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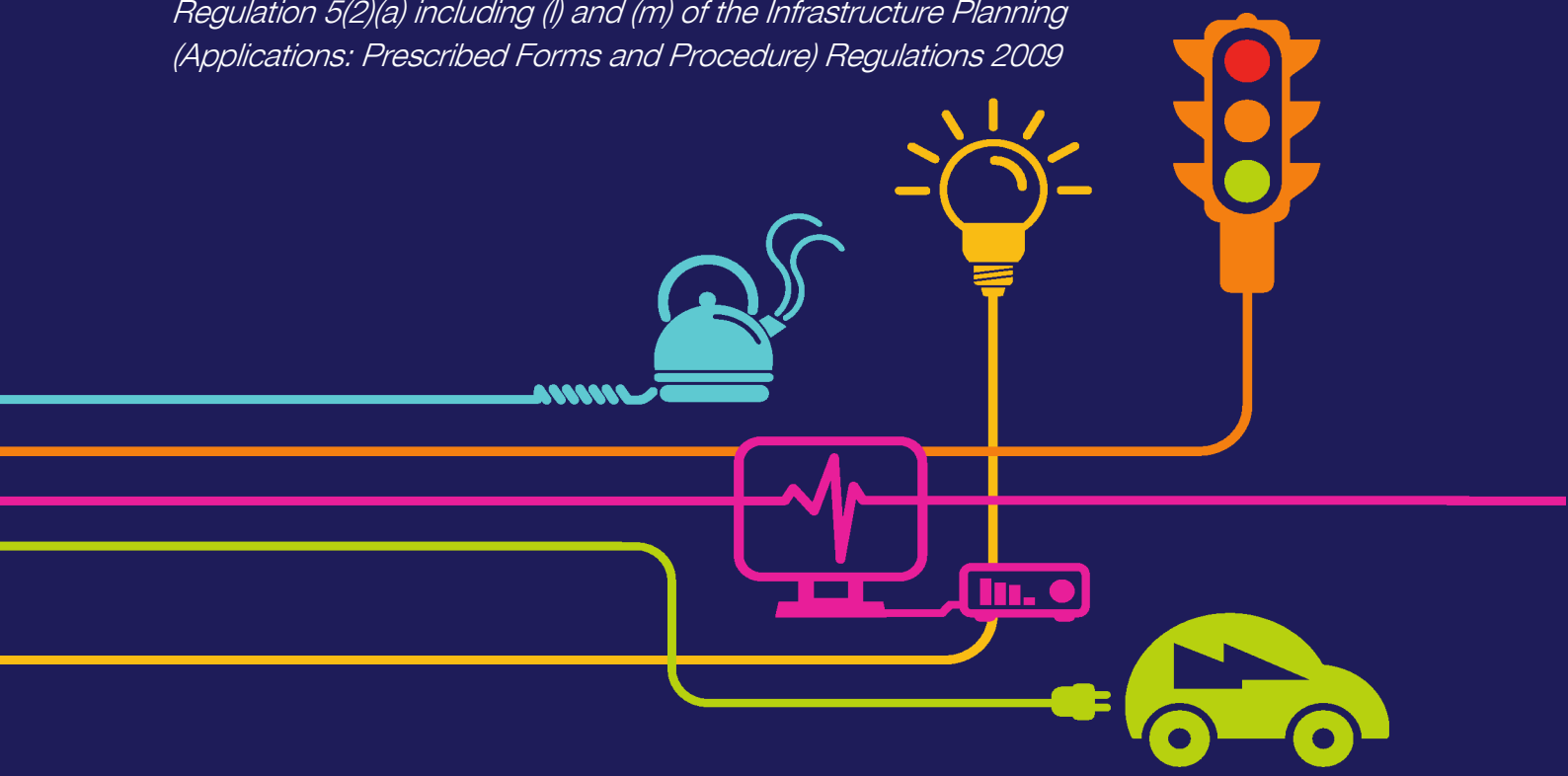
DOCUMENT 5.3

Environmental Statement Chapter 3

Description of the Proposed Development

National Grid (North Wales Connection Project)

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



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North Wales Connection Project

Volume 5

Document 5.3 Chapter 3 Description of the Proposed Development

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1 Introduction

1.1.1 In accordance with Schedule 4, Part 1 of the Infrastructure Planning (Environmental Impact Assessment Regulations) 2009, this chapter provides a description of the physical characteristics of the Proposed Development.

1.1.2 This chapter provides a description of the Proposed Development in terms of what infrastructure is proposed, where it would be located, what size it would be, permanent access requirements and its likely appearance.

1.1.3 Chapter 4, Construction, Operation, Maintenance and Decommissioning of the Proposed Development (**Document 5.4**) describes how the Proposed Development would be constructed, operated, maintained and decommissioned.

1.1.4 A description of the Proposed Development is also provided in Schedule 1 of the draft Development Consent Order (DCO) (**Document 2.1**).

1.1.5 This chapter is supported by a number of Appendices as listed below:

- Appendix 3.1 – Indicative Pylon Schedule (**Document 5.3.2.1**);
- Appendix 3.2 – Indicative Watercourse Crossing Schedule (**Document 5.3.2.2**);
- Appendix 3.3 – Indicative Road, Rail and Public Rights of Way (PRoW) Crossing Schedule (**Document 5.3.2.3**); and
- Appendix 3.4 – Indicative Utilities Crossing Schedule (**Document 5.3.2.4**).

1.1.6 The following Plans should be referred to when reading this chapter:

*400 kV OHL (Volume 4 (**Document 4.13**))*

- DCO_DE/PS/08_01 Sheet 1 of 4 – Illustrative Lattice Pylons;
- DCO_DE/PS/08_02 Sheet 2 of 4 – Illustrative Lattice Pylon Footprints;
- DCO_DE/PS/08_03 Sheet 3 of 4 – Illustrative Lattice Pylon Foundations; and

- DCO_DE/PS/09_04 Sheet 4 of 4 - Indicative Maximum and Minimum Lattice Pylon Heights
- DCO_DE/PS/10_03 Sheet 3 of 3 – Indicative OHL Limits of Deviation.

*Tunnel and Tunnel Head House and Cable Sealing End Compound (Volume 4 (**Document 4.13**))*

- DCO_DE/PS/07_01 Sheet 1 of 3 – Illustrative Tunnel Longitudinal Section;
- DCO_DE/PS/07_02 Sheet 2 of 3 – Illustrative Tunnel Cross Section;
- DCO_DE/PS/07_03 Sheet 3 of 3 – Illustrative Tunnel Cross Section
- DCO_DE/PS/09_01 Sheet 1 of 8 – Parameter Plan for Braint Tunnel Head House and Cable Sealing End Compound;
- DCO_DE/PS/09_02 Sheet 2 of 8 – Indicative Final Arrangement for Braint Tunnel Head House and Cable Sealing End Location;
- DCO_DE/PS/09_03 Sheet 3 of 8 – Indicative Finished Surface Levels for Braint Tunnel Head House and Cable Sealing End Location;
- DCO_DE/PS/09_04 Sheet 4 of 8 – Indicative Final Arrangement for Braint Tunnel Head House and Cable Sealing End Compound;
- DCO_DE/PS/09_05 Sheet 5 of 8 – Parameter Plan for Tŷ Fodol Tunnel Head House and Cable Sealing End Compound;
- DCO_DE/PS/09_06 Sheet 6 of 8 – Indicative Final Arrangement for Tŷ Fodol Tunnel Head House and Cable Sealing End Location;
- DCO_DE/PS/09_07 Sheet 7 of 8 – Indicative Finished Surface Levels for Tŷ Fodol Tunnel Head House and Cable Sealing End Location; and
- DCO_DE/PS/09_08 Sheet 8 of 8 – Indicative Final Arrangement for Tŷ Fodol Tunnel Head House and Cable Sealing End Compound.

*Substations (Volume 4 (**Document 4.13**))*

- DCO_DE/PS/01_01 Sheet 1 of 10 – Substation Parameter Plan – Wylfa
- DCO_DE/PS/01_02 Sheet 2 of 10 – Indicative Substation Layout – Wylfa;

- DCO_DE/PS/01_03 Sheet 3 of 10 – Indicative Substation Elevation – Wylfa;
- DCO_DE/PS/01_04 Sheet 4 of 10 –Substation Parameter Plan – Pentir;
- DCO_DE/PS/01_05 Sheet 5 of 10 – Indicative Substation Layout – Pentir;
- DCO_DE/PS/01_06 Sheet 6 of 10 – Indicative Substation Elevation – Pentir; and
- DCO_DE/PS/01 Sheets 7 of 10 to 10 of 10 – Illustrative Substation Equipment.

2 Location of the Proposed Development

2.1 INTRODUCTION

2.1.1 The Proposed Development is located in North West Wales and crosses the administrative boundaries of the Isle of Anglesey County Council and Gwynedd Council. The location of the Proposed Development is illustrated on Figure 1.1 (**Document 5.1.1.1**).

2.1.2 For ease of reference Sections have been identified along the route of the Proposed Development. The Sections are illustrated on Figure 3.1 (**Document 5.3.1.1**) and comprise:

- Section A Wylfa to Rhosgoch;
- Section B Rhosgoch to Llandyfrydog;
- Section C Llandyfrydog to B5110 north of Talwrn;
- Section D B5110 north of Talwrn to Ceint;
- Section E Ceint to the Afon Braint; and
- Section F Afon Braint to Pentir.

2.1.3 The Proposed Development would be located within an area which is predominately rural comprising primarily of agricultural land. Built development is dispersed comprising of predominately small settlements and isolated dwellings located within or adjacent to the Proposed Development area. The larger settlements are located towards the south of Anglesey and include Llangefni to the west of the Proposed Development and Llanfairpwll to the east. In Gwynedd, Caernarfon is to the south-west and Bangor is to the north-east of the Proposed Development.

2.1.4 The landform on the island of Anglesey typically falls from north-east to south-west, with ridgelines generally following the same pattern. There are two large water supply reservoirs. Llyn Alaw lies to the north of the island, located approximately 550 metres (m) from the Proposed Development and Cefni Reservoir is in the centre of the island, located approximately 2.25 kilometres (km) from the Proposed Development. The island is separated

from the Welsh mainland by the Menai Strait, which is a narrow stretch of tidal water approximately 25 km long and 250 m wide at the narrowest point.

2.1.5 Anglesey's rural coastline has mostly been designated as an Area of Outstanding Natural Beauty (AONB).

2.1.6 The landform area of Gwynedd within which the Proposed Development would be located generally rises from the coast and estuaries in the north and west of the county to the Snowdonia mountain range. The rolling landform transitions from the Menai Strait to the upland fridges of Snowdonia.

2.1.7 The A55 is the primary road route that links Holyhead to the coastal towns along the North Wales Coast. The A55 is crossed by the Proposed Development to the west of Llanfairpwll. Other main roads include the A5, A5025, A4080, A4087, A487 and the A4244. The local road network comprises minor roads which connect the main roads.

2.1.8 Environmental designations are illustrated on the Other Environmental Features Plans (**Document 4.6**), Statutory or Non-Statutory Sites or Features of Nature Conservation, Habitats and Water Bodies Plans (**Document 4.7**) and Statutory or Non-Statutory Sites or Features of the Historic Environment Plans (**Document 4.10**).

2.1.9 Section 7 of each of the technical chapters (**Documents 5.7 to 5.18**) provide full details of the baseline environment within which the Proposed Development would be constructed, operated, maintained and eventually decommissioned.

2.2 SUMMARY OF THE PROPOSED DEVELOPMENT

2.2.1 The Proposed Development would provide a new 400 kilovolt (kV) connection between the existing substations at Wylfa and Pentir and includes the following principal components:

- Extension to the existing substation at Wylfa;
- Sections of new 400 kV overhead line (OHL) between Wylfa substation and Braint Tunnel Head House (THH) and Cable Sealing End Compound (CSEC) on Anglesey including modifications to parts of the existing 400 kV OHL between Wylfa and Pentir;
- Braint THH and CSEC on Anglesey;
- Tunnel between Braint and Tŷ Fodol THHs;
- Tŷ Fodol THH and CSEC in Gwynedd;

- New section of 400 kV OHL between Tŷ Fodol THH and CSEC and Pentir Substation;
- Extension to the existing substation at Pentir; and
- Temporary construction compounds, access tracks, construction working areas, localised widening of the public highway and third party works required to construct the infrastructure listed above.

2.3 ORDER LIMITS

2.3.1 The Order Limits delineate the extent of the 'authorised development' for which development consent is being sought; and are the full extent of area required to locate and construct the Proposed Development. The Order Limits are all encompassing of the components listed in Section 2.3.1 and are illustrated on Figure 3.1 (**Document 5.3.1.1**).

3 Overhead Line

3.1 OVERVIEW

3.1.1 The proposed 400 kV connection would initially be achieved through the construction of approximately 33 km of new 400 kV OHL between Wylfa Substation on the north coast of Anglesey to Braint THH/CSEC to the south-west of Llanfairpwll. The connection would then be placed in a tunnel for approximately 4 km to the proposed Tŷ Fodol THH/CSEC south of A4087 in north-west Gwynedd. There would then be a further approximate 1 km section of new 400 kV OHL from Tŷ Fodol THH/CSEC to Pentir Substation.

3.1.2 In order to achieve the close parallel and to minimise environmental effects, some sections of the existing 400 kV OHL would need to be dismantled and a section of new build constructed at the transposition points as described in section 3.3. In view of this, the Proposed Development also includes approximately 3 km of new sections of 400 kV OHL in parallel. Figure 3.2 (**Document 5.3.1.2**) illustrates the sections of new and existing 400 kV OHL.

3.1.3 The proposed 400 kV OHL is described in more detail in the following sections.

3.2 OPTIONS

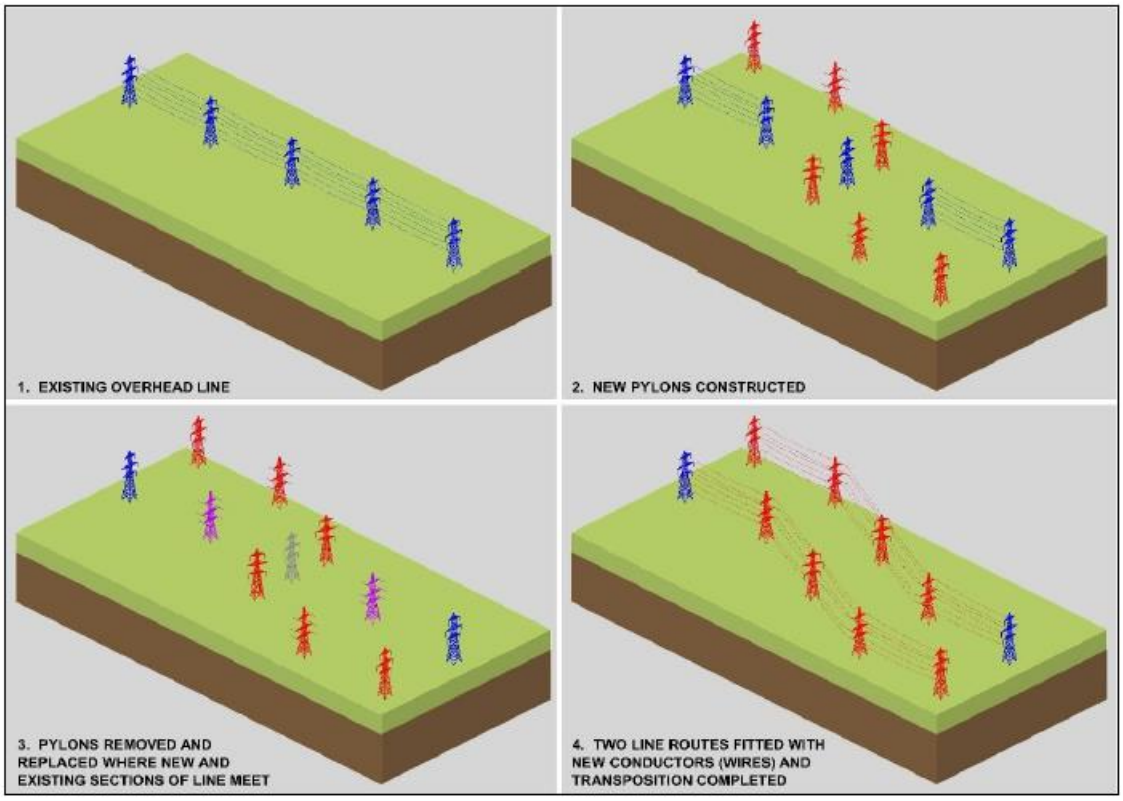
3.2.1 Two options are being applied for in relation to the 400 kV OHL on Anglesey. Option A would oversail a residential property at Talwrn (R4/01483) and remove proposed pylon 4AP065 and Option B would avoid oversailing the same property. Proposed pylons 4AP064 and 4AP066 are in different locations for Option A and Option B; all other proposed pylons are broadly contiguous for both options. Options A and B are illustrated on Figure 3.2 (**Document 5.3.1.2**). The reasons for the inclusion of these options are set on in section 5 of Chapter 2 Alternatives and Proposed Development History (**Document 5.2**).

3.3 TRANSPOSITION POINTS

3.3.1 Transposition points are a reconfiguration of the existing 400 kV OHL to allow OHL routes to remain parallel without the need for a line ‘duck-under’ or cross-over. Transposition points allow for the continuation of a route from a section of new pylons to a section of existing pylons, whilst the parallel route is a continuation of a route from a section of existing pylons to a section of new pylons. Transpositions are achieved by removing a section

of the existing line forming two unconnected ends, which are then each connected to a new line approaching from either side. A transposition point is illustrated schematically in Image 3.1 below.

Image 3.1 Transposition Point



3.3.2 In routeing the new connection, to minimise environmental effects there would be three transposition points with the existing 400 kV OHL. The location of these are between Rhosgoch and Rhosybol, near Llandyfrydog and close to Maenaddwyn. At these locations there would be two parallel sections of new 400 kV OHL as illustrated on Figure 3.2 (**Document 5.3.1.2**).

3.3.3 As a result of the transpositions both the new and the existing connection would contain sections of new 400 kV OHL and sections of existing 400 kV OHL. Figure 3.2 (**Document 5.3.1.2**) illustrates where the new and existing sections would be located.

3.4 OVERHEAD LINE DETAILS

3.4.1 The OHL component of the 400 kV connection would comprise conductors supported by steel lattice pylons. Pylons are either suspension pylons, from which the conductor is simply suspended, or tension pylons, which are more robust structures that hold conductors in tension where the alignment of an OHL changes direction or to maintain tension in long straight sections of the route. The conductors are connected to the pylon by a set of insulators

(components made from a material with a high resistance to the flow of electric current such as glass or porcelain) and steel fittings. Additional fittings, such as spacers and vibration dampers, may be fitted to the conductors. Spacers prevent the conductors from touching each other and vibration dampers prevent oscillations from the overhead conductors from reaching the insulator fitting and minimise the effects of fatigue loading.

Alignments

3.4.2 The western alignment is referred to as the 4AP and the eastern alignment is referred to as the 4ZA[1]. Option A as illustrated on the Works Plans (**Document 4.4**) would consist of 65 new pylons on the 4AP alignment and 35 new pylons on the 4ZA alignment giving 100 in total[2]. Option B as illustrated on the Works Plans (**Document 4.4**) would consist of 66 new pylons on the 4AP alignment and 35 new pylons on the 4AP alignment (, giving 101 pylons in total[3]. Both options include modifications to five existing pylons. The Proposed Development includes four new gantries at Wylfa Substation, two new full line tension (FLT) gantries at Braint CSEC, two new FLT gantries at Tŷ Fodol CSEC and two new FLT gantries at Pentir Substation. A gantry is a structure which supports the conductors as they transition from an OHL to equipment within a substation of CSEC. Appendix 3.1 'Indicative Pylon Schedule' (**Document 5.3.2.1**) lists the proposed pylons for the 4AP and the 4ZA, including the proposed pylon height. Pylon numbers are shown on Figure 3.2 (**Document 5.3.1.2**) and the Works Plans (**Document 4.4**), for identification purposes only.

3.4.3 Where work is required to an existing pylon, such as the installation of fibre optic earthwire, this is included within the Order Limits and has been assessed as part of this Environmental Impact Assessment (EIA) of the Proposed Development. Where no works are required to an existing pylon, or section of existing 400 kV OHL, this is not included within the Order Limits and does not form part of the Proposed Development.

[1] The existing OHL is known as the 4ZA, however this reference and subsequent references in this chapter (unless specified) refer to the 4ZA as proposed by the Proposed Development (i.e. the new eastern alignment) which includes sections of existing pylons and conductors and sections of new pylons and conductors.

[2] This reflects the centre line as shown on the Works Plans, and is subject to the Limits of Deviation (LOD) see Section 5.3 below.

[3] This reflects the centre line as shown on the Works Plans, and is subject to the LOD.

Parallel and Synchronised Design

3.4.4 The detailed design work undertaken to identify the 400 kV OHL design of the Proposed Development has set out to develop a synchronised design wherever practicable. Localised constraints to siting of individual pylons have precluded this where an unpaired or less synchronised design would be locally preferable, based upon the nature of the receptors local to a given pylon. The Design Report (**Document 7.17**) provides an explanation as to how the evolution of the design has resulted in the Proposed Development for which a development consent order is being sought; this is also summarised in Chapter 2 Alternatives and Proposed Development History (**Document 5.2**).

Existing Pylons

3.4.5 The existing 400 kV OHL was constructed using lattice pylons with a quad conductor arrangement (i.e. four conductors in each bundle and one bundle per pylon arm). These are typical lattice pylons with three arms on either side of a central pylon body, the longest arm being the middle of the three. The arms have a flat bottom and taper from the pylon body down to the end of each arm. A standard pylon of this type is 50 m in height with an 11 m x 11 m base dimension; however the pylons of this type on the existing 400 kV OHL average 54 m in height.

Proposed Pylons

3.4.6 The proposed pylons are also typical lattice pylons, with three arms on either side of a central pylon body, the longest arm being the middle of the three, but with a slightly different form to the existing 400 kV OHL, as the arms taper from the pylon body along the bottom and the top down to the end of each arm and they are, overall the steelwork is slightly lighter and slimmer in appearance. The pylons are illustrated on Design Plan DCO_DE/PS/08 Sheet 1 of 4 (**Document 4.13**). The standard height is 46.5 m with a 7.1 m x 7.1 m base dimension. The proposed pylons of this type average 51 m in height.

3.4.7 As the 4ZA and 4AP alignments would include both existing and proposed pylons, the average pylon height on the 4ZA would be 52.9 m and the 4AP 52.4 m. The indicative pylon schedules for both the 4ZA and 4AP are provided in Appendix 3.1 (**Document 5.3.2.1**).

Conductors and Insulators

3.4.8 The existing connection is strung with Quad conductor which consists of four conductors per bundle each conductor having a cross sectional area of 400 mm^2 (referred to as 'Zebra' conductor). The new connection would be

strung with Twin conductor, which would consist of two conductors per bundle each conductor having a cross sectional area of 850 mm^2 (41 mm diameter conductor)(referred to as 'Redwood' conductor). At transposition points where there would be a change from Quad conductor to Twin conductor or vice versa an adaptor plate would be used.

3.4.9 Insulators can be made of different types of material, but the most common industry standard is either glass or porcelain.

3.4.10 Suspension pylons would typically have a single insulator string hanging vertically downwards from each crossarm end to carry the conductor bundle. A tension pylon would typically have one insulator string per conductor (i.e. two insulator strings for a conductor bundle consisting of two conductors) and these are orientated horizontally outwards from the crossarm ends and take the tension of the conductors.

3.5 ABOVE GROUND LIMITS OF DEVIATION

3.5.1 As recognised by the Planning Inspectorate's Advice Note 9 (Ref 3.1) a necessary and proportionate degree of flexibility often needs to be incorporated into the design of a development so that unforeseen issues encountered after a development has been consented can be addressed. In this instance, for example, previously unidentified poor ground conditions, or the identification of significant unrecorded archaeological remains, may require a pylon to be re-sited. Therefore, to allow for this the 400 KV OHL would be constructed within the specified limits of deviation (LOD). The proposed alignment of the new build 400 kV OHL sections are subject to LOD to provide this necessary and proportionate degree of flexibility. The above ground LOD provides a maximum distance or measurement of variation within which every element of the 400 kV OHL would be located.

3.5.2 In respect of the 400 kV OHL, LOD are applied horizontally and vertically.

3.5.3 The proposed above ground LOD for the Proposed Development are in summary:

- Horizontal: The Horizontal LOD is 100 m (50 m either side of the centre line). In certain locations this has been pulled in to less than 100 m to avoid a particular receptor. Where the LOD is 100 m the extent of movement of any pylon is limited by the span length and conductor swing. The potential for pylon movement is reduced in long spans with large conductor sags as the swing of the conductor can be up to 20-30 m in plan either side of the centreline. It is possible for individual spans to have smaller conductor swings, conversely allowing respective pylon bases to move further towards the edge of the LOD. At a maximum span length the centre of a pylon could move

approximately 20 m either side of the centreline subject to topography and local conditions. The horizontal LOD is shown on Figure 3.1 (**Document 5.3.1.1**) and the Works Plans (**Document 4.4**). There is no limit placed on the movement of a pylon horizontally along the centreline with the exception of the pylons listed and shown on the Schedule of Environmental Commitments (**Document 7.4.2.1**). The horizontal movement along the alignment of all other pylons is constrained by the number of pylons and the distance a single pylon could move whilst still maintaining ground clearance and not exceeding the vertical LOD described below.

- Vertical: The upwards vertical LOD of the pylon height is 6 m. Standard extension panels for lattice pylons are typically in 3 m increments, hence the LOD allows for two such panels. This height has been chosen as a vertical increase of 3 m typically allows a 25 m increase of horizontal movement subject to localised factors such as topography; given the design objective to maintain a 25 m clearance distance from hedges, fences and roads, a total of 50 m of horizontal movement is therefore required to move a pylon from one field to the next, which could equate to up to a 6 m vertical increase albeit this is dependent on local topography. The final design of a pylon may be lower in height, if the LOD was used, as such there is no restriction placed on a reduction in height. Minimum safety clearances for all OHLs are strictly prescribed[4] and are legally binding (Ref 3.2). The statutory safety clearances must be maintained between conductors and the ground as well as trees, buildings and any other structures such as street lighting columns. To maintain the safety clearances, the height of any pylon must allow for the sag of the conductor (wires), the swing (how conductors perform in windy conditions) and the span (i.e. the distance) between two pylons. There is no below ground LOD in respect of the 400 kV OHL.

3.5.4 The flexibility introduced by the LOD has been assessed as part of this EIA; this is explained in Chapter 6 (**Document 5.6**).

3.6 SECTION A WYLFA TO RHOSGOCH

Section Description

3.6.1 Section A of the Proposed Development is shown on Figure 3.2 Sheet 1 of 6 (**Document 5.3.1.2).** It commences at Wylfa Substation and extends easterly towards Rhosgoch, passing to the north and east of the villages of Tregele and Llanfechell, the two lines run in close parallel for the extent of

[4] Energy Networks Association – Technical Specification 43-8

the section. The majority of new 400 kV OHL is to the east of the existing OHL and is on the 4ZA alignment, however there is a short section of new 400 kV OHL on the 4AP alignment between 4AP001 and 4AP002. Both alignments cross the A5025 and head south-east to the end of the section north of the settlement of Rhosgoch.

3.6.2 Settlements closest to the Proposed Development in this section include Tregele and Llanfechell.

Pylons

3.6.3 This section would comprise of 21 new pylons made up of one new pylon on the 4AP (4AP001) and 20 new pylons on the 4ZA (4ZA005 – 4ZA025). There is no proposed 4ZA011. These are illustrated on the Works Plans, DCO_A/WO/PS/01 to DCO_A/WO/PS/05 (**Document 4.4**).

3.6.4 This section would also include four new gantries at Wylfa Substation (included as part of the Wylfa Substation modifications). These are included on the Indicative Pylon Schedules for both the 4ZA and 4AP, Appendix 3.1 (**Document 5.3.2.1**) and illustrated on Figure 3.2 Sheet 1 of 6 (**Document 5.3.1.2**) and Works Plan DCO_A/WO/PS/01 (**Document 4.4**).

Options

3.6.5 Options A and B are contiguous in this section.

Conductors

3.6.6 On the 4AP there would be a short section of new Twin Redwood conductor bundles between the Gantry at Wylfa Substation and 4AP002, for the remainder of this section the 4AP 400 kV OHL would comprise of the existing Quad Zebra conductor bundles. On the 4ZA 400 kV OHL there would be new Twin Redwood conductor bundles for the entire section.

Removal of Existing Assets

3.6.7 All the existing gantries at Wylfa Substation and the section of existing conductor bundles between these gantries and 4AP002 would be removed. This is illustrated on Works Plan DCO_A/WO/PS/01 (**Document 4.4**).

Existing Assets to be Modified

3.6.8 Modifications are required to existing pylon 4AP002 and the earthwire on the existing 4AP pylons would be replaced along the whole of this section. These are illustrated on Works Plan DCO_A/WO/PS/01-06 (**Document 4.4**).

Summary of the Permanent Works for the Proposed Development in Section A

3.6.9 Table 3.1 provides a summary of the Proposed Development in this section.

Table 3.1 Summary of the Permanent Works for the Proposed Development in Section A

	4AP	4ZA
Number of New Pylons	1 (+2 New Gantries at Wylfa)	20 (+2 New Gantries at Wylfa)
Number of Retained Pylons	20 (1 Modified, 19 Not Affected)	1 (Modified)
Number of Dismantled Pylons	N/A	2 Gantries at Wylfa
Total Length of New 400 kV OHL Build	233 m (4AP001 – 4AP002) 76 m Downleads (Wylfa – 4AP001)	6.8 km (4ZA004 – 4ZA025) 75 m Downleads (Wylfa – 4ZA004)
Length of Existing Retained Line	6.55 km (Modified (4AP002 – 4AP021))	N/A
Length of Line to be Dismantled	279 m (4ZA004 – 4AP002) 86 m Downleads (Wylfa – 4ZA004)	
Height of Tallest Retained Pylon	59.2 m (4AP008, 4AP016 & 4AP018)	55.3 m (4ZA004)
Height of Tallest Proposed Pylon	46 m (4AP001)	55.5 m (4ZA017)
Height of Shortest Retained Pylon	48.6 m (4AP004 & 4AP014)	55.3 m (4ZA004)
Height of Shortest Proposed Pylon	46 m (4AP001)	45.3 m (4ZA007)

3.7 SECTION B RHOSGOCH TO LLANDYFRYDOG

Section Description

3.7.1 Section B of the Proposed Development is shown on Figure 3.2 Sheet 2 of 6 (**Document 5.3.1.2)**. It runs in a north-west to south-east direction along the

route of the existing 400 kV OHL from a location south of Bodewryd, where Section A changes into Section B. The Proposed Development then heads south-east to pass immediately south of Rhosgoch and Rhosybol and crosses the B5111 before reaching Llandyfrydog where Section B ends and Section C begins.

3.7.2 This section includes two of the three transposition points between Rhosgoch and Rhosybol and near Llandyfrydog therefore this section includes sections of two new 400 kV OHLs. These are illustrated on Figure 3.2 Sheet 2 of 6 (**Document 5.3.1.2).**

3.7.3 Settlements closest to the Proposed Development in this section include Rhosgoch, Rhosybol and Llandyfrydog.

Options

3.7.4 Options A and B are contiguous in this section.

Pylons

3.7.5 This section would comprise of 25 new pylons made up of 14 new pylons on the 4AP (4AP024 – 4AP037) and 11 new pylons on the 4ZA (4ZA026 – 4ZA034 and 4ZA041 – 4ZA042). These are illustrated on Figure 3.2 Sheet 2 of 6 (**Document 5.3.1.2)** and the Works Plans, DCO_B/WO/PS/01 to DCO_B/WO/PS/04 (**Document 4.4**).

Conductors

3.7.6 On the 4AP there would be two short sections of line utilising existing Quad Zebra conductor bundles between the start of the section and 4AP023 and between 4AP037 and the end of this section. The remainder of the 4AP 400 kV OHL in this section would consist of new Twin Redwood conductor bundles. On the 4ZA, 4ZA034 to 4ZA040 would consist of Quad Zebra conductor bundles with the remainder of the 4ZA in this section comprising of new Twin Redwood conductor bundles.

Removal of Existing Assets

3.7.7 In order to minimise environmental effects throughout this section an existing section of the 4ZA 400 kV OHL would be dismantled and two new sections of OHL constructed in parallel to the south of Rhosybol. This would require the removal of approximately 2.64 km of existing 400 kV OHL including eight pylons (X4ZA027 – X4ZA033 and X4ZA040) on the existing 400 kV OHL. In addition the existing conductor bundles between 4AP023 and 4ZA034 and between 4ZA040 and 4AP037 would also be removed. These removals are illustrated on Works Plans DCO_B/WO/PS/01 to DCO_B/WO/PS/04 (**Document 4.4**).

Existing Assets to be Modified

3.7.8 Modifications would be required to the existing 400 kV OHL between the start of this section up to and including pylon 4AP023, between pylons 4ZA034 and 4ZA036, a modification to pylon 4ZA040 and modifications between pylon 4AP037 and the end of this section. These modifications are illustrated on Works Plans DCO_B/WO/PS/01 to DCO_B/WO/PS/04 (**Document 4.4**).

Summary of the Permanent Works for the Proposed Development in Section B

3.7.9 Table 3.2 provides a summary of the Proposed Development in this section.

Table 3.2 Summary of the Permanent Works for the Proposed Development in Section B

	4AP	4ZA
Number of New Pylons	14	11
Number of Retained Pylons	3 (1 Modified)	6 (1 Modified)
Number of Dismantled Pylons	8 (Existing 4ZA)	
Number of Temporary Pylons	None	2
Total length of New Line Build	4.91 km (4AP023 – 4AP037)	3.64 km (4ZA025 – 4ZA034 & 4ZA040 – 4ZA042)
Length of Existing Retained Line	0.94 km (Modified (4AP021 – 4AP023 & 4AP037 – 4AP038))	1.42 km Existing (4ZA036 – 4ZA040) 0.79 km Modified (4ZA034 – 4ZA036)
Length of Line to be Dismantled	2.64 km (4AP023 – 4ZA035 & 4ZA040 – 4AP037)	
Length of Temporary OHL	2.43 km (4ZA028 – 4ZA035 & 4AP036 – 4AP037)	
Height of Tallest Retained Pylon	65.3 m (4AP038)	59.2 m (4AP036, 4AP037, 4AP038 & 4AP039)

Table 3.2 Summary of the Permanent Works for the Proposed Development in Section B		
	4AP	4ZA
Height of Tallest Proposed Pylon	57.3 m (4AP036)	58.5 m (4ZA042)
Height of Smallest Retained Pylon	48.6 m (4AP023)	48.6 m (4ZA040)
Height of Smallest Proposed Pylon	43.5 m (4AP026 & 4AP035)	43.5 m (4ZA030)

Temporary Pylons

3.7.10 In order to realign the existing 400 kV OHL and construct the new 400 KV OHL, two temporary pylons would be required during construction to maintain the electricity supply to Anglesey. The temporary pylons are 4ZA030T to the south of Pen-yr-orsedd and 4ZA034T directly east of the B5111. These temporary pylons would be removed on completion of the construction of this section of work. The temporary pylons are illustrated on Works Plans DCO_B/WO/PS/01 to DCO_B/WO/PS/03 (**Document 4.4**).

3.8 SECTION C LLANDYFRYDOG TO B5110 NORTH OF TALWRN

Section Description

3.8.1 Section C of the Proposed Development is shown on Figure 3.2 Sheet 3 of 6 Options A and B (**Document 5.3.1.2)**. It commences east of the settlement of Llandyfrydog and extends in parallel with the existing 400 kV OHL in a south-easterly direction towards the hamlet of Maenaddwyn, passing to the west of Hebron and then to the north of the village of Capel Coch. To the north-east of Capel Coch the existing 400 kV OHL continues south-east through the Anglesey Fens Special Area of Conservation (SAC); the new 400 kV OHL is routed south to the east of Capel Coch adjacent to the Anglesey Fens SAC. After crossing the Afon Erddreiniog the new 400 kV OHL turns south-east where it converges back to close parallel with the existing 400 kV OHL at Maen Eryr. The two OHLs then run in close parallel for the remainder of this section to a point south of the B5110. The two OHLs are not in close parallel for approximately 2.6 km through this section to avoid direct effects from the new 400 kV OHL on the Anglesey Fens SAC.

3.8.2 This section includes the third transposition point close to Maenaddwyn. Therefore this section includes a section of two new 400 kV OHLs. This is illustrated on Figure 3.2 Sheet 3 of 6 Options A and B (**Document 5.3.1.2**).

3.8.3 Settlements closest to the Proposed Development in this section include Maenaddwyn and Capel Coch.

Options

3.8.4 The proposed pylon positions are broadly contiguous between the two options A and B. In this section however there are very slight variations in the locations of pylons 4AP057 to 4AP062 (approximately 1 m) and as a result there are also slight variations in both the LOD and Order Limits from south-east of Maen Eryr to the end of this section where Section D commences. The differences between the two options in this section are shown on Figure 3.2 Sheet 3 of 6 Options A and B (**Document 5.3.1.2**).

Pylons

3.8.5 This section would comprise 26 new pylons, made up of 22 new pylons on the 4AP (4AP041 – 4AP062) and four new pylons on the 4ZA (4ZA043 – 4ZA046). These are illustrated on Figure 3.2 Sheet 3 of 6 Options A and B (**Document 5.3.1.2**) and the Works Plans DCO_C/WO/PS/01_A to DCO_C/WO/PS/07_A and DCO_C/WO/PS/01_B to DCO_C/WO/PS/07_B (**Document 4.4**).

Conductors

3.8.6 On the 4AP approximately 600 m between the start of the section and 4AP041 would be the existing Quad Zebra conductor bundles. The remainder of the 4AP in this section would comprise of the new Twin Redwood conductor bundles. On the 4ZA there would be a section of approximately 1.5 km between the start of the section and 4ZA047 of new Twin Redwood conductor bundles, the remainder of the 4ZA in this section is not included in the Proposed Development and would remain as the existing Quad Zebra conductor bundles.

Removal of Existing Assets

3.8.7 In order to reduce environmental effects throughout this section the design incorporates a longer transposition point over two spans between Clorach-fawr and Maenaddwyn. This would require the removal of two existing pylons (X4ZA044 and X4ZA045) on the existing 400 kV OHL. In addition the existing conductor between 4AP041 and 4ZA047 would also be removed. These removals are illustrated on Works Plans DCO_C/WO/PS/01_A to DCO_C/WO/PS/02_A and DCO_C/WO/PS/01_B to DCO_C/WO/PS/02_B (**Document 4.4**).

Existing Assets to be Modified

3.8.8 Modifications are required to the existing alignment from the start of the section to 4AP041 and to pylon 4ZA047. These modifications are illustrated on Works Plans DCO_C/WO/PS/01_A to DCO_C/WO/PS/02_A and DCO_C/WO/PS/01_B to DCO_C/WO/PS/02_B (**Document 4.4**).

Section of No Works

3.8.9 No works are proposed to the existing 400 kV OHL for approximately 6.45 km from pylons 4ZA048 to 4ZA064 inclusive. These are illustrated on Works Plans DCO_C/WO/PS/01_A to DCO_C/WO/PS/07_A and DCO_C/WO/PS/01_B to DCO_C/WO/PS/07_B (**Document 4.4)**. Whilst this does not form part of the Proposed Development it has been provided in Table 3.3 below for context.

Summary of the Permanent Works for the Proposed Development in Section C

3.8.10 Table 3.3 provides a summary of the Proposed Development in this section.

Table 3.3 Summary of the Permanent Works for the Proposed Development in Section C

	4AP	4ZA
Number of New Pylons	22	4
Number of Retained Pylons	2	18 (1 is Modified)
Number of Dismantled Pylons	2 (Existing 4ZA)	
Total Length of New Line Build	7.3 km (4AP041 – 4AP062)	1.75 km (4ZA042 – 4ZA047)
Total Length of Existing Line to be Retained	1.04 km (Modified (4AP038 – 4AP041)	6.45 km (4ZA047 – 4ZA064)
Length of Line to be Dismantled	0.68 km (4AP041 – 4ZA047)	
Height of Tallest Retained Pylon	57.7 m (4AP039)	59.2 m (4ZA048, 4ZA051, 4ZA059, 4ZA061 & 4ZA064)
Height of Tallest Proposed Pylon	61.5 m (4AP044)	54.3 m (4ZA043)

Table 3.3 Summary of the Permanent Works for the Proposed Development in Section C		
	4AP	4ZA
Height of Smallest Retained Pylon	50 m (4AP040)	51.6 m (4ZA056 & 4ZA058)
Height of Smallest Proposed Pylon	45.8 m (4AP052)	48.3 m (4ZA045)

3.9 SECTION D B5110 NORTH OF TALWRN TO AFON CEINT

Section Description

3.9.1 Section D of the Proposed Development is shown on Figure 3.2 Sheet 4 of 6 Options A and B (**Document 5.3.1.2).** This section is approximately 3.5 km and commences to the south of the B5110. The two lines continue in a south-easterly direction crossing the B5109 to the west of Talwrn and the B5420 to the east of Llangefni where the section ends. The two lines are in close parallel for the entire section.

3.9.2 Settlements closest to the Proposed Development in this section include Talwrn and Ceint.

Options

3.9.3 The proposed pylon positions are different for Option A and Option B in this section. Option A is shown on Figure 3.2 Sheet 4 of 6 Option A (**Document 5.3.1.2**) and Works Plans DCO_D/WO/PS/01_A to DCO_D/WO/PS/04_A (**Document 4.4**) and Option B is shown on Figure 3.2 Sheet 4 of 6 Option B (**Document 5.3.1.2**) and Works Plans DCO_D/WO/PS/01_B to DCO_D/WO/PS/04_B (**Document 4.4**). There is also an associated variation between the LOD and Order Limits between the two options from the start of this section, to a point south-east of Hendre Hywel. The LOD and Order Limits for Option A are shown on Works Plans DCO_D/WO/PS/01_A to DCO_D/WO/PS/04_A (**Document 4.4**) and for Option B they are shown on Works Plans DCO_D/WO/PS/01_B to DCO_D/WO/PS/04_B (**Document 4.4**). The differences between the two options in this section are show on Figure 3.2 Sheet 4 of 6 Option A and Option B (**Document 5.3.1.2**).

Pylons

3.9.4 This section would comprise of 10 new pylons for Option A and 11 new pylons for Option B all of which are on the 4AP (4AP063 – 4AP073). Option A does not include pylon 4AP065 and proposed pylons 4AP064 and 4AP066 are in different locations compared to Option B, all other proposed

pylons are broadly contiguous for both. The pylons are illustrated on Figure 3.2 Sheet 4 of 6 Option A and Option B (**Document 5.3.1.2**) and Works Plans DCO_D/WO/PS/01_A to DCO_D/WO/PS/04_A for Option A and DCO_D/WO/PS/01_B to DCO_D/WO/PS/04_B for Option B (**Document 4.4**).

Conductors

3.9.5 On the 4AP the whole of this section would comprise of new Twin Redwood conductor bundles. The 4ZA is outside of the Proposed Development and the whole section comprises of the existing Quad Zebra conductor bundles.

Section of No Works

3.9.5.1 No works are proposed to the entirety of the 4ZA 400 kV OHL throughout this section and it is outside of the Proposed Development. Whilst this does not form part of the Proposed Development information has been provided in Table 3.4 below for context.

Summary of the Permanent Works for the Proposed Development in Section D

3.9.6 Table 3.4 provides a summary of the Proposed Development in this section.

Table 3.4 Summary of the Permanent Works for the Proposed Development in Section D

	4AP	4ZA
Number of New Pylons	Option A = 10 Option B =11	None
Number of Retained Pylons	N/A?	10
Number of Dismantled Pylons	N/A	N/A
Total Length of New Line Build	3.59 km (4AP062 – 4AP073)	None
Total Length of retained 400 kV OHL	N/A	3.52 km (4ZA064 – 4ZA074)
Height of Tallest Retained Pylon	N/A	59.2 m (4ZA071)
Height of Tallest Proposed Pylon	58.5 m (4AP069)	N/A

Table 3.4 Summary of the Permanent Works for the Proposed Development in Section D		
	4AP	4ZA
Height of Smallest Retained Pylon	N/A	50 m (4ZA068)
Height of Smallest Proposed Pylon	46.5 m (4AP063 & 4AP071)	N/A

3.10 SECTION E CEINT TO THE AFON BRAINT

Section Description

3.10.1 Section E of the Proposed Development is shown on Figure 3.2 Sheet 5 of 6 (**Document 5.3.1.2).** This section is 4.36 km and commences south of the B5420 to the east of Llangefni. The two lines continue south south-east in close parallel to pylon 4ZA078 at which point the new 4AP 400 kV OHL diverts away from the existing 4ZA 400 kV OHL. The new 4AP 400 kV OHL continue south-east crossing the A55, A5 and railway between Garnedd fawr and Tyddyn-isaf continuing to the end of this section where the 400 kV OHL crosses the Afon Braint.

3.10.2 The settlements closest to the Proposed Developing in this section are Star and Gaerwen.

Options

3.10.3 Options A and B are contiguous in this section.

Pylons

3.10.4 This section would comprise of 13 new pylons all of which would be on the 4AP 400 kV OHL (4AP074 – 4AP086). Proposed pylons 4AP085 and 4AP086 would be a low height lattice pylon. These are illustrated on Figure 3.2 Sheet 5 of 6 (**Document 5.3.1.2**) and on Works Plans DCO_E/WO/PS/01 to DCO_E/WO/PS/04 (**Document 4.4**).

Conductors

3.10.5 On the 4AP the whole of this section would comprise of new Twin Redwood conductor bundles. The 4ZA is outside of the Proposed Development and the whole section would comprise of the existing Quad Zebra conductor bundles.

Section of No Works

3.10.6 No works are proposed to any elements of the existing 4ZA 400 kV OHL throughout this section and it is outside of the Proposed Development. Whilst this does not form part of the Proposed Development it has been provided in Table 3.5 below for context.

Summary of the Permanent Works for the Proposed Development in Section E

3.10.7 Table 3.5 provides a summary of the Proposed Development in this section.

Table 3.5 Summary of the Permanent Works for the Proposed Development in Section E

	4AP	4ZA
Number of New Pylons	13	None
Number of Retained Pylons	N/A	12
Number of Dismantled Pylons	N/A	N/A
Length of New Line Build	4.36 km (4AP073 – 4AP086)	N/A
Length of Existing Line Retained	N/A	4.29 km (4ZA074 – 4ZA086)
Height of Tallest Retained Pylon	N/A	56.1 m (4ZA077 & 4ZA086)
Height of Tallest Proposed Pylon	52.5 m (4AP076 & 4AP081)	N/A
Height of Smallest Retained Pylon	N/A	50 m (4ZA081, 4ZA083 & 4ZA085)
Height of Smallest Proposed Pylon	38.4 m (4AP086)	N/A

3.11 SECTION F AFON BRAINT TO PENTIR (400 KV OHL)

Section Description

3.11.1 The 400 kV OHL in Section F comprises of one low height pylon (4AP087) on Anglesey to the proposed 400 kV gantries at Braint CSEC. In Gwynedd there is a section of 400 kV OHL, comprising of four pylons (one of which is

low height (4AP088)) from the proposed 400 kV gantries at Tŷ Fodol CSEC south across Coed Nant y Garth to Pentir Substation.

3.11.2 Settlements closest to the Proposed Development in this section include Llanfairpwll on Anglesey and Pentir in Gwynedd.

Options

3.11.3 Options A and B are contiguous in this section.

Pylons

3.11.4 This section would comprise of five new pylons all of which would be on the 4AP 400 kV OHL (4AP087 – 4AP091) and six new FLT gantries, two each at Braint CSEC, Tŷ Fodol CSECs and Pentir Substation. Proposed pylons 4AP087 and 4AP088 would be low height lattice pylons. These are illustrated on Works Plans DCO_F/WO/PS/01 to DCO_F/WO/PS/05 (**Document 4.4**).

Conductors

3.11.5 On the 4AP the whole of this section would comprise of new Twin Redwood conductor bundles. The 4ZA is outside of the Proposed Development and the whole section would comprise of the existing Quad Zebra conductor bundles.

Section of No Works

3.11.6 No works are proposed to any elements of the existing 4ZA 400 kV OHL throughout this section and is outside of the Proposed Development. Whilst this does not form part of the Proposed Development it has been provided in Table 3.6 below for context.

Summary of the Permanent Works for the Proposed Development in Section F

3.11.7 Table 3.6 provides a summary of the Proposed Development in this section.

Table 3.6 Summary of the Permanent Works for the Proposed Development in Section F

	4AP	4ZA
Number of New Pylons	5 (six Gantries)	None
Number of Retained Pylons	N/A	23 (two Gantries at Pentir)

Table 3.6 Summary of the Permanent Works for the Proposed Development in Section F		
	4AP	4ZA
Number of Dismantled Pylons	N/A	N/A
Total Length of New Line Build	1.84 km (4AP086 – Braint & Tŷ Fodol – Pentir)	N/A
Total Length of Existing Line to be retained	N/A	6.63 km (4ZA086 – 4ZA109) 55 m Downleads (4ZA109 – Pentir)
Height of Tallest Retained Pylon	N/A	62.2 m (4ZA095 & 4ZA096)
Height of Tallest Proposed Pylon	55.5 m (4AP090)	N/A
Height of Smallest Retained Pylon	N/A	43.9 m (4ZA107)
Height of Smallest Proposed Pylon	35.4 m (4AP088)	N/A
Height of Gantries	14.9 m (Tŷ Fodol, Braint & Pentir)	M/A

3.12 FOUNDATIONS

3.12.1 The foundations of the proposed pylons would either be standard column and pad, mini pile or tube pile, or a bespoke design if necessary. Typical drawings for the three standard types of foundation are illustrated on Design Plan DCO_DE/PS/08 Sheet 3 of 4 – Illustrative Lattice Pylon Foundations (**Document 4.13**). The selection of foundation type would depend upon the ground conditions encountered. Appendix 3.1 (**Document 5.3.2.1**) details the indicative foundation type for each of the new proposed pylons on the 4AP and 4ZA.

3.13 TEMPORARY CONSTRUCTION COMPOUNDS

3.13.1 Two construction compounds would be required to facilitate the construction of the 400 kV OHL elements of the connection. These are required for site offices, welfare facilities and storage during the construction period. They would be used from the commencement of construction of the 400 kV OHL through to the end of construction of the 400 kV OHL elements of the

Proposed Development. A generic layout for a construction compound is illustrated on Design Plan DCO_DE/PS/12 sheet 1 of 5 (**Document 4.13**).

Penmynydd Road Construction Compound

3.13.2 This compound would be located on Anglesey, approximately 1.5 km to the east of Llangefni, centred on Grid Reference SH 482 751 and would be accessed off the B5420 (Penmynydd Road (Link 7)). This is illustrated on Works Plans DCO_D/WO/PS/03_A to DCO_D/WO/PS/04_A and DCO_D/WO/PS/03_B to DCO_D/WO/PS/04_B (**Document 4.4**) and Figure 4.1 Construction Plan **(Document 5.4.1.1**).

Pentir Construction Compound

3.13.3 This compound would be located in Gwynedd directly south of Pentir Substation, centred on Grid Reference SH 559 674, and would be accessed off the B4547 (Link 19). This is illustrated on Works Plan DCO_F/WO/PS/05 (**Document 4.4**) and Figure 4.1 Construction Plans (**Document 5.4.1.1**).

3.14 TEMPORARY WORKING AREAS

3.14.1 In addition to the main construction compounds, temporary working areas and access tracks would be required to construct individual pylons, string the conductors, dismantle existing pylons and to access these working areas and compounds. These areas would be temporary and could extend up to the Order Limits. These temporary working areas are illustrated on Figure 4.1 Construction Plans (**Document 5.4.1.1**).

3.14.2 These areas can be split down into a number of types, Table 3.7 describes each and Chapter 6 EIA Approach and Methodology (**Document 5.6**) explains how each has been assessed by the technical chapters (**Documents 5.7 to 5.18**).

Table 3.7: 400 kV OHL Temporary Work Areas

Temporary Working Area	Description
Temporary Access	
Access Tracks	These would provide access to and between pylon locations providing access for personnel and equipment required to construct individual pylons and string conductors. The access tracks would typically be 4.5 m wide and 9 m wide at passing places. The total width including drainage and fencing would be a maximum of 12 m. Access tracks would either

Table 3.7: 400 kV OHL Temporary Work Areas	
Temporary Working Area	Description
	be stone laid on a geotextile, or formed of interlocking panels, depending on ground conditions and the duration and type of use. Typical stone and interlocking panel access tracks are shown on Design Plans DCO_DE/PS/11 sheet 2 of 6 and sheet 3 of 6 (**Document 4.13**) respectively. The proposed locations of the temporary stone and interlocking panel access tracks are shown on Figure 4.1 Construction Plans (**Document 5.4.1.1**). The temporary access tracks would be reinstated to the previous land use following completion of construction.
Bellmouths	A bellmouth would be required where a temporary access track connects to the public highway. An illustrative bellmouth layout is shown on Design Plan DCO_DE/PS/11 sheet 1 of 6 (**Document 4.13**) and the locations of the proposed bellmouths are shown on the Access and Rights of Way Plans (**Document 4.2**) and Figure 4.1 Construction Plans (**Document 5.4.1.1**). Appendix 4.1, Temporary Access Principle Note (**Document 5.4.2.1**) also provides a bellmouth schedule. Temporary bellmouths would be reinstated to the previous land use following completion of construction.
Visibility Splays	Visibility splays would be required to ensure sufficient line of sight for users of a bellmouth to see traffic and other road users in both directions. Visibility splays allow users to safely turn on to the public or un-adopted highway and to ensure other road users have time to react to any potential incident. Within the visibility splay vegetation would need to be cut to a specified height or visual obstacles removed depending on local conditions, the speed rating of the road and whether traffic management is in place. Visibility splays would be reinstated to the previous land use following completion of construction.

Table 3.7: 400 kV OHL Temporary Work Areas	
Temporary Working Area	Description
Crossings	
Culverts	Culvert installations would be required for access tracks to cross ditches and waterways. The size of the culvert would vary per crossing depending on the dimensions of the crossing. Illustrative culvert construction details are shown on Design Plan DCO_DE/PS/11 Sheet 4 of 6 (**Document 4.13**). On completion of construction the temporary culverts would be removed. Appendix 3.2 (**Document 5.3.2.2**) sets out the Indicative Watercourse Crossing Schedule which details the location and type of crossing.
Bridges	Where culverts are not suitable for a particular crossing due to either the sensitivity of the watercourse or engineering requirements a temporary bridge would be installed. Illustrative bridge details for 400 kV OHL construction are shown on Design Plan DCO_DE/PS/11 Sheet 5 of 6 (**Document 4.13**). On completion of construction the temporary bridges would be removed. Appendix 3.2 (**Document 5.3.2.2**) sets out the Indicative Watercourse Crossing Schedule which details the location and type of crossing.
Pylon Working Areas	
New Pylon Work Area	The stoned working area for a proposed new pylon would typically be a 50 m by 50 m or 2500 square metre (sq m) for both suspension and tension pylons. Working areas at tension pylons would typically be larger (4250 sq m), but the full area would not be stoned, these are illustrated on Design Plan DCO_DE/PS/10_01 Sheet 1 of 3 (**Document 4.13**). The locations of the proposed pylon working areas are illustrated on Figure 4.1 Construction Plans (**Document 5.4.1.1**). Working areas would be reinstated to the previous land use following completion of

Table 3.7: 400 kV OHL Temporary Work Areas	
Temporary Working Area	Description
	construction.
Existing Pylon Work Area	The working area for an existing suspension pylon would typically be 40 m by 40 m or 1600 sq m (50 m by 50 m for an existing tension pylon) and would not be stoned. The locations of the working areas at the existing pylons are illustrated on Figure 4.1 Construction Plans (**Document 5.4.1.1**). Working areas would be reinstated to the previous land use following completion of construction.
Existing Pylon Dismantling Area	The working area for a pylon dismantling area would typically be 50 m by 50 m or 2500 sq m. The locations of the dismantling areas for existing pylons are illustrated on Figure 4.1 Construction Plans (**Document 5.4.1.1**). Working areas would be reinstated to the previous land use following completion of construction.
Pylon Conductor Pulling Positions	An illustrative conductor pulling position is shown on Design Plan DCO_DE/PS/10_02 Sheet 2 of 3 (**Document 4.13**). The areas available would be approximately 23000sq m; however this allows for micro siting of the pulling positions within these wider areas. The locations of the proposed conductor pulling positions are illustrated on Figure 4.1 Construction Plans (**Document 5.4.1.1**). The access track leading up to the pulling position could be stoned or have an interlocking panel form. The pulling position itself would typically be interlocking panels. Pulling positions would be reinstated to the previous land use following completion of construction.
Scaffolding	
Scaffold Work Area	Temporary scaffolding would be installed to protect roads and railways and could be used

Table 3.7: 400 kV OHL Temporary Work Areas	
Temporary Working Area	Description
	to protect hedgerows that would be crossed/affected by the construction of the 400 kV OHL. The proposed scaffold working areas are illustrated on Figure 4.1 Construction Plans (**Document 5.4.1.1**).
Drainage	
Drainage	Drainage areas are illustrated on Figure 4.1 Construction Plans (**Document 5.4.1.1**). These areas have been identified to allow appropriate drainage management during construction of the 400 kV OHL.

4 Tunnel

4.1 OVERVIEW

4.1.1 As explained in Chapter 2 (**Document 5.2**) and the Menai Strait Crossing Report (**Document 9.6**) National Grid has committed to the use of underground cables through the Anglesey AONB, and across the Menai Strait, to reduce effects on the landscape of the AONB and to protect iconic views along the Menai Strait. In order to place the connection underground in this section (Section F) the following permanent components are proposed:

- Braint THH/CSEC on Anglesey;
- Tunnel containing the underground cables between Braint and Tŷ Fodol THHs; and
- Tŷ Fodol THH/CSEC in Gwynedd.

4.2 CABLE

4.2.1 The proposed cables would be likely to be a cross linked polyethylene (XLPE) single core cable.

4.3 TUNNEL

4.3.1 The tunnel would have an internal diameter of up to 4 m and would be approximately 4 km in length. An example alignment of the tunnel is illustrated on the Illustrative Tunnel Longitudinal Section, Design Plan DCO_DE/PS/07_01 Sheet 1 of 3 (**Document 4.13**) and an illustrative cross section on Design Plan DCO_DE/PS/07_02 Sheet 2 of 3 and Design Plan DCO_DE/PS/07_03 Sheet 3 of 3 (**Document 4.13**).

4.3.2 The tunnel would include service tunnels and either a launch/reception chamber or niches depending on the tunnel construction method. The launch chamber would be approximately 120 m in length with an excavation area of approximately 35m^2 and would provide an area for assembling the sections of a tunnel boring machine (TBM) should this construction technique be used. Should the tunnel be constructed using drill and blast niches would also be required along the length of the tunnel during construction for the storage and equipment and for use by personnel. The niches would be approximately 2-3 m away from the tunnel excavation face approximately 5 m in height and approximately every 200 m. The service

tunnels would provide additional working and storage space at the bottom of the shaft and would be approximately 20 m in length. Storing materials such as segments and small plant in these tunnels allows the shaft bottom to be kept clear for the lifting operations.

4.3.3 The Proposed Development includes a tunnel shaft at Braint of approximately 75 m in depth and one at Tŷ Fodol approximately 95 m in depth. Both shafts would have an internal diameter of up to 15 m. An illustrative shaft cross section is shown on Design Plan DCO_DE/PS/07_02 Sheet 2 of 3 (**Document 4.13**).

Below Ground Limits of Deviation

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

Horizontal Limit of Deviation

4.3.5 The horizontal LOD is shown on Figure 3.1 Sheet 6 of 6 (**Document 5.3.1.1**) and Works Plans DCO_F/WO/PS/01 to DCO_F/WO/PS/05 (**Document 4.4**). This LOD provides the maximum distance of variation horizontally within which all the permanent works would be constructed. This is required to provide the necessary flexibility to adjust the alignment of the tunnel should problematic ground conditions be identified.

Vertical Limit of Deviation

4.3.6 The top of the tunnel would maintain a minimum of 10 m of bedrock cover to either the surface level or Menai Strait. No lowest vertical LOD has been specified.

4.3.7 The flexibility introduced by the LOD has been assessed as part of this EIA; this is explained in Chapter 6 (**Document 5.6**).

Typical Equipment

4.3.8 Table 3.8 details the typical equipment which would be permanently located within the tunnel and the shafts.

Table 3.8 List of Typical Equipment – Tunnel and Shafts

Equipment	Description
Monorail / guide rail	To provide access along the length of the tunnel
Internal Lighting	To provide illumination in the shafts for maintenance staff.

Table 3.8 List of Typical Equipment – Tunnel and Shafts	
Equipment	Description
Lift	To take equipment and personnel into the tunnel for maintenance in the event that the cables need to be repaired
Internal Communication System ('Leaky Feeder')	Communication system
Generators ((Permanent or Temporary) (located within or on the edge of the THH	The facility requires power supply. In the event of the power supply failing a backup system that uses generators will be used.
Battery Back-Up (within the THH)	Will require permanent self-contained area and will be ventilated
Tunnel Inspection Vehicle	To carry out inspections/maintenance along the tunnel
Pump	Located at the base of each shaft to pump any water which seeps into the tunnel and shafts
Stairwell fans	To provide ventilation in the shafts

4.4 TUNNEL HEAD HOUSES AND CABLE SEALING END COMPOUNDS

4.4.1 Where the connection transitions from an OHL to underground cable a CSEC is required to provide a point of connection.

4.4.2 THHs are required to provide maintenance access to the tunnel and tunnel shafts. They contain ventilation equipment to regulate the temperature in the tunnel and shafts.

4.4.3 To minimise environmental effects each CSEC has been sited adjacent to each of the associated THHs and are collectively referred to as THH/CSECs. Works Plan DCO_F/WO/PS/01 (**Document 4.4**) shows the location of Braint THH/CSEC and DCO_F/WO/PS/04 (**Document 4.4**) shows the location of Tŷ Fodol THH/CSEC.

4.5 BRAINT TUNNEL HEAD HOUSE AND CABLE SEALING END COMPOUND

Site Description

4.5.1 This proposed site is centred on Grid Reference SH 517 710, and is approximately 47,700 sq m (79,000 sq m inclusive of the area within which

the permanent access track would be located (the permanent access track would be approximately 4 m wide located within the wider swathe)). The proposed site is shown on Figure 3.2 Sheet 5 of 6 (**Document 5.3.1.2**). The site is located at approximately 35 m Above Ordnance Datum (AOD), on relatively flat ground within an existing agricultural field. An unnamed track which connects Unnamed Road 22 (Link 15) (**Document 5.13.1.7**) with Tyddyn Fadog borders the south-east of the site.

4.5.2 The Afon Braint is approximately 400 m to the north and west of the site and the A4080 is approximately 670 m to the south-east of the site.

4.5.3 The settlement of Llanfairpwll is located approximately 1 km to the north-east of the site and Llanddaniel Fab 2 km to the south-west.

4.5.4 The site is approximately 1 km from the Menai Strait.

Site Use

4.5.5 The site would contain two gantries, cable sealing end (CSE) equipment which would provide the transition from an OHL to underground cable, underground cables in concrete troughs, the THH which is required to provide maintenance access to the tunnel and tunnel shafts, ventilation for the stairwells and landscaping areas.

Parameters

4.5.6 Design Plan DCO_DE/PS/09_01 Sheet 1 of 8 (**Document 4.13**) shows the maximum parameters within which Braint THH/CSEC would be developed. This parameter plan shows the maximum height and volume of the THH building, the zones within which the THH and gentries would be located within the site and the zone within which the permanent access road would be located.

Design

Layout

4.5.7 A site layout is illustrated on Design Plan DCO_DE/PS/09_02 Sheet 2 of 8 (**Document 4.13**) and Design Plan DCO_DE/PS/09_04 Sheet 4 of 8 (**Document 4.13**).

4.5.8 The illustrative footprint and layout has been determined by the operational requirements as well as environmental and safety considerations. Further information about the design process is contained within the Design Report (**Document 7.17**) and the Design and Access Statement (**Document 7.16**).

4.5.9 The THH/CSEC would be surrounded by a 2.4 m mesh or palisade security fence topped with an electric pulse fence to a height of 3.4 m, this is

illustrated on Design Plan DCO_DE/PS/09_03 Sheet 3 of 8 and Design Plan DCO_DE/PS/09_04 Sheet 4 of 8 (**Document 4.13**).

4.5.10 The area inside of the security fence would comprise the gantries, CSE equipment, Distribution Network Operator's (DNO) supply and compound, portable relay room, THH, 400 kV underground cables, firefighting water tank if required and internal vehicular access.

4.5.11 The attenuation ponds and water storage tank would be located within the site boundary perimeter fence but beyond the security fence. The indicative alignment of the tunnel means that any seepage into the tunnel during operation would be pumped out through Braint shaft this could include saline water. The site layout includes an area for saline water treatment, if required, this is illustrated on Design Plan DCO_DE/PS/09_02 Sheet 2 of 8 (**Document 4.13**).

4.5.12 Landscaping is proposed around the operational compound within the site boundary perimeter fence; the indicative area within which landscape planting would be located is illustrated on DCO_DE/PS/09_01 Sheet 1 of 8 (**Document 4.13**). The indicative landscaping proposals for this area are shown on Figure 7.14 (**Document 5.7.1.14**) and are summarised in the Design Guide (**Document 7.19**).

Appearance

4.5.13 The Design Guide (**Document 7.19**) sets out the building form and key design principles proposed and suggested approaches to the materials and colour palette.

4.5.14 The site under normal operational conditions would not be lit. Lighting would be required during planned or unplanned maintenance activities. Lighting would be required to allow the safe movement of vehicles and pedestrians at night within the operational boundary. The minimum exterior lighting requirements are:

- Maintained average illuminance: 6.0 lux; and
- Maintained minimum point illuminance: 2.5 lux.

4.5.15 These requirements apply to all perimeter fencing and gates and permanent access roads, verges, footpaths, designated walkways and areas occupied by plant or other equipment contained by the operational fence line.

4.5.16 Additional portable lighting would be used for both planned and unplanned maintenance activities. This would be brought to site when required and removed on completion of the maintenance activity.

Scale

4.5.17 The site, inclusive of the area within which the permanent access track will be located, would be approximately 79,0000 sq m. Table 3.9 below sets out the dimensions which make up Braint THH/CSEC subject to the parameters shown on DCO_DE/PS/09_01 Sheet 1 of 8 (**Document 4.13**).

Table 3.9: Braint THH/CSEC Compound Dimensions and CSEC Typical Equipment

Component	Length	Width	Height	Area/Volume
Site	N/A	N/A	N/A	79,0000 sq m inclusive of the area within which the permanent access track would be located.
Compound	N/A	N/A	N/A	8,640 sq m
Tunnel Head House	N/A	N/A	8 m (maximum parameter)	4,350 m^3 (maximum parameter)
Gantries	N/A	N/A	14.9 m	
Cable Sealing End Equipment	• Down Leads • Down Droppers • Terminations and Support Including Foundations, Post Insulators, Disconnection/Earth Switches, Link Boxes, Surge Arrester, and Current Transformers			

Access

4.5.18 A new permanent 4 m wide access track would connect Braint THH/CSEC to the public highway at Unnamed Road 22 (Link 15) which connects the A5 west of Llanfairpwll with the A4080 (Brynsiencyn Road) at Victoria Cottages. The new junction with the Unnamed Road 22 (Link 15) (**Document 5.13.1.7**) would allow appropriate visibility splays. The location of the permanent access track is shown on Design Plan DCO_DE/PS/09_01 Sheet 1 of 8 and Design Plan DCO_DE/PS/09_02 Sheet 2 of 8 (**Document 4.13**).

Landscaping

4.5.19 The indicative landscaping proposals for this area are shown on Figure 7.14 (**Document 5.7.1.14**) and are summarised in the Design Guide (**Document 7.6**).

4.6 TŶ FODOL TUNNEL HEAD HOUSE AND CABLE SEALING END COMPOUND

Site Description

4.6.1 This proposed site is centred on Grid Reference SH 546 683, and is approximately 34,200 sq m which is inclusive of the permanent access track and shown on Figure 3.2 (**Document 5.3.1.2**). The site is located at approximately 80 m AOD, on relatively flat ground and within two existing agricultural fields. The site is bordered to the north by Ffordd Fodolydd Lane and to the south by Coed Nant y Garth Local Wildlife Site.

4.6.2 The A487 is located approximately 400 m to the north-west of the site and the B4547 approximately 450 m to the south. A tributary of the Nant Cefn flows in a westerly direction, approximately 170 m south of the site.

4.6.3 The site is approximately 2.35 km from the Menai Strait.

Site Use

4.6.4 The site would contain two gantries, CSE equipment which provides the transition from an OHL to underground cable, underground cable in concrete troughs and the THH, which is required to house the tunnel ventilation and provide maintenance access to the tunnel and tunnel shafts, ventilation for the stairwells and landscaping areas.

Parameters

4.6.5 Design Plan DCO_DE/PS/09_05 Sheet 5 of 8 (**Document 4.13**) shows the maximum parameters within which Tŷ Fodol THH and CSEC would be developed. This parameter plan shows the maximum height and volume of the THH building and the zones within which the THH and gentries would be located within the site.

Design

Layout

4.6.6 A site layout is illustrated on Design Plan DCO_DE/PS/09_06 Sheet 6 of 8 (**Document 4.13**).

4.6.7 The footprint and layout has been determined by the operational requirements as well as environmental and safety considerations. Further information about the design process is contained within the Design Report (**Document 7.17**) and the Design and Access Statement (**Document 7.16**).

4.6.8 The THH/CSEC would be surrounded by a 2.4 m mesh or palisade security fence topped with an electric pulse fence to a height of 3.4 m, this is

illustrated on Design Plan DCO_DE/PS/09_07 Sheet 7 of 8 and Design Plan DCO_DE/PS/09_08 Sheet 8 of 8 (**Document 4.13**).

4.6.9 The area inside of the security fence comprises of the gantries, CSE equipment, DNO supply and compound, portable relay room, THH, firefighting water tank and internal vehicular access.

4.6.10 The attenuation ponds and water storage tank would be located within the site boundary perimeter fence but beyond the security fence.

4.6.11 Landscaping is proposed around the operational compound within the site boundary perimeter fence, the indicative area within which landscape planting would be located is illustrated on DCO_DE/PS/09_05 Sheet 5 of 8 (**Document 4.13**). The indicative landscaping proposals for this area are shown on Figure 7.15 (**Document 5.7.1.15**) and are summarised in the Design Guide (**Document 7.19**).

Appearance

4.6.12 The Design Guide (**Document 7.19**) sets out the building form and key design principles and suggested approaches to the materials and colour palette.

4.6.13 The site under normal operational conditions would not be lit. Lighting would be required during planned or unplanned maintenance activities. Lighting would be required to allow the safe movement of vehicles and pedestrians at night within the operational boundary. The minimum exterior lighting requirements are:

- Maintained average illuminance: 6.0 lux; and
- Maintained minimum point illuminance: 2.5 lux.

4.6.14 These requirements apply to all perimeter fencing and gates and permanent access roads, verges, footpaths, designated walkways and areas occupied by plant or other equipment contained by the operational fence line.

4.6.15 Additional portable lighting would be used for both planned and unplanned maintenance activities. This would be brought to site when required and removed on completion of the maintenance activity.

Scale

4.6.16 The site, inclusive of the permanent access track, would be approximately 34,200 sq m. Table 3.10 below sets out the dimensions which make up Tŷ Fodol THH and CSEC subject to the parameters shown on DCO_DE/PS/09 Sheet 5 of 8 (**Document 4.13**).

4.6.17 The Tunnel Head House at Tŷ Fodol THH/CSEC would be taller than Braint THH/CSEC because it would house the main tunnel ventilation fans to draw air though the tunnel in order to maintain the correct temperature in the shaft and tunnel needed to ensure the cables would not overheat.

Table 3.10: Tŷ Fodol THH and CSEC Dimensions and CSEC Typical Equipment

Component	Length	Width	Height	Area/Volume
Site	N/A	N/A	N/A	34,200 sq m inclusive of the permanent access track
Operational Compound	N/A	N/A	N/A	8,640 sq m
Tunnel Head House	N/A	N/A	11 m (maximum parameter)	9,300 m^3 (maximum parameter)
Full Line Tension Gantry (x2)	N/A	N/A	14.9 m	
Cable Sealing End	• Down Leads • Down Droppers • Terminations and Support Including Foundations, Post Insulators, Disconnection/Earth Switches, Link Boxes, Surge Arrester, and Current Transformers.			

Access

4.6.18 A new permanent 4 m wide access track would connect Tŷ Fodol THH/CSEC to the public highway at Ffordd Fodolydd Lane (Link 30) which connects with the B4547. The new junction with Ffordd Fodolydd (**Document 5.13.1.3**) would allow appropriate visibility splays. The location of the permanent access track is shown on Design Plan DCO_DE/PS/09_05 Sheet 5 of 8 and Design Plan DCO_DE/PS/09_06 Sheet 6 of 8 (**Document 4.13**).

4.6.19 In addition to the permanent access track to Tŷ Fodol THH/CSEC shown on Design Plan DCO_DE/PS/09_05 Sheet 5 of 8 and Design Plan DCO_DE/PS/09_06 Sheet 6 of 8 (**Document 4.13**) permanent access rights would be maintained over the temporary access track from bellmouth F4 as illustrated on Figure 4.1 Construction Plans (**Document 5.4.1.1**) . These rights are required to access the THH and CSEC for a 1 in 40 year maintenance or unplanned event. Should this access be required it may be

possible to use a temporary access track and the land would be reinstated on completion of the works.

Landscaping

4.6.20 The indicative landscaping proposals for this area are shown on Figure 7.15 (**Document 5.7.1.15**) and are summarised in the Design Guide (**Document 7.19**).

4.7 TEMPORARY CONSTRUCTION COMPOUNDS

4.7.1 Two construction compounds are proposed to facilitate the construction of the tunnel (including shafts) and the THH/CSECs. These are areas extended beyond the operational site boundary to accommodate site offices, welfare facilities and material and plant storage during the construction period. They would be used from the commencement of construction of the tunnel shafts through to commissioning when the construction compound boundary would be withdrawn to the operational site boundary and the temporary land reinstated.

Braint Construction Compound

4.7.2 Braint Construction Compound would be located within and adjacent to the proposed operational compound for Braint THH/CSEC. This site centred on Grid Reference SH 517 710, is approximately 56,800 sq m and shown on Works Plan DCO_F/WO/PS/01 Sheet 1 of 5 (**Document 4.4**) and Figure 4.1 Construction Plans (**Document 5.4.1.1**). Design Plan DCO_DE/PS/12_02 Sheet 2 of 5 (**Document 4.13**) provides the illustrative layout of the Braint Construction Compound.

Tŷ Fodol Construction Compound

4.7.3 Tŷ Fodol Construction Compound would be located within and adjacent to the proposed operational compound for Tŷ Fodol THH/CSEC. This site centred on Grid Reference SH 546 683, is approximately 49,900 sq m and shown on Works Plan DCO_F/WO/PS/04 Sheet 4 of 5 (**Document 4.4**) and Figure 4.1 Construction Plans (**Document 5.4.1.1**). Design Plan DCO_DE/PS/12_03 Sheet 3 of 5 (**Document 4.13**) provides the illustrative layout of the Tŷ Fodol Construction Compound.

4.8 TEMPORARY WORKING AREAS

4.8.1 Temporary working areas are required in addition to the construction compounds, to allow the construction of the tunnel and THH/CSECs. These temporary working areas are illustrated on Figure 4.1 Construction Plans (**Document 5.4.1.1**).

4.8.2 These areas can be split down into a number of types and each of these is described in Table 3.11. Chapter 6 EIA Approach and Methodology (**Document 5.6**) explains how each has been assessed by the technical chapters (**Documents 5.7 to 5.18**).

Table 3.11: Tunnel and THH/CSECs Temporary Work Areas

Temporary Working Area	Description
Temporary Access	
Access Tracks	These would provide access from the construction traffic routes to the tunnel construction compounds. The access tracks would be up to 7 m wide and would be stone laid on a geotextile at passing places this would increase to 9 m wide. The total width including drainage and fencing would be a maximum of 25 m. A typical stone access road is shown on Design Plans DCO_DE/PS/11_02 sheet 2 of 6 (**Document 4.13**). The proposed locations of the access tracks are shown on Figure 4.1 Construction Plans (**Document 5.4.1.1**). The access tracks, with the exception of proposed permanent accesses, would be reinstated to the previous land use following completion of construction.
Bellmouths	A bellmouth would be required where an access track connects to the public highway. An illustrative bellmouth layout is shown on Design Plan DCO_DE/PS/11_06 sheet 1 of 6 (**Document 4.13**) and the locations of the proposed bellmouths are shown on the Access and Rights of Way Plans (**Document 4.2**) and Figure 4.1 Construction Plans (**Document 5.4.1.1**). Appendix 4.1, Temporary Access Principle Note (**Document 5.4.2.1**) also provides a bellmouth schedule. Temporary bellmouths with the exception of proposed permanent bellmouths would be reinstated to the previous land use following completion of construction.
Visibility Splays	Visibility splays are required to ensure sufficient line of sight for users of a bellmouth to see traffic and other road users in both

Table 3.11: Tunnel and THH/CSECs Temporary Work Areas	
Temporary Working Area	Description
	directions. Visibility splays allow users to safely turn on to the public or un-adopted highway and to ensure other road users have time to react to any potential incident. Within the visibility splay vegetation would need to be cut to a specified height or visual obstacles removed depending on local conditions, the speed rating of the road and whether traffic management is in place. Temporary visibility splay with the exception of those required for the proposed permanent bellmouths would be reinstated to the previous land use following completion of construction.
Crossings	
Culverts	Culvert installations would be required for temporary access tracks to cross ditches and waterways. The size of the culvert would vary per crossing depending on the dimensions of the crossing, sensitivity and importance of the watercourse. Illustrative culvert construction details are shown on Design Plan DCO_DE/PS/11_04 Sheet 4 of 6 (**Document 4.13**). On completion of construction the temporary culverts would be removed. Appendix 3.2 (**Document 5.3.2.2**) sets out the Indicative Watercourse Crossing Schedule which details the location and type of crossing.
Bridges	Where culverts are not suitable for a particular crossing due to either the sensitivity of the watercourse or engineering requirements a temporary bridge would be installed. Illustrative bridge details for tunnel construction are shown on Design Plan DCO_DE/PS/11_06 Sheet 6 of 6 (**Document 4.13**). On completion of construction the temporary bridges would be removed. Appendix 3.2 (**Document 5.3.2.2**) sets out the Indicative Watercourse Crossing Schedule which details the location and type of crossing.

Table 3.11: Tunnel and THH/CSECs Temporary Work Areas	
Temporary Working Area	Description
Drainage	
Drainage	Drainage areas are illustrated on Figure 4.1 Construction Plans (**Document 5.4.1.1**). These areas identified allow appropriate drainage management during construction of the tunnel (including shafts) and THH/CSECs.

5 Substations

5.1 OVERVIEW

5.1.1 In order to facilitate the new connection, work would be required to modify and extend Wylfa Substation and Pentir Substation. The following sections provide a description of the work which would be required including the additional equipment to be installed and any equipment which would need to be removed.

5.2 WYLFA SUBSTATION

5.2.1 Wylfa Substation is located adjacent to the existing Wylfa Nuclear Power Station and is centred on Grid Reference SH 352 938. The potential extension size to the existing substation is approximately 508 sq m. Items of existing equipment would need to be removed and new equipment installed within the site boundary. The parameter plan within which the modified equipment would be located is shown on Design Plan DCO_DE/PS/01_01 Sheet 1 of 10 and the proposed layout is shown on Design Plan DCO_DE/PS/02 Sheet 2 of 10 (**Document 4.13**). The proposed elevations are shown on Design Plan DCO_DE/PS/01_03 Sheet 3 of 10 (**Document 4.13**). Table 3.12 lists the equipment that would be installed and removed from Wylfa Substation as part of the Proposed Development.

Table 3.12 List of Equipment to be Installed / Removed at Wylfa Substation

Equipment	Description
Equipment to be Installed	
Gantries (x4)	A structure which supports electrical conductors as they transition from an OHL pylon to busbars and equipment within a substation. The proposed location of the gantries are shown on Design Plan DCO_DE/PS/01_02 Sheet 2 of 10 (**Document 4.13**) and an illustrative gantry is shown on Design Plan DCO_DE/PS/01_08 Sheet 8 of 10 (**Document 4.13**)
400 kV Voltage Transformers (12)	Transformers convert system voltage to levels which can be safely measured by control and protection equipment. The proposed location of

Table 3.12 List of Equipment to be Installed / Removed at Wylfa Substation	
Equipment	Description
	the voltage transformers are shown on Design Plan DCO_DE/PS/01_02 Sheet 2 of 10 (**Document 4.13**) and an illustrative voltage transformer is shown on Design Plan DCO_DE/PS/01_07 Sheet 7 of 10 (**Document 4.13**)
Single Post Insulators (x27)	A post insulator is a structure that supports the connection of different sections of busbar/conductors. It provides a solid attachment point whilst maintaining electrical clearance. The proposed location of the post insulators are shown on Design Plan DCO_DE/PS/01_02 Sheet 2 of 10 (**Document 4.13**) and an illustrative post insulator is shown on Design Plan DCO_DE/PS/01_07 Sheet 7 of 10 (**Document 4.13**)
Section of Perimeter Fence	A section of palisade fencing (2.4 m) with electric fence (3.4 m), would be installed along the south-eastern site boundary. The proposed new section is shown on Design Plan DCO_DE/PS/01_02 Sheet 2 of 10 (**Document 4.13**)
Equipment to be Removed	
The following equipment would be removed: • 2 existing line landing gantries; • 2 Super Grid Transformer (SGT) transformer bunds; • Redundant equipment foundations in the former SGT bays; and • Ancillary equipment such as ducts, power and signalling cables.	

5.3 PENTIR SUBSTATION

5.3.1 Pentir Substation is located in north-west Gwynedd and is centred on Grid Reference to SH 559 677. The substation would be extended to the north-west, south-east and to the north-east with a total extension area of approximately 40,000 sq m, to accommodate the additional equipment required for the new connection. Design Plan DCO_DE/PS/09_04 Sheet 4 of 10 (**Document 4.13**) shows the maximum parameters within which Pentir

Substation extension would be developed. An indicative layout which is subject to the parameters is shown on Design Plan DCO_DE/PS/01_05 Sheet 5 of 10 (**Document 4.13**) and the proposed elevations are shown on Design Plan DCO_DE/PS/01_06 Sheet 6 of 10 Plans (**Document 4.13**). Table 3.13 lists the equipment to be installed and removed from Pentir Substation as part of the Proposed Development.

Table 3.13 List of Indicative Equipment which would be Installed / Removed at Pentir Substation

Equipment	Description
Equipment to be Installed	
Busbars and Connectors	Busbars are connections which carry electrical power around the substation to various equipment
400 kV Cable Sealing Ends (CSE) (x12)	Used where high voltage underground cable joins onto an OHL. The proposed locations are shown on Design Plan DCO_DE/PS/01_05 Sheet 5 of 10 (**Document 4.13**) and an illustrative CSE is shown on Design Plan DCO_/DE/PS/01_09 Sheet 9 of 10 (**Document 4.13**)
Circuit Breakers (x24)	A circuit breaker is an automatically operated electrical switch designed to protect an electrical circuit from damage caused by overload or short circuit. Its basic function is to clear a fault condition by interrupting continuity, which would immediately discontinue electrical flow. The proposed locations are shown on Design Plan DCO_DE/PS/01_05 Sheet 5 of 10 (**Document 4.13**) and an illustrative circuit breaker is shown on Design Plan DCO_DE/PS/01_07 Sheet 7 of 10 (**Document 4.13**)
Current Transformers (X36)	Convert system current to levels which can be safely measured by control and protection equipment. Positioned so that no part of the network is left un-monitored by protection systems. The proposed locations are shown on Design Plan

Table 3.13 List of Indicative Equipment which would be Installed / Removed at Pentir Substation	
Equipment	Description
	DCO_DE/PS/01_05 Sheet 5 of 10 (**Document 4.13**) and an illustrative current transformer is shown on Design Plan DCO_DE/PS/01_06 Sheet 7 of 10 (**Document 4.13**)
Pantograph Disconnectors (X18)	Are used to make sure that an electrical circuit can be completely de-energised for service or maintenance. The proposed locations are shown on Design Plan DCO_DE/PS/01_05 Sheet 5 of 10 (**Document 4.13**) and an illustrative pantograph disconnector is shown on Design Plan DCO_/DE/PS/01_09 Sheet 9 of 10 (**Document 4.13**)
Full Line Tension Gantry (x2)	A structure which supports electrical conductors as they transition from an OHL pylon to busbars and equipment within a substation. The proposed locations are shown on Design Plan DCO_DE/PS/01_05 Sheet 5 of 10 (**Document 4.13**) and the parameters within which the landing gantries could be located is shown on Design Plan DCO_DE/PS/01_04 Sheet 4 of 10 (**Document 4.13**). An illustrative line landing gantry is shown on Design Plan DCO_DE/PS/01_08 Sheet 8 of 10 (**Document 4.13**)
Portable Relay Rooms (x8)	Pre-fabricated unit containing protection relays and metering equipment. The proposed locations are shown on Design Plan DCO_DE/PS/01_05 Sheet 5 of 10 (**Document 4.13**) and an illustrative portable relay room is shown on Design Plan DCO_DE/PS/01_08 Sheet 8 of 10 (**Document 4.13**)
400 kV Shunt Reactor (x1)	This is reactive compensation equipment which controls and regulates the voltage. The proposed locations are shown on

Table 3.13 List of Indicative Equipment which would be Installed / Removed at Pentir Substation	
Equipment	Description
	Design Plan DCO_DE/PS/01_05 Sheet 5 of 10 (**Document 4.13**) and the parameters within which the shunt reactor could be located is shown on Design Plan DCO_DE/PS/01_04 Sheet 4 of 10 (**Document 4.13**).
Voltage Transformer (x9)	Converts system voltage to levels which can be safely measured by control and protection equipment. The proposed locations are shown on Design Plan DCO_DE/PS/01_05 Sheet 5 of 10 (**Document 4.13**) and an illustrative voltage transformer is shown on Design Plan DCO_DE/PS/01_07 Sheet 7 of 10 (**Document 4.13**)
400 kV Surge Arresters (x3)	A Surge Arrester provides a path to the earth when triggered by an abnormal voltage condition (e.g. lightning strike) to protect important equipment. The proposed locations are shown on Design Plan DCO_DE/PS/01_05 Sheet 5 of 10 (**Document 4.13**) and an illustrative surge arrester is shown on Design Plan DCO_DE/PS/01_09 Sheet 9 of 10 (**Document 4.13**)
Earth Switches (x13)	An earth switch is a safety device. This provides a low impedance path to earth for currents allowing equipment that forms part of the high voltage system to be safely maintained. The proposed locations are shown on Design Plan DCO_DE/PS/01_05 Sheet 5 of 10 (**Document 4.13**) and an illustrative earth switch is shown on Design Plan DCO_DE/PS/01_07 Sheet 6 of 9 (**Document 4.13**)
Disconnector with Earth Switch (x8)	The proposed locations are shown on Design Plan DCO_DE/PS/01_05 Sheet 5 of 10 (**Document 4.13**) and an illustrative

Table 3.13 List of Indicative Equipment which would be Installed / Removed at Pentir Substation	
Equipment	Description
	disconnector with earth switch is shown on Design Plan DCO_DE/PS/01_07 Sheet 7 of 10 (**Document 4.13**)
Post Insulators including Single Post Insulators (x25) and 3 Phase Post Insulators (x17)	A post insulator is a structure that supports the connection of different sections of busbar/conductors. It provides a solid attachment point whilst maintaining electrical clearance. The proposed location of the post insulators are shown on Design Plan DCO_DE/PS/01_05 Sheet 5 of 10 (**Document 4.13**) and an illustrative post insulator is shown on Design Plan DCO_DE/PS/01_07 Sheet 7 of 10 (**Document 4.13**)
Gantry (x1)	A structure which supports electrical conductors as they transition from an OHL pylon to busbars and equipment within a substation. The proposed location of the gantries are shown on Design Plan DCO_DE/PS/01_05 Sheet 5 of 10 (**Document 4.13**) and an illustrative gantry is shown on Design Plan DCO_DE/PS/01_08 Sheet 8 of 10 (**Document 4.13**)
ST Pylon	The proposed location of the ST pylon is shown on Design Plan DCO_DE/PS/01_05 Sheet 5 of 10 (**Document 4.13**) and the parameters within which the ST pylon could be located is shown on Design Plan DCO_DE/PS/01_04 Sheet 4 of 10 (**Document 4.13**). An illustrative ST pylon is shown on Design Plan DCO_DE/PS/01_10 Sheet 10 of 10 (**Document 4.13**).
400 kV Cable	This would be buried in the ground. The proposed location of the cable is shown on Design Plan DCO_DE/PS/01_05 Sheet 5 of 10 (**Document 4.13**)

Table 3.13 List of Indicative Equipment which would be Installed / Removed at Pentir Substation	
Equipment	Description
Equipment to be Removed	
The following equipment would be removed from the existing substation: • 1 x Gantry; • 6 x Circuit Breaker; • 3 x Disconnector; • 3 x 400 kV Earth Switches; and • Ancillary equipment such as ducts, power and signalling cables.	

Landscaping

5.3.2 The indicative landscaping proposals for Pentir Substation are shown on Figure 7.16 (**Document 5.7.1.16**).

5.4 TEMPORARY CONSTRUCTION COMPOUNDS

5.4.1 The construction compounds to facilitate the works required at the substations would be located adjacent to each of the substations.

Wylfa Substation Construction Compound

5.4.2 The proposed Wylfa Substation Construction Compound is located adjacent to the north-western boundary of Wylfa Substation. The proposed construction compound is approximately 0.28 ha and is shown on Design Plan DCO_DE/PS/01_02 Sheet 2 of 10 (**Document 4.13**) and Figure 4.1 Construction Plans (**Document 5.4.1.1**).

Pentir Substation Construction Compounds

5.4.3 The proposed Pentir Substation Construction Compound is located to the north of the substation. The proposed construction compound is approximately 0.17 ha and is shown on Design Plan DCO_DE/PS/01_05 Sheet 5 of 10 (**Document 4.13**) and Figure 4.1 Construction Plans (**Document 5.4.1.1**). The Pentir Construction Compound as described in section 3.13.3 would also be utilised for the construction of the Pentir Substation extension.

6 Third Party Services

6.1 INTRODUCTION

6.1.1 In order to construct the 400 kV connection safely and efficiently, sections of existing overhead or underground third party services (for example Distribution Network Operator (DNO) low voltage power lines, or communication lines) would be modified (undergrounded or relocated). These sections are included within the Order Limits and form part of the Proposed Development.

6.1.2 The proposed area within which the modified third party asset would be located and the proposed accesses are shown on Figure 4.2 Third Party Construction Plans (**Document 5.4.1.2**).

6.1.3 Chapter 4 (**Document 5.4**) describes how the third party services would be modified and Chapter 6 ES Approach and Methodology (**Document 5.6**) explains how these have been assessed by the technical chapters (**Documents 5.7 to 5.18**).

7 References

Ref 3.1 Planning Inspectorates Advice Note Nine: Rochdale Envelope available at https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/

Ref 3.2 The Electricity Safety, Quality and Continuity Regulations 2002 available at http://www.legislation.gov.uk/uksi/2002/2665/pdfs/uksi_20022665_en.pdf