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4 PROJECT DESCRIPTION – THE ONSHORE COMPONENTS

4.1 INTRODUCTION

The key elements of the onshore aspects of the project are described in this section, principally the:

- overhead electric lines;
- underground electric cable; and
- onshore substation option.

The onshore proposals are described in subsequent sections and shown on *Figure 4.1*.

The remainder of this section gives a description of the onshore components of the proposed project and the methods by which those elements will be installed, operated and decommissioned. It must be noted that, due to the fact that the contractors have not yet been selected, some assumptions have been made where stated.

4.2 THE ONSHORE PROJECT COMPONENTS

4.2.1 Overview

The route from the shoreline to the point of entry into the electricity distribution network will be approximately 7 km in length and will be constructed as follows:

- the electric cable will be underground from the landfall to the substation;
- the underground cable (likely to consist of four separate cables) will enter the substation at medium voltage (MV), typically 33 kV, and be transformed into 132 kV;
- in the event that an offshore substation is constructed, there will no longer be a requirement for a 132 kV substation onshore and, as a consequence, there would only be one cable at the point of landfall. A terminal pole and metering station would be installed in the place of the substation. The offshore substation option is described in *Section 3*;
- the 132 kV overhead line will be a wooden pole trident line design; and
- the line would cover a length of approximately 6 km to the existing 132 kV tower line, at which point the connection would be made with the existing electricity network.

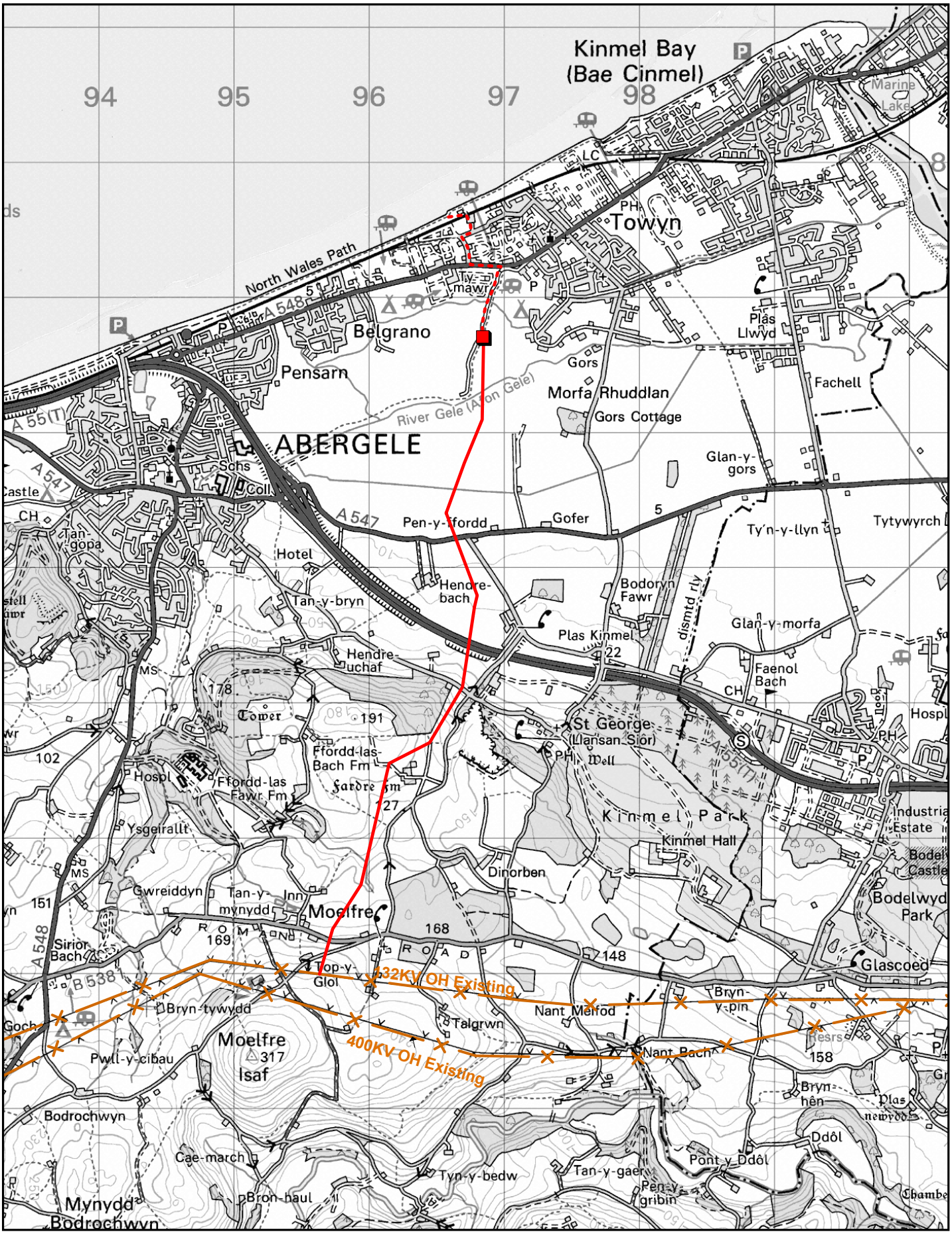


Figure 4.1
Rhyl Flats Project
Onshore Components

4.2.2 Landfall Location

The landfall location is shown on *Figure 4.1* and described in more detail in *Section 3*.

4.2.3 Grid Connection Route Corridor

The grid connection route will be underground along a track through the Golden Gate Caravan Park, along the A548 road and along a track to the east of the Ty Mawr Holiday Park and into the proposed substation or terminal pole to the south-east of the Holiday Park. Approximately 500 m of an existing track from the public road network to the substation location will be upgraded by the laying and compacting of imported crushed stone.

The overhead line will emerge from the substation or the terminal pole at 132 kV and will be routed in a southerly direction for approximately 2.5 km across agricultural fields and Rhuddlan Road to a point to the west of Bodtegwel Terrace.

The grid connection route will cross the A55, and head in a south-westerly direction uphill between Coed y Geufron and Parc y Meirch Quarry. The route will avoid Fadre Farm (Grade II Listed Building) to the north and continue in a southerly direction across the agricultural fields to the existing electricity distribution network.

The route has been designed to minimise proximity to dwellings and to reduce where possible the visual effects of the grid connection. Access to the route for construction purposes is good.

4.2.4 The 33 kV/132 kV Substation (Onshore Option)

It is standard practice to ensure that the entire substation area is bunded, due to the presence of oil in the transformer. A sump would be used to remove rainwater and run-off from the bunded area.

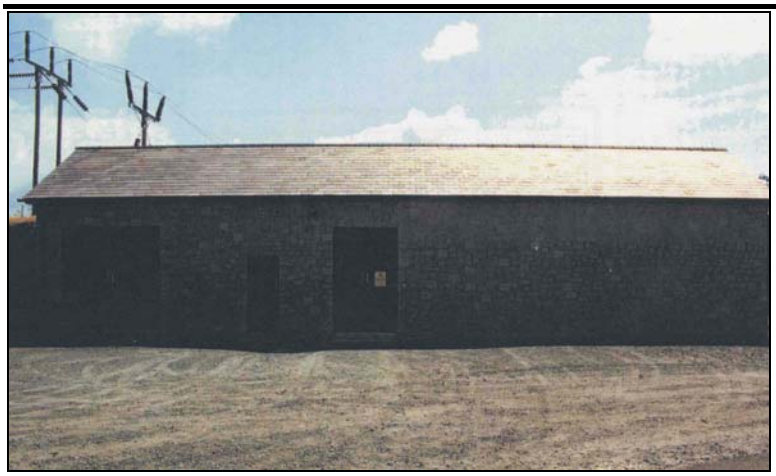
The appearance of the substation will be similar to that shown on *Figure 4.2* and the entire bunded substation area will measure approximately 40 m by 30 m. The existing track, running from the A548 to the proposed substation site, will be upgraded to a hardcore surface approximately 4 m wide.

The substation building in the corner of the compound will incorporate the main 33/132 kV switch gear and metering equipment as well as a storage area. It will be of a single storey construction, using reconstituted stone with a pitched roof. It will have three dark painted steel doors and no windows. The building will be approximately 21 m by 6 m by 4.5 m high (to the roof apex).

A palisade fence, which will be approximately 2.5 m high, would surround the remainder of the compound. The overhead line connection would be

situated in the southern half of the compound. The compound will be locked and clearly signed to prevent unauthorised access.

Figure 4.2 ***Photographs of a Typical Substation***



4.2.5 Design - The Overhead Line

The majority of the wooden poles will be single, with typical distances between the poles ('spans') of 130 m. There will be a requirement for 'H' pole design to be used at angle points or where extended spans of up to 200 m are required. It is estimated that 26 single poles and 9 'H' poles will be required, together with approximately 20,000 m of cabling.

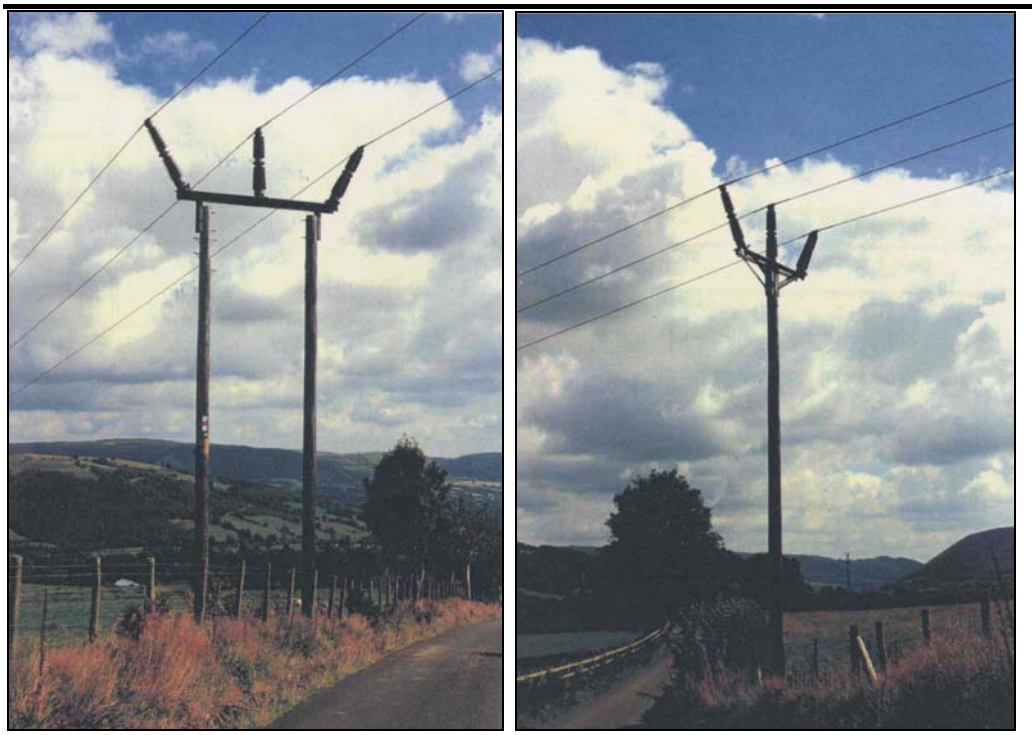
Each wooden pole is manufactured from softwood preserved timber varying in length between 11 m and 15 m and in diameter between 300 mm and 400 mm. Depending on soil conditions and span length, between 2 m and 3 m of each pole would be buried in the ground. Each pole supports three insulators 1.5 m in length. Total typical height above ground for the trident structures, including insulators, is therefore between 10.5 m and 13.5 m.

The insulators are manufactured from porcelain or polymeric material. Each insulator supports an aluminium steel-reinforced conductor. The minimum

distance between the conductors and the ground is 6.7 m, this being the lowest point of the span. The minimum distance between each conductor is about 2 m.

Typical overhead line design is shown on *Figure 4.3*.

Figure 4.3 Photographs of Typical Overhead Line



4.3 CONSTRUCTION

4.3.1 Overview

The onshore grid connection (from junction chamber to point of connection with the existing grid network) will take approximately four months to establish, beginning in month two or three of the construction period. Between 10 and 20 personnel would be engaged in construction activities at any one time.

The following sequence of events would be typical, with some of these occurring concurrently:

- establishment of substation option;
- trench excavation from substation (or terminal pole) to the junction chamber at the landfall;
- construction of junction chamber and establishment of land cable connections;

- assembly and installation of grid connection route poles;
- stringing of conductors; and
- testing and commissioning.

The marine cables would subsequently be joined to the land cables at the junction chamber and the system used to energise the wind turbines.

The construction of a substation and underground/overhead cabling will entail the use of the following potentially polluting materials:

- fuel and lubricants for installation plant; and
- cooling oil for optional 132 kV/MV transformer substation.

It is likely that the onshore grid connection will be adopted and operated by the Distribution Network Operator. All construction and commissioning specifications will therefore be in accordance with the Distribution Network Operator standard practices and policies. It will be the responsibility of the chosen contractor to ensure that such standards are adhered to.

4.3.2 Cable Route

The landfall construction techniques are described in *Section 3*. The sea cables will be directed to a junction chamber adjacent to the landfall at which the transition from marine to land cables will occur. The junction chamber will typically be either 9 m by 5 m or 12 m by 5 m in area.

Open cut trenching methods will be used to bring the land cables from the junction chamber to a suitable location for thrust boring underneath the rail tracks. A supported trench will be dug on the sea side of the tracks and a similar trench on the inland side. The trench will be of a size and depth to allow thrust bore installation of the cables under the rail tracks without disturbance or disruption to rail operations.

After passing under the rail tracks, the cables will be installed through Millers Cottage Caravan Park and along the public highway, and the cables will then enter the substation via the existing track.

The land cables from the landfall junction chamber to the substation will be single core with the following overall dimension and weights:

- diameter, 56.4 mm; and
- weight in air, 6.3 kg m^{-1}.

There will be 12 single core cables with three connected to each of the four marine cables (onshore substation option). The cables can be clustered in groups of three and spaced not less than 0.45 m apart with a total trench width of approximately 1.9 m. An alternative arrangement would be to have a

deeper, but narrower trench with the cables still in groups of three, stacked above each other.

4.3.3 The Overhead Line

A detailed Construction Method Statement will be agreed with the local authority and with the Distribution Network Operator prior to construction of the line, covering issues such as:

- access to the route for construction vehicles and personnel;
- mitigation measures;
- timing of works; and
- any requirements for clearance provisions and traffic management on the A55 or other local roads.

Where appropriate, these issues are discussed within the relevant sections of *Volume III* of this ES.

Wooden poles do not require heavy erection equipment. Apart from the initial pole delivery, most equipment is no larger than typical agricultural machinery. Typically, construction will involve about six vehicles including a four wheel drive lorry, a JCB and Land Rovers.

The poles are assembled on site. They are planted directly into the ground, therefore it is not anticipated that there will be any requirement for deliveries of concrete or backfill material.

Between five and ten poles will be erected per day, so time spent at any single location is short. The entire route should be connected within one month. Work on site will usually be confined to the hours of 0700 to 1900, unless special conditions apply.

Poles and equipment will be transported to the vicinity of the grid connection route by lorry. Excavations will be made by a JCB-type vehicle, and poles erected using special equipment attached to that vehicle. The excavation will be backfilled and consolidated using the excavated material. Baulks may be used where the poles will be subject to stress from wind.

The stringing of the conductors between the poles will involve all-terrain vehicles and light winches.

Access for construction and ongoing maintenance will give due consideration to farming and other activities.

4.3.4 The Onshore Substation (option)

If the onshore substation option is adopted, the building will be constructed to contain the 33/132 kV grid connection and associated equipment. The entire construction and equipment installation will comply with all current legislation and applicable standards. Planning and Building Control approval from the Local Authority and Fire Officers requirements will be obtained.

The Distribution Network Operator will have an Environment, Health and Safety Policy which will be adhered to during construction. In addition, COWL has adopted the UK Environment, Health and Safety Policy of Edison Mission Energy (one of the constituent partners of COWL) and this will be in force where appropriate throughout construction and will place functional requirements on the construction contractors, see *Annex F (Volume V)*.

4.4 OPERATION

No major operations and maintenance activities, in relation to the onshore grid connection, are expected during the operational life of the wind farm.

The following minor activities will be undertaken on an annual basis:

- tree inspections;
- pole condition monitoring;
- testing switchgear / substation sump units; and
- visual inspection of substation bunding.

No polluting or hazardous materials are expected to be brought onto site during the operation of the onshore grid connection.

Operations and maintenance activities will be undertaken by the Distribution Network Operator in accordance with their standard practice and policies. No permanent staff are expected to be allocated to the maintenance and operation of the onshore grid connection.

The Distribution Network Operator will have an Environment, Health and Safety Policy which will be adhered to throughout the operational life of the onshore components.