3 DESIGN, EVOLUTION AND ALTERNATIVES

3.1 INTRODUCTION

3.1.1. The Environmental Impact Assessment (EIA) Regulations states that an EIA Report should include:

- In paragraph 17(3)(d) of Part 5*: "a description of the reasonable alternatives studied by the developer, which are relevant to the development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment";*
- *Paragraph 2 of Schedule 4: "A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects."*

3.1.2. The design evolution and consideration of alternatives of the Project is discussed in the sub-sections below.

3.2 SITE SELECTION

SITE SELECTION PROCESS

3.2.1. An initial assessment of the feasibility of the site was conducted using Geographical Information Systems ('GIS'), to look at high-level constraints and key criteria for the proposed grid connection. This process allowed early identification of key technical, environmental, planning and commercial issues, which could either support or potentially hinder the Project.

3.2.2. Some locations were excluded, following this exercise, due to factors including landscape and visual, planning policy, and commercial constraints.

3.2.3. At the conclusion of the initial assessment phase, the final proposed Site was identified as being potentially suitable for development as no significant constraints had been identified.

3.2.4. Potentially suitable sites were evaluated, using the basic assessment criteria as outlined below:

- **Land Availability**: ensuring there is sufficient land available for development;
- **Land Use and Context**: assessing the suitability of the existing land use and ensuring that the chosen site is out with international or national environmental or planning designations;
- **Electricity Grid**: assessing whether the site is within appropriate proximity of a suitable connection point to the electricity grid network;
- **Transport Infrastructure**: ensuring the site is accessible via public road infrastructure to allow the construction, operation and maintenance of a wind farm;
- **Landscape and Visual**: an initial assessment of the landscape and visual effects of the proposed grid connection on important receptors (i.e. ensuring it is not located within a statutory designated landscape and taking into account considerations of landscape sensitivity and potentially sensitive visual receptors); and
- **Nature Conservation Sites**: an initial assessment to determine the distance of statutorily designated sites such as Sites of Special Scientific Interest (SSSIs), National Nature Reserves

('NNRs'), Ramsar Sites, Special Areas of Conservation ('SACs') and Special Protection Areas ('SPAs') from the site.

3.2.5. The conclusion of this feasibility assessment work was that the final proposed Site met the necessary basic assessment criteria and therefore warranted further detailed environmental and technical assessment.

3.2.6. The findings of the feasibility assessment were subsequently built on by undertaking design work for the Project. This included undertaking consultations with relevant stakeholders such as National Resources Wales (NRW), in order to understand their views on a potential grid connection at the Site and to ultimately assist in the evolution of an appropriate, responsibly designed Project.

3.2.7. Assessment was undertaken to understand environmental and technical constraints. This design has evolved as detailed in **Section 3.4**, to the current Project which is illustrated in **Figure 4.1**.

3.3 CONSIDERATION OF ALTERNATIVES

3.3.1. In EIA terms, the requirement of consideration of alternatives is to report on reasonable alternatives that have been considered by an applicant rather than it being a requirement of an EIA to identify and consider alternatives beyond those considered by an applicant.

3.3.2. Specific to the Project, alternatives in respect of layout were considered and the alternatives in respect of these are set out below.

WITHOUT THE PROPOSED DEVELOPMENT

3.3.3. A description of the existing baseline conditions and the potential evolution of that baseline is described in each of the technical chapters. Without the Project, the status quo would be expected to remain.

TECHNOLOGY

3.3.4. The proposed grid connection will be used to connect the consented Foels Trawsnant Wind Farm to the wider national grid; without which, the wind farm would not be able to serve its purpose in providing renewable energy. The requirement for renewable energy is accepted at national policy level with wind energy widely recognised as the most mature renewable energy technology currently available. The Site was identified as being appropriately located to transfer electricity from the wind farm to the national grid.

3.4 DESIGN EVOLUTION

3.4.1. The layout of the route has progressed through a number of design iterations, as summarised in **Table 3-1**. A 10m micro-siting allowance is proposed for the OHL pole locations, to build in contingency and avoid encroachment into any environmentally or technically constrained areas. In addition, micro-siting provides scope to mitigate potential geo-environmental and geotechnical constraints.

3.4.2. The design of the Project has evolved following consultations with stakeholders such as Natural Resources Wales (NRW).

3.4.3. Embedded mitigation measures have been incorporated into the design and construction of the Proposed Development, to avoid, prevent or minimise significant adverse environmental effects where possible. These embedded mitigation measures are captured and discussed in the relevant technical chapters and a summary of the proposed mitigation measures is presented in **Chapter 11: Summary of Mitigation**.

3.4.4. The proposed gird connection route has evolved in response to a number of environmental and technical constraints, as well as achieving landowner agreements for the siting of wooden poles, the installation of overhead lines and underground cables.

3.4.5. **Table 3-1** identifies the main iterations of the route design and the rationale for such changes.

Design Iteration	Rationale / Summary
Route 1 August 2013	The initial plan was for an overhead connection through the Penhydd and Margam forest blocks heading to south. This reflected a connection offer from Western Power Distribution to Pennant Walters, which at the time was for 132kV connection. The route connected into the existing electricity network southwest of Llangynwyd. This route served as the starting point for consideration of the Project.
Route 2 March 2014	This iteration was prepared following feedback from Natural Resources Wales who requested that the northern section of the route (from Foel Trawsnant to the Neath Road) be undergrounded through the Penhydd forest via an existing forest track to minimise effects on forestry operations.
Route 3 2016	No route change – but Western Power Distribution modified their offer from 132kV to 66kV. In addition, the underground route was modified to align with the proposed bellmouth on the Neath Road which would serve the Foel Trawsnant Wind Farm.
Route 4 2016 to 2018	The southern end of the route, south of the Neath Road, was revised to avoid and minimise effects on sites of archaeological or historic importance, including the Y Bwlwarcau Hillfort (GM059).
Route 5 2019	In 2019 a wind farm development “Y Bryn” came forward on the Penhydd and Margam forest blocks (awarded to Coriolis via a competitive tender). To minimise effects on this wind farm the use of the existing track through the Penhydd forest as a connection route was no longer an option. As a result, an overhead line connection further east was taken forward, but still within the Penhydd Forest.

Route 6 2019 to 2023	In the northern part of the route, a series of iterative alignments to the east were required to further minimise effects on the "Y Bryn" wind farm and to avoid ongoing or planned forestry operations within Penhydd Forest. In the southern part of the route, similar iteratives alignments to the east were required to avoid impacts on the Y Bryn wind farm, and also to avoid ancient woodland and to minimise effects on forests.
Route 7 (final route) 2023 to 2024	This final iteration introduced the use of undergrounding cables. Whilst this is significantly more expensive, it was considered the most straightforward method to achieve a connection which by this point had taken over a decade to negotiate and design. The resultant route design involved: • 350m (approx.) of overhead line from the Foel Trawsnant wind farm site to a location north west of Nantyffyllon at which point in transitions to underground cables laid in roads and lanes, from Kings Terrace heading south. • Once south of Maesteg the connection reverts back to an overhead line on private land. • The alignment of the route at the southern end of the connection has been designed to minimise effects on residential properties whilst also positioning the wood poles as close to field boundaries as possible to minimise effects on agricultural operations. It also reflects agreements reached with landowners.

3.5 SUMMARY

3.5.1. As outlined above, environmental and technical issues (such as cumulative effects with nearby developments) have been addressed during the development of the Project design, which is based on a thorough understanding and appreciation of local character and circumstances. The final design of the Project was the result of several stages of design iteration, informed by analysis of the environmental baseline, commercial considerations and comprehensive consultation.

3.5.2. The approach to mitigation is set out in **Chapter 2: EIA Approach**; the general project description is outlined **in Chapter 4: Description of the Project**. Where necessary, additional mitigation measures to address specific environmental effects are set out within technical **Chapters 6 to 10** and summarised in **Chapter 11: Summary of Mitigation.**