 cable sealing ends as well as gantry structures to support the incoming OH. The CSECs would also need to accommodate other electrical equipment, including surge arrestors and current transformers to provide electrical protection for the cable section.

3.1.14 Each CSEC would be surrounded by a tall, electrified, high security fence and would require a permanent access road from the public highway.

3.1.15 A typical Cable Sealing End Compound is illustrated at Figure 3.2 below.

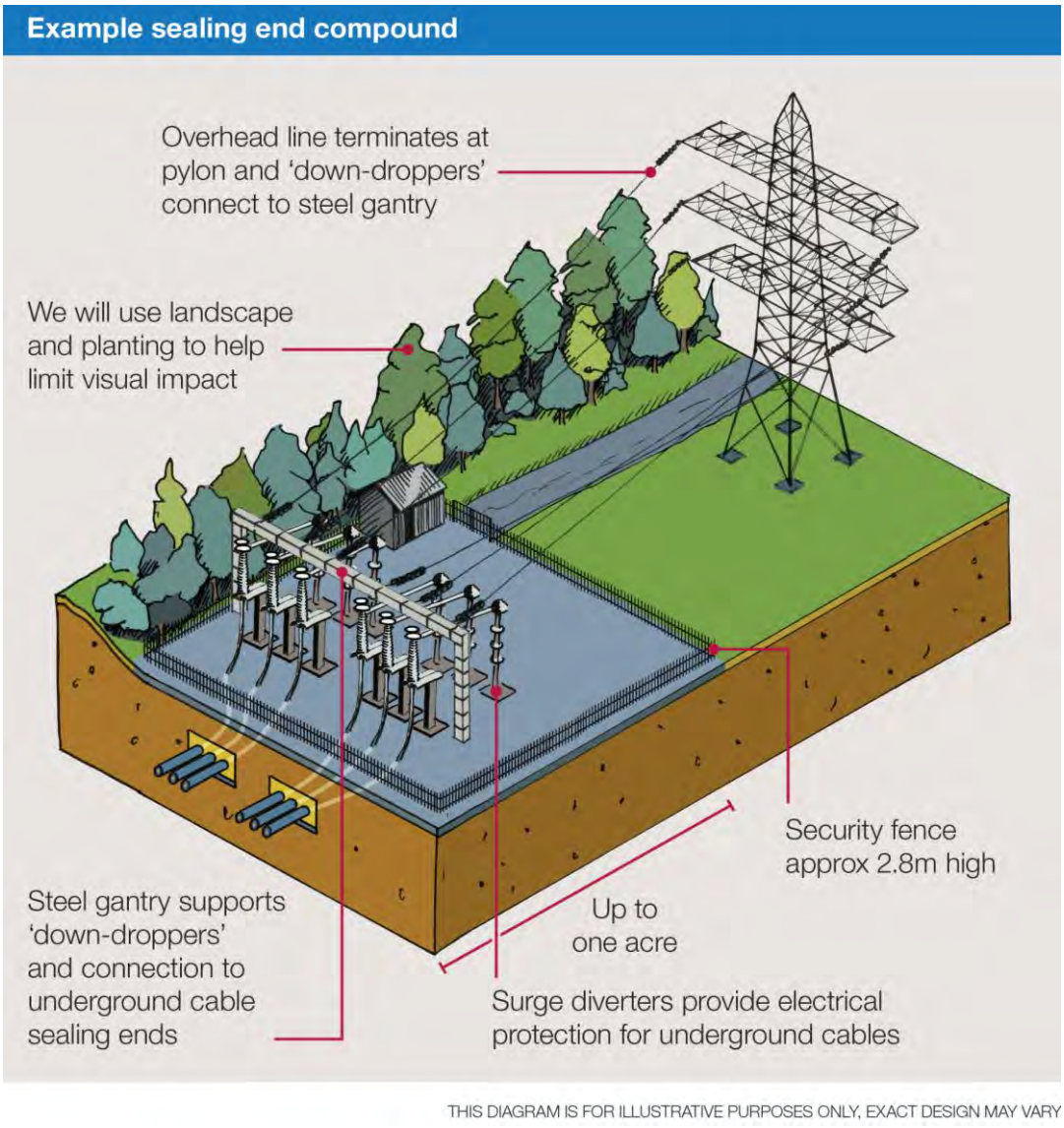

Figure 3.2. Illustration of Typical Cable Sealing End Compound.

3.1.16 Each CSEC would need electricity supplies from the local electricity distribution network. These may be either on wood pole line or low voltage underground cable

3.1.17 Dependent upon the full extent of any additional UGC in the circuits between Wylfa and Pentir one or more additional Shunt Reactors would be required. Dependent upon the final number of Shunt Reactors this could require substantial reconfiguration of the substation within which they were located. The closer to Wylfa that any new cable section is, the more likely that the Shunt Reactor(s) would need to be located at Wylfa. For other options, it may be that additional Shunt Reactor(s) would be required within the existing Pentir substation. The costs of any such additional shunt reactors required if multiple sections of UGC were to be installed are not reflected in the costs considered in this Section of the Report.

3.2 DESCRIPTION OF INITIAL APPRAISAL RELATING TO TECHNOLOGY CHOICE

3.2.1 The Wylfa – Pentir Preferred Route Corridor Selection Report (**Document 9.2**) sets out the reasons for and the outcomes of National Grid's initial appraisal relating to the most appropriate choice of transmission technology in potentially more sensitive sections of the route between Wylfa and Pentir.

3.2.2 National Grid appreciates that there may be more highly sensitive areas / sites within the route corridor where the construction of a new overhead line could create significant adverse environmental or socio-economic effects. These locations were identified as a result of both preliminary appraisals of a fully overhead connection informed by site visits undertaken by environmental professionals and by feedback from the first round of public consultation.

3.2.3 A number of such locations were identified along the route of the Proposed Development where consideration was given to the need to employ underground technology as a mitigation measure. These Mitigation Zones, the locations of which are illustrated in Figure 3.3 below, were:

- M1: Wylfa to Llanfechell
- M4: Rhosgoch and Rhosybol
- M5: Capel Coch and Cors Erddreiniog
- M6: Anglesey AONB and Menai Strait

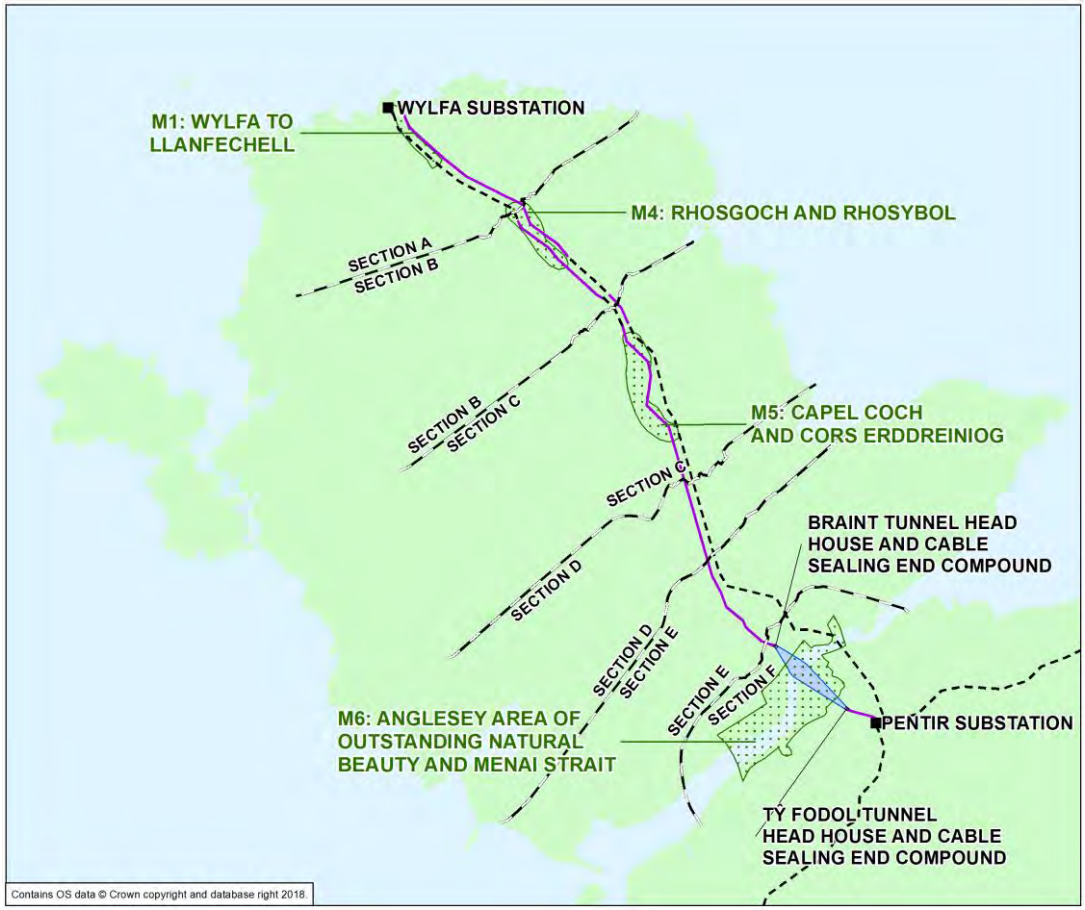

Figure 3.3. Technology Choice and More Sensitive Locations

3.2.4 To better inform the appraisal outcome, consideration was also given to the opportunities that might be available to reduce or avoid effects through OHL route alignment at later stages of the project's development.

3.2.5 In the case of Mitigation Zones M1: Wylfa to Llanfechell, M4: Rhosgoch and Rhosybol and M5: Capel Coch and Cors Erddreiniog the appraisal concluded that it was reasonable to assume that an overhead line route could be identified in these areas that would comply with all relevant legislation and planning policies.

3.2.6 Therefore, in respect of these three Mitigation Zones, the appraisal also concluded that, whilst no environmental, socio-economic or technical considerations appeared to preclude the use of buried cables in these areas, the significant additional cost associated with this mitigation would not be justifiable in the context of National Grid's statutory duties.

3.2.7 The Report also noted that these assumptions would be back checked following more detailed design and assessment plus feedback from further stages of public consultation, taking into account the full range of mitigation

measures that would be available to reduce the adverse effects of an overhead line.

3.2.8 In respect of Mitigation Zone 'M6: Anglesey AONB and Menai Strait' the initial review concluded that the nature of the landscape and the number, concentration and importance of sensitive sites in the area meant that an overhead line crossing of Anglesey AONB and the Menai Strait would result in significant adverse landscape and visual effects.

3.2.9 The Report also suggested that viable installation techniques could be found that would avoid long-term landscape and visual effects and would not result in significant adverse effects upon the marine habitats of the Y Fenai aBae Conwy / Menai Strait and Conwy Bay SAC.

3.2.10 National Grid concluded that the effect of an overhead line upon iconic views from within the AONB (including from Plas Newydd) to the mainland and the Snowdonia range beyond, and the resultant magnitude of harm caused to the natural beauty of the AONB might conflict with National Grid's statutory duty to have regard to the purposes of the AONB. The potentially significant effects that an overhead line might have upon the setting of nationally designated heritage sites and major tourism attractions in the area were also a significant concern.

3.2.11 On balance, it was considered that an overhead line across the Anglesey AONB and the Menai Strait would not comply with the relevant policy tests set out in sections 2.8.8 and 2.8.9 and NPS EN-5. As a result National Grid concluded that further detailed design work should be undertaken to identify preferred CSEC locations, crossing locations and underground cable installation methods for the Menai Strait crossing.

3.3 BACK-CHECK OUTCOMES

Section A; Technology Choice in Mitigation Zone M1: Wylfa to Llanfechell

3.3.1 Following the back-check exercise National Grid considers that the detailed design and assessment of the Proposed Development in Section A of the route confirms National Grid's earlier assumptions that an overhead line route could be identified in the area between Wylfa and Llanfechell that would comply with all relevant legislation and planning policies. The Proposed Development achieves a wholly parallel and highly synchronised design in this section of the route, relative to the existing OHL partly due to the design mitigation achieved through the acquisition of property in the area, as described in the Design Report (**Document 7.17**).

3.3.2 In addition, the detailed mitigation proposals and control measures now proposed will serve to further reduce any effects arising from the development of an OHL in this section of the route.

3.3.3 The results of the landscape and visual assessments reported in the Environmental Statement (**Documents 5.7 and 5.8** respectively) conclude that the Proposed Development would have no significant effects upon nationally designated landscapes. It also concludes that whilst 52 properties would experience moderate adverse effects upon residential visual amenity (the majority located on the edges of Tregele and Llanfechell from where the proposed new OHL would be seen on the far side of the existing OHL), the Proposed Development would not result in any major adverse effects upon residential visual amenity between Wylfa and Llanfechell.

3.3.4 National Grid does not therefore consider that there should be serious concerns on planning policy grounds about the landscape and visual effects of the Proposed Development in Section A of the route. Nevertheless, as part of the back-check exercise National Grid has carried out an appraisal of an alternative underground cable design in this section of the route between Wylfa and a point east of Llanfechell (Mitigation Zone M1).

3.3.5 As a result, National Grid is satisfied that the benefits from the non-overhead line alternative would not outweigh the additional capital cost of £72 Million and the environmental and socio-economic effects and technical difficulties associated with the installation and operation of employing underground cables in this area.

3.3.6 In response to consultation a number of requests were received asking National Grid to consider the use of underground cables between Wylfa to Rhosgoch. Compared to the above scenario, this would double the length of underground cable in this section of the route from approximately 3.5 km to 7 km, and increase the additional costs to approximately £101 Million. Whilst this would remove the proposed OHL section passed the Mynedd Mechell and Surrounds Special Landscape Area, no significant effects are predicted on this locally designated landscape from the Proposed Development.

3.3.7 Whilst this longer length of underground cable route would avoid significant operational effects upon the residential visual amenity at a further three properties National Grid is satisfied that the benefits from the non-overhead line alternative would not outweigh the additional capital cost, environmental and socio-economic effects and technical difficulties

associated with the installation and operation of underground cables in this area.

3.3.8 The back-check exercise has therefore confirmed that the development of an overhead line in Section A of the route is appropriate having regard to national planning policy and National Grid's statutory duties.

Section B; Technology Choice in Mitigation Zone M4: Rhosgoch - Rhosybol

3.3.9 Following the back-check exercise National Grid considers that the detailed design and assessment of the Proposed Development in Section B of the route confirms National Grid's earlier assumptions that an overhead line route could be identified in the area between Rhosgoch and Rhosybol that would comply with all relevant legislation and planning policies. The Proposed Development achieves a wholly parallel and highly synchronised design in this section of the route, partly due to the design mitigation afforded by the realignment of the existing OHL and acquisition of property in the area, as described in the Design Report (**Document 7.17**).

3.3.10 In addition, the detailed mitigation proposals and control measures now proposed will serve to further reduce any effects arising from the development of an OHL in this section of the route.

3.3.11 The results of the landscape and visual assessments reported in the Environmental Statement (**Documents 5.7** and **5.8** respectively) conclude that the Proposed Development would have no significant effects upon nationally designated landscapes. It also concludes that whilst 27 properties would experience moderate adverse effects upon residential visual amenity the Proposed Development would not result in any major adverse effects upon residential visual amenity in the Rhosgoch and Rhosybol area.

3.3.12 National Grid does not therefore consider that there should be serious concerns on planning policy grounds about the landscape and visual effects of the Proposed Development in Section B of the route. Nevertheless, as part of the back-check exercise National Grid has carried out an appraisal of an alternative underground cable design in the Rhosgoch and Rhosybol area (Mitigation Zone M4).

3.3.13 As a result, National Grid is satisfied that the benefits from the non-overhead line alternative would not outweigh the additional capital cost of £71 Million and the environmental and socio-economic effects and technical difficulties associated with the installation and operation of underground cables in this area.

3.3.14 In response to consultation a number of requests were received asking National Grid to consider the use of underground cables between Rhosgoch and Maenaddwyn. Compared to the above scenario, this would more than double the length of underground cable in this section of the route from approximately 3.5 km to 7.5 km, and increase the additional costs to approximately £109 Million.

3.3.15 Whilst this longer length of underground cable route would avoid significant operational effects upon the residential visual amenity at a further 12 properties, six of these at Hebron, National Grid is satisfied that the benefits from the non-overhead line alternative would not outweigh the additional capital cost, environmental and socio-economic effects and technical difficulties associated with the installation and operation of employing underground cables in this area.

3.3.16 The back-check exercise has therefore confirmed that the development of an overhead line in Section B of the route is appropriate having regard to national planning policy and National Grid's statutory duties.

Section C; Technology Choice in Mitigation Zone M5: Capel Coch and Cors Erddreiniog

3.3.17 Following the back-check exercise National Grid considers that the detailed design and assessment of the Proposed Development in Section C of the route confirms National Grid's assumptions in 2015 that an overhead line route could be identified in the Capel Coch area that would comply with all relevant legislation and planning policies.

3.3.18 In order to reduce adverse effects the Proposed Development follows a wide parallel alignment relative to the existing OHL north of Capel Coch to avoid residential properties, and deviates away from the existing OHL east of Capel Coch in order to avoid causing significant effects upon the nationally and internationally designated nature conservation sites at Cors Erddreiniog, as described in the Design Report (**Document 7.17**).

3.3.19 In addition, the detailed mitigation proposals and control measures now proposed will serve to further reduce any effects arising from the development of an OHL in this section of the route.

3.3.20 The results of the landscape and visual assessments reported in the Environmental Statement (**Documents 5.7** and **5.8** respectively) conclude that the Proposed Development would have no significant effects upon nationally designated landscapes. It also concludes that the Proposed Development would result in moderate adverse effects upon residential

visual amenity at 22 addresses in the Capel Coch area and major adverse effects upon the residential visual amenity of a further two properties in this area.

3.3.21 National Grid does not therefore consider that there should be serious concerns on planning policy grounds about the landscape and visual effects of the Proposed Development in Section C of the route. Nevertheless, as part of the back-check exercise National Grid has carried out an appraisal of two alternative underground cable designs in the Capel Coch area (Mitigation Zone M5).

3.3.22 As a result, National Grid is satisfied that the benefits from the non-overhead line alternative would not outweigh the additional capital costs of between approximately £42 Million and £62 Million and the environmental and socio-economic effects and technical difficulties associated with the installation and operation of underground cables in this area.

3.3.23 The back-check exercise has therefore confirmed that the development of an overhead line in Section C of the route is appropriate having regard to national planning policy and National Grid's statutory duties.

Section D; Technology Choice at Talwrn

3.3.24 Following the back-check exercise National Grid considers that the detailed assessment of both the Option A and Option B designs of the Proposed Development in Section D of the route confirms National Grid's assumptions in 2015 that an overhead line route could be identified in the Talwrn area that would comply with all relevant legislation and planning policies.

3.3.25 In order to reduce adverse landscape and visual effects the Proposed Development follows a broadly parallel alignment relative to the existing OHL and would achieve largely or wholly paired tower positions, as described in the Design Report (**Document 7.17**).

3.3.26 In addition, the detailed mitigation proposals and control measures now proposed will serve to further reduce any effects arising from the development of an OHL in this section of the route.

3.3.27 The results of the landscape and visual assessments reported in the Environmental Statement (**Documents 5.7** and **5.8** respectively) conclude that the Proposed Development would have no significant effects upon nationally designated landscapes. It also concludes that the Proposed Development would result in moderate adverse effects upon residential

visual amenity at four addresses in the Talwrn area and major adverse effects upon the residential visual amenity of a further one property in the event that the Option B design is developed.

3.3.28 National Grid does not therefore consider that there should be serious concerns on planning policy grounds about the landscape and visual effects of the Proposed Development in Section D of the route. Nevertheless, following consultation feedback, National Grid has, as part of the back-check exercise, considered whether the use of underground cables in this section of the route would be more appropriate than the proposed OHL.

3.3.29 The use of underground cables in the Talwrn area would result in a reduction of just three or four (Option A and Option B respectively) in the number of pylons, at an additional capital cost of approximately £27 Million.

3.3.30 As a result, National Grid is satisfied that the benefits from the use of underground cables in the Talwrn area would not outweigh the additional capital cost and the environmental and socio-economic effects and technical difficulties associated with the installation and operation of underground cables in this area.

3.3.31 The back-check exercise has therefore confirmed that the development of an overhead line in Section D of the route is appropriate having regard to national planning policy and National Grid's statutory duties.

Sections E and F: Technology Choice in Mitigation Zone M6: Anglesey AONB and Menai Strait

3.3.32 As part of the back-check exercise National Grid has again considered whether the use of underground cables to cross the Anglesey AONB and Menai Strait (Mitigation Zone M6) is justified in planning policy terms and complies with National Grid's statutory duties to develop an economic and efficient connection design and to have regard to the purposes of the Anglesey AONB.

3.3.33 In response to Stage 1 consultation substantial feedback was received raising policy concerns about the acceptability of an overhead line crossing of the Anglesey AONB and Menai Strait. Feedback was received from important stakeholder organisations including both affected local authorities, Natural Resources Wales (then CCW), Welsh Government and the National Trust.

3.3.34 None of the information considered as part of the back-check exercise suggests to National Grid that the landscape and visual effects of an

overhead line crossing of the Anglesey AONB and Menai Strait would no longer give rise to serious concerns in planning policy terms.

3.3.35 The anticipated capital cost of the underground crossing has increased since the initial decision to employ underground cables in this part of the route was taken, as the method of underground cable installation has developed. However National Grid continues to believe that the benefits of employing underground cables in this part of the route would clearly outweigh the additional capital cost, environmental and socio-economic effects and technical difficulties associated with the installation and operation of underground cables in a tunnel.

3.3.36 The back-check exercise has considered the outcome of the detailed assessments of the Proposed Development which has confirmed National Grid's earlier assumptions that an overhead line route could be identified to the preferred CSEC sites on Anglesey and in Gwynedd (connecting to Pentir Substation) that would comply with all relevant legislation and planning policies.

3.3.37 Since that time the alignment of the OHL element of the Proposed Development has been refined on both sides of the Menai Strait, individual pylon locations have been carefully sited and lower height pylon designs are proposed, all as described in the Design Report (**Document 7.17**).

3.3.38 In addition, the detailed mitigation proposals and control measures now proposed will serve to further reduce any adverse effects arising from the development of an OHL in this section of the route.

3.3.39 The results of the landscape and visual assessments reported in the Environmental Statement (**Documents 5.7** and **5.8** respectively) conclude that the Proposed Development would have no significant effects upon nationally designated landscapes, including the Anglesey AONB and Snowdonia National Park, but a moderate adverse effect upon the locally designated Southern Anglesey Estatelands Special Landscape Area in Sections E and F of the route. It also concludes that the Proposed Development would result in moderate adverse effects upon residential visual amenity at 13 properties between Ceint and the Braint CSEC and THH and major adverse effects upon the residential visual amenity of a further 11 properties in this area. A further 10 residential properties between the Tŷ Fodol THH and CSEC and Pentir Substation would experience significant effects upon residential visual amenity (four moderate and six major).

3.3.40 National Grid does not therefore consider that there should be serious concerns on planning policy grounds about the residual landscape and visual effects of the Proposed Development in Sections E and F of the route following the decision to place underground approximately four kilometres of the route in this location.

3.3.41 Nevertheless, in response to consultation feedback, National Grid has carried out an appraisal of increased underground cable lengths from the Tunnel Head Houses on either side of the Strait as part of the back-check exercise. National Grid considered extensions using directly buried underground cables from Braint Tunnel Head House and Cable Sealing End Compound to Ceint or Star on Anglesey and to Pentir from Tŷ Fodol Tunnel Head House and Cable Sealing End Compound in Gwynedd.

3.3.42 As a result, National Grid is satisfied that the benefits from extending the underground cable length on Anglesey (installed in trenches) would not outweigh the additional capital costs of over £95 Million (Ceint) or over £32 Million (Star) and the environmental and socio-economic effects and technical difficulties associated with the installation and operation of underground cables in this area.

3.3.43 National Grid is also satisfied that the benefits of employing directly buried underground cables between Tŷ Fodol Tunnel Head House and Cable Sealing End Compound and Pentir Substation would not outweigh the additional capital cost of over £30 Million and the environmental and socio-economic effects and technical difficulties associated with the installation and operation of underground cables in this area.

3.3.44 A similar conclusion was reached when considering requests to develop the tunnel head house at Pentir Substation, increasing the length of the tunnel by approximately 1.2 km and increasing capital costs by over £73 Million.

3.3.45 The back-check exercise has therefore confirmed that the extents of OHL and underground cable in Sections E and F of the route are appropriate.

Third Menai Crossing

3.3.46 As mentioned in Section 2.6, the Welsh Government and National Grid are undertaking a Feasibility Study to look at the potential for the North Wales Connection Project to use the proposed Third Menai Crossing bridge to carry the connection across the Menai Strait. The study is considering routeing to / from the preferred option, options for the installation of cables on the bridge and programme considerations. Once the study is completed National Grid will evaluate the options using the options appraisal process

that has been used throughout the evolution of the North Wale Connection Project, having regard to its statutory duties, including the need to be 'economic and efficient'.

3.3.47 National Grid's contracted position with Horizon Nuclear Power is to provide a connection by 2026. Given the technical considerations associated with tunnelling beneath the Anglesey AONB and the Menai Strait, a contract for the delivery of the tunnel will need to be awarded in 2020 to meet the HNP connection date (assuming the DCO is granted).

3.3.48 The use of the Third Menai Crossing could therefore present challenges in terms of technical delivery and programme. The Feasibility Study will help to establish if these can be overcome.

3.3.49 To rely on the Third Menai Crossing as a means of carrying the North Wales Connection the proposal would need to be;

- An economic and efficient solution to pursue (taking into consideration environmental, socio economic, technical and cost considerations); and
- Capable of being delivered to meet the HNP connection date prior to the award of the tunnel contract. If this were not the case, then National Grid would require an agreed position with Welsh Government as to the way forward should the delivery of the bridge to meet the HNP contracted date only be certain post 2020.

3.3.50 The Feasibility Study will represent a significant back-check of the design decision in 2016 to install the UGCs in a deep tunnel. As the decision on the Welsh Government's preferred option is still awaited National Grid needs to continue to move forward to secure Development Consent for the Proposed Development.

3.4 OVERALL TECHNOLOGY CHOICE

3.4.1 As explained in this Chapter, National Grid has considered the appropriateness of employing underground cables in all sections of the route. The underground cable routes considered extend in total to cover approximately 25 km of the approximately 31 km of additional new OHL route that forms the Proposed Development. The remaining 6 km of the route represents those areas of least concern and lowest sensitivity to the development of an OHL, and this is reflected in the outcome of the detailed assessments that support the application for Development Consent.

3.4.2 As a result of the back-check National Grid has confirmed in all cases that the use of an OHL (with cables installed in a tunnel beneath the Anglesey AONB and Menai Strait) represents the most appropriate technology choice having regard to national planning policies and National Grid's statutory duties. This is reflected in the conclusion reported in the Strategic Options Report (**Document 7.2**) relating to a wholly underground connection between Wylfa and Pentir.

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4 Back-Check of Preferred CSEC/THH Selection

4.1 INTRODUCTION

4.1.1 In January 2015, National Grid announced a preferred route corridor for the development of the new electricity transmission line connection between Wylfa and Pentir. At the same time, National Grid also announced that overhead lines would not be used to cross the Anglesey Area of Outstanding Natural Beauty (AONB) and the Menai Strait.

4.1.2 The Wylfa to Pentir Route Options Report (Oct 2015) (**Document 9.3**) identified potential zones for Cable Sealing End Compounds (CSEC) to allow the overhead line to connect to proposed underground cables beneath the Anglesey AONB and Menai Strait. These search areas were identified within both Anglesey and Gwynedd, either side of the area within which underground cables would be installed.

4.1.3 Three search areas were identified on Anglesey: Anglesey North, Anglesey Central and Anglesey South CSEC Search Areas. In Gwynedd, two search areas; Gwynedd North and Gwynedd South CSEC Search Areas, were identified. The CSEC search areas (and the eight OHL route options identified that might connect to them) are illustrated at Figure 4.1 below.

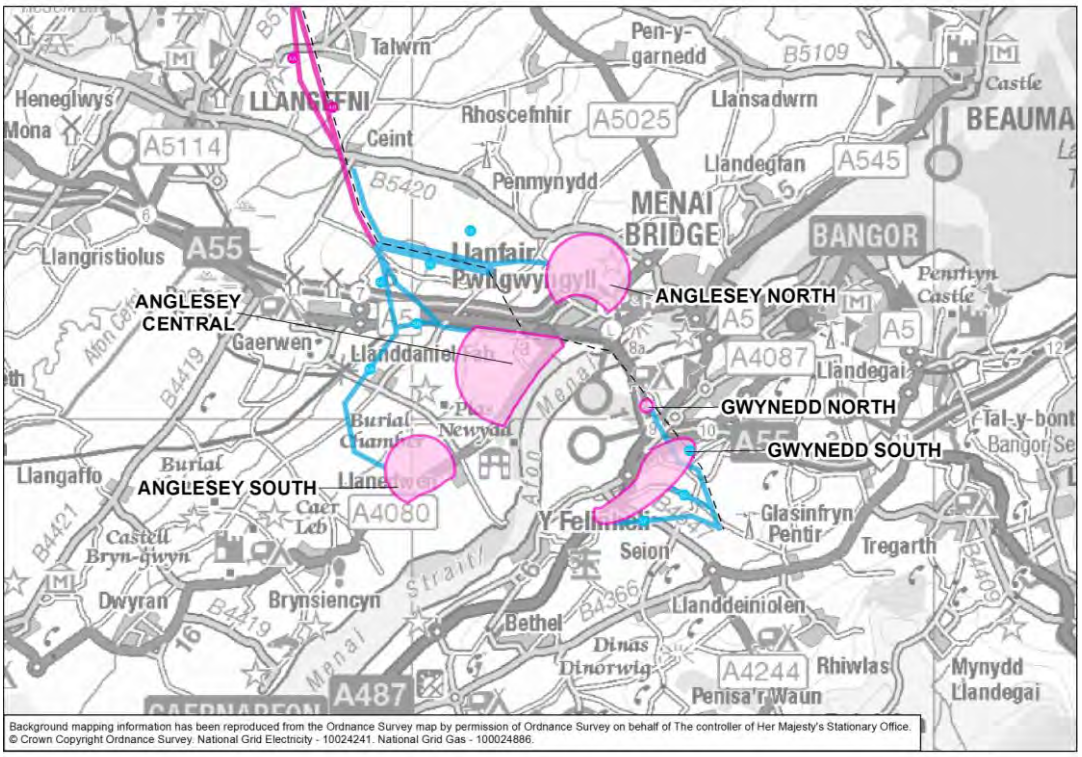

Figure 4.1. Cable Sealing End Compound Search Areas and Related OHL Route Options.

4.2 DESCRIPTION OF CSEC SITE OPTIONS

4.2.1 The Menai Strait Crossing Report (**Document 9.6**) explains how these Search Areas were further developed to identify a range of potential site options for CSECs at either end of an underground cable section. This exercise followed the guidance set out in National Grid's document 'Substations and the Environment: Guidelines on Siting and Design' and considered a range of topic areas to identify potentially suitable site locations.

4.2.2 Twelve potential CSEC sites were identified through the appraisal process on Anglesey and seven were identified in Gwynedd. These are shown at Figure A4.1 in Appendix A. An appraisal of these CSEC site options was carried out against a range of topic areas, as described in the Menai Strait Crossing Report (**Document 9.6**). This appraisal concluded that:

There is no definitive outcome identifying preferred options in either Anglesey or Gwynedd. In many instances options could not be preferred or least preferred without consideration of other elements of the project (overhead lines, cable routes, crossing zones etc.).

4.2.3 In order to determine an overall solution a number of end to end options were defined, combining options for each element of the project in Sections E and F of the route; overhead line route options, CSEC site options, cable route options and Menai crossing zones. An appraisal of these end to end options was then carried out as described in the Menai Strait Crossing Report (**Document 9.6**). This appraisal concluded that:

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 has been taken forward and is being developed further into a design for the DCO application.

4.2.4 End to end Option C comprised the following elements of work:

- Overhead line Route Options 5A, 5B or 5C to;
- CSEC Site Option AC6 (located within the Anglesey Central CSEC Search Area) then a;
- Cables installed in a Tunnel to;
- CSEC Site Option GS1 (located within the Gwynedd South CSEC Search Area) and then;
- Overhead line Route Options 5F or 5G to Pentir Substation

4.3 CONSIDERATIONS FOR THE BACK-CHECK OF CSEC SITE LOCATION

4.3.1 In undertaking the back-check of the selection of the preferred CSEC site location National Grid has had regard to those matters set out in Chapter 2 of this Report.

4.3.2 As described in section 2.3 of this Report, in undertaking a back-check of the preferred CSEC site location, National Grid has also had regard to National Policy Statements EN-1 and EN 5, the principal planning policies with which the Proposed Development must comply. These policies have not altered since the preferred CSEC site locations were selected in 2016.

4.3.3 National Policy Statement EN-5 recognises that

New substations, sealing end compounds and other above ground installations that form connection, switching and voltage transformation points on the electricity networks can also give rise to landscape and visual impacts

and suggests that

applicants will give consideration to how Substations are placed in the local landscape taking account of such things as local topography and the possibility of screening.

4.3.4 To assist in siting of all above ground sites, including Substations and CSECs, National Grid follows internal guidance set out in the documents 'Substations and the Environment: Guidelines on Siting and Design' and National Grid's 'Our Approach to Options Appraisal. The selection of the preferred CSEC site locations in 2016 was made having regard to these Guidelines and these have not altered since that time.

4.3.5 Of particular note are those matters set out in Chapter 2 of this Report which represent changes that have occurred since the preferred CSEC site locations were first identified in 2016.

Environmental and Socio-Economic Effects

4.3.6 In carrying out the back-check of the preferred CSEC site locations National Grid has had regard to the original appraisal outcomes as set out in the Menai Strait Crossing Report (**Document 9.6**).

4.3.7 National Grid has also had regard to the assessment findings presented in the Environmental Statement (**Volume 5 Documents**) and Habitat Regulations Assessments (**Document 5.23**) which have been carried out since the preferred CSEC site options were identified in 2016.

4.3.8 The outcomes of the Viewpoints Assessments (**Document 5.8.2.2**) and the indicative photomontages (**Document 5.29**) have helped to inform the back-check with regard to potential visual effects, particularly in relation to views from the community of Star.

Planning Policy

4.3.9 The Anglesey and Gwynedd Joint Local Development Plan (JLDP) 2011-2026 has been adopted by both planning authorities, coming into effect on 31st July 2017. The allocations and policies set out in the Development Plan have therefore been adopted since the preferred CSEC site options was first identified. However, when selecting the preferred CSEC site option, regard was had to the Deposit version of the draft Development Plan, for example in considering the extent of the then draft Southern Anglesey Estatelands Special Landscape Area. The adopted allocations

and policies set out in the JLDP have been considered as part of the back-check exercise.

Design of Proposed Development

4.3.10 Section 2.7 of this Report describes the engineering designs now available which were not available at the time that the CSEC site options were selected. These are described in detail in the Design Report (**Document 7.17**) and the back-check exercise has had regard to these.

4.3.11 It was noted in the Menai Strait Crossing Report (**Document 9.6**) that the use of low height pylons may reduce the effects of the overhead line entry into the CSECs located at AC6 (Anglesey Central) and GS1 (Gwynedd South). As described in the Design Report (**Document 7.17**) National Grid has now confirmed that terminal gantries within the CSECs and low height pylons in the approaches to both CSECs would be used and how their use would help to reduce the wider landscape and visual effects of the Proposed Development in this area.

4.3.12 The detailed design of the Proposed Development now includes specific landscape proposals to help screen both preferred CSEC sites. Design Principles have also been developed for the sympathetic architectural design of the Tunnel Headhouses within each CSEC. In the case of the Braint Tunnel Head House the opportunity has been taken to significantly reduce the height of the building from that originally envisaged when the preferred CSEC site option was selected. These measures are described in the Design Report (**Document 7.17**) and the Design Guide (**Document 7.19**).

Mitigation and Control Measures

4.3.13 Section 2.10 of this Report describes the various mechanisms that have been developed since the route options were selected that would limit, control or mitigate the effects of the Proposed Development. These measures have been considered during the back-check exercise.

4.3.14 One reason for favouring sites within the Anglesey Central and Gwynedd South CSEC Search Areas in 2016 was the perceived range of access opportunities for construction traffic; an important consideration given the duration and volume of spoil that would need to be removed from the tunnel. Following detailed consideration of the potential access arrangements for both CSEC sites an Outline Construction Traffic Management Plan (**Document 7.5**) has been developed for these areas, which has reduced the potential for traffic disruption on nearby

communities. Again, this Outline Management Plan has been considered during the back-check exercise.

4.4 BACK-CHECK OUTCOMES

4.4.1 Following the back-check exercise it remains clear that the siting of the CSEC cannot be considered in isolation from the design and route of both the underground cables beneath the Anglesey AONB and Menai Strait and the OHL routes on Anglesey and in Gwynedd.

4.4.2 As a result of the back-check exercise, which has considered all elements of the Proposed Development associated with the use of underground cables in this section of the route, it is clear that the benefits of employing a long tunnel between CSEC site options AC6 and GS1 remain. As described in section 3.3 of this Report, these benefits clearly outweigh the higher costs, technical complexity and environmental and socio-economic effects associated with the construction and operation of the CSECs and tunnel as proposed.

4.4.3 The use of a long tunnel between CSEC site options AC6 and GS1 continues to represent the most appropriate response to the environmental and socio-economic concerns, engineering challenges and cost estimates associated with the use of underground cables in this part of the route.

4.4.4 Feedback received in response to Stage 3 consultation requested that National Grid consider extending the length of this section of underground cable on both sides of the crossing, which in turn would result in alternative CSEC site locations. The reasons for rejecting the resultant CSECs at Ceint or Star in preference to AC6, or at Pentir in preference to GS1, are summarised in Chapter 3 of this Report.

4.4.5 Whilst concerns about the effect of the CSEC sites on views from local residential properties, including from the community of Star on Anglesey, have been raised in consultation feedback, National Grid considers that the detailed design proposal and the control measures set out in the CEMP (**Document 7.4**) and the Schedule of Mitigation (**Document 5.28**) will help to reduce or mitigate these effects to an acceptable level.

4.4.6 On balance, National Grid believes that CSEC site options AC6 and GS1 represent the most appropriate site options having regard to national planning policy and National Grid's statutory duties. These site options, together with the deep tunnel between the two, therefore form the basis of the Proposed Development in this section of the route.

5 Back-Check of Preferred Overhead Line Route Selection

5.1 INTRODUCTION

5.1.1 Having concluded during the earlier stage of the back-check exercise that, except for the crossing of the Anglesey AONB and Menai Strait area, the use of an OHL remains appropriate throughout the remainder of the route and would comply with all relevant legislation and planning policies, the selection of a preferred route option for the new OHL between Wylfa Substation and the Menai Strait Crossing and the Menai Strait Crossing and Pentir Substation could be considered.

5.1.2 This Chapter summarises why route options presented at Stage 2 consultation and not taken forward remain less appropriate options than the route which now forms the basis for the Proposed Development. This included consideration of alternative route options, suggested during consultation, and whether these might have merit over the preferred route option.

5.1.3 The back-check has considered consultation feedback received during the project's development and has had regard to relevant updated information as described in Part 2 of their Report.

5.2 DESCRIPTION OF INITIAL OVERHEAD LINE ROUTE OPTION SELECTION.

5.2.1 In 2015 National Grid identified potential route options for a new overhead line between Wylfa and the Anglesey AONB at the Menai Strait, and between the Menai Strait and Pentir. The design of these route options was informed by a range of environmental, socio-economic, technical and cost considerations identified through data gathering and site visits. A short-list of route options was identified for public consultation in Autumn 2015 and detailed information including a description of each Route Option was published in the Wylfa to Pentir Route Options Report (Oct 2015) (**Document 9.3**) to inform during Stage 2 consultation.

5.2.2 For the purposes of providing a structure to identify and appraise route options, the route was divided into five sections. These sections and the identified route options are described and illustrated below.

5.2.3 **Section 1**: This section of route options broadly equates to Section A of the Proposed Development. Two route options (Route Options 1A and 1B) were presented within this section: both broadly parallel and to the north of the existing overhead line, with one presenting a localised deviation away from the line to the east of Llanfechell. These are illustrated at Figure 5.1 below.

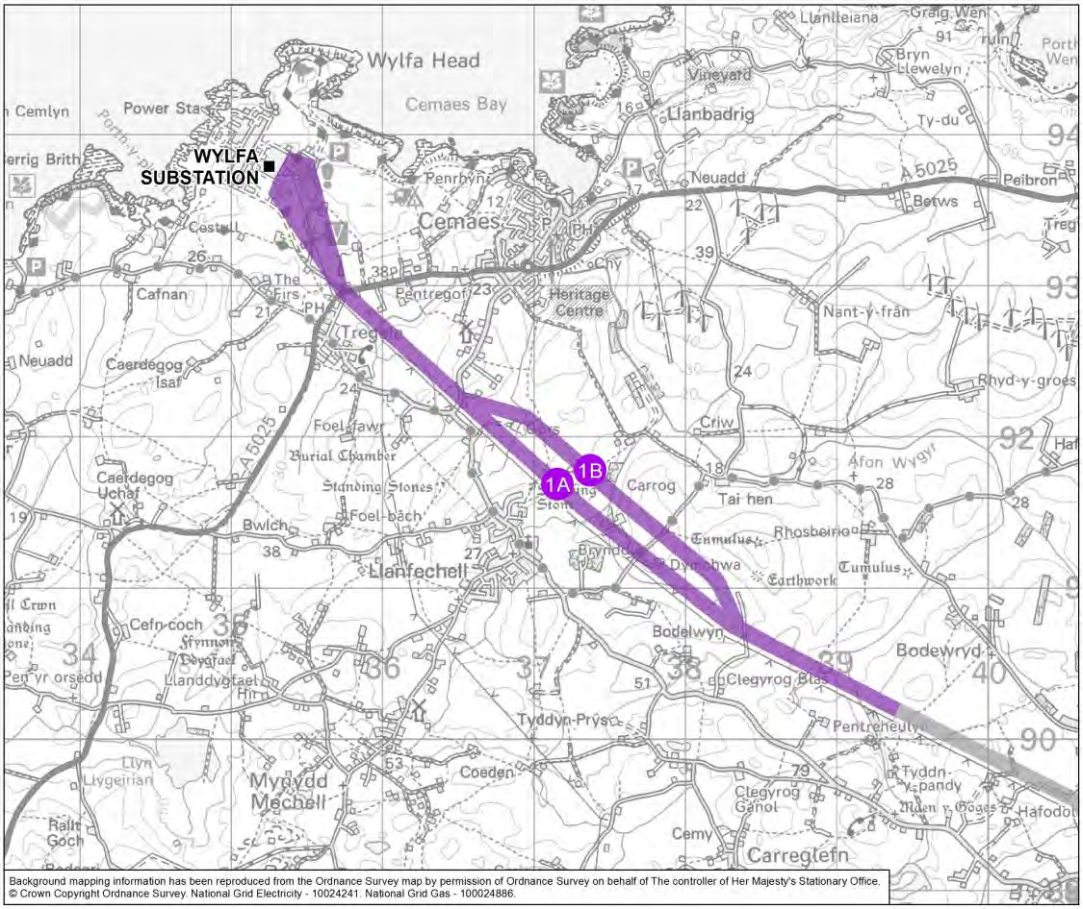

Figure 5.1. OHL Route Options in Section 1 (Section A) of the Route.

5.2.4 **Section 2**: This section of route options broadly equates to Section B of the Proposed Development. Four route options (Route Options 4A, 4B, 4C and 4D) to both sides of the existing line were presented in this section; three of these included localised deviations away from a parallel alignment to avoid particular features, whilst a fourth was routed to the west, closer to Llyn Alaw reservoir and Site of Special Scientific Interest (SSSI). These route options are illustrated at Figure 5.2 below.

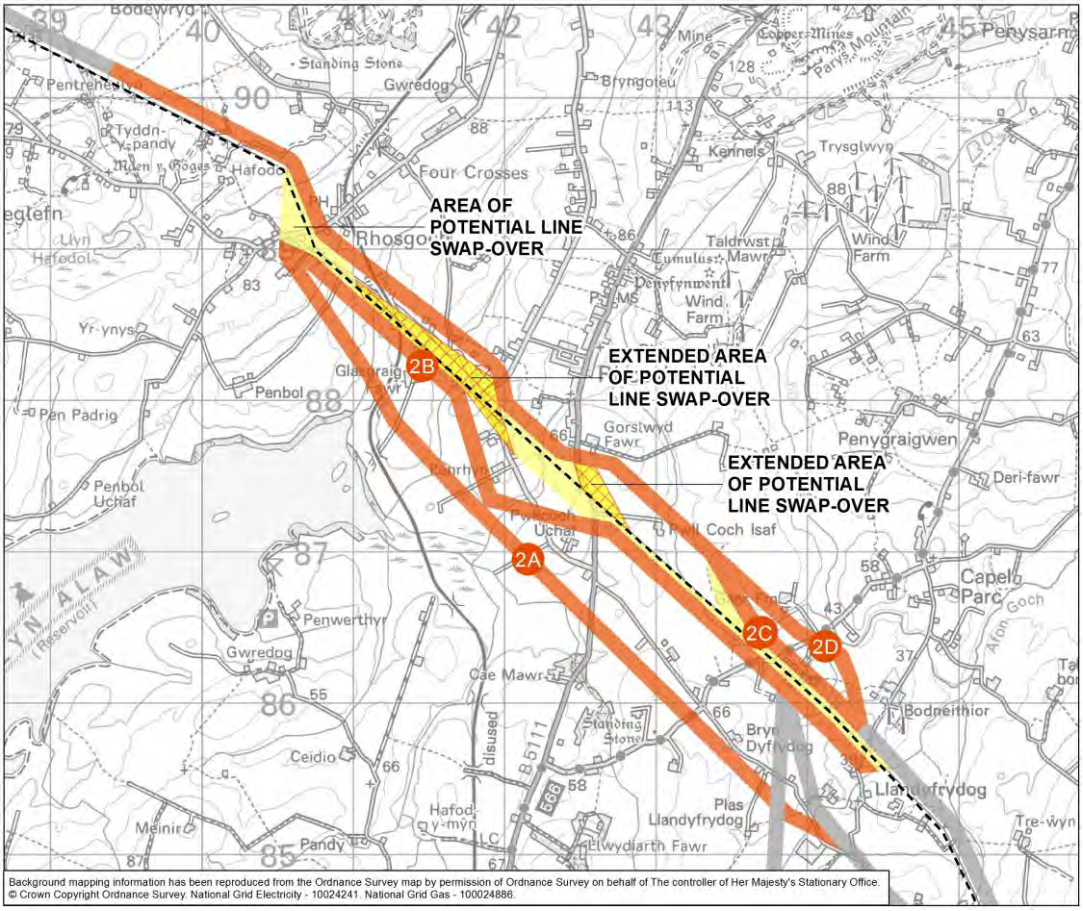

Figure 5.2. OHL Route Options in Section 2 (Section B) of the Route.

5.2.5 **Section 3**: This section of route options broadly equates to Section C of the Proposed Development. Three route options (Route Options 3A, 3B and 3C) were presented in this section; two pass to the north and east of Capel Coch, but seek to avoid the sensitive locations of Cors Erddreiniog SSSI and National Nature Reserve, which is also part of the European protected Corsydd Môn (Anglesey Fens) Special Area of Conservation and Corsydd Môn a Llyn (Anglesey and Llyn Fens) Ramsar site. The third route option was routed across a less constrained area to the west of Capel Coch and east of Llanerchymedd, with much of the route not being visible from points that currently experience views of the existing overhead line. This third option spread the visual impact of transmission development, but was considered to reduce the potential for cumulative effects. The three route options are illustrated at Figure 5.3 below.

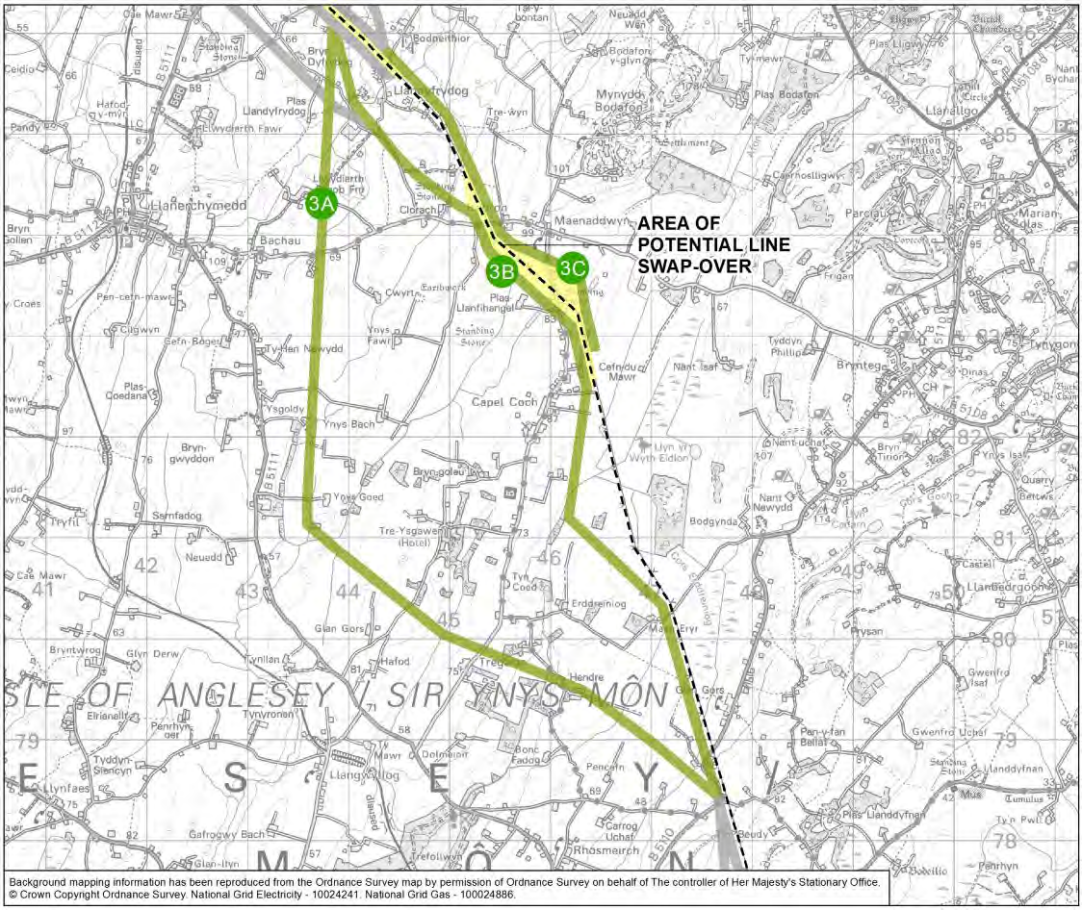

Figure 5.3. OHL Route Options in Section 3 (Section C) of the Route.

5.2.6 **Section 4**: This section of the route options broadly equates to Section D of the Proposed Development. Two route options (Route Options 4A and 4B) were presented in this section; both broadly parallel to the western side of the existing overhead line, with one presenting a localised deviation away from the line to the west of Talwrn. Both route options are illustrated at Figure 5.4 below.

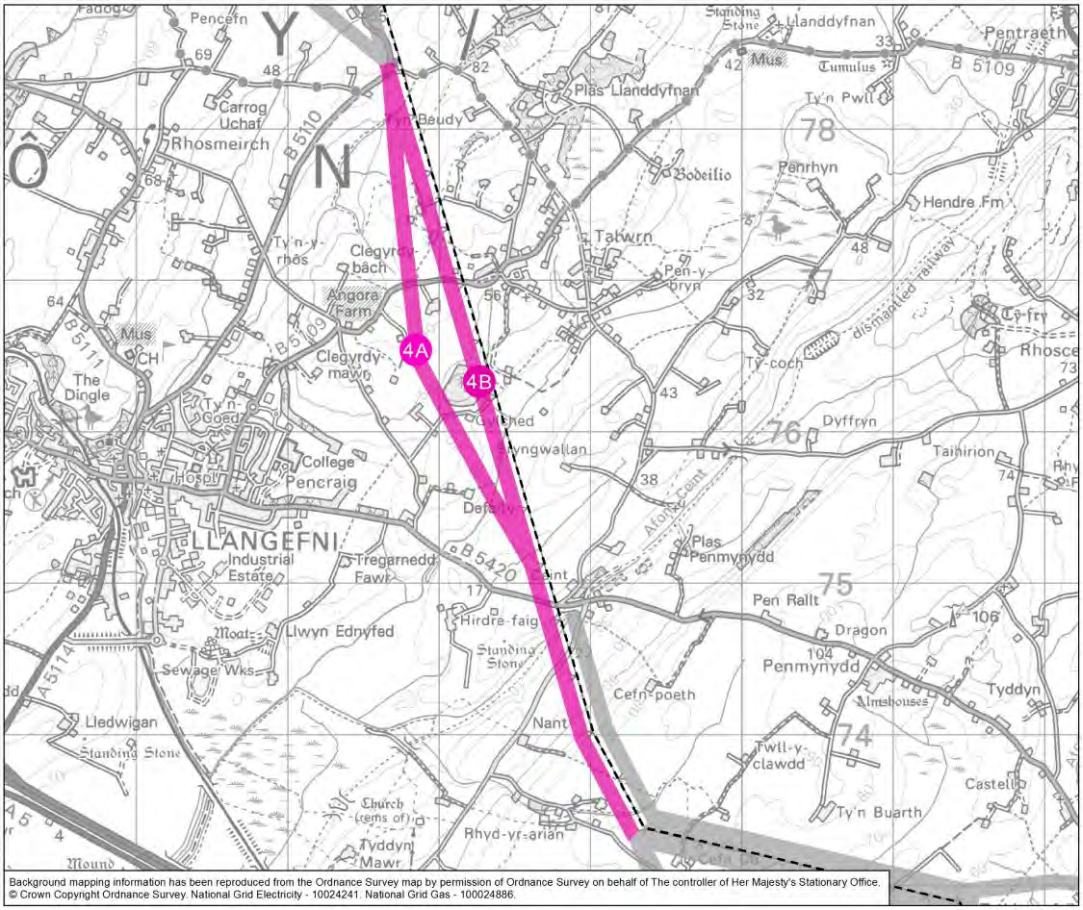

Figure 5.4. OHL Route Options in Section 4 (Section D) of the Route.

5.2.7 **Section 5**: This section of the route options broadly equates to Sections E and F of the Proposed Development. The Wylfa to Pentir Route Options Report (Oct 2015) (**Document 9.3**) identified potential zones for Sealing End Compounds to allow the overhead line to connect to the proposed underground cables beneath the Anglesey AONB and Menai Strait. These search areas were identified within both Anglesey and Gwynedd, either side of the area within which underground cables would be installed. Three search areas (Anglesey North, Central and South CSEC Search Areas) and five route options (Route Options 5A, 5B, 5C, 5D and 5E) were identified on Anglesey. In Gwynedd two search areas (Gwynedd North, and Gwynedd South CSEC Search Areas) and three route options (Route Options 5F, 5G and 5H) were identified. The CSEC search areas and the eight route options are illustrated at Figure 5.5 below.

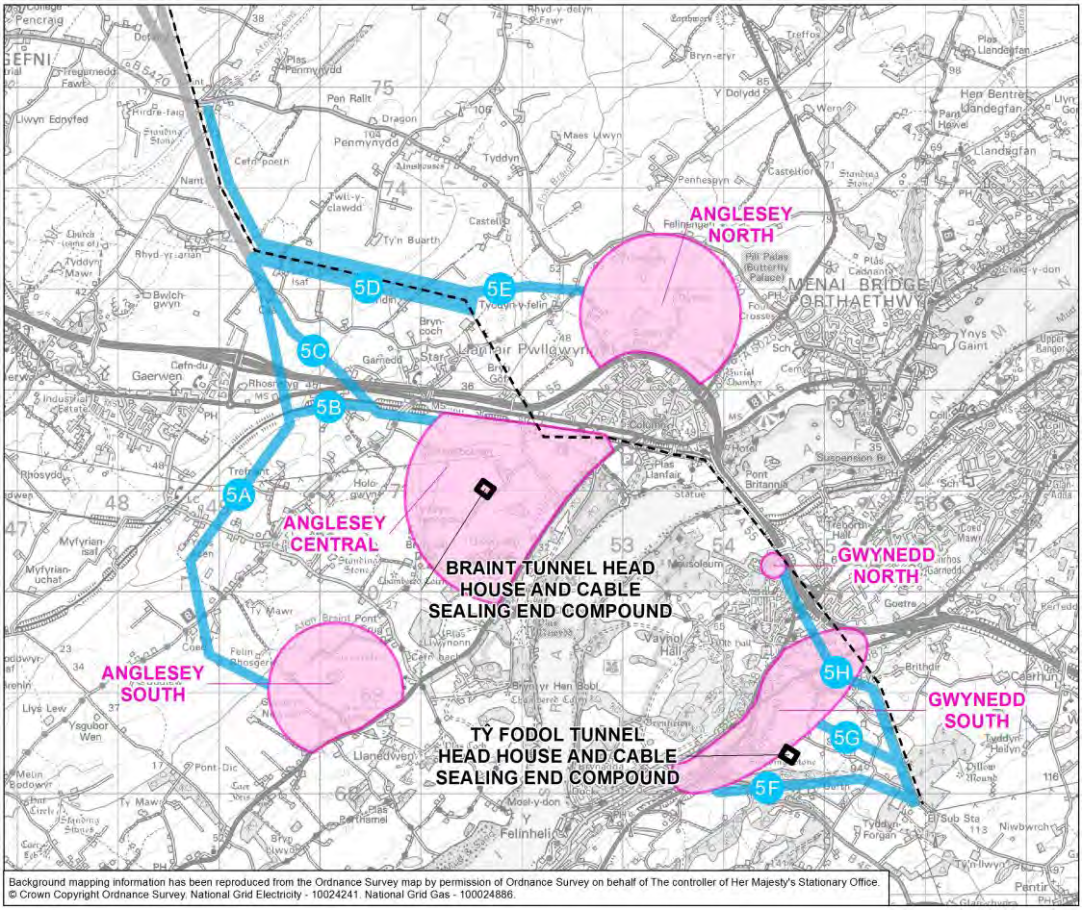

Figure 5.5. OHL Route Options in Section 5 (Sections E and F) of the Route.

5.2.8 Although the route was divided into sections, National Grid also considered the various ways in which the sections might be combined along the route. This assisted in considering the merits of different combinations of short-listed route options. Zones where the routes might transpose from one side of the existing line to the other were also identified in order to allow various combinations of route options to be achieved.

5.2.9 As well as the route options presented for consultation, National Grid also described a number of other potential route options within each section of the route, which had been identified as less well-performing options, informed by environmental, socio-economic, technical and cost appraisals and feedback from stakeholders. These are shown as grey routes in the above figures 5.1 to 5.5.

5.2.10 National Grid's Approach to Options Appraisal was used to ensure that the route options were comprehensively appraised and that the most appropriate option was taken forward based on the outcome of the appraisal having regard to national planning policy, National Grid's statutory

duties and the results of consultation feedback. Topic areas considered included technical, landscape and visual, ecology and nature conservation, operational noise, cultural heritage, soils and agriculture, land and property, socio-economics, other environmental issues (including hydrology, drainage and construction noise) and cost.

5.2.11 The appraisal findings are summarised in the Preferred Route Option Selection Report Wylfa to the Menai Crossing Area (**Document 9.4**) and the Menai Strait Crossing Report (**Document 9.6**).

5.2.12 Selection of the most appropriate combination of route options was informed by the more detailed appraisal, extensive site surveys and feedback received from stakeholders, including the public, in response to Stage 2 consultation held in Autumn 2015. Feedback received during the Stage 2 consultation is summarised in the Consultation Report (**Document 6.1**).

5.2.13 Following a multi-disciplinary appraisal, the Route Options or sections of Route Options selected to be taken forward for detailed design and consultation comprised the following elements;

- Modified line entry into the substation at Wylfa
- Route Option 1A (close parallel to east), transposing to;
- Route Option 2B in the west, realigned northwards in the east to closely parallel a diverted section of the existing overhead line, transposing to;
- Route Option 3C (northern), transposing to;
- Route Option 3B (southern), and then on to;
- Route Option 4B

5.2.14 At the end of Route Option 4B the route passed into Section 5 of the Corridor. Here the design of the overhead line became increasingly influenced by the environmental, socio-economic, technical and cost considerations associated with the installation of underground cables beneath the Anglesey AONB and the Menai Strait. This complex interplay of design considerations and environmental and socio-economic effects was described in detail in the Menai Strait Crossing Report (**Document 9.6**). The appraisal of OHL route options in this area concluded:

There is no definitive outcome identifying a preferred option in either Anglesey or Gwynedd.

Without considering the CSEC Search Area, on Anglesey Option 5A would be discounted as other options are more favourable. Although Options 5D / 5E were favoured by a number of disciplines other options could not be discounted at this stage without consideration of other elements of the project (CSEC siting areas, cable routes, crossing zones etc.).

In Gwynedd there was similarly no definitive outcome ….

Without considering the CSEC Search Areas … Option 5H would be discounted as there are significant technical challenges and other options are more favourable. Neither Option 5F nor 5G could be discounted at this stage without consideration of other elements of the project (cable routes, crossing zones etc.).

5.2.15 The Menai Strait Crossing Report (**Document 9.6**) explains the appraisal process that led to the identification of a preferred CSEC site located within the Anglesey Central CSEC Search Area. Both Route Options 5B and 5C provided a potential connection to CSEC Site Option AC6 within the Anglesey Central Search Area from route option 4B. Following an appraisal of these route options, Route Option 5C was taken forward.

5.2.16 The Menai Strait Crossing Report (**Document 9.6**) also sets out the appraisal process that led to the identification of a preferred CSEC site located within the Gwynedd South CSEC Search Area. None of the route options presented at Stage 2 consultation (Route Options 5F, 5G and 5H) led directly to CSEC Site Option GS1 (within the Gwynedd South Search Area) and only a short connection was required between the site and Pentir Substation. Therefore a draft alignment was developed that provided the straightest connection with the least number of pylons and was considered to have fewer visual effects on properties.

5.2.17 The preferred route options described above formed the basis for the route of the detailed proposal presented at Stage 3 consultation, and continue to form the basis for the route of the Proposed Development.

5.3 CONSIDERATIONS FOR THE BACK-CHECK OF OVERHEAD LINE ROUTE OPTION SELECTION

5.3.1 In undertaking the back-check of the selection of preferred route options National Grid has had regard to those matters set out in Chapter 2 of this Report.

5.3.2 As described in section 2.3 of this Report, in undertaking a back-check of the selection of the preferred route options, National Grid has also had regard to National Policy Statements EN-1 and EN-5, the principal planning policies with which the Proposed Development must comply. These policies have not altered since the preferred route option was selected in 2015.

5.3.3 The primary guidance relating to the routeing of overhead electricity lines is provided by the Holford Rules, which form an intrinsic part of National Policy Statement EN-5. The selection of the preferred route option in 2015 was made having regard to the Holford Rules and again these have not altered since that time.

5.3.4 Of particular note are those matters set out in Chapter 2 of this Report which represent changes that have occurred since the preferred route options were first identified in 2015.

Environmental and Socio-Economic Effects

5.3.5 In carrying out the back-check of the route options selection National Grid has had regard to the original appraisal outcomes as set out in the Route Options Report (**Document 9.3**), the Preferred Route Options Selection Report (**Document 9.4**) and the Menai Strait Crossing Report (**Document 9.6**).

5.3.6 National Grid has also had regard to the assessment findings presented in the Environmental Statement (**Volume 5 Documents**) and Habitat Regulations Assessments (**Document 5.23**) which have been carried out since the preferred route options were first identified in 2015.

Planning Policy

5.3.7 The Anglesey and Gwynedd Joint Local Development Plan (JLDP) 2011-2026 has been adopted by both planning authorities, coming into effect on 31st July 2017. The allocations and policies set out in the Development Plan have therefore been adopted since the preferred route options were first identified. However, when selecting the preferred route options regard was had to the Deposit version of the draft Development Plan, for example in considering the extents of draft Special Landscape Areas. The adopted allocations and policies set out in the JLDP have been considered as part of the back-check exercise.

Design of Proposed Development

5.3.8 Section 2.7 of this Report describes the detailed engineering designs now available which were not available at time the route options were selected.

5.3.9 The detailed design of the Proposed Development has achieved a high degree of synchronisation between the existing and proposed OHL in many sections of the route, beyond that envisaged at the time that the preferred route options were selected. (see paragraph 10.3.13 of the Preferred Route Option Selection Report (**Document 9.4**)). This has been a consideration during the back-check exercise.

5.3.10 Changes that have been made to the detailed design of the Proposed Development in each section of the route since the preferred route option was selected are described in more detail in the Design Report (**Document 7.17**). This also explains the reduced environmental or socio-economic effects that would result.

Land Negotiations

5.3.11 Section 2.9 of this Report describes the benefits arising from the acquisition of properties since the route options were selected. These are considered material to the back-check of the selection of the preferred route option.

5.3.12 This is the case in section A of the route where National Grid has acquired a residential property to the south of Cemaes after the preferred Route Option 2B was selected. This has allowed National Grid to optimise the OHL design for the Proposed Development in this location, as detailed in the Design Report (**Document 7.17**). This has moved the alignment of the proposed OHL further from residential properties in the village, helping to reduce environmental and socio-economic effects.

5.3.13 National Grid has also acquired a residential property on the west side of Rhosgoch, in Section B of the route, since the preferred Route Option 1A was selected. This has allowed National Grid to optimise the OHL design for the Proposed Development in this location, as detailed in the Design Report (**Document 7.17**), helping to reduce environmental and socio-economic effects.

5.3.14 The design changes facilitated by these land acquisitions have been considered during the back-check exercise in these sections of the route.

Mitigation and Control Measures

5.3.15 Section 2.10 of this Report describes the various mechanisms that have been developed since the route options were selected that would limit, control or mitigate the effects of the Proposed Development. These measures have been considered during the back-check exercise.

Alternative Route Options

5.3.16 As well as the Route Options presented in detail during Stage 2 consultation other route options had been initially identified by National Grid. These initial route options were considered inferior to the route options presented and were not taken forward for consultation for the reasons set out in the Route Options Report (**Document 9.3**). These are illustrated as grey routes in the figures shown above at Section 5.2 of this Report. The back-check exercise also reviewed these options to confirm whether the original decision remained appropriate.

5.3.17 Other suggested route options were raised in feedback to both Stage 2 and Stage 3 consultation. National Grid considered possible design responses to these requests having regard to known environmental, socio-economic cost and technical factors.

5.3.18 The same consultation feedback also suggested more minor realignments of the proposed OHL route in some areas. These more minor realignments have not been considered as part of the back-check exercise as they were considered as part of the detailed design iteration that led to the final design of the Proposed Development, which is discussed in the Design Report (**Document 7.17**).

5.4 BACK-CHECK OUTCOMES

Route Section 1 / Section A

5.4.1 Following the back-check exercise National Grid considers that the benefits of the closely parallel alignment that Route Option 1A represents have been further enhanced through the localised realignment of the Proposed Development south of Cemaes and the high degree of design synchronisation between the new and existing OHLs. Route Option 1A achieves the design that best accords with the Holford Rules and would result in lower overall environmental and socio-economic effects.

5.4.2 Whilst concerns about the effect of the Proposed Development on local residential properties close to Route Option 1A have been raised in consultation feedback, National Grid considers that the detailed design proposal and the control measures set out in the CEMP (**Document 7.4**) and the Schedule of Mitigation (**Document 5.28**) will help to reduce or mitigate these effects to an acceptable level.

5.4.3 National Grid's decision to screen out a number of initially identified route options was also reviewed and remains appropriate.

5.4.4 On balance, National Grid believes that Route Option 1A represents a more appropriate Route Option, having regard to national planning policy, the Guidance set out in the Holford Rules and National Grid's statutory duties. Route Option 1A was therefore confirmed as the preferred route option and forms the basis of the Proposed Development in this section of the route.

Route Section 2 / Section B

5.4.5 Following the back-check exercise National Grid considers that the benefits of the closely parallel alignment that the modified route option 2B represents have been further enhanced through the localised realignment of the Proposed Development south-west of Rhosgoch. In addition, the replacement of the existing OHL in this section of the route has further increased the degree of design synchronisation between the new and existing OHLs and has allowed the final parallel alignments to be optimised. Whilst this has resulted in higher capital costs these are considered merited having regard to the reduced effects that would result throughout the operational life of the Proposed Development.

5.4.6 The modified Route Option 2B achieves the design that best accords with the Holford Rules and would result in lower overall environmental and socio-economic effects than the other Route Options considered.

5.4.7 Whilst concerns about the effect of the Proposed Development on local residential properties, especially those in the Rhosgoch area close to the modified Route Option 2B, have been raised in consultation feedback, National Grid considers that the detailed design proposal and the control measures set out in the CEMP (**Document 7.4**) and the Schedule of Mitigation (**Document 5.28**) will help to reduce or mitigate these effects to an acceptable level.

5.4.8 National Grid's decision to screen out a number of initially identified route options in this section of the route was also reviewed and remains appropriate.

5.4.9 Feedback received in response to Stage 3 consultation requested that National Grid consider a number of alternative OHL route options in Section B of the Proposed Development. Four alternative route options have been considered as part of the back-check exercise. These were located

- south-west of Rhosgoch;
- north of Rhosgoch;

- between Rhosybol and Maenaddwyn (including replacement of the existing OHL) and;
- south of Capel Parc (including replacement of the existing OHL).

5.4.10 The appraisal of these Requested Route Options highlighted a number of adverse effects and planning policy concerns which led to them not being preferred to the modified Route Option 2B. Concerns variously included: sharp changes in route direction; greater numbers of pylons; greater levels of adverse effects upon residential receptors and wider landscape character; impacts to nationally designated nature conservation sites; increased costs and; greater amenity effects during construction.

5.4.11 On balance, National Grid believes that Modified Route Option 2B represents a more appropriate Route Option, having regard to national planning policy, the Guidance set out in the Holford Rules and National Grid's statutory duties. Modified Route Option 2B was therefore confirmed as the preferred route option and forms the basis of the Proposed Development in this section of the route.

Route Section 3 / Section C

5.4.12 Following the back-check exercise National Grid considers that a route following the northern section of Route Option 3C and then transposing onto Route Option 3B to the west of Maenaddwyn continues to best accord with the Holford Rules. This design would result in lower overall environmental and socio-economic effects than the other Route Options considered.

5.4.13 Whilst concerns about the effect of the Proposed Development on local residential properties, especially those in the Maenaddwyn and Capel Coch area close to Route Option 3B, have been raised in consultation feedback, National Grid considers that the detailed design proposal and the control measures set out in the CEMP (**Document 7.4**) and the Schedule of Mitigation (**Document 5.28**) will help to reduce or mitigate these effects to an acceptable level.

5.4.14 National Grid's decision to screen out a number of initially identified route options in this section of the route was also reviewed and remains appropriate.

5.4.15 Feedback received in response to Stage 3 consultation requested that National Grid consider a number of alternative OHL route options in Section C of the Proposed Development. Three alternative route options have been considered as part of the back-check exercise. These were located:

- parallel to the existing OHL east of Capel Coch;
- north and east of Cors Erddreiniog and;
- west and south of Capel Coch.

5.4.16 The appraisal of these Requested Route Options highlighted a number of adverse effects and planning policy concerns which led to them not being preferred to the northern section of Route Option 3C and southern section of Route Option 3B. Concerns variously included: significant effects upon the internationally designated nature conservation sites at Cors Erddreiniog which could affect the integrity of the designated sites; adverse landscape effects both to Anglesey AONB and the Parciau Estatelands Special Landscape Area, increased visual effects upon views from Maenaddwyn and west and south from Capel Coch where an OHL would be introduced into currently unaffected views from the wider community.

5.4.17 On balance, National Grid believes that the northern section of Route Option 3C and southern section of Route Option 3B continues to be the most appropriate Route Option, having regard to national planning policy, the Guidance set out in the Holford Rules and National Grid's statutory duties. This combination of Route Options was therefore confirmed as preferred and forms the basis of the Proposed Development in this section of the route.

Route Section 4 / Section D

5.4.18 The Proposed Development comprises two mutually exclusive design proposals in this section of the route, for which National Grid is seeking Development Consent. However, both versions of the Proposed Development (referenced as 'Option A' and 'Option B' in the draft Development Consent Order) broadly follow Route Option 4B. These are illustrated at Figure A5.4 in Appendix A.

5.4.19 Following the back-check exercise National Grid considers that the benefits of the close parallel alignment that route option 4B represents have been further enhanced as the detailed design has achieved a high degree of synchronisation between the existing and proposed OHL in this section of the route (especially in the case of Option A, where all pylon locations are considered to be synchronised or broadly synchronised).

5.4.20 Route Option 4B achieves the design that best accords with the Holford Rules and would result in lower overall environmental and socio-economic effects than Route Option 4A.

5.4.21 Whilst concerns about the effect of the Proposed Development on local residential properties, especially those in the Talwrn area close to the Route Option 4B, have been raised in consultation feedback, National Grid considers that the detailed design proposal and the control measures set out in the CEMP (**Document 7.4**) and the Schedule of Mitigation (**Document 5.28**) will help to reduce or mitigate these effects to an acceptable level.

5.4.22 National Grid's decision to screen out a number of initially identified route options in this section of the route was also reviewed and remains appropriate.

5.4.23 On balance, National Grid believes that Route Option 4B represents a more appropriate Route Option, having regard to national planning policy, the Guidance set out in the Holford Rules and National Grid's statutory duties. This Route Option was therefore confirmed as the preferred route option and forms the basis of the Proposed Development in this section of the route.

Route Section 5 / Sections E and F

5.4.24 The back-check of the selection of Route Options in Sections E and F of the route has been undertaken as a progressive exercise, recognising the inter-relationship of different elements of the connection in this area.

5.4.25 As described in Chapter 4, the back-check of the selection of the CSEC Search Areas, considered in the context of the OHL Route Options leading to those Search Areas, has confirmed National Grid's earlier preference for the adoption of CSEC sites in the 'Anglesey Central' and 'Gwynedd South' CSEC Search Areas. In turn the back-check of CSEC Search Areas has confirmed that the following Route Options should not be favoured over those leading to the Anglesey Central and Gwynedd South Search Areas:

- Route Option 5A leading to the 'Anglesey South' Search Area,
- Route Options 5D and 5E, leading to the 'Anglesey North' Search Area
- The extension to Route Option 5H leading to the 'Gwynedd North' Search Area

5.4.26 Consequently, the back-check of route option in Sections E and F of the route considered Route Options 5B and 5C on Anglesey, and Route Options 5F, 5G and (the shorter length of) Route Option 5H, on the mainland. The Route Option selection was considered in the context of the

proposed CSEC sites at 'Braint' (in 'Anglesey Central') and 'Tŷ Fodol' (in 'Gwynedd South') which have been identified following further detailed design and appraisal work. These sites now form the basis of the Proposed Development for which Development Consent is sought.

Anglesey

5.4.27 On Anglesey, the design of the Proposed Development, whilst based upon Route Option 5C, follows a slightly modified route. The original route options and the slightly modified route now proposed are illustrated at Figure A5.5 in Appendix A. The alignment has been adjusted in the north west to reduce effects upon views from isolated residential properties west of Star; the angle that the route crosses the main transport corridor has mean made more acute to ease construction and reduce traffic management concerns and; the final three pylons have been amended to use a lower height design to reduce effects upon views from the community of Star, local properties and the Scheduled Monument at Bryn Celli Ddu (AN002).

5.4.28 Following the back-check exercise National Grid considers that a route following Route Option 5C on Anglesey, modified to route directly to the Braint Tunnel Head House and Cable Sealing End Compound, would best accord with the Holford Rules.

5.4.29 The back-check exercise concluded that the adoption of the modified Route Option 5C would result in lower overall environmental and socio-economic effects than Route Option 5B.

5.4.30 Whilst concerns about the effect of the Proposed Development on local residential properties, especially those in the Star area, have been raised in consultation feedback, National Grid considers that the detailed design proposal and the control measures set out in the CEMP (**Document 7.4**) and the Schedule of Mitigation (**Document 5.28**) will help to reduce or mitigate these effects to an acceptable level.

5.4.31 Feedback received in response to Stage 3 consultation requested that National Grid consider an alternative OHL route option between Section D of the route and the proposed Braint Tunnel Head House and Cable Sealing End Compound. This would have initially paralleled the existing OHL to the north and east until a point near the A55 and would then have deviated away from the existing OHL to connect to the Braint Tunnel Head House and Cable Sealing End Compound.

5.4.32 The appraisal of this Requested Route Option highlighted a number of adverse effects and planning policy concerns which meant it was not preferred to Route Option 5C. Concerns included: the increased length and number of pylons involved, effects upon views from the community of Star, and effects upon residential properties to the south east of Star especially those immediately north of the A55, increased landscape effects upon the Southern Anglesey Estatelands Special Landscape Area and the increased technical complexity arising from the introduction of two additional route transpositions, one potentially crossing the A55.

5.4.33 On balance, National Grid believes that Route Option 5C represents a more appropriate Route Option on Anglesey, having regard to national planning policy, the Guidance set out in the Holford Rules and National Grid's statutory duties. This Route Option was therefore confirmed as the preferred route option and forms the basis of the Proposed Development in this section of the route where the OHL connects to the Braint Tunnel Head House and Cable Sealing End Compound.

Gwynedd

5.4.34 Within Gwynedd three Route Options were presented at Stage 2 consultation between the Gwynedd South CSEC Search Area and Pentir Substation. These are illustrated at Figure A5.6 in Appendix A. Due to the extent of the Search Area these were necessarily indicative Route Options, as acknowledged in the Route Options Report (**Document 9.3**):

It was acknowledged that there could be alternatives to the [above] overhead route options. However, at this stage the purpose of identifying a potential overhead connection was to determine a feasible route option to understand the potential overhead connection risks associated with each of the potential CSEC search areas. The route options would also aid the consultation process to identify further matters that should be taken into account…

Route Options 5F to 5H may need to be revised following a more detailed CSEC siting study to better connect to any CSEC sites identified within the search areas.

5.4.35 As explained in the Menai Strait Crossing Report (**Document 9.6**), the final location of the proposed Tŷ Fodol Tunnel Head House and Cable Sealing End Compound is approximately 1.3 km from Pentir Substation. As a result, only a small number of pylons are required to complete the OHL connection.

5.4.36 Following design and appraisal work it was possible to identify a reasonably direct route that would accord with the guidance set out in the Holford Rules. This alignment has presented at Stage 3 consultation and has subsequently been revised to further reduce potential visual effects in response to feedback, as discussed in the Design Report (**Document 7.17**).

5.4.37 The final OHL alignment in this section of the Proposed Development does not follow any of the Route Options presented at Stage 2 consultation, none of which led directly to the site of the Tŷ Fodol Tunnel Head House and Cable Sealing End Compound from Pentir Substation.

5.4.38 It is therefore not necessary to consider which of the other Route Options should be preferred, as all are considered inappropriate.

5.5 SUMMARY

5.5.1 In summary, following a back-check of the design decision to select:

- Route Option 1A in preference to Route Option 1B
- Route Options 2C/2D at their western end, transposing onto a modified Route Option 2B in preference to Route Options 2A, 2C or 2D
- Route Option 3C and the southern section of Route Option 3B in preference to Route Option 3A or Route Option 3B in its entirety
- Route Option 4B in preference to Route Option 4A
- Route Option 5C in preference to Route Option 5B

National Grid considers that these remain the most appropriate Route Options having regard to national planning policy, the Guidance set out in the Holford Rules and National Grid's statutory duties.

6 Back-Check of Preferred Route Corridor Selection

6.1 INTRODUCTION

6.1.1 The earlier stage of the back-check exercise concluded that the use of an OHL remains appropriate throughout the route between Wylfa Substation and the Menai Strait Crossing and the Menai Strait Crossing and Pentir Substation. It then went on to conclude that the local OHL route options initially selected also remain the most appropriate Route Options having regard to national planning policy, the Guidance set out in the Holford Rules and National Grid's statutory duties.

6.1.2 In light of these earlier stage conclusions, this Chapter now considers the back-check of the selection of a preferred broader Route Corridor between Wylfa Substation and the Menai Strait Crossing.

6.1.3 The back-check of Route Corridor options has considered consultation feedback received during the project's development and has had regard to relevant updated information as described in Part 2 of their Report.

6.2 DESCRIPTION OF INITIAL ROUTE CORRIDOR OPTION SELECTION

6.2.1 National Grid identified initial route corridor options for a new 400kV overhead line between Wylfa and Pentir using a desk-based study, supplemented by specialist surveys of 'baseline' environmental, socio-economic and technical data. This baseline data was reviewed to identify features or sensitive sites that had the potential to pose significant constraints to the development of a new OHL (e.g. location of large residential areas, conservation sites or other development such as wind farms).

6.2.2 From this review, four potential route corridors that avoided or reduced the potential effects associated with these constraints were identified. Taking account of the data and assessments available at that stage, it was assumed a transmission connection could be achieved with a fully OHL connection between Wylfa and Pentir.

6.2.3 Figure 6.1 below illustrates the route corridors and crossing options identified and presented for public consultation in 2012.

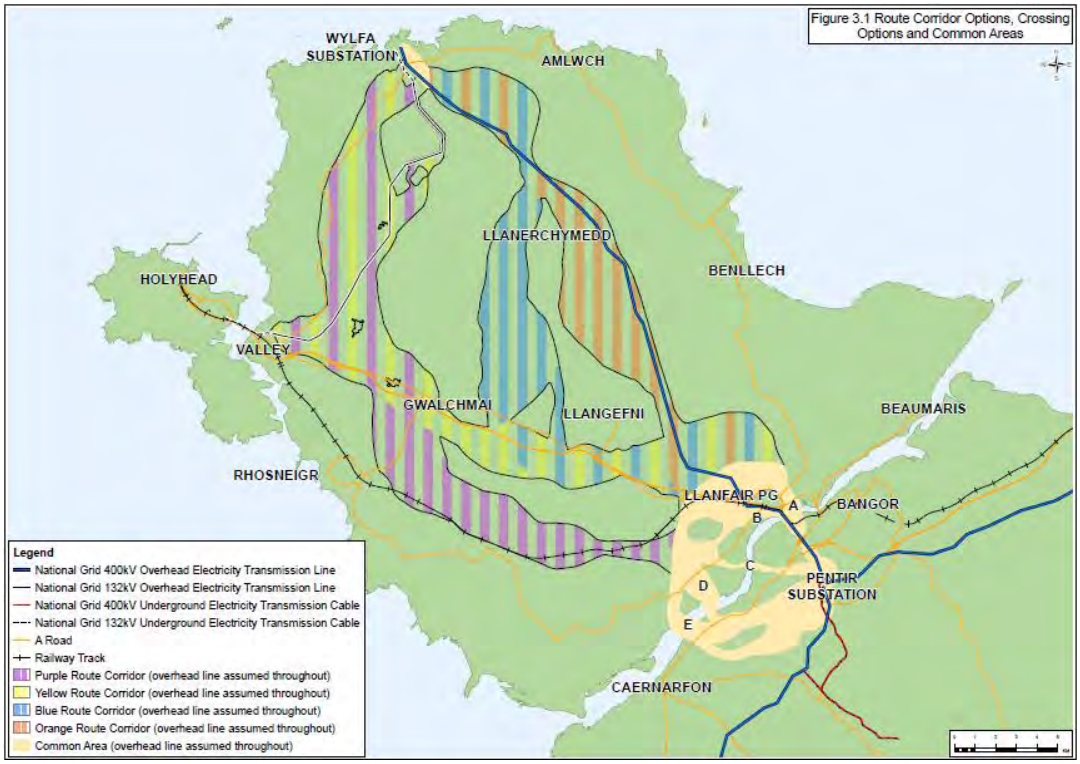

Figure 6.1. Route Corridor Options.

6.2.4 In summary, the route corridor options comprised:

- Northern Common Area – all the route corridors shared a 'common area' around Wylfa and Tregele connecting into the 400kV substation at Wylfa.
- Orange Route Corridor – broadly based on the route of the existing 400kV OHL as it runs from Wylfa Power Station to Llanfairpwll, where it joined the Southern Common Area).
- Blue Route Corridor – presented an option running generally north-south through open countryside in the centre of the island before turning east to follow the A55 towards the Southern Common Area.
- Yellow Route Corridor – presented an option to route a transmission line to the west of the island. It left Wylfa in a south or south-westerly direction, with an option to largely follow the direction of the existing 132kV OHL transmission line and A5025 to the area near Valley and the A55. The route corridor then followed the A55 to join the Blue Route Corridor near Royal Air Force (RAF) Mona.
- Purple Route Corridor – shared the same route as the Yellow Route Corridor until the A55, from where it took a more southern route

away from, but parallel to, the A55 through the centre of Malltraeth Marsh to the Southern Common Area.

- Crossing Options and Southern Common Area – A number of alternative overhead line crossing options were identified through the AONB and across the Menai Strait, defined largely by environmental considerations. A single search area was established between the four route corridors on Anglesey and Pentir Substation in Gwynedd, which included the crossing points and onward corridors to Pentir, allowing any one of the route corridors to be linked to Pentir via any one of the crossing options.

6.2.5 In January 2015, National Grid announced the Orange Route Corridor as the preferred route corridor for a new 400kV electricity transmission connection between Wylfa and the vicinity of the Anglesey AONB in the Menai Strait area.

6.2.6 As set out in the Wylfa – Pentir Preferred Route Corridor Selection Report (**Document 9.2)** National Grid concluded that the potential cumulative effects of constructing a second overhead line within the Orange Route Corridor, once detailed design and mitigation measures had been developed, would not be so great as to negate the advantages that the Orange Route Corridor offered over the three alternative corridors considered.

6.3 CONSIDERATIONS FOR THE BACK-CHECK OF ROUTE CORRIDOR OPTION SELECTION

6.3.1 As explained in the Wylfa – Pentir Preferred Route Corridor Selection Report (**Document 9.2**) the original appraisal made a number of assumptions regarding the need to apply embedded mitigation within each of the four corridors considered.

6.3.2 The original appraisal was undertaken on the basis that the environmental benefit of removing the EV 132kV OHL between Wylfa and Valley (requirement the development of a new substation in the Bodedern area) and thereby offsetting or mitigating the landscape and visual effects of a new 400kV OHL over a wide area within the Purple and Yellow Route Corridors was sufficient to justify the additional cost of constructing the substation and dismantling the line. This led to a conclusion that an assumption should be made that the 132kV EV OHL would be removed if either the Purple or Yellow Route Corridors were taken forward.

6.3.3 The recent connection agreements, as discussed at Section 2.11 of this Report, have resulted in the refurbishment and confirmed need to retain a connection between Penrhos and Wylfa in the long term. Therefore the back-check of the route corridor selection process was undertaken on the same assumption as the original appraisals in 2015; assuming the EV OHL would be removed and would need to be replaced with a new 400kV OHL and Substation.

6.3.4 The local highway improvements that either have been or are proposed to be made as referenced in Chapter 2 of this Report would somewhat improve HGV and construction traffic access to parts of each of the four Route Corridors originally considered. Whilst these proposals have moved on since the original decision to select the Orange Route Corridor, was made they are not considered to offer any differentiation for the back-check of the original preferred Route Corridor selection.

6.3.5 In response to consultation, concerns continue to be raised about the potential for conflicts between new OHL developments and operations at RAF Valley and RAF Mona. These considerations had been a factor when undertaking the original selection of a preferred route corridor and therefore do not represent a new differentiator for the back-check of the earlier decision.

6.3.6 The three alternative Route Corridors not taken forward after the original appraisal and selection exercise all cross the Malltraeth Marsh. Whilst the adoption of the Joint Local Development Plan has now confirmed the designation of the Marsh as a Special Landscape Area, account was taken of the potential for this area to be so designated when the initial selection exercise was undertaken. There has also been recent development of the RSPB Reserve on the Marsh (Cors Ddyga Nature Reserve), but all three Route Corridors avoid crossing within the Reserve. Again, the presence of the Reserve was considered as part of the original selection exercise. Therefore, whilst confirming that it was appropriate to consider these sites in the original appraisal and selection process, they do not represent newly introduced differentiators for the back-check exercise.

6.3.7 Both the Holyhead Waterfront and Penrhos Leisure Village developments referred to in Chapter 2 of this Report have been approved since the original work to identify a preferred OHL route corridor on Anglesey was undertaken. Both developments are likely to lead to an increase in tourist visitor numbers to the west and south-west of the island who would experience any new OHL, particularly if routed within the Purple and Yellow corridors. However this is not considered to add a significant new

differentiator, merely reinforcing earlier information concerning the distribution of tourism facilities considered at the time the original design decision to select the Orange Route Corridor was taken.

6.4 BACK-CHECK OUTCOME

6.4.1 As a result of the back-check exercise it is considered that the benefits of selecting the Orange Route Corridor between Wylfa and the Anglesey AONB in the Menai Strait area envisaged at the time the Corridor was first selected have been realised as a result of the detailed design exercise undertaken.

6.4.2 On balance, National Grid believes that the Orange Route Corridor represents the most appropriate wider corridor between Wylfa and the proposed Braint Tunnel Head House and Cable Sealing End Compound having regard to the guidance set out in the Holford Rules, other national planning policy and National Grid's statutory duties.

6.4.3 Whilst consultation feedback continues to raise concerns about the effect of the proposed OHL within the Orange Route Corridor National Grid considers that the detailed design proposal and the control measures set out in the CEMP (**Document 7.4**) and the Schedule of Mitigation (**Document 5.28**) will help to reduce or mitigate these effects to an acceptable level.

6.4.4 The back-check exercise has therefore confirmed that it is appropriate for the Proposed Development to be routed within the Orange Route Corridor across Anglesey.

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7 Summary

7.1.1 The North Wales Connection Project has evolved over several years of design and assessment work and through three formal stages of consultation (undertaken in 2012, 2015 and 2016). This has led to the identification of a detailed design proposal for the Proposed Development of the new connection between the existing Substations at Wylfa and Pentir, for which Development Consent is now being sought from the Secretary of State for Business, Enterprise and Industrial Strategy.

7.1.2 The evolution of the design for the Proposed Development has followed the staged approach set out in National Grid's guidance documents 'Our Approach to the Design and Routeing of New Electricity Transmission Lines'[1] and 'Our Approach to Options Appraisal'[2].

7.1.3 This staged approach results in a number of main design decision points as the range of design options is refined and narrowed in response to appraisal and feedback from consultation. In the case of the North Wales Connection these staged decisions involved:

- the selection of an appropriate Strategic Option i.e. where on the electricity transmission system the new connection should be made and the transmission technology that should be used. In the case of the North Wales Connection Project this has been identified as a connection from Wylfa Substation to Pentir Substation (and related works on the Welsh mainland) using onshore circuits. This initial design-related decision was taken in 2012.

[1] 'Our Approach to the Design and Routeing of New Electricity Transmission Lines'. National Grid 2012.

[2] 'Our Approach to Options Appraisal'. National Grid 2012.

- The selection, from four/five broad 'Route Corridors', of an appropriate 'Route Corridor' within which the new connection might be routed. In the case of the North Wales Connection Project this has been identified as a corridor that generally runs directly between the two Substation sites, and broadly follows the alignment of an existing OHL between the two substations. It was also concluded that it was appropriate to employ an OHL through much of the route corridor but that underground cables should be used to reduce the effects of the connection in the vicinity of the Anglesey AONB at the Menai Strait. This design-related decision was taken in 2015.

- The selection, from a number of 'Route Options' within the Route Corridor, of an appropriate 'Route' for the new connection. In the case of the North Wales Connection Project this has been identified as a route that generally closely parallels the alignment of the existing OHL between the two substations. From a point west of the village of Llanfairpwll, the Route moves away from the existing OHL, before passing beneath the Anglesey AONB and Menai Strait using UGC installed in a deep tunnel. This design-related decision was taken in 2016.

- The final detailed design proposal that now forms the Proposed Development, aligned largely within the identified parallel Route Option, has evolved through a continuous series of more localised design iterations since 2016.

7.1.4 At each stage of the design's evolution, decisions have been taken relating to the most appropriate form of transmission technology to employ (e.g. whether to use overhead lines or underground cables).

7.1.5 Throughout the evolution of the North Wales Connection Project, National Grid has considered whether previous design decisions remain appropriate in light of any subsequent changes. A final back-check exercise has been undertaken to ensure that these decisions remain robust prior to applying for Development Consents for the final Proposed Development.

7.1.6 The review of Strategic Options is reported in the Strategic Options Report (**Document 7.2**) and the outcome of the back-check exercise of other design decisions is reported in the Back-Check Report (this Report). Information about the detailed design iterations that have led to the final design of the Proposed Development are discussed in the Design Report (**Document 7.17**).

7.1.7 The back-check exercise considered a wide range of issues when reaching its final conclusions. Matters considered included: National Grid's statutory duties; National and Local Planning Policy; legislative changes; recent decisions relating to applications for Development Consent for new overhead electricity lines and; changes to environmental and socio-economic sites and features that could influence the design decisions being reviewed.

7.1.8 The back-check has also had due regard to the feedback received throughout the evolution of the North Wales Connection Project, including that received in response to the three formal stages of public consultation.

7.1.9 The back-check was undertaken with the benefit of the full range of detailed information and assessments now available to National Grid. This includes the detailed engineering designs now proposed (which include significant embedded design mitigation), the outcome of the Environmental Impact and Habitat Regulations Assessments and the detailed Control and Management Measures that are now proposed as part of the final Proposed Development. These have helped ensure a high degree of knowledge and confidence around the environmental and socio-economic effects likely to arise from the Proposed Development.

7.1.10 National Grid has back-checked the choice of transmission technology throughout the route of the North Wales Connection. This back-check confirmed that the use of underground cables beneath the Anglesey AONB and Menai Strait remains an appropriate design decision, despite the increased costs associated with installing approximately four kilometres of cable route within a deep tunnel.

7.1.11 Elsewhere along the route National Grid has back-checked whether the localised use of sections of UGC would be appropriate, either as a review of earlier decisions taken by National Grid or in response to consultation requests to consider such localised use of UGC. In all instances the back-check has concluded that the benefits from the use of underground cables would not outweigh the additional capital cost and the environmental and socio-economic effects and technical difficulties associated with the installation and operation of underground cables.

7.1.12 The back-check exercise has therefore confirmed that the development of an overhead line in all sections of the route, with the exception of the four kilometre section beneath the Anglesey AONB and the Menai Strait, remains appropriate, having regard to national planning policy and National Grid's statutory duties.

7.1.13 Having confirmed the appropriate form of transmission technology the back-check exercise considered whether the choice of preferred Route Option for the OHL sections remained appropriate.

7.1.14 In all sections of the route the back-check concluded that the most appropriate combination of OHL Route Options had been taken forward as the basis for the detailed design of the final Proposed Development. This conclusion had regard to national planning policy, the Holford Rules (established Guidance for the routeing of OHLs, referenced in national planning policy) and National Grid's statutory duties.

7.1.15 Having confirmed the most appropriate combination of Route Options and transmission technology has been selected within the originally preferred 'Orange' Route Corridor the back-check exercise then considered whether the choice of this Route Corridor remained appropriate.

7.1.16 The back-check exercise concluded that the benefits of selecting the Orange Route Corridor between Wylfa and the start of the proposed UGC and tunnel on Anglesey envisaged at the time the Corridor was first selected have been realised as a result of the detailed design exercise undertaken. No changes have occurred that would significantly favour alternative corridors.

7.1.17 The Orange Route Corridor therefore continues to represent the most appropriate wider corridor between Wylfa and the proposed Braint Tunnel Head House and Cable Sealing End Compound having regard to the guidance set out in the Holford Rules, national planning policy and National Grid's statutory duties.

7.1.18 Therefore, as a result of the back-check exercise, National Grid is confident that the evolution of the Proposed Development for which Devolvement Consent is now being sought has been based upon a robust series of progressive design decisions which remain appropriate.

Appendix A. Figures.

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N

HOLYHEAD to Dublin 3 hrs

Dublin 2 hrs

RHYD-Y-GROES WIND FARM (TPG WIND LTD)

WYLFA SUBSTATION

AMLWCH LLANDBADRIG SOLAR FARM

HORIZON NUCLEAR POWER STATION ONLINE ROAD IMPROVEMENTS

HOLYHEAD WATERFRONT REDEVELOPMENT

ORTHIOS ECO PARK & ENERGY CENTRE

PENRHOS LEISURE VILLAGE

PENRHOS SUBSTATION

MORLAIS TIDAL DEMONSTRATION ZONE PROJECT - OFFSHORE SCOPING AREA

CAERGILIOG 132 KV SUBSTATION

LLANGEFNI LINK ROAD

MENAI SCIENCE PARK

3RD MENAI CROSSING

PENTIR SUBSTATION

A B C D E

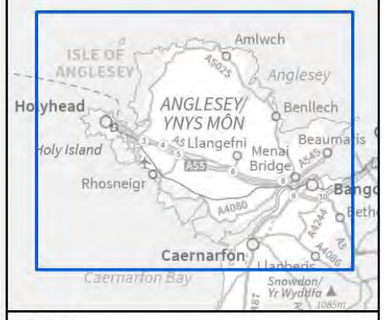
ANGLESEY / YNYS MÔN

HOLY ISLAND/ YNYS GYBI

CAERNARFON BAY/

0 1 2 3 4 5 Kilometres

NWC ROUTE LEGEND



LEGEND

- SUBSTATION
- SIGNIFICANT DEVELOPMENT PROPOSAL
- EXISTING OVERHEAD LINE
- PENRHOS LEISURE VILLAGE
- HOLYHEAD WATERFRONT REDEVELOPMENT
- LLANGEFNI LINK ROAD
- MORLAIS TIDAL DEMONSTRATION ZONE PROJECT - OFFSHORE SCOPING AREA
- HORIZON NUCLEAR POWER STATION ONLINE ROAD IMPROVEMENTS
- ROUTE CORRIDORS, COMMON AREAS AND CROSSING OPTONS

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Scheme: NORTH WALES CONNECTION PROJECT

Document Number: 7.18

Document Title: FIGURE A2.1
EXISTING ELECTRICITY INFRASTRUCTURE AND OTHER NEW OR PROPOSED DEVELOPMENTS OF NOTE

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N

WYLFA SUBSTATION

CEMAES

TREGELE

LLANFECHELL

M1: WYLFA TO LLANFECHELL

MYNYDD MECHELL & SURROUNDS

RHOSGOCH

RHOSGOCH AND RHOSYBOL

NWC ROUTE LEGEND

1 of 1

LEGEND

- SYNCHRONISED AND BROADLY SYNCHRONISED NEW BUILD PYLONS (OPTION A)
- OTHER NEW BUILD PYLONS (OPTION A)
- NEW OVERHEAD LINE
- EXISTING OVERHEAD LINE TO BE REMOVED
- EXISTING OVERHEAD LINE TO BE MODIFIED
- EXISTING OVERHEAD LINE NOT AFFECTED
- NEW OHL TO REALIGN EXISTING OHL ROUTE
- LOCATION OF PROPERTY ACQUISITION
- MYNYDD MECHELL AND SURROUNDS SPECIAL LANDSCAPE AREA
- MITIGATION ZONE

0 200 400 600 800 1,000
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JF	05/09/2018	CC	05/09/2018	GDS	05/09/2018

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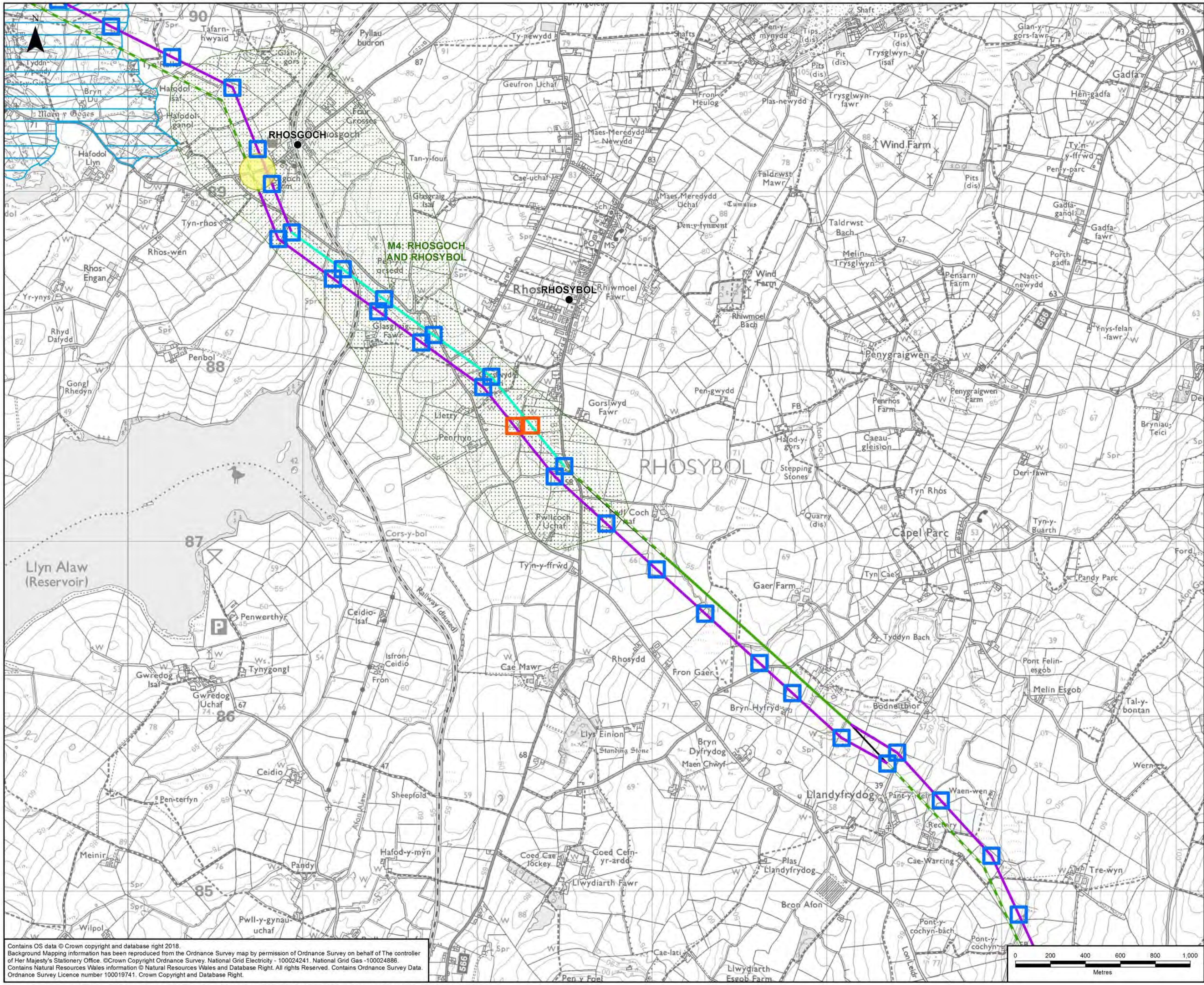

NWC ROUTE LEGEND

1 of 1

ANGLESEY / YNYS MÔN

LEGEND

- SYNCHRONISED AND BROADLY SYNCHRONISED NEW BUILD PYLONS (OPTION A)
- OTHER NEW BUILD PYLONS (OPTION A)
- EXISTING OVERHEAD LINE (OHL)
- NEW OVERHEAD LINE
- EXISTING OVERHEAD LINE TO BE REMOVED
- EXISTING OVERHEAD LINE TO BE MODIFIED
- EXISTING OVERHEAD LINE NOT AFFECTED
- NEW OHL TO REALIGN EXISTING OHL ROUTE
- LOCATION OF PROPERTY ACQUISITION
- MYNYDD MECHELL AND SURROUNDS SPECIAL LANDSCAPE AREA
- MITIGATION ZONE

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Document Title: FIGURE A3.2 THE PROPOSED DEVELOPMENT IN SECTION B OF THE ROUTE AND MITIGATION ZONE M4

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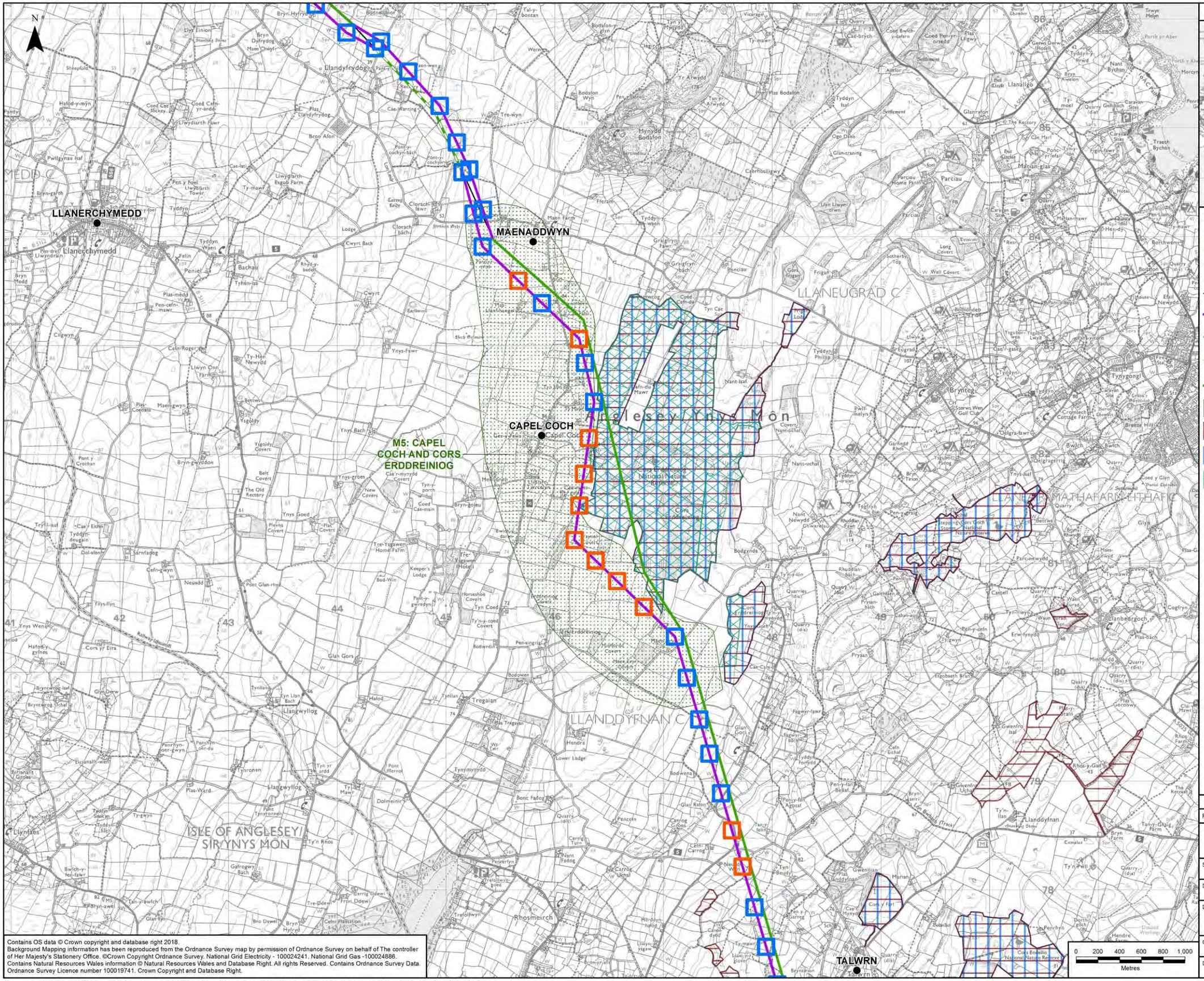

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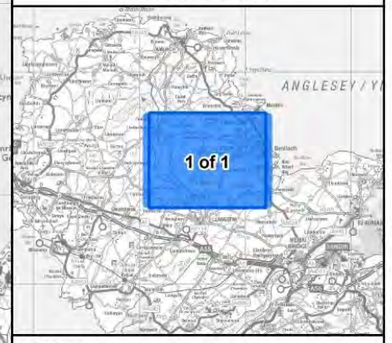

LEGEND

- SYNCHRONISED AND BROADLY SYNCHRONISED NEW BUILD PYLONS (OPTION A)
- OTHER NEW BUILD PYLONS (OPTION A)
- EXISTING OVERHEAD LINE (OHL)
- NEW OVERHEAD LINE
- EXISTING OVERHEAD LINE TO BE REMOVED
- EXISTING OVERHEAD LINE TO BE MODIFIED
- EXISTING OVERHEAD LINE NOT AFFECTED
- MITIGATION ZONE
- CORSYDD MÔN / ANGLESEY FENS SPECIAL AREA OF CONSERVATION
- CORSYDD MÔN / ANGLESEY FENS RAMSAR SITE
- CORS ERDDREINIOG NATIONAL NATURE RESERVE

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Document Title: FIGURE A3.3 THE PROPOSED DEVELOPMENT IN SECTION C OF THE ROUTE AND MITIGATION ZONE M5

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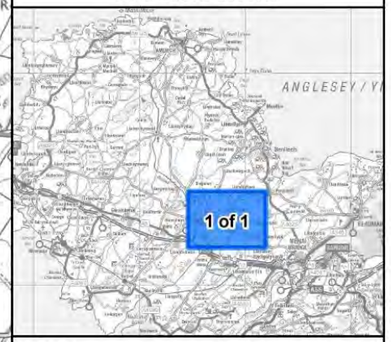

LEGEND

- SYNCHRONISED AND BROADLY SYNCHRONISED NEW BUILD PYLONS (OPTION A)
- OTHER NEW BUILD PYLONS (OPTION A)
- EXISTING OVERHEAD LINE (OHL)
- NEW OVERHEAD LINE (OPTION
- EXISTING OVERHEAD LINE TO BE REMOVED
- EXISTING OVERHEAD LINE TO BE MODIFIED
- EXISTING OVERHEAD LINE NOT AFFECTED
- MITIGATION ZONE

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N

LLANGEFNI

CEINT

STAR

LLANFAIR PG

MENAI BRIDGE

BANGOR

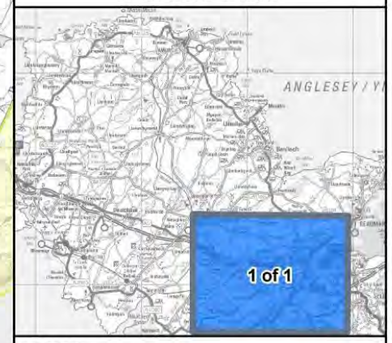
Y FELINHELI

PENTIR SUBSTATION

M6: ANGLESEY AREA OF OUTSTANDING NATURAL BEAUTY AND MENAI STRAIT

MENAI STRAIT

NWC ROUTE LEGEND



LEGEND

- PROPOSED LOWER HEIGHT PYLONS
- SYNCHRONISED AND BROADLY SYNCHRONISED NEW BUILD PYLONS (OPTION A)
- OTHER NEW BUILD PYLONS (OPTION A)
- EXISTING OVERHEAD LINE (OHL)
- NEW OVERHEAD LINE
- EXISTING OVERHEAD LINE TO BE REMOVED
- EXISTING OVERHEAD LINE TO BE MODIFIED
- EXISTING OVERHEAD LINE NOT AFFECTED
- BELOW GROUND LIMITS OF DEVIATION
- TUNNEL HEAD HOUSE AND CABLE SEALING END COMPOUND
- MITIGATION ZONE
- SOUTHERN ANGLESEY ESTATELANDS SPECIAL LANDSCAPE AREA
- ANGLESEY AREA OF OUTSTANDING NATURAL BEAUTY

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Document Title: FIGURE A3.5 THE PROPOSED DEVELOPMENT IN SECTIONS E AND F OF THE ROUTE AND MITIGATION ZONE M6

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NWC ROUTE LEGEND

LEGEND

- SUBSTATION
- NEW LOW HEIGHT LATTICE PYLON
- EXISTING OVERHEAD LINE
- NEW OVERHEAD LINE
- EXISTING OVERHEAD LINE TO BE REMOVED
- EXISTING OVERHEAD LINE TO BE MODIFIED
- EXISTING OVERHEAD LINE NOT AFFECTED
- OVERHEAD LINE ROUTE OPTIONS 5A-5H
- TUNNEL HEAD HOUSE AND CABLE SEALING END COMPOUND
- SEALING END COMPOUND SEARCH AREA
- POTENTIAL CABLE SEALING END COMPOUND LOCATION
- SOUTHERN ANGELSEY ESTATELANDS SPECIAL LANDSCAPE AREA
- ANGLESEY AREA OF OUTSTANDING NATURAL BEAUTY

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Scheme: NORTH WALES CONNECTION PROJECT

Document Number: 7.18

Document Title: FIGURE A4.1
CABLE SEALING END COMPOUND SITE OPTIONS IN SECTIONS E AND F OF THE ROUTE

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N

WYLFA SUBSTATION

CEMAES

TREGELE

LLANFECHELL

1A

1B

NWC ROUTE LEGEND

1 of 1

ANGLESEY / YNYS MÔN

LEGEND

- SYNCHRONISED AND BROADLY SYNCHRONISED NEW BUILD PYLONS (OPTION A)
- OTHER NEW BUILD PYLONS (OPTION A)
- NEW OVERHEAD LINE
- EXISTING OVERHEAD LINE TO BE REMOVED
- EXISTING OVERHEAD LINE TO BE MODIFIED
- EXISTING OVERHEAD LINE NOT AFFECTED
- OVERHEAD LINE ROUTE OPTIONS 1A AND 1B
- LOCATION OF PROPERTY ACQUISITION

RHOSGOCH

RHOSYBOL

0 200 400 600 800 1,000
Metres

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Document Number: 7.18

Document Title: FIGURE A5.1
OVERHEAD LINE ROUTE OPTIONS IN
SECTION 1 / SECTION A OF THE ROUTE

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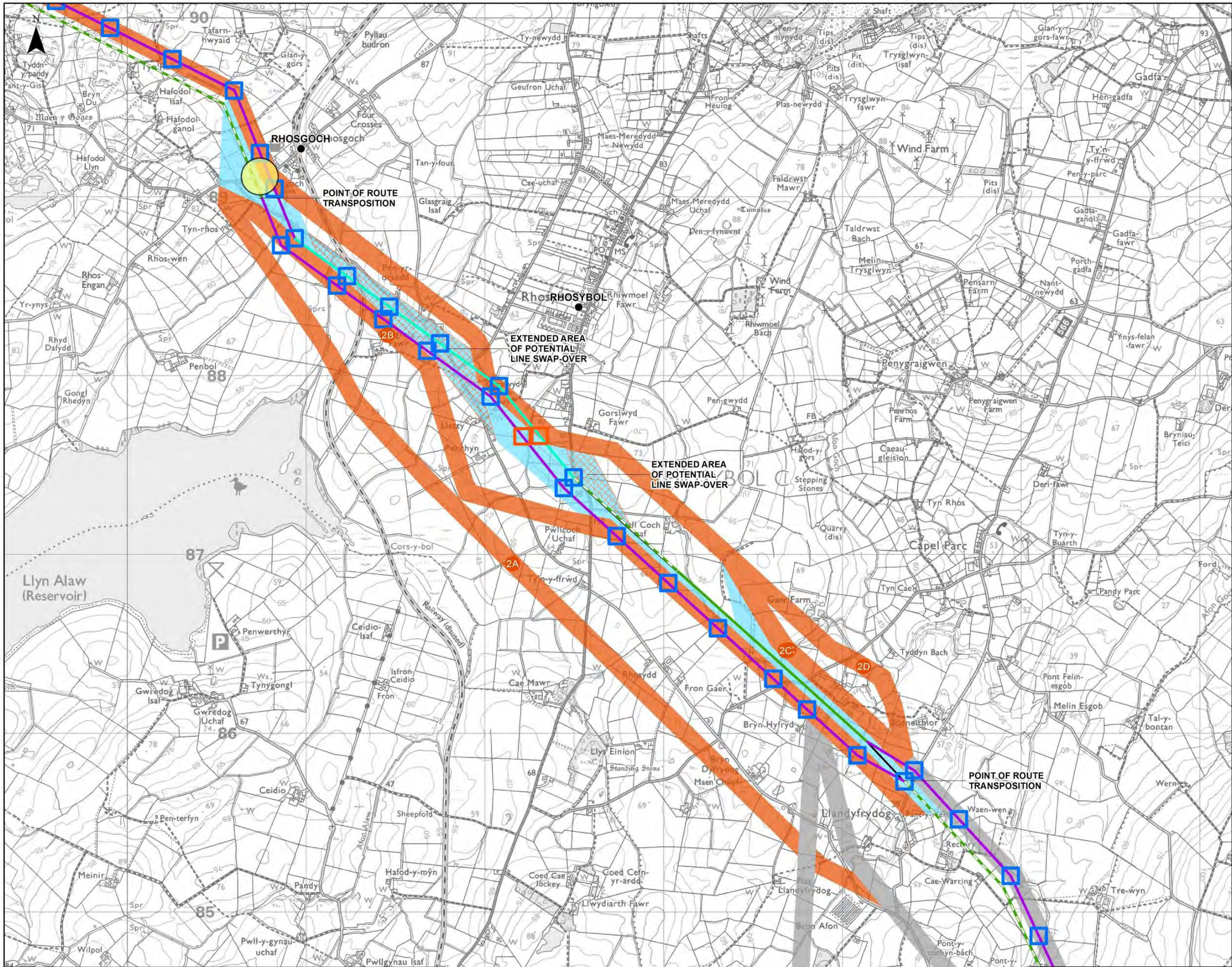

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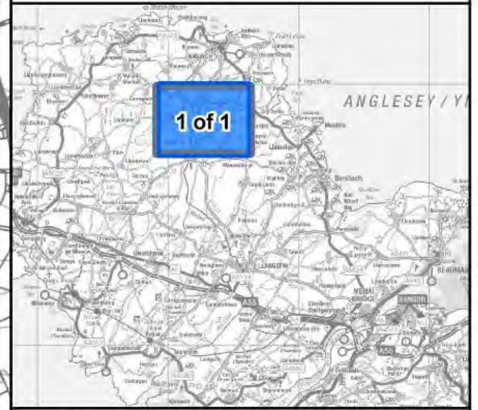
NWC ROUTE LEGEND



LEGEND

- SYNCHRONISED AND BROADLY SYNCHRONISED NEW BUILD PYLONS (OPTION A)
- OTHER NEW BUILD PYLONS (OPTION A)
- EXISTING OVERHEAD LINE (OHL)
- NEW OVERHEAD LINE
- EXISTING OVERHEAD LINE TO BE REMOVED
- EXISTING OVERHEAD LINE TO BE MODIFIED
- EXISTING OVERHEAD LINE NOT AFFECTED
- NEW OHL TO REALIGN EXISTING OHL ROUTE
- OVERHEAD LINE ROUTE OPTIONS 2A - 2D
- EXTENDED TRANSPOSITION ZONE
- LOCATION OF PROPERTY ACQUISITION

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Scheme: NORTH WALES CONNECTION PROJECT

Document Number: 7.18

Document Title: FIGURE A5.2 OVERHEAD LINE ROUTE OPTIONS IN SECTION 2 / SECTION B OF THE ROUTE

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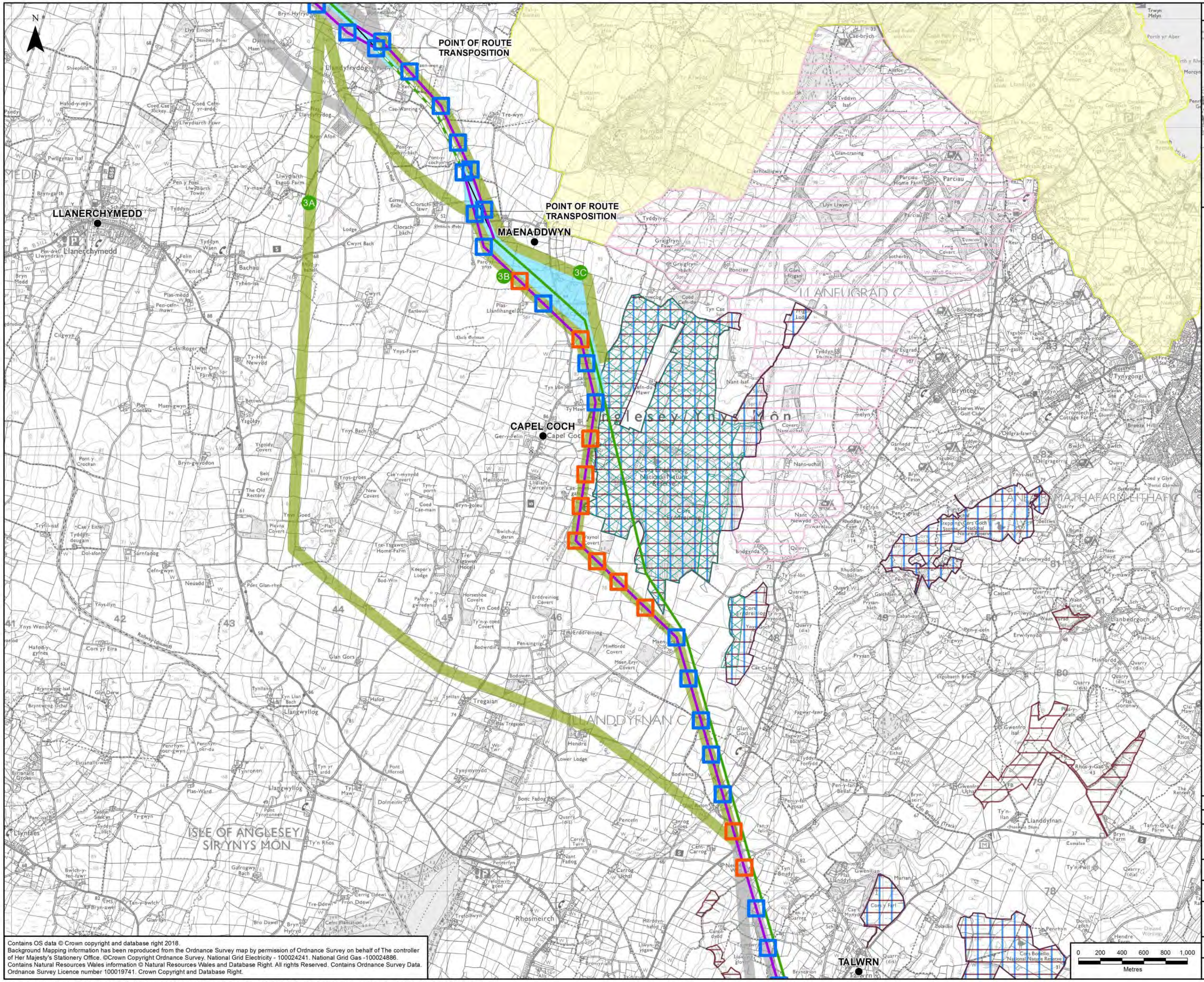

NWC ROUTE LEGEND

1 of 1

LEGEND

- SYNCHRONISED AND BROADLY SYNCHRONISED NEW BUILD PYLONS (OPTION A)
- OTHER NEW BUILD PYLONS (OPTION A)
- EXISTING OVERHEAD LINE (OHL)
- NEW OVERHEAD LINE
- EXISTING OVERHEAD LINE TO BE REMOVED
- EXISTING OVERHEAD LINE TO BE MODIFIED
- EXISTING OVERHEAD LINE NOT AFFECTED
- OVERHEAD LINE ROUTE OPTIONS 3A, 3B AND 3C
- POINT OF ROUTE TRANSPOSITION
- CORSYDD MÔN / ANGLESEY FENS SPECIAL AREA OF CONSERVATION
- CORSYDD MÔN / ANGLESEY FENS RAMSAR SITE
- PARCIAU ESTATELANDS SPECIAL LANDSCAPE AREA
- CORS ERDDREINIOG NATIONAL NATURE RESERVE
- ANGLESEY AREA OF OUTSTANDING NATURAL BEAUTY

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A	05/09/2018	BACK CHECK REPORT	JF	CC	GDS

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Scheme: NORTH WALES CONNECTION PROJECT

Document Number: 7.18

Document Title: FIGURE A5.3 OVERHEAD LINE ROUTE OPTIONS IN SECTION 3 / SECTION C OF THE ROUTE

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JF	05/09/2018	CC	05/09/2018	GDS	05/09/2018

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:32,000	A3	1 of 1	A

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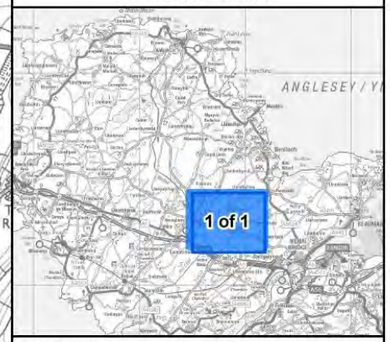
NWC ROUTE LEGEND



LEGEND

- SYNCHRONISED AND BROADLY SYNCHRONISED NEW BUILD PYLONS (OPTION A)
- OTHER NEW BUILD PYLONS (OPTION A)
- EXISTING OVERHEAD LINE (OHL)
- NEW OVERHEAD LINE (OPTION A)
- EXISTING OVERHEAD LINE TO BE REMOVED
- EXISTING OVERHEAD LINE TO BE MODIFIED
- EXISTING OVERHEAD LINE NOT AFFECTED
- OVERHEAD LINE ROUTE OPTIONS 4A AND 4B

0 200 400 600 800 1,000
Metres

Rev	Date	Description	GIS	Chk	App
A	05/09/2018	BACK CHECK REPORT	JF	CC	GDS

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Scheme: NORTH WALES CONNECTION PROJECT

Document Number: 7.18

Document Title: FIGURE A5.4
OVERHEAD LINE ROUTE OPTIONS IN SECTION 4 / SECTION D OF THE ROUTE

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FIGURE	1:20,000	A3	1 of 1	A

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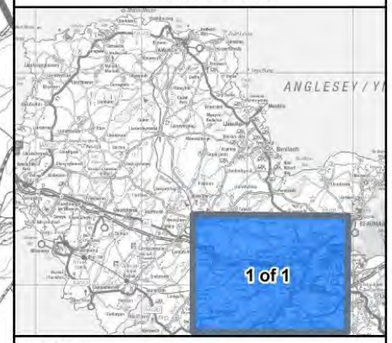
NWC ROUTE LEGEND



LEGEND

- PROPOSED LOWER HEIGHT PYLONS
- SYNCHRONISED AND BROADLY SYNCHRONISED NEW BUILD PYLONS (OPTION A)
- OTHER NEW BUILD PYLONS (OPTION A)
- EXISTING OVERHEAD LINE (OHL)
- NEW OVERHEAD LINE
- EXISTING OVERHEAD LINE TO BE REMOVED
- EXISTING OVERHEAD LINE TO BE MODIFIED
- EXISTING OVERHEAD LINE NOT AFFECTED
- OVERHEAD LINE ROUTE OPTIONS 5A - 5E
- BRYN CELLI DDU BURIAL CHAMBER AND STANDING STONE SCHEDULED MONUMENT
- A5
- A55
- RAILWAY
- TUNNEL HEAD HOUSE AND CABLE SEALING END COMPOUND
- SEALING END COMPOUND SEARCH AREA
- SOUTHERN ANGLESEY ESTATELANDS SPECIAL LANDSCAPE AREA
- ANGLESEY AREA OF OUTSTANDING NATURAL BEAUTY

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A	05/09/2018	BACK CHECK REPORT	JF	CC	GDS

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Document Title: FIGURE A5.5 OVERHEAD LINE ROUTE OPTIONS IN SECTION 5 / SECTION E AND F OF THE ROUTE ON ANGLESEY

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Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:25,000	A3	1 of 1	A

0 200 400 600 800 1,000 Metres

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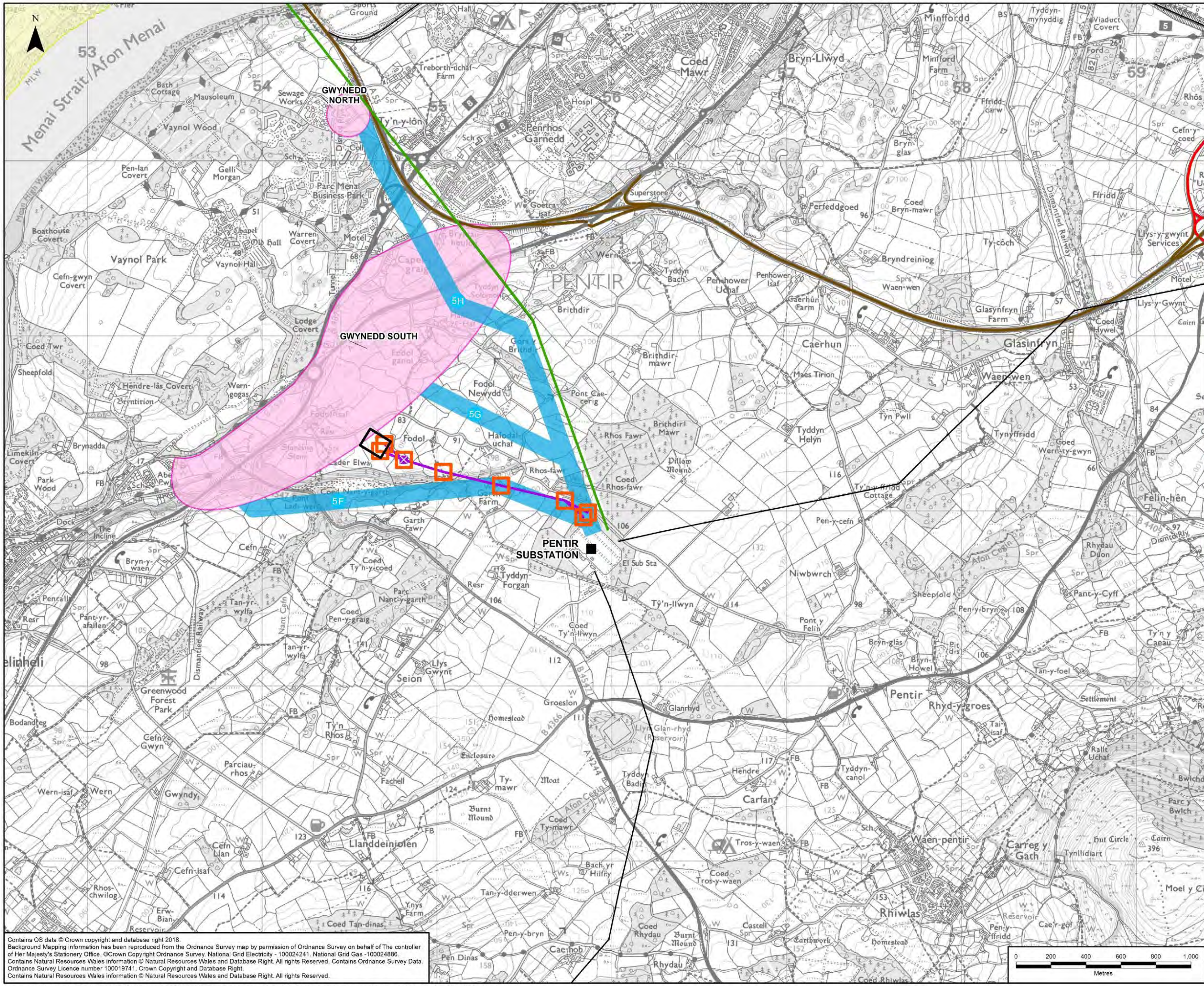

NWC ROUTE LEGEND

1 of 1

LEGEND

- PROPOSED LOWER HEIGHT PYLONS
- SYNCHRONISED AND BROADLY SYNCHRONISED NEW BUILD PYLONS (OPTION A)
- OTHER NEW BUILD PYLONS (OPTION A)
- EXISTING OVERHEAD LINE (OHL)
- NEW OVERHEAD LINE
- EXISTING OVERHEAD LINE TO BE REMOVED
- EXISTING OVERHEAD LINE TO BE MODIFIED
- EXISTING OVERHEAD LINE NOT AFFECTED
- OVERHEAD LINE ROUTE OPTIONS 5F - 5H
- A5
- A55
- RAILWAY
- TUNNEL HEAD HOUSE AND CABLE SEALING END COMPOUND
- SEALING END COMPOUND SEARCH AREA
- ANGLESEY AREA OF OUTSTANDING NATURAL BEAUTY

0 200 400 600 800 1,000
Metres

Rev	Date	Description	GIS	Chk	App
A	05/09/2018	BACK CHECK REPORT	JF	CC	GDS

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Scheme: NORTH WALES CONNECTION PROJECT

Document Number: 7.18

Document Title: FIGURE A5.6
OVERHEAD LINE ROUTE OPTIONS IN SECTION 5 / SECTION F OF THE ROUTE IN GWYNEDD

Creator:	Date:	Checker:	Date:	Approver:	Date:
JF	05/09/2018	CC	05/09/2018	GDS	05/09/2018

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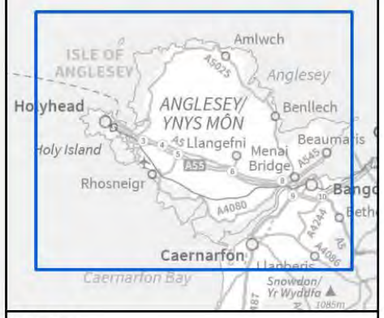
N

HOLYHEAD to
Dublin 3 hrs
Dublin 2 hrs

RHYD-Y-GROES WIND FARM (TPG WIND LTD)
LLANDBADRIG SOLAR FARM
CEMAES
TREGELE
LLANFECHELL
RHOSGOCH
RHOSYBOL
HORIZON NUCLEAR POWER STATION ONLINE ROAD IMPROVEMENTS
HOLYHEAD WATERFRONT REDEVELOPMENT
ORTHIOS ECO PARK & ENERGY CENTRE
HOLYHEAD
PENRHOS LEISURE VILLAGE
BODEDERN
LLANERCHYMEDD
MAENADDWYN
CAPEL COCH
HEBRON
TALWRN
LLANGEFNI
LLANGEFNI LINK ROAD
CEINT
MENAI SCIENCE PARK
GWALCHMAI
RHOSNEIGR
LLANFAIR PG
MENAI BRIDGE
3RD MENAI CROSSING
BANGOR
BEAUMARIS
Y FELINHELI
MENAI STRAIT
CAERNARFON
MORLAIS TIDAL DEMONSTRATION ZONE PROJECT - OFFSHORE SCOPING AREA

ANGLESEY / YNYS MÔN
HOLY ISLAND / YNYS GYBI
HOLYHEAD BAY / BAE CAERGYBI

NWC ROUTE LEGEND



LEGEND

- SUBSTATION
- AIRPORT / AIRFIELD
- SIGNIFICANT DEVELOPMENT PROPOSAL
- EXISTING OVERHEAD LINE
- NEW OVERHEAD LINE
- EXISTING OVERHEAD LINE TO BE REMOVED
- EXISTING OVERHEAD LINE TO BE MODIFIED
- EXISTING OVERHEAD LINE NOT AFFECTED
- MALLTRAETH MARSH ROYAL SOCIETY FOR THE PROTECTION OF BIRDS RESERVE
- MALLTRAETH MARSH SITE OF SPECIAL SCIENTIFIC INTEREST
- MALLTRAETH MARSH SPECIAL LANDSCAPE AREA
- ANGLESEY AREA OF OUTSTANDING NATURAL BEAUTY
- PENRHOS LEISURE VILLAGE
- HOLYHEAD WATERFRONT REDEVELOPMENT
- LLANGEFNI LINK ROAD
- MORLAIS TIDAL DEMONSTRATION ZONE PROJECT - OFFSHORE SCOPING AREA
- HORIZON NUCLEAR POWER STATION ONLINE ROAD IMPROVEMENTS
- ROUTE CORRIDORS, COMMON AREAS AND CROSSING OPTONS

Rev	Date	Description	GIS	Chk	App
A	05/09/2018	BACK CHECK REPORT	JF	CC	GDS

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Scheme: NORTH WALES CONNECTION PROJECT

Document Number: 7.18

Document Title: FIGURE A6.1 THE PROPOSED DEVELOPMENT AND ROUTE CORRIDOR OPTIONS

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FIGURE	1:150,000	A3	1 of 1	A

0 1 2 3 4 5 Kilometres

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Appendix B. Environmental Data Review

Table B1: Change Analysis of Environmental Data Considered at One or More Design Decision Points.		
Designations	Back Check details	Relevant Results
National Parks	GIS Back check completed	No change
Areas of Outstanding Natural Beauty (AONBs)	GIS Back check completed	No change
Special Landscape Area	GIS Back check completed	No change
Landscape Character Areas	GIS Back check completed	No change
LANDMAP Data	GIS Back check completed	No change
Country Parks	GIS Back check completed	No change
World Heritage Sites	GIS Back check completed	No change
Scheduled Monuments	GIS Back check completed	No change
Listed Buildings	GIS Back check completed	No change
Registered Historic Parks and Gardens	GIS Back check completed	No change
National Monument Record for Wales	GIS data is not available from previous studies.	Up to date information used to inform back-check exercise.
Historic Environment Record	GIS data from previous studies used Welsh Government data.	Latest datasets from Gwynedd Archaeological Trust Historic Environment Record used to inform back-

Table B1: Change Analysis of Environmental Data Considered at One or More Design Decision Points.		
Designations	Back Check details	Relevant Results
		check exercise.
Conservation Areas	GIS back check completed	No change
Wreck Sites	GIS Back check completed	No change
National Trust Properties	GIS Back check completed for Menai Strait area.	No change
Heritage Coast	GIS Back check completed	No change
Registered Historic Landscapes/ Landscape of Special and Outstanding Historic Interest	GIS Back check completed	No change
Ramsar Sites	GIS Back check completed. All citations checked	No change
Special Areas of Conservation	GIS Back check completed All citations checked	No change
Special Protection Areas	GIS Back check completed All citations checked	Cemlyn Bay and the Skerries SPA has been extended and renamed Anglesey Terns SPA since the preferred Route Corridors and Route Options were selected. (Note the boundary of the Liverpool Bay SPA has been extended but due to location is not considered relevant).
Sites of Special Scientific Interest	GIS Back check completed	No change

Table B1: Change Analysis of Environmental Data Considered at One or More Design Decision Points.		
Designations	Back Check details	Relevant Results
	All citations checked	
National Nature Reserves	GIS Back check completed	Slight extension to boundary of Cors Erddreiniog NNR since the preferred Route Options were identified and selected.
Tree Preservation Orders	GIS Back check completed	No change
Ancient and Semi Natural Woodland Sites	GIS Back check completed	No change
Important Bird Areas	GIS Back check completed	No change
County Wildlife Site	GIS Back check completed	No change
RSPB Reserves	GIS Back check completed	The boundary of the Malltraeth Marsh Reserve has been extended since a preferred Route Option was identified.
North Wales Wildlife Trust Reserves	GIS Back check completed	No change
Woodland Trust Sites	GIS Back check completed	No change
Local Nature Reserves	GIS Back check completed	No change (but note significant enhancements made to Nant y Pandy LNR in Llangefni)
Main Rivers	Latest dataset has been considered. Comparison with earlier data set not completed.	Up to date information used to inform back-check exercise.
Water Bodies	GIS Back check	No change

Table B1: Change Analysis of Environmental Data Considered at One or More Design Decision Points.		
Designations	Back Check details	Relevant Results
	completed	
EAW Flood Zone Mapping	GIS Back check completed	No change
TAN15 Flood Zone Mapping	No change from TAN 8 figure online	No change
Shellfish/ Shellfish Waters	GIS Back check completed	No change
Principal Settlements	GIS Back check completed	OS Mapped extent of settlement area at Llanerchymedd and south of Llangefni has increased since the preferred route corridor was selected.
Address Point Data	Latest dataset has been considered. Partial comparison with earlier datasets completed.	Up to date information used to inform back-check exercise.
Electricity Infrastructure	GIS Back check completed	No change
Railways	GIS Back check completed	No change
Roads	GIS Back check completed	Short section of local road north of Llanbabo added since Route Options were identified.
Active / Closed Waste Management Sites	GIS Back check completed	Waste management sites at Llanbabo, Llanerchymedd, Gwalchmai, and Menai Bridge not identified at earlier stages.
Local Plan Designations	GIS Back check completed	No material changes from Deposit Draft.

Table B1: Change Analysis of Environmental Data Considered at One or More Design Decision Points.		
Designations	Back Check details	Relevant Results
Employment		
Local Plan Designations Housing	GIS Back check completed	No material changes from Deposit Draft.
Common Land	GIS Back check completed	Slight difference noted in boundary of Common Land east of Red Wharf Bay, near Benllech, since route corridor options were identified.
CRoW Access Land	GIS Back check completed	No change.
National Cycle Route	GIS Back check completed	A small section of cycle route has been added through the hospital at Bangor since the preferred Route Option was selected.
Wales Coastal Path	GIS Back check completed	No change
Public Rights of Way	Back check has been completed on PROWs affected by the current proposed development and not all PROWs in the wider study area which were assessed in previous studies.	No change
Hotels, Caravan Sites and B'n'B Accommodation.	Completed back check with data from August 2016.	No change
Caravan/Camping Site	Data purchased in 2016. No further data available to undertake back check.	Latest information used to inform back-check exercise.
Golf Course	Data purchased in	Latest information used to

Table B1: Change Analysis of Environmental Data Considered at One or More Design Decision Points.		
Designations	Back Check details	Relevant Results
	2016. No further data available to undertake back check.	inform back-check exercise.
Sports or Leisure Centre	Data purchased in 2016. No further data available to undertake back check.	Latest information used to inform back-check exercise.