2.2 Preliminary Environmental Information Report (PEIR)

Mid Wales Connection Project

A preliminary assessment of the likely environmental effects of the proposals and the measures we propose to limit them, where we can.
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PART 1: PRELIMINARY ENVIRONMENTAL INFORMATION REPORT

1. INTRODUCTION

1.1 Classification of the Proposed Development and Purpose of the PEIR

1.1.1 This Preliminary Environmental Information Report (PEIR) relates to a proposed application that National Grid Electricity Transmission plc (National Grid) intends to make to connect new onshore wind generation in Mid Wales by constructing a marshalling substation, in the Cefn Coch area of Powys, Mid Wales, and a new 400 kilo volts (400 kV) connection from that marshalling substation to a point on the existing National Electricity Transmission System (NETS) near Lower Frankton, Shropshire (the proposed development). The location of the proposed development is shown in Figure 1.1, with specific elements of the proposed development described in Section 2 of this PEIR. The information contained in this report is ‘preliminary’ with the intention to seek comment on it for consideration in project design and further assessment.

1.1.2 The proposed development is classified as a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008, requiring an application to be submitted for a Development Consent Order (DCO). An Environmental Impact Assessment (EIA) will be undertaken in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (as amended).

1.1.3 In Wales some aspects of the proposed development may fall more appropriately into the Town and Country Planning Act 1990 (as amended) consenting regime. Therefore in Wales in relation to some works, notably the proposed marshalling substation (and associated works) near Cefn Coch, consent may be sought via a Town and Country Planning Act application to Powys County Council. However, for the purposes of this PEIR, given the potential interdependence of the component parts, the proposed development has been considered as a whole to ensure that potential predicted effects can be considered in their entirety.

1.1.4 This PEIR has been prepared for the purposes of statutory consultation with the local community landowners and other statutory consultees affected by the proposed development, in accordance with the requirements of Sections 42 and 47 of the Planning Act 2008. It provides a preliminary assessment of the likely significant effects of the proposed development. As such, the information presented in this report is ‘preliminary’ only. The final design remains open to change and will be influenced and shaped by the statutory consultation. National Grid is seeking feedback on the information presented in this PEIR, and will consider the feedback and use that feedback to develop the design.

1.1.5 An assessment of the likely significant effects of the proposed development for which consent is sought, will then be undertaken and will be presented within an Environmental Statement (ES).

1.1.6 In particular, the PEIR has been prepared in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (as amended) (hereafter known as the ‘2009 EIA Regulations’). National Grid, in its statement of community consultation sets out how it intends to publicise and consult on the preliminary environmental information gathered in respect of the proposed development.

1.1.7 Regulation 2 of the 2009 EIA Regulations defines preliminary environmental information as information ‘referred to in Part 1 of Schedule 4 which has been compiled by the applicant and is reasonably required to assess the environmental effects of the development (and of any associated development)’. This PEIR includes the information referred to in Part 1,
Schedule 4. Although similar information is required to be included in an ES, it should be noted that this PEIR is not a draft ES. The PEIR is a mechanism to enable the local community, and other statutory consultees and stakeholders to:

- Gain an understanding of the proposed development;
- Assist with the identification of potential issues; and
- Gain an understanding of the potential environmental effects, their likely significance and measures proposed to reduce them.

1.1.8 The PEIR also aims to:

- Provide the context for consultation;
- Describe the outstanding information that National Grid anticipates will subsequently be provided in the ES to accompany the consent applications; and
- Inform the responses of the local community, and other statutory consultees and stakeholders to this consultation.

1.1.9 In addition to meeting the legislative requirements, the PEIR has also been prepared taking into account policy and guidance documents, which are also outlined in the subsequent paragraphs including:

- Overarching National Policy Statement (NPS) for Energy (EN-1) (July 2011);
- NPS for Electricity Networks Infrastructure (EN-5) (July 2011);
- Department for Communities and Local Government (DCLG) - Planning Act 2008: Guidance on the pre-application process (August 2014); and
- The Planning Inspectorate; Advice Note 7 – Screening, Scoping and Preliminary Environmental Information, July 2013.

1.1.10 For energy related NSIPs there are two relevant NPSs, EN-1 and EN-5. EN-1 requires the decision maker to take account of adverse impacts - environmental, social and economic - and weigh these against the benefits of the proposal. It identifies the generic issues which should be taken into account in assessing applications for development consent, recognising that these are the issues which are likely to arise most frequently but that they are not equally applicable to all projects. EN-5 identifies a number of issues specific to proposals for network development.

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

- Air quality and emissions;
- Biodiversity and geological conservation, noting particularly the effects on designated sites. NPS EN-5 seeks information on the impacts on birds and their flight paths;
- Civil and military aviation and defence interests;
- Coastal change;
- Dust, odour, artificial light, smoke, steam and insect infestation;
- Flood risk and climate change resilience;
- Historic environment, noting particularly the effects on designated sites;
- Landscape and visual impacts, noting particularly the effects on nationally designated landscapes. NPS EN-5 promotes the use of the Holford Rules and outlines the approach to the consideration of undergrounding;
- Land use, including open space, green infrastructure and Green Belt;
- Noise and vibration. NPS EN-5 notes that with appropriate mitigation measures, noise
from overhead lines is unlikely to lead the determining authority to refuse an application;

- Socio-economic impacts;
- Traffic and transport impacts;
- Waste management; and
- Water quality and resources.

1.1.12 In addition, NPS EN-5 notes that with regard to electric and magnetic fields (EMF), the determining authority will need to satisfy itself that the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines are met.

1.1.13 The importance of the NPSs are reiterated in the Secretary of State's (SoSs) Scoping Opinion and the ES will provide further information on how the policy requirements within the NPSs have been addressed.

1.1.14 Paragraphs 72 and 73 of the DCLG guidance on pre-application stages stress the importance of pre-application consultation and the inclusion of as much information as possible to make such consultation meaningful. However, the guidance recognises that provision of the level of environmental information that would be expected at the ES stage is not likely to be practicable or, indeed, desirable at this preliminary stage. The guidance reinforces this by stating that the preliminary environmental information should ‘enable consultees to develop an informed view of the project….is not expected to replicate or be a draft of the ES’, and that ‘information presented must provide clarity to all consultees’.

1.1.15 Likewise, these aims are reflected in the Planning Inspectorate’s Advice Note 7 which states that ‘the focus of the PEI is to enable the local community to understand the environmental effects of the proposed development so as to inform their responses regarding the proposed development’.

1.1.16 Although it is largely aimed at the local community, this PEIR is also available to the technical consultees, such as the statutory consultees and, therefore, contains sufficient information for them also to develop an informed view of the proposed development and assess the potential effects of the proposals without being overly technical. The aim is to provide clarity to all stakeholders involved.

1.1.17 The PEIR has also been tailored to meet the needs and interests of the target audience, i.e. the local community and consultees, remaining concise, written in clear, and largely non-technical language whilst providing a level of detail and technicality appropriate to the target audience. It also includes illustrations.

1.1.18 As a minimum, the PEIR includes:

- A description of the proposed development;
- An outline of the main alternatives studied and the history of the evolution of the proposed development;
- A description of the environmental baseline by environmental aspect (e.g. ecology, landscape, water, cultural heritage etc.);
- A description of the likely significant effects of the proposed development on the environment, the methods used to assess these effects, and mitigation measures envisaged to address any significant adverse effects; and
- A non-technical summary.

1.1.19 Detailed information, such as the methodologies being used to gather baseline information, and planning policy background, have been specifically excluded in order to maintain the focus and conciseness of the report. However, this information will be included within the forthcoming ES and information on the baseline methodologies can be found in the EIA.
1.1.20 This PEIR forms part of a suite of documents which are available as part of the statutory (National Grid’s Stage Four) consultation and should be read in conjunction with those documents.

1.2 Structure of the PEIR

1.2.1 This PEIR has been set out in the following structure:

Non-Technical Summary

PART 1: INTRODUCTION TO THE PROPOSED DEVELOPMENT

1. Classification of the Proposed Development and Purpose of the PEIR
2. The Proposed Development
3. Alternatives and Project History
4. Non-Statutory Pre-application Consultation

PART 2: PRELIMINARY ENVIRONMENTAL APPRAISAL

5. Landscape and Views
6. Historic Environment
7. Ecology and Biodiversity
8. Water Quality and Resources, including Flood Risk
9. Geology, Soils and Contaminated Land
10. Agriculture and Land Use
11. Air Quality
12. Electric and Magnetic Fields
13. Traffic and Transport
14. Socio-Economics, including Tourism
15. Construction Noise and Vibration
16. Operational Noise
17. Other Emissions
18. Summary and Preliminary Conclusions
19. Glossary / Abbreviations

PART 3: FIGURES AND APPENDICES

1.3 National Grid and its Duties under the Electricity Act 1989

1.3.1 National Grid is the operator of the high voltage transmission system for the whole of Great Britain and the owner of the high voltage electricity transmission system in England and Wales.

1.3.2 The transmission system in England and Wales consists of approximately 7200km of overhead lines and a further 700km of underground cabling, operating mainly at 400 kV and 275 kV. The overhead lines and cables connect around 340 substations to form a highly interconnected network. The substations provide points of connection to the local

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2 Available through the Mid Wales Connection Project website ‘Documents and Maps’ section (http://www.midwalesconnection.com/documents-and-maps.aspx)
distribution networks which operate at voltages from 132 kV down to 240 v (at which voltage the power is distributed to domestic consumers). The distribution networks are owned by Distribution Network Operators (DNOs).

1.3.3 National Grid has a statutory obligation under the terms of its transmission licence to offer a connection to the transmission system made by any new generating stations. National Grid is obliged to make an offer of connection in response to each valid application made.

1.3.4 In addition to the above, as holder of the transmission licence for England and Wales National Grid has a statutory duty, under Section 9 (2) of the Electricity Act 1989 to:

“develop and maintain an efficient, co-ordinated and economical system of electricity transmission; and,

to facilitate competition in the supply and generation of electricity.”

1.3.5 Under Section 38 and Schedule 9 of the 1989 Act, when planning new works National Grid is also required to:

“(a) have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and

(b) do what he reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects.”

1.4 Introduction to Preliminary Environmental Information

1.4.1 The environmental information and baseline data gathered to date is presented within this PEIR and used to inform the preliminary assessment. On-going information gathering and data collection will also inform the overall EIA, the findings of which will be presented within the final ES to be submitted as part of the consent applications. The information and data gathered to date is the result of a range of desk studies and field surveys, the details of which are summarised below.

1.4.2 The information in this PEIR has also been informed by the comments made by the SoS in the Scoping Opinion. These comments, and how they have been addressed, are summarised in Appendix 1A to this report.

1.4.3 Landscape and Views: to date a large quantity of baseline data has already been acquired through desk and field surveys, which have been ongoing and updated since September 2009, including the following:

- Identification of the local landscape character, including verification of published assessments and LANDMAP data;
- Desk based assessment of landscape sensitivity to a 400 kV overhead line across the wider Mid Wales Connection Project study area;
- Desk based Zone of Theoretical Visibility (ZTV) of the proposed 400 kV overhead line for the broad route corridor;
- Field based Landscape and Visual Appraisal of the sensitivity of the landscape to a 400 kV overhead line, along the preferred route corridor, including considerations for overhead line routeing;
- Field based visibility overview of the broad route corridor and its surroundings, including identification of important visual receptors; and
- An assessment of which parts of the Draft Route (if any) would benefit most in

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3 Draft Route Report Preferred Substation Site Report
In addition to assisting with the identification of the preferred route and appraisal process and the on-going design of the proposed development, the above work, combined with consultation responses, has helped identify the study area for the EIA and the main landscape and visual issues to be considered. Much of the data has already been published and is available to view on the project website.

A detailed assessment of the likely landscape and visual effects of the proposed development will be undertaken and provided as part of the ES in accordance with the *Guidelines for Landscape and Visual Assessment* (3rd Edition)\(^4\).

**Historic Environment:** to date the desk-based assessment has considered designated and registered cultural heritage assets, such as World Heritage Sites, Scheduled (ancient) Monuments, Registered Parks & Gardens, Registered Battlefields, Listed Buildings, Conservation Areas, Ancient Woodland, Welsh Historic Landscapes and Historic Landscape Character Areas.

Work has been undertaken with regard to the comparison of proposed connection technologies. Preliminary responses from relevant consultees have also been received and have been and are continuing to be considered going forward.

**Ecology and Biodiversity:** to date a detailed desk study has been undertaken to obtain ecological information from a number of sources.

Statutory designated sites, such as: Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and the internationally designated Wetland of International Importance (Ramsar sites); Ancient Woodland and nationally designated Sites of Special Scientific Interest (SSSIs), along the route of the proposed development and within the wider area (up to 30km) have been identified, as have non-statutory sites of nature conservation importance and protected or notable species, within 1km of the proposed development.

Detailed ecological surveys and assessments commenced in March 2013 including detailed extended Phase 1 and Phase 2 surveys.

**Water Quality and Resources, including Flood Risk:** to date information in respect of the status of the water resources (groundwater, surface water and drainage) has been obtained and reviewed, as part of an overall desk study exercise.

Surface water features, including rivers, streams, canals, lakes and ponds have been identified along the route of the proposed development. Licensed surface water abstractions have also been identified that draw water from the river network, providing water for agricultural use, private water supply and electricity generation.

Groundwater / aquifer classification information has also been obtained, including data on small private unlicensed groundwater abstractions (less than 20m\(^3\)/day), usually used for providing a water supply to a single domestic property for general use, including drinking water, and licensed groundwater abstractions (greater than 20m\(^3\)/day), which include drinking water uses as well as agricultural uses.

Other information obtained and reviewed to date includes data on Source Protection Zones, the Shropshire Groundwater Scheme Phase 7, Catchment Abstraction Management Strategies, the River Severn River Basin Management Plan, and discharge consents, including from sewage treatment works and from domestic properties.

Hazard maps have been produced that show the sensitivity of the important surface water and groundwater features that have the potential to be impacted from a water resources or

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\(^4\) Guidelines for Landscape and Visual Assessment 3rd Edition (GLVIA3) published in April 2013 by the Landscape Institute and IEMA.
water quality perspective. These hazard maps have been used to identify areas where further consideration may be needed.

1.4.16 A hydraulic model has been produced for the River Vyrnwy from Newbridge in the south-west to Llanymynech in the north-east. The model has been used to simulate flows, levels, depths, inundation extents and velocities for the 1 in 2, 1 in 5, 1 in 10, 1 in 20, 1 in 50, 1 in 100 and 1 in 100 year plus climate change flood events.

1.4.17 **Geology, Soils and Contaminated Land:** all data and information presented has been derived from a desk study review of a number of relevant sources, such as the British Geological Survey (BGS), the Landmark Information Group, the Coal Authority, Historical maps, and Geoindex. A site walkover has also been completed.

1.4.18 The review has specifically looked at solid (bedrock) and drift (superficial) geology, and soil types, including peat. A review of ground stability was undertaken in 2011 to identify geo-hazards within the area, including running sand, collapsible ground, compressible ground, ground dissolution and landslide ground.

1.4.19 Mineral exploitation sites have also been identified, as well as mineral protected areas for potential future exploitation. Sites designated for geological protection have also been identified.

1.4.20 **Agriculture and Land Use:** to date, information and data gathered with regard to agriculture and land use has been as part of a detailed desk study. Data gathered and reviewed includes: the types of land use present; Agricultural Land Classification; the presence and locations of land under agri-environment schemes; climate; and Nitrate Vulnerable Zones.

1.4.21 **Air Quality:** similarly, to date, data relating to air quality along the proposed development has been gathered and reviewed as part of a desk study of available information, such as from the nearest air quality monitoring stations (UK National Air Quality Archive) at Aston Hill and Leominster. Information relating to Air Quality Management Areas set by Powys and Shropshire Councils has also been obtained and reviewed.

1.4.22 **Electric and Magnetic Fields (EMF):** the information and data presented within this report is based on current knowledge of EMF’s produced by similar developments, including 400 kV overhead lines, underground cables, substation and sealing end compound developments during their operational phase.

1.4.23 It covers EMF’s occurring in the natural world, EMF’s resulting from the use of modern technology and the wider use of electricity and electrical devices, and from the use of energised high-voltage power-transmission equipment.

1.4.24 **Traffic and Transport:** to date, information and data relating to traffic and transportation has been obtained through a mix of desk study and site visits, to identify roads and tracks for potential use for traffic during the construction phase. Desk studies and site visits have also been undertaken to identify the suitability of the local road network for the construction of the proposed development, including the delivery of abnormal loads.

1.4.25 **Socio-economics, including Tourism:** to date information and data has been gathered, as part of a detailed desk study and from a wide range of sources, on a variety of community, social and economic facilities and activities within the area, including aviation and defence, tourism resources, recreation resources (including: Public Rights of Way (PROW) footpaths, National Trails, cycle routes), recreational facilities such as country parks, golf courses and fishing facilities, plus other businesses. A tourism survey has also been undertaken.

1.4.26 **Noise and Vibration:** Four baseline background noise surveys have been carried out to date at 29 separate locations to establish the prevailing background noise conditions in the area. The locations were selected to be representative of residential receivers as far as practicable.
1.4.27 Data relating to operational noise of overhead lines, underground cables and other associated infrastructure, such as substations, is presented from current experience and knowledge of the equipment being proposed.

1.4.28 **Other emissions**: the data presented covers potential for mud on roads, light pollution and waste management impacts not covered elsewhere. It is presented based on desk study research and experience.

1.4.29 Work regarding the potential effects of changing climatic factors on the proposed development and consideration of the whole life effects of the proposed development on climate change will be presented in the ES. Preliminary information relating to the potential effects of climate change is included in the PEIR topic chapters where relevant.

1.5 **Appraisal Processes adopted for Preliminary Environmental Information**

1.5.1 The PEIR uses the following processes in the topic chapters:

**Significant Effects**

1.5.2 The likely significance of effects will reflect judgements as to the importance or sensitivity of the affected receptor(s) and the nature and magnitude of the predicted changes. For the purpose of the preliminary assessment, any likely effect judged to be moderate or major adverse is considered more significant and secondary mitigation (see below) is more likely to be required, whilst any likely effect judged to be minor or negligible is considered to be of a lesser significance and secondary mitigation is less likely to be required. This general approach is used within the PEIR unless otherwise stated in the specific topic chapters. It should also be noted that, in some circumstances due to the preliminary nature of the assessment, it may not be currently possible to attribute levels of significance. In such instances the likely effect may be described purely as significant. The general approach identified here is without prejudice to the consideration of the more detailed effects of individual impacts. Further matters of significance of impacts will be reconsidered as part of the ES work.

**Mitigation Measures**

1.5.3 Mitigation measures considered in the PEIR typically fall into one of three categories as follows:

- Primary or ‘embedded’ mitigation measures which have been developed through the iterative design process and have become integrated mainstream components of the design of the proposed development;

- Standard construction practices for avoiding and minimising environmental effects. For example, National Grid will compile a Code of Construction Practice (CoCP) and/or a Construction and Environmental Management Plan (CEMP) as part of its applications for consent; and

- Secondary mitigation measures which are designed to address any significant adverse effects remaining after primary measures and standard construction practices have been applied to the proposed development. These are usually identified once the assessment has been completed.

**Cumulative Effects**

1.5.4 A number of other developments (SPManWeb / Contracted wind farm Generation – see Table 2.1) come together in the area around the proposed Bryngwyn Substation. Without some of these elements the proposed development will not go ahead and therefore the cumulative assessment needs to reflect this.

1.5.5 A baseline assessment will be carried out as part of the full EIA and presented in the ES. In respect of the area around Bryngwyn a cumulative assessment will be carried out which will consider the 400 kV / 132 kV substation and the 400 kV OHL.
1.5.6 The cumulative assessment will then include a further two stages:-

- Stage 2 – related developments – the cumulative assessment will be carried out against a baseline which will include the wind farms considered in our Needs Case (i.e. the 630MW with connection agreements with SPManWeb), SPManWeb’s connections to the 132 kV substation and Tirgwyt Wind Farm (due to its proximity to the proposed substation and its construction programme); and

- Stage 3 – in respect of other developments (other wind farms in the vicinity (10km) of Bryngwyn and the OHL, and other developments not already mentioned above).

1.6 Information to be presented as part of the EIA

1.5.7 The main study area for the EIA is approximately 327km² and centred around the proposed development, as illustrated in Figure 1.2.

1.5.8 In general, the study area will comprise an approximate 3km wide buffer zone around the proposed development, although this will be widened, e.g. to 10km, or narrowed where appropriate to take account of specific features within the environment or associated with the proposed development, and will vary spatially from topic to topic. Where particularly localised works would be undertaken, for example at the existing Shrewsbury Substation and some minor offsite highway works, a 3km buffer area is not considered necessary for all topics.

1.5.9 Further details of the on-going data gathering exercise for each topic area are given in Chapters 5 to 17.

2. THE PROPOSED DEVELOPMENT

2.1 Need for the Proposed Development

2.1.1 The need for the project is outlined in the document ‘Connection of On-shore Wind Farms in Mid Wales – Project Need Case’⁵, updated in July 2012.

2.1.2 The Welsh Government has identified potential onshore wind development sites (known as Strategic Search Areas – SSA B, C and D) as part of its commitment to delivering renewable energy. These SSAs are documented in the Welsh Government Technical Advice Note (TAN) 8 and illustrated on Figure 2.1.

2.1.3 As a result, SPManWeb, the Distribution Network Operator (DNO) of the existing electricity distribution infrastructure for the northern part of Wales, has contracts with a number of wind farm developers seeking connection in Mid Wales for new generation projects with a total requirement for 630MW export capacity. There is limited capacity on the existing distribution infrastructure to accommodate new generation without reinforcement works, and have applied to National Grid for a new connection to the national high voltage electricity transmission system. As required by its licence obligations, and as recognised in NPS EN-5, National Grid has a statutory duty to provide a connection.

2.1.4 In the absence of existing high voltage electricity transmission infrastructure and limited existing distribution infrastructure capacity in the Mid Wales region, both National Grid and SPManWeb need to construct new infrastructure with sufficient capacity to connect the generation projects referred to above.

2.1.5 In order to meet the Need Case, National Grid proposes to develop a significant new substation, which would act as a marshalling point for the power output from the wind farms and transform the voltage from 132 kV to 400 kV for onward transmission. The installation of a 400 kV transmission route from this marshalling substation to the National Electricity

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⁵ ‘Connection of On-shore Wind Farms in Mid Wales – Project Need Case’ (National Grid (March 2011)), available via the National Grid project website http://www.midwalesconnection.com within the documents and maps section.
Transmission System (NETS) would achieve a secure connection capable of carrying the anticipated combined renewable generation from the projects identified above. The marshalling substation and the 400 kV connection would also have sufficient capacity to accommodate some further generation from the Welsh Assembly Governments’ TAN 8 Strategic Search Areas (SSA) B, C, and D in the future. Proposed contracted wind farm generation in these SSAs are shown in Table 2.1.

**Table 2.1: Proposed contracted wind farm generation in SSAs, B, C & D**

<table>
<thead>
<tr>
<th>Wind farm</th>
<th>MW</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuadd Goch</td>
<td>30</td>
<td>Applied to local authority. Not determined</td>
</tr>
<tr>
<td>Rhyd Ddu</td>
<td>99</td>
<td>Requires DCO but not applied. Vattenfall has renamed Rhyd Ddu as Mynydd Lluest y Graig and applied for a connection to National Grid directly</td>
</tr>
<tr>
<td>Llaithddu</td>
<td>74.4</td>
<td>Section 36 public inquiry</td>
</tr>
<tr>
<td>Carno III</td>
<td>48</td>
<td>Applied to local authority. Not determined</td>
</tr>
<tr>
<td>Dyfnant Forest</td>
<td>78</td>
<td>Requires DCO but not applied.</td>
</tr>
<tr>
<td>Llanbadarn Fynydd</td>
<td>61.2</td>
<td>Section 36 public inquiry</td>
</tr>
<tr>
<td>Llanbrynmair</td>
<td>90</td>
<td>Section 36 public inquiry</td>
</tr>
<tr>
<td>Carnedd Wen</td>
<td>150</td>
<td>Section 36 public inquiry</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>630.6</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Potential new generation (not yet contracted)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mynydd y Gwynt</td>
<td>90</td>
<td>Application for DCO accepted by the Planning Inspectorate.</td>
</tr>
</tbody>
</table>

2.2 Overview and Summary Description of the Proposed Development

**Overview of Proposed Development**

2.2.1 To manage the assessment and presentation of environmental information, ‘Sections’ have been identified along the route of the 400 kV connection, based on different proposals for each section. The extent of the connection described below is shown at Figure 1.1).

- Bryngwyn Substation
- Western Overhead Line (OHL) Section
- Western Sealing End Compound (SEC) at Dyffryn Meifod West
- Underground Cable Section
- Eastern SEC at Dyffryn Meifod East
- Eastern OHL Section
- Tee-in Point at Berghill
• Shrewsbury Substation (existing)

2.2.2 The breakdown into these component parts aids the PEIR assessment and communication of potential effects; whilst considering the potential effects of the proposed development as a whole.

2.2.3 The above component parts of the development are defined through changes in the nature of the connection from overhead line (from the Bryngwyn Substation), to underground cable (through the Meifod Valley), and back to overhead line to where the proposed development meets the existing ZZK overhead line in Shropshire. The decision on whether the connection should be underground or overhead, and the identification of the sections where this undergrounding should be proposed (i.e. Meifod), is provided within the September 2013 Draft Route Report[1]. The 2013 Draft Route Report proposed undergrounding through the Meifod Valley, between Ffridd Mathrafal and Waen-fach, due to significant landscape and visual considerations.

2.2.4 A number of alternative steel lattice pylon options are available to the proposed development. These are known as L8, L12 Low Height (L12 LH) and L13. T-Pylons offer several variations to the traditional steel lattice pylon design such as a more simplistic structure with increased mass, and a reduced permanent footprint. These options were considered and the appraisal of them is reported in the Pylon Design Options Report[6]. This concluded that for the OHL sections consideration is being given to two pylon designs, the L12 LH Pylon and T-Pylon. Further information on these is given in Figure 2.2.

2.2.5 The design of the proposed development which has been considered in the PEIR has been based on technical and environmental considerations and consultation feedback. Project design work will continue to be influenced where appropriate by further consultation feedback as part of this current statutory stage of consultation.

2.2.6 The proposed development is based on technology presently available and National Grid will review the proposal if new technology becomes available prior to making its application(s) for consent.

**Summary Description of the Proposed Development**

2.2.7 The proposed development would include a 400 kV connection, as a combination of overhead line and underground cabling, the Bryngwyn Substation, sealing end compounds (SECs) and a tee-in to the existing 400 kV (ZZK) overhead line. The proposed development would also include relatively minor works at the existing substation at Shrewsbury and numerous minor offsite works (mainly associated with transportation of construction materials). All ‘permanent’ infrastructure required for the proposed development would have a design life of a minimum of 40 years, beyond which, if necessary, it may be re-engineered to extend its design life. The elements which form the proposed development at this stage (both permanent and temporary) are included within the Proposed Project Boundary (PPB) as shown on the plans and figures which accompany the PEIR. The PPB includes all of the above proposed works and makes provision for limits of deviation (as described at 2.4). The PPB is shown graphically on Figure 1.1.

2.2.8 The proposed Bryngwyn Substation site occupies a low lying and secluded bowl within the upland plateau at the head of a tributary of the River Rh iw. Centred on the property known as Bryngwyn, it lies 1km north from the Llanfair Caereinion to Carno Lane (New Road) along a stone track.

2.2.9 From the substation site, the proposed development, with an overall total length of

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[1] [http://nationalgrid.opendebate.co.uk/files/Mid-Wales_Draft_Route_Report.pdf](http://nationalgrid.opendebate.co.uk/files/Mid-Wales_Draft_Route_Report.pdf)

approximately 50km, would head north-east down a small tributary valley of the Afon Rhiw, though an undulating landscape of well-wooded ridges and valleys, descending into the Banwy Valley where it would cross the A458 and Afon Einion to the south-east of Moel Bentyrch. After crossing the road the proposed development would cross open farmland and the Afon Banwy, heading in a more easterly direction north of Bryn-glas Hall.

2.2.10 From the Afon Banwy near Bryn-glas Hall, the proposed development would continue in a north-easterly direction passing between small woodlands and dispersed properties and following the lower lying land. South of Tynrhos it would head east and join the Yr Hafesb Valley. From here the proposed connection would be via underground cable. In the narrow section of the Yr Hafesb Valley, the proposed development would cross the A495 and pass between the two areas of the Tan-y-Ffriidd Caravan Park. It would continue along the Meifod Valley in a north-easterly direction along the Vyrnwy Valley floor past Waen-fach where the proposed connection would again become overhead. From Llansantffraid-y-Mechain it would then turn east, passing around the south side of Llanymynech Hill as far as the English border near Llanymynech.

2.2.11 After crossing the A483 between Llanymynech and Llandysilio/Four Crosses the proposed development would turn back to a more north-easterly route, crossing the River Vyrnwy and the B4398 before traversing the low lying farmland around the River Morda.

2.2.12 After crossing Maesbury Road and the Montgomery / Shropshire Union Canal near Maesbury Marsh, the proposed development would continue in a north-easterly direction through the farmland before passing between the edge of Aston Hall and Oswestry Golf Club. It would then cross the A5 and the B5009 and would turn slightly to the east crossing the Shrewsbury to Chester railway line before passing between small woodland blocks and large farms to join the existing 400 kV overhead line close to Lower Frankton.

The character of the area ranges from upland plateau comprising a series of gentle ridges and valleys separated by shallow depressions, at the substation end, through a more undulating landscape towards Meifod. Beyond the Meifod Valley going north eastwards into Shropshire the landscape widens out into a broad, low-lying expanse of large, mainly arable fields, with occasional pastures and some waterside meadows.

2.2.13 The character of the area ranges from upland plateau comprising a series of gentle ridges and valleys separated by shallow depressions, at the substation end, through a more undulating landscape towards Meifod. Beyond the Meifod Valley going north eastwards into Shropshire the landscape widens out into a broad, low-lying expanse of large, mainly arable fields, with occasional pastures and some waterside meadows.

2.2.14 Environmental, cultural heritage and other features in the vicinity of the proposed development are illustrated in the relevant figures in the PEIR which include: Offa’s Dyke; the Montgomery Canal Special Area of Conservation and SSSI; Tanat and Vyrnwy Special Area of Conservation; Morton Pool Ramsar site; Elenydd Special Protection Area; Berwyn Special Protection Area; various scheduled ancient monuments; conservation areas, and many listed buildings.

2.3 Limits of Deviation

2.3.1 The final route of the overhead line and underground cables would be subject to limits of deviation which would provide a necessary and proportionate degree of flexibility as to the final alignment of the works. The limits of deviation identify a maximum distance or measurement of variation within which all the permanent works are to be constructed.

2.3.2 Lateral limits of deviation are designed to allow for localised constraints or unknown or unforeseeable issues that may arise during construction and which might require a minor adjustment to the overhead line or underground cable design and pylon positions. Lateral limits of deviation also allow for potential operational circumstances (see below). The proposed lateral limits of deviation on straight sections (subject to constraints) are:

- Overhead line (L12 LH and T-pylon) 400 kV pylon – 100m (50m either side of the centre line) or 120m (60m either side of the centre line) at pylon locations to allow for cranes and overhead line pulling positions. It would also allow for any lateral swing of the conductors during operation, i.e. with the conductors remaining inside the LOD; and

- Underground 400 kV cables – 100m (nominally 50m each side of the cable).
2.3.3 The proposed vertical limits of deviation take account of both lattice and T-pylon options, both above ground (height) and below ground (foundations). The vertical limit of deviation above ground for both the T-pylon and for the lattice pylon is 4m. The final below ground vertical limit of deviation for foundation works would be determined from results of engineering works. The final design of pylons may be lower in height; there is no restriction placed on a reduction in height, but clearance requirements must be maintained from the ground and structures and trees. Vertical limits of deviation would also apply to the cable and these will be determined from results of geological assessment and engineering works.

2.3.4 These limits of deviation, that would allow for proportionate flexibility, are contained within the PPB as shown in Figure 1.1 and referred to throughout the PEIR chapters.

2.4 Location of Proposed Development

2.4.1 The proposed development is primarily located in both Powys (Wales) and Shropshire (England) and crosses the administrative boundaries of the following county / county borough authorities:

- Powys County Council
- Shropshire Council
- Wrexham County Borough Council (for transport related works only)

2.4.2 The locations and extent of the specific elements of the proposed development are described in more detail below. The location of the proposed development is also displayed graphically on Figure 1.1.

2.5 Bryngwyn Substation

2.5.1 The substation site is in a remote rural situation, within and near the edge of TAN 8 Strategic Search Area (SSA) B and adjacent to the proposed Tir Gwynt Wind Farm. It occupies a low lying and secluded bowl within the upland plateau (approximately 377m Above Ordnance Datum - AOD) at the head of a tributary of the River Rhiw. Centred on a disused farmhouse known as Bryngwyn, it lies 1km north from the Carno to Llanfair Caereinion Lane along a stone track.

2.5.2 The site comprises some large open fields which slope broadly eastwards. The fields are semi-improved grazed pastures and there is a small copse of deciduous trees next to the unoccupied farmhouse. This farmhouse and out buildings would need to be demolished to accommodate the proposed substation. The nearest residential property in current use is Carreg-y-big which lies approximately 1km away. A number of public rights of way (PRoWs) converge on the site and connect into the wider footpath network.

2.5.3 The proposed development would comprise a 132/400 kV substation with separate 132 kV and 400 kV compounds. Four 132 kV wind generator circuits would connect into the 132 kV compound. The 132 kV and 400 kV compounds would be connected by an underground 132 kV connection. The 400 kV compound would then connect to the 400 kV transmission system.

2.5.4 The 400 kV compound would comprise a securely fenced compound (maximum 270m x 160m), incorporating five Super Grid Transformers (SGTs) (each 10.5m high), two shunt reactors, a single storey control building, switchgear, busbar, and other externally sited apparatus (maximum height less than 15m). The site would be protected by a 2.4m – 4m high security fence and would also include associated facilities such as amenity buildings and access roads. An additional temporary working area would need to be established around this. The total compound size would be approximately 4 hectares (10 acres). A description of proposed substation components is provided in Table 2.1.

2.5.5 The 132 kV compound would consist of four SGT feeder bays with provision for a fifth SGT feeder bay, a 132 kV busbar, four 132 kV feeder bays with provision for three future 132 kV feeder bays. The compound size would be approximately 2 hectares (5 acres) . The 132 kV compound would also include associated facilities including control buildings, fencing and
2.5.6 The proposed 132/400 kV substation would occupy a combined total area of approximately 6 hectares (15 acres).

2.5.7 For the proposed air insulated switchgear (AIS) at Bryngwyn Substation, appropriate clearance distances must be maintained between the high voltage conductors and adjacent equipment and the ground to ensure that the substation can be operated and maintained in a safe manner. The higher the voltage of the substation, the larger the clearance distances required to achieve safe operation and maintenance. At 400 kV a minimum safety distance of 3.1m from the high voltage conductor is required.

Table 2.1: Typical equipment to be utilised at Bryngwyn Substation

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Roads</td>
<td>Provides access to and within the substation.</td>
</tr>
<tr>
<td>Amenity building</td>
<td>Provides welfare facilities, an office and storage for the site.</td>
</tr>
<tr>
<td>Busbar</td>
<td>Aluminium tube conductor predominantly used to carry the current around the substation.</td>
</tr>
<tr>
<td>Cable ducts and troughs</td>
<td>Used to accommodate the protection and control cables that go from the control room to the portable relay rooms and other equipment around the site.</td>
</tr>
<tr>
<td>Circuit breaker</td>
<td>Equipment used to switch a circuit ‘on’ or ‘off’ under both normal and fault conditions.</td>
</tr>
<tr>
<td>Control building</td>
<td>Contains all the protection and control equipment for the operation of the substation and includes relay panels, batteries, etc.</td>
</tr>
<tr>
<td>Current Transformer</td>
<td>Equipment used to measure the current in a circuit.</td>
</tr>
<tr>
<td>Disconnector</td>
<td>Equipment used to isolate a section of the substation so that maintenance activities can be carried out safely.</td>
</tr>
<tr>
<td>Earth Switch</td>
<td>Equipment used to apply a direct connection to earth on the busbar so as to allow maintenance activities to be carried out safely. Often these switches are integrated with disconnectors.</td>
</tr>
<tr>
<td>Fencing and gates</td>
<td>Used to secure the site for safety and security purposes.</td>
</tr>
<tr>
<td>Portable Relay Rooms</td>
<td>Contains protection and control equipment associated with individual circuits and are situated close to those circuits.</td>
</tr>
<tr>
<td>Post Insulator</td>
<td>Equipment used to support the Busbar.</td>
</tr>
<tr>
<td>Shunt Reactor</td>
<td>This equipment looks similar to an SGT (see below). Shunt reactors are required at Bryngwyn as the 400 kV cable through the Meifod Valley has a lot of ‘capacitance’, which can cause high voltages at the substation which may damage equipment. Shunt Reactors compensates for this ‘capacitance’.</td>
</tr>
<tr>
<td>Super Grid Transformer (SGT)</td>
<td>Equipment used to change the voltage of the substation. At Bryngwyn these change the voltage from 132,000 volts (132 kV) to 400,000 volts (400 kV) which is the required transmission voltage on the National Grid overhead line.</td>
</tr>
<tr>
<td>Support structures</td>
<td>These support the electrical switchgear within the substation so that it is at the correct height above ground level.</td>
</tr>
</tbody>
</table>
Surge Arrester | Equipment used to protect other equipment from very high voltage surges that might otherwise damage them. Typically these are used to protect SGTs from lightning strikes.

Voltage Transformer | Equipment used to measure the voltage on a circuit.

2.5.8 The proposed Bryngwyn Substation is illustrated in Figure 2.3.

2.6 Western Overhead Line Section (OHL), (L12 Low Height (LH) and T-Pylon)

2.6.1 The Western OHL Section of the preferred alignment would be approximately 13km in length from the proposed 400 kV Bryngwyn Substation through to the Western SEC at Dyffryn Meifod West (see Figure 1.1).

2.6.2 From the substation site, the proposed Western OHL Section would head in a north-easterly direction down a small tributary valley of the Afon Rhiw through a remote and sparsely populated area comprising rough upland grazing and marshy grassland. It would continue down this valley eventually descending into the Banwy Valley where it would cross the A458 and Afon Einion approximately 1.5km to the south-east of Moel Bentyrch. From here it would turn in a more easterly direction to the north of Bryn-glas Hall and on to connect into the Western SEC at Dyffryn Meifod West close to the A495.

2.6.3 This section is designed to use either L12 LH lattice design or T-pylon options. For both designs, a total of approximately 49 pylons would be required along the Western OHL Section with an average span between pylons being approximately 270m.

2.6.4 In this Western OHL Section, the L12 LH pylon option would be a combination of L12 LH suspension pylons for straight OHL sections and L12 LH D30 tension angle pylons where a change in route direction (up to 30°) is required. L12 LH pylon heights along the route of the proposed development range from 29.3m up to 44.4m with an average pylon height along the Western OHL Section of 38.3m. A standard L12 LH pylon is illustrated at Figure 2.2.

2.6.5 In this Western OHL Section, a T-pylon option would include a combination of suspension, flying angle and tension pylons. Again, the suspension pylons are used between the angle pylons to form straight sections. The flying angle T-pylon would be used for changes in OHL direction of up to 10°, whilst the tension T-pylons are for OHL deviations between 10° and 30°. T-pylon heights would vary from 32.5m up to 42m, with an average pylon height along the Western OHL Section of 35.2m. The T-pylon options are illustrated at Figure 2.2.

2.6.6 Other pylon types would be used depending on location requirements along the route, and include:
- Terminal pylon - would be used to support OHLs entering a substation or connecting to underground cables at SECs; and
- Tee or junction pylon – used where two OHL routes connect.

2.6.7 Alternative terminal pylon / gantry options are also proposed at line entries into Bryngwyn Substation to reflect the alternative pylon options along this section. For L12 LH pylons, these include the potential for an L8 substation terminal pylon (approx 44m high) and L8 junction pylon (approx 48m high) with two substation gantries. The alternative option for T-Pylon includes for three T-Pylon diamond structures with T-pylon gantries (approx 28m high). These are shown in Figure 2.2.

2.6.8 At line entries into Dyffryn Meifod West SEC, alternative options proposed are two L6 SFT full tension gantries for L12 LH pylons or two T-Pylon gantries for the respective T-pylon option. The choice of pylon types at line entries into Bryngwyn Substation and Meifod West SEC will be dependent on, and informed by, the choice of pylon type across the remainder of the route. Further information on this choice is provided in Section 2.8.
2.6.9 The typical base footprint of a low-height lattice pylon is approximately 7m x 7m comprising the area enclosed by the pylon base consisting of steel work rising from four stubs secured in foundations. The base footprint of a T-pylon is approximately 2 - 2.3m in diameter and represents the area taken by the solid support of the pylon fixed to its foundation.

2.6.10 The connection will carry two circuits, one on each side of the pylon. Each circuit is made up of three phases and each phase consists of two conductors (twin bundle). The conductor currently being considered for use is an All Aluminium Alloy Conductor (AAAC) known as Sorbus. The diameter of the conductor is 33.4mm.

2.6.11 To protect the circuits from lightning strikes an earthwire will be fitted above the circuit conductors. Incorporated within the earthwire will be a fibre optic which will allow communications between substations. The earthwire will have a diameter of 20.6mm.

2.7 Western SEC at Dyffryn Meifod West

2.7.1 The proposed site for the Western SEC at Dyffryn Meifod West is located adjacent and immediately north of the A495 close to the disused Graig-wen Quarries and the B4382 as illustrated at Figure 2.4. The land in this area slopes to the north / north-west down to the low lying Yr Hafesb watercourse. The proposed site comprises low lying land (between 110m AOD and 115m AOD) adjacent to the Yr Hafesb watercourse. The area generally comprises arable land and grazed pasture bounded by low hedgerows. Nearby properties include Oak Leigh, a small chapel, a group of buildings on the A495, Craig-wen and Pencaedu.

2.7.2 The Western SEC at Dyffryn Meifod West would require a likely footprint of approximately 80m x 40m. At construction stage the SEC will also need to accommodate temporary working areas and the equipment necessary to test and commission the underground circuits. A power source would also be required or alternatively a connection with the local electricity supplier would be needed for the duration of construction.

2.7.3 The Western SEC at Dyffryn Meifod West would be enclosed by a palisade perimeter fence and would have a gravelled surface within the compound. The site would include associated steel support structures and a permanent access road would be provided to the SEC from the public highway.

2.7.4 For a L12 LH pylon option connecting into the SEC, the SEC would consist of two lattice tower gantries for termination of the overhead line. Flexible conductors would connect onto post insulators, with other equipment including earth switches, surge arresters and cable sealing ends all connected by busbar. The lattice tower gantry is approximately 20m to the top of the earth post, and would be the highest item of equipment in the compound.

2.7.5 For a T-Pylon option connecting into the SEC, the SEC would consist of two T-pylon gantries for termination of the overhead line. Flexible conductors would connect onto an earth switch, with other equipment including surge arresters and cable sealing ends all connected by busbar. The T-pylon gantry is approximately 16.6m to the top of the earth post, and would be the highest item of equipment in the compound.

2.8 Underground Cable Section

2.8.1 The proposed Underground Cable Section would be approximately 13km long between the two SECs at Dyffryn Meifod West and East. The cable would mainly follow the course of the Meifod Valley and would run close to the River Vyrnwy (Afon Efyrnwy) for a significant proportion of its length. The level of the land is approximately 115m AOD in the south-west dropping to approximately 84m AOD at Meifod and 89m AOD at the north-eastern end.

2.8.2 The majority of land through which the Underground Cable Section has been routed is grassland used for grazing by local farm livestock. The cable route would cross a caravan site at Tan-y-Ffridd and would pass south of a rugby club near Meifod. The underground cable route would also include numerous road and watercourse crossings, notably a major crossing of the River Vyrnwy. A section of the cable route is proposed within the highway.
along the A495 at Tan House and temporary road closures would be needed to facilitate the installation of underground cables in this area.

2.8.3 For the entirety of the Underground Cable Section insulated cables would be used and would be typically installed through the use of open-cut trenches. For direct buried cables, the cable would need to be well-spaced from others for good heat dissipation. For the proposed development, it is anticipated that six separate cables would be required, in two trenches each in the order of 1-2m wide.

2.8.4 Underground cables, because of the insulation and surrounding environment, tend to retain the heat produced in the conductor. This heat then has to be dissipated to the surrounding environment. To compensate for this, underground cables are generally bigger than overhead lines to reduce their electrical resistance and radiate the heat produced.

2.8.5 It is anticipated the cables will consist of six power cables. The power cables would comprise of approximately 146 mm diameter (2500 mm²) cross-linked polyethylene (XLPE) insulated cables (worst case), buried in close proximity to each other within the same trench. The installation of the cable would likely be completed by traditional open cut trenching methods. Some areas of directional drilling to install the cable may be required, with an approximate maximum depth of 10m. Please refer to Figure 2.5 for an illustration of a typical cable swathe. Cable working areas would typically be:

- 10-15m width to store the stripped topsoil and sub soil from the cable trench excavation and inclusion of any temporary & permanent land drainage requirement;
- 6m width to install the cable circuits; and
- 15-20m width for stripped topsoil from the haul road, and for use as an access strip/haul road for construction vehicles (with passing places).

2.8.6 The installation of underground cable would also include the siting of joint bays. These are required to join sections of cable together and would typically be installed with 650m to 1000m spacing (dependent on chosen cable supplier). The joint bays would consist of reinforced concrete boxes approximately 20m long x 3m wide and 2.5m deep (walls approximately 250mm thick). The whole box would be back filled with cement bound sand to cover the joint boxes and concrete tiles used to cover the whole joint bay. The excavation would then be back filled to ground level.

2.8.7 Associated with joint bays, link boxes would be required at each joint bay location to facilitate periodic testing of the cables. Link Boxes (approximately 1m high) would be located above ground within 10m of a joint bay.

2.9 Eastern SEC at Dyffryn Meifod East

2.9.1 The proposed site for the Eastern SEC at Dyffryn Meifod East is situated close to the A495 and lies adjacent to the Afon Efyrnwy/River Vyrnwy as illustrated at Figure 2.6. The site comprises relatively flat land which is currently pasture, bounded by vegetation associated with the River Vyrnwy, the elevation of the site is approximately 79m AOD.

2.9.2 This SEC would require a likely footprint of approximately 80m x 40m. It would also need to accommodate temporary areas and the equipment necessary to test and commission the underground circuits. A power source would also be required or alternatively a connection with the local electricity supplier would be sought.

2.9.3 The SEC would be enclosed by an appropriate perimeter fence and would have a gravelled surface within the compound. The site would include associated steel support structures and a permanent access road would be provided to the SEC from the public highway.

2.9.4 For an L12 LH pylon option connecting into the SEC, the SEC would consist of two lattice tower gantries for termination of the overhead line. Flexible conductor would connect onto post insulators, with other equipment including earth switches, surge arresters and cable sealing ends all connected by busbar. The lattice tower gantry is approximately 20m to the top of the earth post, and would be the highest item of equipment in the compound.
2.9.5 For a T-Pylon option connecting into the SEC, the SEC would consist of two T-pylon gantries for termination of the overhead line. Flexible conductors would connect onto an earth switch, with other equipment including surge arresters and cable sealing ends all connected by busbar. The T-pylon gantry is approximately 16.6m to the top of the earth post, and would be the highest item of equipment in the compound.

2.10 Eastern Overhead Line Section (L12 Low Height and T-Pylon)

2.10.1 The Eastern OHL Section would total approximately 23km in length and would run from the Eastern SEC at Dyffryn Meifod East to the Tee-in Point at Berghill (see Figure 1.1). Here the new overhead line would connect into the existing 400 kV overhead line.

2.10.2 As with the Western OHL Section (above), the proposed alignment is designed for either L12 LH or T-pylon options. For both designs a total of approximately 66 pylons will be required for this section. The average span length between pylons is 348m, and in comparison to the Western OHL section, longer span lengths would be achievable along this section mainly due to the flatter terrain.

2.10.3 In this Eastern OHL Section, the L12 LH pylon would be a combination of L12 LH suspension pylons for straight OHL sections and L12 LH D30 tension angle pylons where a change in route direction (up to 30°) is required. Tension pylons would also be used at regular intervals for strengthening. L12 LH along the route range from 29.3m up to 44.4m with an average pylon height along the Eastern OHL Section of 41.5m.

2.10.4 In this Eastern OHL Section, a T-pylon option would include a combination of suspension, flying Angle and tension pylons for scenarios as described for the Western OHL Section. T-pylon heights would vary from 32.5m up to 42m, with an average pylon height along the Eastern section of 38.2m.

2.10.5 In the Eastern OHL Section the average pylon heights (both L12 LH and T-Pylon designs) would be slightly higher than in the Western OHL Section. This is due to reduced span lengths (270m) between pylons being required in the Western OHL Section to accommodate the higher altitude, higher wind speed, increased ice loading conditions and variations in topography in comparison to the Eastern OHL Section (348m). Longer spans in the eastern section would result in a higher overall pylon height in order to maintain required ground and safety clearances and to avoid undue stress on the pylon structures.

2.11 Tee-in Point at Berghill

2.11.1 The proposed site for the connection point (Tee-in) to the existing 400 kV OHL (ZZK Route) is located approximately 700m to the south of Lower Frankton, to the south-east of the A495 and north-west of the Montgomery / Shropshire Union Canal (see Figure 2.7).

2.11.2 The Tee-in point site centres on a location just south of the existing pylon ZZK061, where a replacement pylon would be constructed. This junction pylon is required to be slightly larger (approximately 48m high) and of a more substantial construction than the existing pylon to accommodate the incoming circuits. The extended area also facilitates a tee-in connection angle of 90° passing between two small woodland blocks at Berghill. The site itself comprises agricultural land used for arable and grazing at an elevation of approximately 82m AOD, with fields surrounded by managed hedgerow field boundaries containing some hedgerow trees and gaps. No farm tracks are present but one public right of way (footpath) crosses the area.

2.11.3 The Tee-in connection would be constructed to allow one of the circuits from the proposed development to be connected to the overhead line on the far circuit using a short section of underground cable to cross under the existing overhead line. This configuration would involve the construction of two compounds (each approximately 35m x 31m) either side of the existing ZZK Route; one located adjacent to the new junction pylon to be constructed along the line of the ZZK Route and one adjacent to the terminal pylon of the proposed development.
2.11.4 Typical equipment included within the Tee-in compounds would be flexible conductors connected onto post insulators, with other equipment including earth switches, surge arresters and cable sealing ends all connected by busbar. Temporary enabling works would also be required to the ZZK Route to facilitate the construction of the Tee-in whilst keeping the overhead line operational. These are likely to include a temporary compound of approximately 75m x 75m and involve the construction of two temporary pylons located to the north-east of the existing ZZK Route to allow for the replacement of the existing ZZK061 pylon.

2.11.5 The Tee-in compounds at Berghill would also be enclosed by a palisade perimeter fence and would have a gravelled surface within the compound. The sites would include associated steel support structures and a permanent access road.

2.12 Shrewsbury Substation

2.12.1 To facilitate the proposed development, an extension to the existing Shrewsbury Substation will be required of approximately 20m x 7m for all permanent works including an extension of the perimeter fence together with the installation of electrical plant and equipment. An approximate area of 300m² of earthworks is also proposed, within and outside the fenceline.

2.12.2 Shrewsbury Substation is located approximately 1.3km to the east of Shrewsbury at an elevation of approximately 56m AOD. The site is situated to the north-east of the junction between the A49 and the A5, as illustrated at Figure 2.8. Work will be carried out within the operational substation and also on land currently used for arable and grazing. The field boundaries which may be affected by the proposed development include managed hedgerows containing some hedgerow trees and gaps.

2.12.3 The requirement at Shrewsbury Substation is to modify the existing ‘Tee-in’ arrangement as a result of the connection of the Bryngwyn Substation onto the National Grid network. The net result of these works would be to split the existing Ironbridge-Legacy-Shrewsbury circuit into an Ironbridge-Shrewsbury and Bryngwyn-Legacy-Shrewsbury circuits. It is proposed that this substation extension would be mostly accommodated by utilising space within the existing substation compound which would be available as a result of recent works by the local distribution network operator. The design would also utilise hybrid-gas insulated switchgear (GIS) to further minimise the space required by the extension, although a small extension on the eastern boundary would still be needed as shown on Figure 2.8.

2.12.4 Two overhead line landing gantries, less than 15m high, would be required and would be the highest point in the substation. Other equipment required includes bus bars, ancillary buildings, circuit breakers, current transformers, capacitor voltage transformer, surge arresters, disconnectors, earth switches pantograph disconnectors, post insulators, and perimeter security fence.

2.13 Construction of the Proposed Development

General Construction Phase Requirements

2.13.1 Construction of all components of the proposed development would commence with the preparation and installation of temporary access roads and working areas. Where necessary improvements to the existing highway network would be undertaken to facilitate construction access and activities. Temporary contractor’s compounds, staff offices and welfare facilities would also be established along the proposed route, as well as equipment and materials for the works. Any topsoil and subsoil excavated would be stored separately along the working area in accordance with good practice so that it can be reinstated once construction activities are complete. Re-instatement of any vegetation and/or tree clearance would be agreed with the relevant statutory consultees.

2.13.2 Some temporary scaffolding would be installed during the works as a safety measure to protect roads, railways, some Public Rights of Way (PROW’s) and distribution network
overhead lines which are crossed / affected by the new connection.

2.13.3 Existing field accesses from public highways may need to be widened to give access to construction vehicles, or temporary new access may be required. Temporary access tracks would be required to the site of each pylon and may be required to access possible scaffolding sites.

2.13.4 For access on agricultural land, temporary tracks would be installed, using crushed stone (MOT Type 1 or similar) with a reinforcing geotextile membrane to protect soils. Temporary access roads would be approximately 4m wide and typically up to 300mm deep, but will depend on the ground conditions. Where a passing place is required on a temporary access track, a 12m swathe would be required. This would allow for a 4m width for each passing place and access track and 2 x 2m for topsoil storage.

2.13.5 Temporary tracks would continue along the length of the connection as far as possible so that construction traffic can run on dedicated routes and avoid the public highway.

2.13.6 It is anticipated that construction for all components of the proposed development would commence in summer 2017 and be completed in autumn / winter 2019. The approximate maximum number of construction workers is anticipated to be around 400. This is expected to peak and trough throughout the construction programme being influenced by construction methods, particularly with respect to the cable construction.

**400 kV Overhead Line**

2.13.7 The area around each pylon would be cleared and where appropriate fenced to keep the public and any livestock away from construction work. Generally, working areas are not usually entirely enclosed by security fencing; working areas around pylons typically comprise access roads, hardstanding, welfare facilities, parking areas, security cabin and small materials storage areas. During construction works, gated entrances would be installed and security cabin if needed in certain locations, restricting access to the working areas to construction vehicles and authorised personnel only. Typical equipment and machinery required at pylon working areas would include:

- Crane:
- Excavators;
- Dumper trucks;
- Concrete lorries and flatbed lorries;
- Winch tractor;
- Mobile Elevated Working Platform (MEWP);
- Low ground bearing pressure vehicles (Hagglund);
- Smaller vehicles e.g. 4x4 vehicles/land rover, vans; and
- Piling rigs (in case of piled foundations).

2.13.8 The working areas would be locked and attended by a security guard (if deemed necessary) outside working hours.

2.13.9 In areas proposed for overhead line, construction access is anticipated to utilise existing road access where practicable and include the use of temporary trackways, comprising metal plates, temporary stone roads of approximately 4m width, from roads to pylon locations. Although it is unlikely that a haul road would be needed for the majority of the overhead line construction, it is possible that sections of haul road may be required in areas where the existing road network is unsuitable. Use of the rail network for the delivery of materials is an unlikely alternative delivery option, as is the need for aerial access.

2.13.10 Temporary stone pads would also be required adjacent to each new pylon location for plant such as cranes and piling rigs, which would be used to construct the pylons. The size of the pad will depend on the size of the pylon base, and the type of foundation being installed.

2.13.11 Temporary site compounds would be needed during the construction phase. For a
connection route of this length, several compounds would be usual, distributed along the route. The exact location of these compounds would be determined and assessed as part of the EIA but it is possible that they would be established at locations such as the site of the substation.

2.13.12 The foundations of the lattice pylons would be piled or excavated. Pre-mixed concrete would be delivered to site in wagons along with steelwork for the foundation frames and bases. The foundation comprises steelwork encased in concrete with ‘stubs’ appearing through the concrete above ground to which the pylon legs are attached. For the T-pylon a single driven steel monopile could be used; however alternative solutions depending on ground conditions including mini pile with a concrete cap or a raft foundation may be used.

2.13.13 The lattice pylon would be erected in sections, with a mobile crane used to lift the assembled sections into position. The T-pylon consists of approximately ten sections and would either be constructed on the ground and lifted by a crane in to position or by lifting each individual section in to place. The insulators would be fastened to the pylons in preparation for the installation of the conductors (wires). The conductors would be delivered to site on drums using Heavy Goods Vehicles (HGVs) and would be installed in sections between tension pylons using tensioning and pulling machines. Once the overhead line is constructed, the temporary access tracks and working areas at the pylon sites would be removed and the ground reinstated by removing stone and trackways.

2.13.14 Once the pylon is assembled, insulators and fittings would be attached in preparation for fitting conductors. Conductors are typically installed in sections between angle (tension) pylons. A ‘pulling site’ with a machine would be established at one end of the section and a ‘tensioning site’ at the other end. These may require a larger working area around the pylons than at other pylon locations. Pilot bonds would be run at ground level from the tensioning site (and over scaffolding and any obstacles such as roads) along the length of the section and fed through running wheels on each pylon arm and on to the pulling site.

2.13.15 The pilot bonds would be fed around the pulling machine and the conductors pulled through. The tensioning machine would keep the conductors off the ground and prevent them from running freely when the pulling machine pulls the pilot bond. The conductors would be attached to the pylon arms by linesman working from platforms on the pylons. Additional fittings such as, spacers and dampers, would then be fitted to the conductors. Spacers prevent the conductors from touching each other and dampers prevent oscillations in the overhead line.

2.13.16 The conductors of the overhead line would be delivered to site on drums using heavy goods vehicles (HGVs). Tractors and other smaller vehicles would be used to transport the drums and other materials along the temporary access roads. The conductors would be installed in sections between tension pylons where the line changes direction. A pulling site would be established at one end of the section with the conductors running out from a tensioning site at the other end of the section.

2.13.17 One or more teams of workers may be constructing pylons at any one time during the construction programme. Work at each pylon would typically take two months.

2.13.18 All temporary access roads, tracks and associated bridges, culverts or other temporary access feature would be removed following completion of construction in that area. Dependent on the project construction programme, reinstatement of construction areas may be staggered during the construction period, with some areas being reinstated earlier than others.

400 kV Underground Cables

2.13.19 For the 400 kV underground cables, a construction working area approximately 40m wide would be created along the length of the underground cable section to be installed and protected by post and wire fencing. This area would include 10-15m wide storage of the stripped topsoil and sub soil from the cable trench excavation and a further 15-20m width.
for use as an access strip/haul road for construction vehicles (with passing places). Vegetation would be cleared and topsoil would be stripped from the areas of ground to be disturbed in the working area.

2.13.20 Where required, drainage improvement works will be implemented to maintain existing land drainage arrangements. Also during cable construction works and as required, trenches would be drained to facilitate the installation of cables.

2.13.21 Cable drums would be delivered to working areas using HGVs, with smaller vehicles such as tractors used to transport the drums and other materials along a temporary haul road. Six cables would be installed into two trenches approximately 1.8m deep and 1-2m wide. The required separation between each cable trench will vary depending on ground conditions, cable depth and cable manufacturer, but a typical swathe once installed would be approximately 40m (subject to the existence of both natural and man-made physical constraints – e.g. if less favourable ground conditions are encountered). Each trench would be approximately 1-2m wide, apart from at the horizontal directional drill (HDD) site where individual cables would be installed beneath the river at wider spacing. Fibre optic cables would also be installed to allow communication with the substation. Cables and ducts will have an approximately 300mm Cement Bound Sand (CBS) surround. On top of the CBS the cable protection tiles would be placed and above that would be subsoil arisings and topsoil reinstatement. During cable construction it is envisaged that some areas, namely the main haul roads/lay down areas, will potentially be in continued use throughout the construction period. The installation of the cable, however, would be worked up in sections. Within each section there could be work progressing on several cable lengths at one time. For example, in one cable length there may be ground preparation, whilst in the previous section there would be laying of cables and in the one before that ground restoration. The sections are likely to be approximately 2.5km to 4km in length. This process is likely to take around six months per section although some areas may need to be kept open for a longer period, for example joint bays as access will be required to these for testing. The majority of the works will be installed over the Spring/Summer/early Autumn periods when the better working conditions are likely to prevail. It is likely that no more than 50% of the Underground Cable Section would be open at any one time up to soil stripped level.

2.13.22 Above ground link boxes/link box pillars would be required where individual cables sections are jointed. The joints between lengths of underground cables installed from the drums would be made on-site in controlled and clean conditions.

2.13.23 The cable construction swathe may be subject to flood risk during construction where it runs through the Meifod Valley. The EIA will determine the frequency of flooding of the floodplain and potential effect on construction.

2.13.24 Due to the width and depth of the River Vyrnwy, it is envisaged that the cable crossing will be done using trenchless techniques e.g. a horizontal directional drilling (HDD). Due to the unknown depth of the river and lack of soil data, the cable rating and hence spacing of the cables cannot currently be determined. Assuming reasonable parameters for the river depth and soil type, the preliminary cable design has calculated an approx cable spacing of 6m. If this is the case, then allowing for an adequate working space, a construction width of 60-70m may be required with an estimated HDD depth of 10m over a 150m long section, but this will be determined by the ground conditions.

2.13.25 Where the underground cable exists in the vicinity of local 11 kV overhead lines, a safe distance of 5m from the overhead line to the conductor will be maintained to satisfy safety clearances.

2.13.26 Once the cables have been laid and the trenches backfilled, the temporary haul road and access tracks would be removed and soil replaced typically section by section. Where possible, hedgerows would be planted or replaced although trees cannot be planted on top of the cables and temporary stored topsoil & subsoil would be re-used for surface reinstatement.
Substations and Sealing End Compounds

Bryngwyn Substation

2.13.27 For Bryngwyn Substation topsoil would be removed and a clean and stable working platform established for development. Construction of concrete foundations for some of the electrical equipment would be undertaken. A series of earth tapes or an earth grid would be installed below the ground to create an ‘earth mat’ connecting both 132 kV and 400 kV compounds and terminal pylons making them electrically safe. The substation support structures and electrical equipment would then be erected. Prior to the substation being brought into service, commissioning tests would be undertaken. Upon completion of the works temporary site installation facilities and working areas would be removed and the ground reinstated.

2.13.28 The proposed Bryngwyn Substation has been split between two compound areas that offer some of the flattest areas within the vicinity. Whilst the two areas are relatively flat in comparison to the surrounding landform, earthworks would still be required to produce a flat platform. In particular, for the 400 kV substation there would need to be a cut to fill exercise at the northern extremity to enlarge the flat area sufficiently to accommodate the substation footprint. Associated with this there would need to be a diversion of the existing stream that runs down the valley and through the proposed site and a diversion of a further stream on the eastern end of the site.

2.13.29 Temporary construction compound areas would be constructed adjacent to the proposed substation that would allow for the safe construction of the permanent operational substation high voltage compounds. The construction compound area would comprise temporary cabins for offices and welfare facilities for construction site workers. Areas of the compound would be allocated for receipt of deliveries, storage of materials and equipment and for storage of waste for removal.

2.13.30 Access to the site area is currently via a stone access track from the Llanfair Caereinion to Carno lane (New Road). At one point a cutting has been made into a batter that has exposed the underlying rock. At this point the track is considered to be too steep to accommodate the vehicles required to deliver the transformers and reactors to the site and hence an alternative access has been identified. Wherever possible areas of blanket bog will be avoided.

2.13.31 The main element of earthworks will be the cut to fill required at the northern end of the 400 kV substation site to produce the substation platform. In the north-west corner of the site the proposed platform cuts into the existing batter. Material from this area would then be transferred to the north-east end of the site to fill the area to the proposed substation platform level. The levels at Bryngwyn Substation may need to be adjusted at detailed design stage when a more accurate topographical survey and the ground investigation are available to allow a balanced cut to fill.

2.13.32 It is possible that highly compressible soils i.e. soft peat beds could be present at the site. If present, peat would be unsuitable as a foundation soil and foundations would need to be taken through the peat onto competent bearing strata.

2.13.33 It is anticipated that the bulk earthworks for the Bryngwyn Substation platform would be carried out using a combination of tracked loaders, bulldozers, 360° excavators and wheeled off road dump trucks. Excavated material that has to be moved some distance would be excavated by 360° excavators and loaded into wheeled off road dump trucks for transportation to fill areas. In these areas, it would be spread and levelled by tracked loaders and bulldozers. Where material is being deposited close to where it is excavated tracked loaders and dozers would be used to move the material to its fill location. The balance of these two methods would be determined by the contractor to suit their preferred working method.

2.13.34 Fill material will be placed in layers and compacted using a towed or self-
vibrating roller. Depending on the type of material, a sheepsfoot roller may be required. The precise type of compaction plant will be determined by the contractor.

2.13.35 It is proposed to construct a new access road following as close to existing access tracks for as long as possible whilst ensuring an alignment that is suitable for the delivery of the transformers and reactors. This will also have to try and avoid the areas of blanket bog, which are unlikely to be suitable for access road construction.

2.13.36 All substation buildings would be constructed on reinforced concrete foundations or piles where ground conditions dictate. Modular pre-fabricated units will be brought to site on the back of a lorry and installed on a pre-prepared reinforced concrete foundation by use of a crane or lorry mounted crane. Where multiple units are involved the units will be bolted together and any weatherproofing and services connections required at the joints installed.

2.13.37 For a purpose built building a reinforced concrete foundation will be constructed. This will be designed to accommodate the many cables that will have to come into and out of the building and for the installation of raised computer flooring in some of the rooms. The method of construction will be similar to that for the bunds and foundations described elsewhere. Steelwork will be brought to site fabricated ready for erection. It will be erected using cranes with operatives in hoists (cherry pickers) to gain access to bolt it together. Once the steel frame is erected, the roof panels will be installed again using a crane and operatives in hoists. This will be followed by the wall panels using similar methods. Completion of the cladding will involve the installation of flashings and trimmings to complete the weatherproof envelope. The foundations for electrical switchgear would generally be of a ‘top hat’ construction. This would involve a large block of reinforced concrete below ground, with only a plinth large enough to accommodate the equipment support structure visible above ground level.

2.13.38 Other site foundations would be sized to suit what is to fit on them and the loads to be transferred to the ground.

2.13.39 Prior to bringing Bryngwyn Substation into service, commissioning tests would be undertaken. Following successful testing, the substation would be connected to the electricity transmission system.

**Eastern and Western SEC and Tee-in Point at Berghill**

2.13.40 At each SEC topsoil would be removed and a clean and stable working platform established for the development. Construction of concrete foundations for some of the electrical equipment would be undertaken, including installing troughs for the underground cable connections. A series of earth tapes or an earth grid would be installed below the ground to create an ‘earth mat’ making each SEC electrically safe. The SEC support structures and electrical equipment would then be erected. Prior to the SEC being brought into service, commissioning tests would be undertaken. Upon completion of the works temporary site installation facilities and working areas would be removed and the soil replaced.

**Shrewsbury Substation**

2.13.41 For works at the existing Shrewsbury Substation, construction activities would typically be similar to those outlined above for Bryngwyn Substation but on a smaller scale, with the removal of topsoil construction of foundations and installation of an earth grid prior to the installation of substation equipment.

2.13.42 All substation buildings would be constructed on reinforced concrete foundations or piles where ground conditions dictate. Modular pre-fabricated units will be brought to site on the back of a lorry and installed on a pre-prepared reinforced concrete foundation by use of a crane or lorry mounted crane. Where multiple units are involved the units will be bolted together and any weatherproofing and services connections required at the joints installed.

2.13.43 Other site foundations will be sized to suit what is to fit on them and the loads to be
transferred to the ground.

2.13.44 Prior to bringing Shrewsbury Substation into service, commissioning tests will be undertaken. Following successful testing, the substation would be connected to the electricity transmission system.

2.13.45 Two accesses are proposed during the construction period. One of these is the existing substation access, the other would be from the same public road entering the substation from the east.

**Associated Works**

**Transhipment Areas**

2.13.46 An area of land would be required to move the SGTs from one vehicle to another (known as transhipment). Each of the five transhipments would be undertaken on a separate day, approximately eight weeks apart over a period of approximately eight to ten months. This would be scheduled in accordance with the construction timetable for Bryngwyn Substation.

2.13.47 Two greenfield options have been identified and have been subject to an initial assessment to date. These are located off the B4385 between Welshpool and Llanfair Caereinion (approximately 7km west of Welshpool), and off the A458 approximately 3km north-west of Llanfair Caereinion. These locations are shown on Figure 13.7. Other options, including existing brownfield sites that may be suitable as transhipment areas, are currently being investigated as possible transhipment areas along the route.

2.13.48 The transhipment operation would require use of a mobile crane to move the AIL from one vehicle to the other. The transhipment area would need to withstand very heavy loads and the currently identified greenfield sites would require addition of infill material to stabilise the ground to a suitable standard. Temporary site lighting, welfare provision are also anticipated to be required. These areas would also require erection of temporary fencing, e.g. Herras or similar and soil stripping and storage.

2.13.49 The onsite facilities and equipment would only be required for short periods during transhipment operations. However these areas would need to be available for use if required for approximately five years to include a commissioning period for the substation.

**Other Associated Works**

2.13.50 A number of other associated works would be required during construction and operation of the proposed development. These include:

- Temporary masts and supports for overhead line construction – may be required at Tee-in Point at Berghill to enable the existing ZZK pylon to be replaced;
- Scaffolds – used adjacent to transport routes (roads, railways, canals and footpaths) to ensure the safe fitting of conductors (wires) to the overhead line;
- Minor modifications to the highway network – required to enable the transportation of material to construction sites; coppicing of hedgerows; temporary removals of street furniture to allow passage of material; and
- Construction storage and working areas – temporary locations to store plant and equipment during the construction phase of the project, sites will typically include construction offices, car parking and fencing.

2.13.51 Many of the above associated works can only be identified during the emergence of a final design, which will take place following the current Section 42 consultation. Further details of these works would be therefore be provided in the ES to accompany the application(s) for development consent.

**Maintenance and Operation**
2.13.52 The overhead line would be subject to annual inspection from the ground or every five years by helicopter fly through. The inspection would identify if there are any visible faults or signs of wear and can also indicate if changes in plant or tree growth or development have occurred which may risk infringing safety clearances. Inspections would confirm when refurbishment is required.

2.13.53 The overhead line would be made up of a variety of materials, from concrete, cast iron and steel for the foundations, steelwork for the pylon and aluminium alloys for the conductors. All these materials have an expected lifespan, which varies depending on how the overhead line is used and where it is located. Typically, pylons have a life expectancy of approximately 80 years, the conductors have a life expectancy of 40 - 60 years and the insulators and fittings have a life span of approximately 25 years. Where necessary, refurbishment work would be undertaken typically on one side of the pylon and then the other, so that one side can be kept ‘live’ and in use.

2.13.54 The connection may be refurbished at various times in its operational life. Refurbishment can involve:

- The replacement of all the conductors, fittings and earth wire;
- The replacement of insulators and all the fittings on the conductors and insulators in place; and
- Painting the pylon steelwork.

2.13.55 During refurbishment there would be activity along the overhead line, particularly at tension pylons where the new conductor is installed and the old conductor taken down.

2.13.56 Vans would be used to carry workers in and out of site and trucks would be used to bring new materials and equipment to site and remove old equipment. Temporary works including access routes and scaffolding to protect roads would be required as for construction. Replacing the conductors would require scaffolding to protect roads etc. Mobile Elevating Working Platforms (MEWPs) would be also be required for a T-pylon. The type i.e. tracked or normal would depend on the ground conditions, time of year and the nature of the works to be undertaken.

**Decommissioning**

2.13.57 Decommissioning of the proposed development may take place where assets are no longer required for operational purposes. The following paragraphs set out the envisaged scope of decommissioning works for the different components. For the purposes of this PEIR and future ES it is considered that in a worst case, effects on the environment as a result of decommissioning would be equal to the initial construction. It is anticipated that decommissioning would involve many of the activities associated with construction, for example provision of access points and haul roads and associated traffic movements for the removal of equipment as outlined below. In reality, however, it is unlikely that this worst case (i.e. equal effects of decommissioning to that of construction) would be realised as, for example, many foundations are likely to be left in situ resulting in overall fewer traffic movements. The substation may be dismantled and removed, leaving only the foundations in place.

2.13.58 If the connection is no longer required, the overhead line may be removed. Upon removal much of the material would be taken for reuse or recycling. Similar access would be required as outlined for construction. Fittings, such as dampers and spacers, would be removed from the conductors. The conductors would be cut into manageable lengths or would be winched onto drums in a reverse process to that described for construction. Scaffolding would be used to protect areas of land as in construction. The fittings would be removed from the pylons and lowered to the ground. The likely principal difference between construction and decommissioning would be that pylon foundations are likely to be removed down to a depth of approximately 1.5m. However a decision as to whether
foundations would be left in the ground would be made at such time in the future and would also take account of land owner wishes and well as environmental issues.

2.13.59 Each pylon may be dismantled by crane, with sections cut and lowered to the ground for further dismantling and removal from site. Depending on the space available, it may be possible to cut the pylon at the base and then pull the pylon to the ground using a tractor. The pylon can then be cut into sections on the ground.

2.13.60 The SECs would also be dismantled and removed and, depending on type, the foundations either taken out or left in situ (deep foundations would be left, but mass foundations removed). The tee-in connection would also be removed.

2.13.61 Underground cables are likely to be removed. Cable removal would require access roads to facilitate this and these would be removed once the cable had been recovered. Access roads would be restored unless the landowner/farmer wanted it to remain (subject to appropriate permission for the change of use from temporary to permanent). Joint bays and other locations of reinforced concrete would be left in situ, although all surface features associated with the cable i.e. link box pillars and perimeter fencing would be removed. A decision as to whether cables would be left in the ground or removed would be made at such time in the future. Where relevant, each topic area will address the extent to which the effects are reversible.

3. ALTERNATIVES AND PROJECT HISTORY

3.1 Introduction

3.1.1 This section describes the project history and consideration of the main alternatives to the proposed development since the beginning of the Project. It outlines the main alterations to the proposed development as it has evolved, following previous consultation phases and work by National Grid, and the main reasons for the development as proposed at this stage.

3.1.2 The proposed development has been developed in stages with an assessment of alternatives carried out throughout each stage. The previous project stages have been subject to and informed by informal public consultation:

- **Stage 1 – Identification of Strategic Options – Spring 2011** - This stage developed and assessed strategic options that would meet the identified need, including an assessment of alternative technologies and selection of the option to take forward.

- **Stage 2 – Selection of Substation Siting areas and Route Corridor – Spring 2012** - A Route Corridor and Substation Siting Study was undertaken to identify substation siting areas, connection points on the existing 400 kV overhead line in Shropshire and route corridors between these locations. The studies assessed how the options performed against factors including National Grid's statutory environmental obligations and guidance provided by the Horlock and the Holford Rules.

- **Stage 3 – Draft Route and Preferred Substation site – Summer 2013** - The draft route and substation siting study, outlined in the Draft Route Report and Preferred Substation Site Report, identified a draft route within the preferred route corridor and substation sites to develop the connection detail. The Draft Route Report also identified a section of underground cable in the more sensitive areas of the Vyrnwy Valley around the village of Meifod.

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8 [http://nationalgrid.opendebate.co.uk/files/Mid-Wales_Draft_Route_Report.pdf](http://nationalgrid.opendebate.co.uk/files/Mid-Wales_Draft_Route_Report.pdf)

9 [http://nationalgrid.opendebate.co.uk/files/Mid-Wales_Substation_Site_Report.pdf](http://nationalgrid.opendebate.co.uk/files/Mid-Wales_Substation_Site_Report.pdf)
Stage 4 - Proposed Connection Alignment – September 2013 to present - Based on the preferred draft route and substation site a detailed proposed connection alignment, substation, Sealing End Compounds and a Tee-in Point were identified. This stage of the Project is now the subject of formal public consultation.

3.2 Need Case

3.2.1 National Grid has a statutory duty to connect new energy generation to the national electricity transmission network. The Project Need Case\(^\text{10}\) (March 2011, updated July 2012) sets out why the proposed development which National Grid is proposing to undertake is needed.

3.3 Stage 1 - Identification of Strategic Options

3.3.1 A Strategic Options Report\(^\text{11}\) and Strategic Options Report Update\(^\text{12}\) (March 2011 and July 2012) identified potential connection options for the Project. That appraisal considered the location of the required connection\(^\text{13}\), technology, National Grid’s statutory obligations and also the location of existing high voltage electricity transmission infrastructure into which the Project could connect.

3.3.2 This report recommended a ‘hub’ marshalling substation to collect generation for onward transmission to the existing National Grid transmission network. A broad ‘area of search’ for a substation location was identified in Mid Wales for this purpose. The analysis considered a number of connection alternatives be provided from a Mid Wales marshalling substation to the existing transmission network. These included:

- To the north (into the Trawsfynydd and Deeside/Legacy circuits);
- To the south (by connecting into the Swansea North, Rassau and Walham circuits); or
- To the east (by connecting into the Legacy, Ironbridge and Bishops Wood circuits), as shown below.

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\(^{10}\) [http://www.nationalgrid.com/NR/rdonlyres/84A59E0B-4448-4228-97F7-E7D887886A5E/55270/NeedCase.pdf](http://www.nationalgrid.com/NR/rdonlyres/84A59E0B-4448-4228-97F7-E7D887886A5E/55270/NeedCase.pdf)


\(^{13}\) [http://www.spmidwalesconnections.info/english/](http://www.spmidwalesconnections.info/english/)
3.3.3 A fourth option outlined in the Strategic Options Report Update considered a sub-sea connection connecting into the potential North Wales (Anglesey) to South Wales (Pembrokeshire) High Voltage Direct Current (HVDC) connection.

3.3.4 The strategic appraisal also identified alternative technologies to achieve the required connection, which included overhead lines, underground cables, high voltage direct current cables / overhead lines and gas insulated lines. Alternatives options were discounted based on an appraisal of major environmental designations (such as National Parks and Areas of Outstanding Natural Beauty) and technical criteria.

3.3.5 Providing a connection to the east (Shropshire) from a marshalling substation in Mid Wales (Powys) at high voltage (400 kV) was identified as the preferred strategic option.

3.4 Stage 2 - Substation Siting Areas and Route Corridors

3.4.1 The Route Corridor and Substation Siting Study\(^\text{14}\) (March 2011) identified potential route corridors and options for substation site areas for the preferred strategic option. Based on National Grid’s technical requirements and obligations, environmental features and designations a number of potential routes and substation siting areas within a wide search area (as shown below) were identified.

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3.4.2 The 2011 Route Corridor and Substation Siting Study identified and evaluated alternative substation siting areas and broad route corridor options. Factors which influenced the identification of substation siting areas included: accessibility, topography, flood zones, ecological and environmental sensitivity; additional space for landscaping; visual amenity potential effects on recreational activities/tourism; and potential for screening.

3.4.3 The study identified the two preferred substation siting areas, at Cefn Coch and Abermule, which merited further appraisal and ten route corridors all linking to the existing transmission network in Shrewsbury at Lower Frankton, Wigmarsh or Walford Heath, as shown below.
3.4.4 Consultation on the Strategic Options Report and Route Corridor and Substation Siting Study substation / corridor options commenced in March 2011.

Preferred Substation Siting Area and Route Corridor

3.4.5 The identification of a preferred substation siting area and route corridor was based on an appraisal of environmental; socio-economic and technical considerations. This appraisal was informed by consultation feedback received during public and stakeholder consultation in 2011, alongside ongoing studies of route corridor and substation options. A two step process was adopted, as below:

- **Step One**: identified a preferred 400 kV route corridor for each substation siting area; and
- **Step Two**: identified a preferred overall 400 kV and 132 kV connection option.
- **Step Two** considered two complete connection options, one for Cefn Coch and one for Abermule comprising:
  - preferred 132 kV routes from the windfarms to the substation;
  - the substation siting area itself; and
  - preferred 400 kV route corridor from the substation to the existing national electricity network.

3.4.6 An assessment was undertaken to compare the two options to identify the preferred connection. This assessment is contained within [The Selection of Preferred Connection](http://www.nationalgrid.com/NR/rdonlyres/DC97DCAA-A978-4292-B7E7-61827F57AB4D/55369/MidWalesStatementofPreferenceDraftJuly2012.pdf)
report (July 2012). The appraisal identified the substation siting area at Cefn Coch and the Red North route corridor (from Cefn Coch, via Llansantffraid, to Lower Frankton) as the preferred scheme for the proposed connection through Powys & Shropshire.

3.4.7 In addition to this preference, as a result of consultation feedback and National Grid’s own assessment of the route corridors, National Grid introduced a widened corridor east of Cefn Coch and a variation to the route corridor adjacent to the Vyrnwy Valley (through the Peniarth Valley) as alternatives to be considered in more detail, as shown below:

Figure 3.4 Alternative Route Corridor

Figure 3.5 Widened Route Corridor

3.4.8 Consultation on the preferred connection option and alternatives took place during the
summer of 2012.

3.4.9 Ongoing work and interim announcements - Winter 2012 - Spring 2013.

3.4.10 Following consultation feedback and more detailed assessment the alternative route corridor through the Peniarth Valley was discounted.

3.4.11 Due to landscape and visual sensitivities in the Vyrnwy Valley use of overhead line technology was also considered less likely. In September 2013 National Grid announced that the connection was proposed to be undergrounded in the more sensitive areas of the Vyrnwy Valley around the village of Meifod.

3.5 Stage 3 - Draft Route & Preferred Substation Site identified – 2013

3.5.1 Within the substation siting area at Cefn Coch, seven alternative substation sites were identified through further assessment within and to the east and west of the original siting area, as shown below:

Figure 3.6 Substation site options

3.5.2 National Grid assessed all alternative substation sites before selecting a preferred site. The assessment concluded that, on the balance of considerations, site NW, to the west of Cefn Coch, was preferred. The assessment and discounting of the alternatives sites is documented within the Preferred Substation Site Report17 (September 2013).

3.5.3 The Draft Route Report18 (Sep 2013) considered the routeing of a 100m wide corridor within which to develop the proposed connection from Cefn Coch (now known as Bryngwyn) to Lower Frankton, having regard to factors including consultation feedback, landscape and visual sensitivity, cultural heritage, ecological, biodiversity, geological, water resources, land-use and socio-economic, and technical considerations. A number of

17 http://nationalgrid.opendebate.co.uk/files/Mid-Wales_Substation_Site_Report.pdf
18 http://nationalgrid.opendebate.co.uk/files/Mid-Wales_Draft_Route_Report.pdf
alternative routes were considered and assessed as part of this process.

3.5.4  In addition a siting study was undertaken to identify the available options for the location of the new Tee-in to the existing Legacy - Shrewsbury – Ironbridge 400 kV overhead line. Chapter 9 of the Draft Route Report summarised the outcome of that Study. The proposed Tee-in location is now known as Berghill.

3.6  Evolution of Draft Route to Proposed Development, September 2013 to present

3.6.1  After the consultation in respect of the Draft Route in autumn 2013, further investigations were undertaken including engineering walkovers and environmental surveys, to further progress the proposals. This work informed the development of a ‘baseline alignment’ for the proposed connection and, for the overhead line sections, the detailed pylon siting.

3.6.2  The baseline alignment was developed by locating pylons and the underground cable broadly along a centreline of the 100m wide Draft Route, except where other factors lead National Grid to deviate from the centre line, having regard to environmental, land and engineering considerations. Consultation feedback received in respect of the Draft Route was considered to inform its development. Development of a baseline alignment allowed modifications and refinements to be made to the proposed connection as more detailed information became available.

3.6.3  Focused consultation on the baseline alignment was undertaken with landowners/occupiers. Feedback on the Draft Route and the baseline alignment included a number of requests from stakeholders and others for modifications. Such requests were received in respect of all elements of the project (e.g. overhead line / cable alignment, pylon locations, Bryngwyn substation, sealing end compound and access routes etc.) and were fed back to National Grid’s environmental and engineering teams and then considered across disciplines.

3.6.4  A preliminary review of each request was undertaken against engineering, environmental and land considerations. This ‘high level’ review assessed the feasibility of the request, and the requirement for additional assessment. If appropriate further engineering and environmental reviews assessed in more detail the implications of the proposed change.

3.6.5  Requests were received from external stakeholders, such as landowners, and potential changes were also identified from within National Grid in order to seek to take account of consultation feedback, or as a result of ongoing investigations. Whether a request for change was internal or external, the same review process was applied.

3.6.6  Due to the nature of overhead lines, any proposed changes to individual pylons may not be self-contained and have the potential to give rise to the possible need for consequential changes along the alignment. The engineering review therefore also assessed the wider implications of any proposed alterations, for example, whether additional pylons would be required, whether deviations in the alignment would be needed and / or whether additional installation and land/access works may be needed. These design implications were then also reviewed against environmental considerations and land requirements.

3.6.7  National Grid assessed whether accepting a proposed alteration to the alignment would, on the balance of relevant considerations, give rise to greater or lesser effects, when compared to the baseline alignment. As a result not all requests resulted in modifications.

3.7  Main Changes and Alternatives

3.7.1  The outcome of this review process is the proposed development, including the Bryngwyn Substation site, overhead line and underground cable alignments, Sealing End Compound locations and Tee-In Point at Berghill, which are the subject of this statutory consultation. The main changes and alternatives investigated are shown on a series of plans at Figure 3.7.
3.8 Bryngwyn Substation

3.8.1 The Preferred Substation Site Report (September 2013) identified site NW, to the west of Cefn Coch, as the preferred substation site. Following the identification of site NW as the preferred site, two ‘micro-sites’ were identified for further investigation; one immediately to the south-west of the Bryngwyn farm buildings and the other immediately south-east. The two micro-sites were identified based on a need for generally flat and level land for construction and operational reasons in order to accommodate both the 400 kV and 132 kV substation compounds, and facilitate the entry of the associated 132 kV and 400 kV connections.

3.8.2 The micro-sites were assessed on the balance of environmental and technical considerations. Four potential substation siting options within the general confines of the NW area were identified and assessed.

3.8.3 The first site (NW-N) assessed was located on fields immediately to the north of the Bryngwyn farm buildings. This site would have required significant earthworks to provide a level development area. Terracing of the site was considered, however this would have increased the site footprint which would result in further earth works. The associated environmental effects outweighed any potential benefit and meant the site was not preferred.

3.8.4 An alternative site (NW-SE) was located on the field immediately to the south-east of the Bryngwyn farm buildings. This area was comparatively flat and offered the potential to reduce earth works. However, the site was steeply sloped on its southern boundary. This site option was not preferred given the strong technical preference not to encroach into this slope. This would have had engineering implications with respect to the required cut and fill earth works and the subsequent constraints on substation positioning.

3.8.5 Further investigations identified that due to local topography the size of the substation compounds increased the difficulty of identifying a single location which could accommodate immediately adjacent ‘back-to-back’ compounds at the same or similar ground levels without extensive ground works. To reduce the required earth works the separation of the 400 kV and 132 kV compounds (with connection via 132 kV cable) was considered, which would allow them to be sited close together but not immediately adjacent and at different ground levels.

3.8.6 The main factor determining preference between sites is the quantity of earthworks required. This, when balanced against the findings of earlier micro-site assessments, resulted in the preferred site option being chosen as Site NW-SE/W, with the 400kV and 132kV compounds split between locations nominally south-east and west of the Bryngwyn farm buildings (predominantly due to the significant reduction in civil earth works that would be required).

3.8.7 At a site known as (NW-SE/W) National Grid investigated a split 400 kV and 132 kV substation configuration between locations nominally southeast and west of the Bryngwyn farm buildings, which reduced the required cut to fill earth works. The majority of groundworks would be associated with the 400 kV compound, due to the nature of the double busbar design, which led to an encroachment of the substation into the valley north of the south-east micro-site. An alternative technical option was assessed utilising a two-switch mesh design which utilised the same site configuration as set out above but with a two-switch mesh for the 400 kV compound rather than a double busbar design. The choice between a double busbar or 2-switch mesh design of substation would not change the proposed substation location as the same “split” site was preferred for either design.

3.8.8 The proposed substation is shown at Figure 2.3.
3.9 West Overhead Line Section – Bryngwyn to Dyffryn Meifod West

Bryngwyn Substation - Pylon 001 to 006

3.9.1 Two alternative locations for this section of the proposed connection were investigated in order to allow consideration of detailed siting and layout proposals for the substation (refer to Figure 3.7).

3.9.2 Based on a prospective substation location south of Bryngwyn an alignment to the south of the baseline alignment was investigated for this section. Pylon 001 was relocated to the south-west of its baseline position with subsequent alterations to pylons 002 to 006. The proposed relocation would have increased the distance of the proposed connection from a peat land habitat at this location, potentially improved pylon access and safeguarded access to a farm. In this configuration pylons 002 to 006 would have traversed the (watercourse) stream towards the property Gwaenydd and two additional pylons, including a larger angle pylon, would have been required.

3.9.3 The alternative alignment would have moved the proposed connection onto sloping topography near to the watercourse. Hillside extensions would have been required which would have increased the construction complexity including more significant earthworks and greater likely visual effects on the landscape.

3.9.4 A second alternative alignment sought to eliminate the need for hillside extensions by relocating all of pylons 001 to 006 south of the watercourse. This configuration would require two additional pylons, including an angle pylon.

3.9.5 Both alternatives were discounted due to the likely increase in landscape and visual effects and the need for more complex and invasive engineering works to ensure slope stability on difficult topography.

3.9.6 Subsequent investigation identified the preferred substation location at Bryngwyn.

3.9.7 The baseline alignment was therefore broadly maintained with minor alterations to pylon positions to balance and optimise span lengths leading to the proposed positions of pylons at 001A-007A. In order to connect the first pylon to the substation two additional pylons are required to the south (SS1 and SS2). The proposed locations of SS1 and SS2 have been sited for use with a low height lattice pylon option. In respect of the T-pylon option the proposed locations of the pylon would differ slightly from the lattice equivalent. An illustration of this can be seen in the detailed design plans.

Pylon 007 to 012

3.9.8 Alternatives in this section sought to address requests to improve access to pylons, in particular pylon 007, increase the distance from the Red Ridge Centre, minimise views of the proposed connection from properties and make use of natural screening.

3.9.9 More northerly pylons positions were investigated. To the north of pylon 012 engineering and environmental constraints including poor ground conditions and an existing pool were identified. Relocating pylon 012 to the north of its baseline position would also lead to the overhead alignment over-sailing a belt of mature trees along the edge of the managed forest at Foel Fawr. This alternative location was assessed as more sensitive than the baseline alignment position with respect to ecological considerations.

3.9.10 Based on the above considerations pylons 008 to 011 were relocated at more northern locations than the baseline positions as a result of moving pylon 007 - in order to avoid a sharp deviation along the connection profile, minimise views of the proposed connection from properties to the south and making better use of natural screening. Pylon 012 was retained in situ at its baseline location. Minor re-siting of pylons in this section was required to balance and optimise span lengths leading to pylon positions 007A to 011A. This increased the distance from the nearest properties at the Red Ridge Centre and Dolytardyn Fawr.
Pylons 023 to 034

3.9.11 This section of the connection was the subject of numerous requests which gave rise to an investigation of alternative alignments, some of which fell outside the Draft Route corridor. Alternative alignments sought to increase the distance from a footpath (PRoW) and reduce adverse landscape and visual effects on existing properties at Llety and Nant Melin-Y-Grug by making use of natural screening and topography. Ecological features, such as ancient woodlands, were also considered.

3.9.12 Alternative pylon positions were investigated to the north of the Draft Route corridor. Pylons 023 to 026 were proposed to be relocated on an alignment to the north and west of Llety (a property). To the north of Llety subsequent pylons were directed north-eastwards to return to the draft route corridor and baseline alignment.

3.9.13 This potential northern realignment moved the proposed connection in close proximity to a derelict property. This realignment would have also led to pylons being located on higher ground and would have resulted in a sharp deviation of the connection. This sharp angle would render the use of low height pylons as not technically feasible and would require a bulkier tension pylon, compared to a typical low height pylon. Based on the above a northern relocation was discounted.

3.9.14 The position of pylon 026 was relocated behind mature trees at a more southerly location (026A) in order to reduce visual impact, increase screening and eliminate tree loss. Pylons 024 and 025 were consequently relocated southwards to maintain a smooth alignment profile. The alternative locations of pylons 024A to 026A were assessed as less sensitive given the drop in levels and screening from existing belts of mature trees at the more southern locations.

3.9.15 Pylon 030 was relocated to a more northerly location (30A) in order to avoid as much as possible effects on mature trees and benefit from natural screening from the woodland and increased distance from the Ceunant property. The locations of pylons 031A to 033A allowed a straight profile to be maintained towards pylon 034.

3.9.16 The above changes led to the proposed connection alignment whereby Pylon 023 was retained at its baseline position, pylons 024A to 033A were relocated to reduce tree clearance and maintain a straight profile to connect to pylon 034 which was also retained at its baseline position to allow the optimum crossing of the A458.

Pylons 042 to 048

3.9.17 This section of the draft route is significantly constrained by mature trees.

3.9.18 A more southerly realignment to the baseline position was investigated in order to reduce farming disruption, tree clearance whilst ensuring the required statutory clearances along the proposed connection. In addition the realignment sought to ensure a smooth profile was maintained in connecting to the proposed West SEC location. Alternatives were restricted by woodland near to pylons 044 to 046 and the proposed West SEC location.

3.9.19 A more southerly alignment reduced tree clearance at the woodland. Relocating pylon 046 to the south also reduced visual effects on the farm at Tyn Rhos.

3.9.20 When the proposed West SEC location was confirmed to be to the south of the river (Yr Hafesb) pylon sites south of their baseline positions were proposed in order to connect to this location whilst maintaining a smooth profile and ensuring span lengths were optimised. Following further engineering investigation pylon 048 was replaced with a gantry (048A). An additional gantry was also required (048i) adjacent to 048A to facilitate connection to the proposed West SEC.

3.9.21 This alternative alignment reduced tree clearance and was assessed as less sensitive from a landscape and visual perspective as well as a socio-economic perspective due to the reduced effect on farming practices, as the pylon sites were located closer to field boundaries. The alternative alignment was assessed as less sensitive than the baseline
alignment from a flood risk perspective as the pylons are not within areas exposed to significant flood risk.

3.9.22 The above investigation led to the baseline pylon positions changing to the proposed pylons positions 042A to 048A.

3.10 West Sealing End Compound

3.10.1 The Draft Route Report at Chapter 19 identified options for sites for the cable sealing end compounds at the western and eastern ends of the underground cable route and summarised the outcome of the assessment of those options. The proposed West SEC site is shown at Figure 2.4.

3.10.2 Since September 2013 more detailed investigations have been undertaken resulting in proposed locations being identified for both the sealing end compounds.

3.10.3 Following an initial assessment of potential SEC site options the Draft Route Report identified a refined search area for further consideration incorporating Site Options WA, WB, WC and WF as shown at Figure 3.10. This area encompassed land on either side of the A495 at the point where it crosses the B4382.

3.10.4 The assessment concluded that the south-western corner of the refined search area (around Site Option WF) was the preferred option for a SEC. Being north of the A495 a SEC in this area would not require an overhead line crossing of the road, which would assist in reducing potential effects on landscape and views along the A495 tourist route. It would reduce the length of overhead line connection required, could be sited outside Floods Zones 2 and 3, and would allow access to be taken directly off the A495, therefore avoiding use of narrower local roads for construction.

3.10.5 Due to its low lying elevation most views to a SEC in this location would be from within the Yr Hafesb Valley and potential views from higher ground are likely to be distant. There are some properties nearby, but due to local landform and vegetation, views of the SEC would be partially screened and visibility could be minimised further through careful siting.

3.10.6 A SEC in the area around Site Option WF could have a slight adverse effect upon the setting of the Pentre Camp hillfort Scheduled Ancient Monument. The effects are however anticipated to be less than if siting in the area south of the A495 around Site Options WA, WB and WC due to the greater intervening distance and the connection being fully underground past the Pentre Camp hillfort.

3.10.7 Other options considered across the refined search area were either discounted or assessed as being less preferable overall taking into account the balance of environmental and technical considerations.

3.10.8 Alternative sites north of the A495 were considered to avoid an overhead line crossing of the A495. These options were preferred in ecological terms, but would require significant earthworks and civil engineering to create a suitable level site for a SEC outside of flood zones. These options would also be more visible than on lower and flatter ground around Site Option WF. In the north-east of the refined search area the presence of woodland (including some ancient woodland) would necessitate the removal of a significant amount of trees for cable construction. The topography in the north of the refined search area also presents considerable difficulties gaining access to a site for construction.

3.10.9 Alternative sites south of the A495 were also considered. Land immediately south of the road falls within indicative Flood Zones 2 and 3 associated with the Yr Hafesb, including land within Site Option WB. In addition to potential flooding issues, the majority of the eastern corner of the refined search area (east of Site Option WB) is constrained by a further area of ancient woodland. Land located between Site Options WB and WF is

19 http://nationalgrid.opendebate.co.uk/files/Mid-Wales_Draft_Route_Report.pdf
constrained by topography with the landform rising steeply up from the flood zone making this area unsuitable for construction of a SEC.

3.10.10 Potential SEC sites further south (around Site Options WA and WC) were assessed which would avoid potential conflicts with the flood zone. These were considered likely to have greater potential effects on landscape character and views particularly in views from the north and north west. As the overhead line would be required to cross the A495, there would also be greater effects on road users. The roads required for construction access in this area are narrow. Typically they have trees and hedgerows to either side which may require removal to facilitate the construction of the underground cable and for any works needed to widen roads or improve junctions. Additional technical considerations for sites south of the A495 included the need to cable across steeply sloping and undulating ground, the requirement for significant earthworks to facilitate a level site in some areas (around Site Option WA) and an additional stream crossing not required for sites to the north.

3.10.11 With respect to the West SEC connection design a number of options were considered.

3.10.12 A large L8 type terminal pylon measuring c.48m in height would be required to terminate a overhead line without utilising full tension gantries. National Grid initially investigated the use of an L8 terminal pylon with either anchor blocks or a gantry to connect to the West SEC. On balance the use of an L8 terminal pylon was assessed as having a greater visual effect on its surroundings owing to the increased height and was therefore discounted.

3.10.13 It is proposed to terminate the overhead line and connect to the SEC using full tension gantries. Full tension gantries eliminate the technical requirement for an L8 terminal pylon, are lower in height and are assessed as giving rise to lesser visual effects in respect of surrounding views. The increased width of the gantries which are sited side by side is likely to require increased tree clearance when compared to an L8 terminal pylon, however given the reduction in height and potential for additional planting, on balance the proposed use of full tension gantries is considered beneficial in environmental terms.

3.11 Underground Cable Section

3.11.1 In parallel with developing the baseline underground cable alignment, a location for the West SEC was being investigated. The identification of the proposed West SEC meant further investigation was required to extend the baseline cable alignment to connect to the West SEC site. The proposed cable alignment is shown at Figure 3.8.

3.11.2 Two alternative routes between the proposed West SEC location and the A495 junction were identified. An alignment was initially investigated which travelled in a south east direction from the proposed West SEC, under the A495, and then continued north eastwards to the B4382. It then crossed the B4382 directly south of a small chapel and continued north east through fields to the A495. This alignment option would extend across a few underground services present.

3.11.3 It was identified however that this potential realignment of the baseline cable alignment was potentially more technically complex and would have involved greater civil engineering works very close to the river and the highway. In addition this realignment would have encountered steep inclines which would have caused construction difficulties. Greater civil engineering works would have been required to stabilise the ground and ensure that the cables remained secure. The potential realignment would also have put the proposed connection in closer proximity to a chapel and would have required the clearance of very large mature trees.

3.11.4 Subsequently a further alternative alignment was identified which would travel a distance of approximately 300m from the proposed West SEC site in a north-easterly direction to the junction of the A495/ B4592. The realignment travelled to the south-east and ran parallel to the A495. Significant programme benefits were identified with this configuration which
required a shorter cable length and reduced vegetation loss and land-take. The route traveled across generally flat terrain and avoided adverse topography found at the initially investigated alternative location.

3.11.5 At the A495 at Tan House no practicable alternative was identified. The proposed solution in this area of the connection is to route predominantly within the carriageway of the A495. Installing in the highway offers a shorter connection, reduces potential tree loss and minimises potential effects on agricultural land. It is likely to result in a temporary road closure while the cables are installed. During this time, access will be maintained for local residents and to all affected properties and land.

**Mathrafal**

3.11.6 In this area the baseline alignment would have disrupted a 3m high earth mound immediately north east of Pontrobert Road, which is understood to be a probable glacial deposit.

3.11.7 The baseline alignment was therefore moved in the vicinity of Pontrobert Road to better avoid the 3m high earth mound to the north east. After consideration of the engineering implications, a length of 900m of the cable was further realigned in order to avoid acute bends in the connection and follow a field boundary.

**Meifod**

3.11.8 In this area the baseline alignment required the installation of the cable through the flood bank which is challenging from an engineering perspective. Two alterations were considered to seek to avoid this requirement. In addition the baseline alignment encroached on two ponds.

3.11.9 An alternative alignment was therefore investigated which moved the connection to land between the River Vyrnwy and the flood bank. The alternative realignment also passed the two ponds centrally. This is beneficial in engineering and environmental terms and is therefore proposed in this section.

3.11.10 In the area directly east of Meifod the baseline alignment crossed a stream at three locations and also passed within 100m of nine residential properties.

3.11.11 In response to this, the connection was realigned approximately 75m east of the baseline alignment eliminating two stream crossings and associated tree clearance. The realignment moved the proposed connection a further 75m away from the residential properties at Meifod and avoided three low voltage overhead line crossings. The realignment is of a similar length when compared to the baseline alignment. Avoiding the watercourse crossings and overhead line crossings would lead to programme benefits. Furthermore moving away from properties benefits residents and this alteration is therefore proposed in this section.

3.11.12 Immediately to the south of Bron-y-Maen farm and adjacent to the A495 the baseline alignment encroached on approximately 400m of overhead line which would have required diverting in order to facilitate the installation of the underground cable. Site visits also identified that the area adjacent to the A495 is a low point in the land and was observed to pond with standing water.

3.11.13 The baseline alignment was therefore moved approximately 150m to the south-east. This alternative shortened the cable length and reduced the likely necessary vegetation clearance by making better use of existing “gaps” in the hedgerow. This option also provides programme benefits and is therefore proposed in this section.

3.11.14 Directly north-east of Bron-y-Maen farm the baseline alignment would have passed two fields containing a large linear pond which are susceptible to water-logging. An alternative considered was to move the baseline alignment approximately 100m south to avoid these fields, also eliminating the need for low voltage overhead line diversions. The length of the relocated connection remained similar but allowed for programme benefits based on the
reduction of work required within the flood plain and is therefore proposed in this section.

3.11.15 Routing the cable directly adjacent to the road in this section was considered but discounted as it would have resulted in longer cable length and would potentially have encroached upon the route of approximately 1km of a low voltage overhead line which would have needed diverting.

Maen Farm

3.11.16 At Upper Maen Farm the baseline alignment would have passed through a pond to the south-east of the farm. The baseline alignment was therefore moved approximately 50m to the south-east. The baseline alignment was further amended over a length of 500m to the south-west approach to the pond to eliminate acute radii20 which is less desirable for installing cable.

3.11.17 Following this alteration, the proposed alignment was approximately 100m closer to the River Vyrnwy, however it remained more than 30m from the river. There is little difference with respect to vegetation loss between the alternatives.

Lower and Middle Maen Farm

3.11.18 Between Lower and Middle Maen farms the baseline alignment would have passed within close proximity to an existing watercourse. Further investigation identified this location to be a low point of the flood plain and likely to generate high overland flood plain flow velocities during times of flood. The connection was therefore realigned to the south east (by approximately 100m) to benefit from higher ground. The alternative alignment would position the proposed connection approximately 100m closer to the River Vyrnwy, however the recommended minimum distance from the river is maintained and flooding implications are lowered given the marginally higher ground. The length remains similar to the baseline alignment and vegetation loss would also be similar when both options are compared.

Ystum Colwyn

3.11.19 The baseline alignment would have crossed a small watercourse (Ceuant Mawr) which is bordered by mature waterside trees approximately 150m west of the Fferm Bungalow. The alignment was therefore moved at the watercourse approximately 10m north-west to reduce mature tree loss. The change was identified as not resulting in a significant difference to the cable length or in flood risk/drainage.

3.11.20 A proposed realignment initially moved the connection directly north of the Fferm and extended the connection to the proposed East SEC location. However this would have required a significant increase in cable length and was discounted.

3.11.21 The identification of the proposed East SEC location meant the connection was subsequently moved to the south of Fferm and north-eastwards towards the proposed SEC site. The realignment resulted in no significant difference with respect to flood risk/drainage (both alignments would be outside the flood plain) and reduces the length of cable required.

3.11.22 Moving the connection 100m south-east from the baseline alignment where it crosses the A490 to the south east of Ystum Colwyn Farm was also investigated. However this would have led to a longer cable length. In addition, moving the connection closer to the River Vyrnwy was also investigated, but discounted due to the more difficult terrain, such as steeper slopes, greater vegetation loss and proximity to the River Vyrnwy.

3.12 East Sealing End Compound

3.12.1 Following an initial assessment of potential SEC site options the Draft Route Report21

20 Sharp deviation in the cable position
21 http://nationalgrid.opendebate.co.uk/files/Mid-Wales_Draft_Route_Report.pdf
identified a refined search area for further consideration incorporating Site Options EF and EF1 as shown at Figure 3.11. This area comprised relatively flat grazed pasture land adjacent to the A495 to the north-east of the A490/A495 junction close to a small tributary valley of the River Vyrnwy. The nearest properties lie approximately 250m to the south-west at Fferm.

3.12.2 Additional assessment concluded that broadly the centre of the refined search area (between Site Options EF and EF1) was the preferred option for a SEC. This location is proximate to the River Vyrnwy and associated vegetation and is better screened by existing trees which would assist in reducing potential effects on landscape and views along the A495. The centre of the search area is within Flood Zone 2 (associated with surface water flood risk from a ditch at the centre of the search area) and Flood Zones 2 and 3 (associated with the River Vyrnwy) are present adjacent to the eastern and southern edges of search area. The SEC search area had good potential.

3.12.3 A potential site to the north of the refined search area (around Site Option EF) was considered. This site is situated to the east of the A495 at a slightly steeper, more elevated and visually prominent position than the south of the refined search area (around Site Option EF1), with an open southerly aspect and which slopes gently down to the River Vyrnwy. This site is not located within areas of flood zone however its sloping nature means a levelling of the land would be required.

3.12.4 Views of this area are to the south and east and along the A495. There is also the potential for views along the Vyrnwy Valley to the north-east and along higher ground to the south and south-west. A SEC in the north of the refined search area would be more visible and proximate to the A495 and more grading of the land would be required. Whilst there is some potential to lessen the visibility of this area through perimeter mounding supplemented by deciduous screen planting, extensive planting to screen views would not be consistent with the local landscape character.

3.12.5 A potential site to the south of the refined search area (around Site Option EF1) was also considered. This area is below site option EF and is flatter and its proximity to the River Vyrnwy and associated vegetation would help screen it on three sides. At this position a SEC and overhead line connection would be positioned slightly lower down in the valley and further away from the A495 than the area to the north. However the indicative Flood Risk Zone 2 extends across half of the field around Site Option EF1.

3.12.6 The north and south of the search area were assessed and discounted as being less preferable overall to the centre of the search area taking into account the balance of environmental and technical considerations. A less prominent central location addresses the landscape and landowner preference to locate the SEC as close as practicable to the River Vyrnwy. The proposed SEC should not adversely affect the existing trees which would provide screening.

3.12.7 With respect to the East SEC a number of design options were investigated.

3.12.8 A large L8 type terminal pylon measuring c.48m in height would be required to terminate the overhead line without utilising full tension gantries. National Grid investigated the use of an L8 terminal pylon with either anchor blocks or a gantry to connect to the East SEC. On balance the use of an L8 terminal pylon was assessed as having a greater visual effect on its surroundings owing to the increased height and was therefore discounted.

3.12.9 It is proposed to terminate the overhead line and connect to the SEC using full tension gantries. Full tension gantries eliminate the technical requirement for an L8 terminal pylon, are lower in height and are assessed as giving rise to lesser visual effects in respect of surrounding views.

3.12.10 The proposed design utilises a gantry and a terminal pylon both positioned to the west of the river to interface in close proximity to the SEC. The design reduces the development area required by the proposed connection and potentially allows for an existing gap in
vegetation adjacent to the river to be utilised. Some lopping of trees may be required; however, tree removal is not anticipated. The design is considered to be more compact and beneficial in technical and ecological terms; with respect to potential effects to trees.

3.12.11 The proposed East SEC site is shown at Figure 2.6.

3.13 East Overhead Line Section

3.13.1 An alternative to the baseline alignment, along a more northern trajectory, outside of the Draft Route, was investigated and discounted due to landscape and ecological sensitivity. A more northern alignment would have led to additional crossing points of the River Vyrnwy and would have given rise to greater views of the proposed connection from the north, particularly for users of the A495 south, as identified in the Draft Route report. The baseline alignment to the south of the river within the Draft Route was therefore broadly maintained.

3.13.2 Pylon 049 was relocated (049A) following identification of the East SEC site. Consequently, pylon 050 (050A) was relocated to the east to maintain a smooth alignment profile, better avoid the flood risk zone (FZ3) and locate the pylon closer to the field boundary. A minor relocation of angle pylon 051 (051A) was implemented at this location, such that it would be moved away from the hedgerow. Minor changes were made to the baseline positions of pylon 52 and 53 (052A and 053A) to maintain a smooth profile. The proposed alignment would cross the River Vyrnwy at approximately the same two locations as the baseline alignment, which was identified as most beneficial from an ecological perspective.

3.13.3 Pylon 056 (056A) was relocated approximately 20m north-east of its baseline position so that it would benefit from being sited on ground at a higher elevation, thereby reducing the risk of flooding presented at lower levels. The proposed cable alignment at pylons 049A (and 049i) to 056A is shown on Figure 3.7.

3.13.4 Trederwen Spring is located approximately 210m from the baseline location of pylon 063. An alternative alignment was investigated to reduce potential effects on Trederwen Springs.

3.13.5 Pylons 062A and 063A were relocated to the north of their baseline positions, outside of the draft route corridor, to maintain a 250m stand-off distance from the current Trederwen Springs water extraction point. Pylon 064A was relocated broadly to its baseline position in order to seek to reduce potential effects on Trederwen Springs and also reduce views from the sensitive Llanymynech landmarks to the north. This proposed alignment avoided the need for additional pylons. Alterations were also made to the proposed pylon locations to reduce tree clearance, maintain a smooth profile and balance span lengths.

3.13.6 More northerly locations were initially investigated. However, this led to the increased potential for effects on a Geological Conservation Review site and palaeo-channels located to the north and east of this location. Furthermore, a more northerly alignment would have brought the proposed connection into closer proximity to a heronry, caravan parks, Carregfofa Heritage Locks, Llanymynech and Llanymynech Hill Fort to the north. The Hill Fort in particular is afforded long distance views to the south. Potential effects of a more northerly alignment on Llanymynech Hill are outlined in the Draft Route Report (paragraphs 10.2.11-12; 10.4.1 and 15.3.1).

3.13.7 The proposed route at pylons 061A to 064A is shown on Figure 3.9.

3.13.8 In this section pylon 067 was relocated to move the connection to a more southern trajectory in order to increase the distance from, and reduce views from, the property
Pentref, as well as reducing tree clearance. An additional pylon, 066i, would be required between pylons 066A and 067A to achieve this more southerly alignment. However this allowed the removal of pylons 068 and 069 owing to the changed span lengths. Pylon 067 was changed to an angle pylon in order to achieve the north-south deviation at this point in the proposed connection.

3.13.9 The above changes led to the proposed connection alignment at pylons 066A to 069A are shown at Figure 3.9.

**Pylon 089 to 096**

3.13.10 In this section of the proposed connection a number of alternative alignments were investigated, including locating pylons outside the Draft Route, in order to reduce views of the proposed connection from the properties of Bromwich Park (and its Scheduled Monument) and Whitehall.

3.13.11 Alternative alignments were investigated which would realign the proposed connection to the east of the canal and broadly follow the canal route north-eastwards.

3.13.12 An initial realignment alignment would have taken the proposed connection outside of the Draft Route and in close proximity to the Montgomery Canal and the Cupid’s Ramble property. The alternative alignment would have required three additional pylons and introduced deviations. The realignment would have led to multiple crossings at the Montgomery Canal, A5 and the B5009.

3.13.13 The additional pylons required, loss of a straight route profile over a relatively short distance, and the location of connection parallel to the canal would have led to increased prominence of the connection, giving rise to greater visual effects. Based on the above considerations this alternative was discounted.

3.13.14 A second alternative realignment to the east of the canal was investigated which would have increased the distance from Bromwich Park. Pylons 090 to 093 were initially relocated outside of the Draft Route to the south-east, however south of Aston Locks (south of Cupid’s Ramble) an angle pylon at a relocated pylon 094 would have been required to divert the proposed connection directly northwards.

3.13.15 This alternative would have moved the proposed connection away from properties in this area and avoided Aston Hall and the woodland by Oswestry Golf Course. However it would have required an additional pylon and over-sailed the golf course which would potentially have caused disruption. In addition the proposed connection would have bisected the canal at a shallow angle directly across Aston Locks creating a large interface between the proposed connection and canal while also running parallel to the canal for several hundred metres. Users of the canal would have continued views of the connection.

3.13.16 Based on consideration of the above alternatives, routing the connection to the eastern side of the canal was discounted.

3.13.17 Given the above, the baseline alignment was realigned along a more easterly trajectory, but maintained to the west of the canal. The more easterly alignment would minimise the interface with the canal, eliminate the over-sailing of garden land at pylons 091A to 092A and increase the distance from the Bromwich Park Scheduled Monument.

3.13.18 Pylons locations 089A to 096A are proposed along this section as shown at Figure 3.9.

**Pylon 097 to 103**

3.13.19 An alternative alignment was investigated in this section which sought to avoid disruption of the siting of new sculptures at or adjacent to the British Ironworks Centre. Pylon 097 was changed to an angle pylon (097A) so that the route could be realigned (097A – 100A).

3.13.20 For the reasons above a more northerly trajectory was investigated. The realignment brings the connection in closer proximity to the property ‘Four Winds’ to the west. To mitigate the increased proximity of the connection to the property pylon 099A was relocated.
behind mature trees to benefit from screening and eliminate direct views of the pylon from this property.

3.13.21 The above changes led to the proposed connection alignment at pylons 097A to 103A as shown on Figure 3.9.

**Pylon 108 to Tee-in Point at Berghill**

3.13.22 Alternative alignments were considered in this section in relation to alternative Tee-in locations. Other considerations included minimising views of the proposed connection, increasing distances from properties and distance from marsh land, avoiding an archaeological site (Roman encampment), ancient woodland and reducing tree clearance.

3.13.23 Pylon 108 was changed to an angle pylon to allow subsequent pylons to be deviated from the baseline alignment in order to increase the distance from Berghill Farm.

3.13.24 Alternative alignments investigated included utilising Tee-in Points connecting at pylons ZZK059 and ZZK060 on the existing Legacy - Shrewsbury – Ironbridge overhead line.

3.13.25 An alternative alignment realigning pylons 109 to 112 in a straight profile towards existing pylon ZZK59 to the north was investigated. Tree clearance would have been required to deliver the necessary statutory clearance. In addition this would have extended the length of the proposed connection leading to an additional suspension pylon being required to connect to a Tee-in at ZZK59. A Tee-in at this location would have been more visible from views from the north, particularly Welsh Frankton. The alternative alignment would also have brought the proposed connection into close proximity to a listed barn.

3.13.26 An alternative alignment was considered which would initially divert the proposed connection to connect up to a Tee in location at existing pylon ZZK060. This realignment placed pylon 112 outside the flood risk zone. However the realignment routed the proposed connection towards Feggy Coppice which is designated ancient woodland. To maintain statutory clearance requirements substantial tree clearance would have been needed. The potential ecological, historic environment and landscape effects led to this option being discounted.

3.13.27 An arcing alignment around Berghill Farm was identified, which relocated pylon 109 to 112 (109A to 112A) to tee in at existing pylon ZZK061 which also avoid Feggy Coppice. This alignment maintained a minimum stand off distance of 200m from the property.

3.13.28 The proposed connection has been maintained to the south of Feggy Coppice which would act as screening of both the overhead line and Tee In from views from the north.

**Tee-in Design**

3.13.29 The Tee-in connection is proposed to be located at pylon ZZK061 existing Legacy - Shrewsbury – Ironbridge overhead line.

3.13.30 A number of alternative Tee-in design solutions were considered. Option 1 consisted of two Sealing End Compounds (SEC) connected by a cable crossing underneath the existing ZZK overhead line. The cable would connect one of two circuits with the other circuit connected to a proposed new ZZK061 pylon. Option 2 consisted of a substation connecting the proposed connection to the existing ZZK line. Option 3 consisted of four SECs which would underground both of the proposed connection circuits to connect onto the exiting ZZK line. Option 4 consisted of an overhead line 'Duck Under' where one of the proposed connection's circuits would be connected to an L6(c) SF60 pylon under sailing the existing ZZK line and the other circuit connected to a proposed new ZZK061 junction pylon.

3.13.31 Options 2 and 3 were discounted primarily due to the significantly greater potential for landscape and visual effects of the necessary infrastructure. Both Options 2 and 3 would have required substantial development footprints and were assessed as likely to affect views from Welsh Frankton to a greater degree when assessed compared to Options 1 and 4. Options 1 and 4 were subsequently progressed for additional assessment.
3.13.32 This additional assessment led to Option 4 being discounted primarily due to safety and maintenance constraints associated with the design layout. The design of option 4 would not have ensured the recommended statutory electrical clearances without a bespoke pylon extension which would have had an overall height greater than 66.5m which would have had significant landscape and visual effects. Based on the above Option 1 is considered preferable on the balance of technical and environmental considerations and is therefore the proposed Tee-in design solution.

3.14 Shrewsbury Substation works

3.14.1 As part of the proposed development the existing single, three-ended circuit (Ironbridge, Legacy & Shrewsbury) is to be split into two separate circuits (Bryngwyn – Legacy – Shrewsbury and Ironbridge – Shrewsbury). This modification would be required to accommodate the additional circuits from Bryngwyn Substation and would also require the installation of additional equipment at Shrewsbury Substation.

3.14.2 To accommodate this equipment alternative options were considered.

3.14.3 An option was initially considered which would have required the extension of the substation on both the eastern and western sides (linked by 400 kV cable). This would have significantly extended the existing substation footprint. On the western end of the site this would have resulted in development in farmland on the opposite side of the disused canal from the existing substation.

3.14.4 A second alternative was considered which sought to minimise the extension of the substation footprint by utilising space within the substation to be vacated by Western Power Distribution (WPD). WPD plan to relocate equipment to its 33 kV substation located directly alongside the existing National Grid 400 kV substation which it plans to redevelop. This alternative proposal would have accommodated the additional National Grid equipment needed in the space cleared by WPD.

3.14.5 Subsequently it was identified that notwithstanding utilising space cleared by WPD a standard Air Insulated Switchgear (AIS) solution could still not achieve a design solution within the existing space constraints at the substation. To accommodate the standard AIS design at the substation a substantial extension to the substation on fields immediately to the south of the existing site would have been required. In addition a new overhead line pylon would have been required on the fields immediately west of the existing substation.

3.14.6 The alternative that is proposed is to utilise the new technology of hybrid-GIS (Gas Insulated Switchgear) which allows a reduction in the design footprint of the proposed substation extension from that required by sole utilisation of standard AIS equipment.

3.14.7 A small extension (approximately 5m) of the existing fence line on the east is proposed. The majority of works are proposed within the boundaries of the existing substation. Overhead line connections would be achieved utilising the existing overhead line pylons. No new pylons would be required.

3.14.8 The Shrewsbury Substation works is shown at Figure 2.8.

3.15 Pylon Options

3.15.1 For the overhead line sections the design of the proposed connection has been formulated so that traditional steel lattice pylons or the new T-pylon can be used. The different pylon options are outlined in the Pylon Design Options Report which considers the use of alternative conductors and pylon types and makes recommendations for the pylon design options that National Grid have taken forward for statutory consultation.

3.16.2 For the Western OHL Section from Bryngwyn Substation to the Western SEC the Pylon Design Options Report finds that on the balance of technical and environmental considerations the preference is for the low-height lattice pylon type to be used throughout the section. For the Dyffryn Meifod East SEC to Lower Frankton, a marginal preference is
3.16 Conclusion

3.16.1 The above chapter outlines the main elements of the project’s history and consideration of main alternatives from the beginning of the project through each of its main stages. It describes the main alterations to the proposed development and the main reasons for the changes as proposed based on thorough assessment of environmental, socio-economic, land and technical considerations as well as consultation feedback at every stage. The assessment of alternatives has led to the proposed development which is the subject of this PEIR.

4. NON STATUTORY PRE-APPLICATION CONSULTATION

4.1 General Introduction to Consultation to Date

4.1.1. Pre-application consultation was introduced by the Planning Act 2008 (the Act). The Act imposes duties on the promoters of NSIPs to consult those who would be directly affected by a project, people with an interest in the land on which development would take place, the local community, local authorities and other statutory bodies and consultees. While the Act specifies particular requirements for formal consultation, the importance of informal consultation is recognised in related guidance and has been embraced by National Grid in its extensive programme of engagement and consultation for the proposed development to date.

4.1.2. The Department of Communities and Local Government (DCLG) guidance on public consultation for NSIP projects states that for large development projects with long development periods developers are encouraged to consider an iterative process, consisting of two (or more) stages.

4.1.3. National Grid is committed to undertaking consultation about its proposed projects. National Grid has produced its policy document ‘Our approach to the design and routeing of new electricity transmission lines 2012’ which describes how consultation forms a fundamental part of its approach to the provision of new infrastructure.

4.1.4. A Consultation Strategy for this proposed development has been developed by National Grid and presented in the documents ‘Mid Wales Wind Farms Connection Project Consultation Strategy’ (2011 and 2013) (available on the project website http://www.midwalesconnection.com). These documents provide details of all stages of informal pre-application consultation to date (Stages One to Three). To comply with Section 47 of the Act National Grid will also publish a Statement of Community Consultation (SOCC) during the next stage of consultation (Stage 4), as well as a supporting Consultation Strategy which will set out how statutory ‘formal’ consultation will be undertaken.

4.1.5. Through compliance with its Consultation Strategy and SOCC National Grid ensures the consultation process and associated communications are made as accessible to as many relevant parts of the community as possible.

4.1.6. Technical documents will not be translated into Welsh, however, we will make someone available to discuss in Welsh the contents of these documents for those requesting this.

4.1.7. Community materials will be available in Welsh, including:
   - Statement of Community Consultation (SoCC);
   - Community newsletter;

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22 DCLG Planning Act 2008: Guidance on the pre-application process
4.1.8. We will have Welsh speaking staff in attendance at all of our consultation events in Wales and the freephone enquiry line has a Welsh language service.

4.2 Consultation Undertaken to Date

4.2.1. Three stages of consultation have been undertaken by National Grid to date excluding this current stage. The stages and their dates are noted below. For further information refer to the Consultation Strategies described above:

- Stage One: Pre-consultation engagement (2010 – March 2011) and Route Corridor and Substation Siting Areas Consultation (March-June 2011);
- Stage Two: Feedback on Stage One Consultation and announcement of Preferred Route Corridor and Preferred Substation Siting Area (July 2012 – March 2013); and
- Stage Three: Announcement of Draft Route and Substation Site (September 2013 – November 2014).

Stage One Consultation and Pre-consultation Engagement

4.2.2. Pre-consultation engagement comprised early discussions (ahead of any other pre-application stages of consultation) with Powys County Council and Shropshire Council about the production and content of a draft Consultation Strategy for the project. Briefings were held with a number of MPs (from Powys and Shropshire) and AMs whose constituencies could be affected by the proposed works. These briefings explained National Grid’s role in connecting the new wind farms and provided a broad overview of the proposed works and the approach to consultation. The pre-consultation engagement formed part of Stage One Consultation.

4.2.3. Stage One consultation comprised consultation with stakeholders and the community about potential route corridors and substation siting areas. This stage of consultation was undertaken between March and June 2011. It included a series of meetings with stakeholders and public exhibitions held throughout the area where the proposed connection could be routed. National Grid consulted jointly with Scottish Power Energy Networks in areas that could be potentially affected by proposed 132 kV and 400 kV works. Channels for future project communications were established including a Freephone number, Freepost address, e-mail, project newsletter and website.

4.2.4. The Stage One Consultation Feedback Report (July 2012) provides an account of the first stage of the pre-application consultation process, a summary of the consultation representations received, National Grid’s response to those representations, and details of how they would be taken into account by National Grid in developing the proposed development.

Stage Two Consultation

4.2.5. National Grid reviewed the feedback received during Stage One Consultation. This feedback was used in National Grid’s decision making about its preference of route corridor and substation siting area.

4.2.6. In July 2012 National Grid confirmed its choice of preferred route corridor and substation siting area. At this time, some updates were introduced: a widening of the corridor at the western end of the route and an additional route option through the Peniarth Valley. Comments on the preferred route corridor, substation siting area and the updates to the
route were invited (Stage Two).

4.2.7. To support these decisions National Grid published its document Mid Wales Connection Project Selection of Preferred Connection (July 2012).

4.2.8. Stage two consultation took place between July 2012 and March 2013. A number of community events took place along the preferred route corridor and briefings were organised for councillors, MPs and AMs. National Grid also organised a number of events within the route corridor for persons with an interest in land (such as landowners and rights holders).

4.2.9. Details of the stage are provided in the Stage 2 Feedback Report and its Addendum (Date).

4.2.10. In April 2013, National Grid announced it would not be progressing with the Peniarth Valley route option and would be considering putting the connection underground around the village of Meifod in the Vyrnwy Valley route option. Comments were invited on the decisions made at this time.

**Stage Three Consultation**

4.2.11. In September 2013 National Grid announced a preferred substation site and draft route (Stage 3). Comments were invited on the substation site and Draft Route; proposed sites for sealing end compounds; the connection point to the existing overhead line in Shropshire; pylon designs; and any other issues consultees and the public wanted to raise. A range of activities were undertaken to engage with landowners and communities along the Draft Route.

4.2.12. Feedback on the Stage Three draft proposals, along with results of environmental assessments, have been used to develop the proposed development which is the subject of this PEIR and Stage 4 consultation.

**Scoping**

4.2.13. In addition to the above, further consultation has been undertaken with the submission of the EIA Scoping Report in May 2014. This document summarised the proposed development and the baseline conditions where they were known, identified the issues and concerns, and set out the assessment approach. The purpose of the Scoping Report was to ensure that all significant issues were identified and addressed by the EIA and that sufficient and proportionate information is provided on potential environmental effects. The report was submitted to the Planning Inspectorate and Powys County Council in support of a request for a formal Scoping Opinion as to the proposed content of the EIA. Feedback on the content of the Scoping Report in the form of a Scoping Opinion was sought from over 130 organisations (including county, borough, district, parish and community councils, government departments, utility providers and various interest groups) by the Planning Inspectorate.

4.2.14. The Scoping Opinion July 2014 includes the Secretary of State's (SoSs) opinion of the proposed scope of assessment relating to EIA and the proposed development. In that opinion the SoS takes account of the detailed responses received from consultees. These comments, and how they have been addressed, are summarised in Appendix 1A of this report.

4.2.15. National Grid also sought feedback on the Scoping Report from organisations (as listed in the Scoping Report) that were not included in the Planning Inspectorate's consultation.