Contents

4. Description of the Proposed Development

4.1 Introduction

4.1.1 This Chapter provides an overview of the Proposed Development, including a description of the Site, infrastructure elements, and the key elements of the construction, operational and decommissioning phases. The extent of the Site and its wider geographical context is set out in **Figure 1.1** and **Figure 1.2.**

4.1.2 The description of the Proposed Development presented in this Chapter has been used by the EIA technical specialists as the basis for assessing its effects on the environment.

4.2 Development description

4.2.1 The Proposed Development is a wind farm consisting of a maximum of seven wind turbines, each with a three-bladed rotor with a diameter of up to 136m, a hub height of up to 97.5m and maximum height to blade tip of 155m. **Table 4.1** provides the grid references for each turbine.

4.2.2 The application also comprises associated infrastructure including internal wind farm tracks off the main access corridor, crane pads at each turbine location, turbine foundations, laydown and storage areas, underground power cables linking the turbines and the on-site substation, temporary construction compounds, and grid connection infrastructure, including an on-site substation and control building together with construction enabling works.

Site location

4.2.3 The Site lies within the Rhondda Cynon Taff County Borough Council (RCTCBC) administrative area and its boundary is located approximately 600m from the south-eastern edge of the village of Pant (National Grid Reference: ST 03626 89459).

4.2.4 The Site is proposed to be accessed from the A4233 Trebanog Road to the west of the Site.

Existing site and surroundings

4.2.5 The Site encompasses an area approximately 182.27 hectares (ha) and is shown in **Figure 1.1** and **Figure 1.2**, consisting of upland habitat, mostly improved and semi-improved grassland which has been used for agricultural grazing. The Site of the Proposed Development is located on the summit and upper slopes of Mynydd-y-Glyn to the south of Rhondda River, the Site is absent of distinct field boundaries and tree cover resulting in the Site being open and exposed.

4.2.6 There is no built development within the Site, but it is traversed by an overhead electricity transmission line supported by double pole pylons.

4.2.7 There is a limited Public Rights of Way (PRoW) network within the Site, there is a principal PRoW linking Porth in the Rhondda Valley to Langton Court Farm, one of the closest

properties to the south-east. A large area within the western and eastern parts of the Site is Access Land.

4.2.8 Parts of the Site are located within a Site of Importance for Nature Conservation (SINC), designated within the RCTCBC Local Development Plan (LDP)[1]. Additionally, the Site lies within Mynydd y Glyn and Nant Muchudd Basin Special Landscape Area (SLA), partially within Rhondda Historic Landscape Area and approximately 15km from the Brecon Beacons National Park.

Wind Farm development proposals

4.2.9 The wind farm will be designed with an operational life of 30 years. At the end of this period the developer has three options; to decommission the wind farm and dismantle and remove the turbines; to apply for an extension to the operating period using existing equipment; or apply to install new equipment on the Site. For the purposes of this assessment, it is assumed that the wind farm would be decommissioned.

4.2.10 The layout of the Proposed Development, incorporating maximum tip heights of up to 155m, has been chosen because it balances sustainably high productivity with the environmental sensitivities present at the Site. The grid references for each turbine are provided within **Table 4.1**.

4.2.11 The current wind farm layout, including access tracks, temporary construction compound and substation are shown on **Figure 4.1a** and **4.1b.**

Table 4.1 Proposed turbine locations

Turbine ID	Easting	Northing
1	302930	189735
2	303395	190000
3	303185	189395
4	303690	189455
5	304185	189380
6	303070	188985
7	303525	188975

Site access

4.2.12 The proposed principal point of access into the Site is from A4233 Trebanog Road to the west of the Site. Construction works will be required to deliver this new junction and access route, ensuring it is suitable to accommodate all general construction traffic and concrete, stone and turbine deliveries which will enter the Site. **Figure 4.2** provides details of this access.

[1] Rhondda Cynon Taf Local Development Plan up to 2021 – Adopted 2021 [online]. Available at Adopted LDP 2011 (rctcbc.gov.uk) [Accessed 07/06/2022]

Grid connection

4.2.13 The applicant has received an offer of a grid connection from Western Power Distribution (WPD) as the Distribution Network Operator (DNO). The connection is planned between the on-site substation and the electricity grid at Upper Boat. This connection will be comprised of two components, the first of which is an overhead line to the south eastern boundary of the Site towards Upper Boat, subsequently the line will be undergrounded to the connection point. The underground cable will be delivered by WPD, whilst the overhead Line will be consented as part of this DNS process. As requested by PEDW in the Scoping Direction, and described in **Chapter 1**, paragraph 1.1.4, potential effects from the grid connection will be considered in this Draft ES.

4.2.14 **Figure 4.3** illustrates the corridor within which the proposed connection would be routed, between the Site and a point which connects to the existing national grid substation at upper boat.

4.2.15 The desk-based assessment of potential effects from the grid connection presented in this Draft ES is based on the installation of a 33kV overhead line on wooden poles for 1.4km and undergrounded 33kV cable following the highway up to the connection point (7.1km).

4.3 Delivery Route

4.3.1 It is anticipated that the Abnormal Indivisible Loads (AILs) [transporting turbine equipment] would travel by road from the Port of Swansea, which is the closest port in the region capable of handling wind turbine equipment. The Port of Swansea has been frequently used for the delivery of wind turbine components in this region, for example being the selected port of entry for Pant y Wal Wind Farm, located to the west of Tonyrefail.

4.3.2 An AIL access study has been undertaken and is provided as **Appendix 12B.**

4.4 Pre-Construction

4.4.1 This section describes those aspects that have become standard practice for developing a consented wind farm proposal into a buildable project. In the technical chapters of this Draft ES which follow, additional environmental management and mitigation proposals are set out and, for the avoidance of doubt, they are additional to the inherent environmental measures that are embedded into the development proposals as described in this Chapter.

Environmental Management Plans

4.4.2 A Construction Environmental Management Plan (CEMP) would be produced prior to construction. Further detail on the CEMP is set out below in **Section 4.9** and a Draft CEMP is provided alongside this Draft ES. The construction works would require an overall Construction Method Statement (CMS) to set out overriding construction principles, programme and health and safety requirements etc. The overall CMS would be agreed with PEDW and RCTCBC in advance of commencement of development. Further detail on the CMS is set out below in **Section 4.9**. Additional CMSs corresponding to individual construction activities would also be provided. They would identify reference documentation for that activity; principally the CEMP and also any relevant individual management plans (e.g. waste, habitat, water management plans), legislation and construction drawings and documents. For each construction activity, the CMS would detail all environmental sensitivities pertaining to the activity alongside the controls/mitigation measures to be put in place. Approvals or consents required to complete the activity would also be described.

4.4.3 Detailed management plans are frequently requested as pre-commencement documents for agreement with the Planning Authority and relevant environmental regulators. Once these are agreed, the provisions and requirements set out therein would be incorporated into the CEMP. It is envisaged that the following may be required, but this it to be confirmed:

- a detailed Construction Transport Management Plan (CTMP – a draft of which is provided with the draft submission alongside this Draft ES);
- a Water Management Plan – a draft of which is provided as Appendix B of the Draft CEMP; and
- an outline Habitat Management Plan (HMP).

Geotechnical Investigations

4.4.4 Geotechnical Investigation (GI) work would be carried out at the pre-construction stage to determine detailed ground conditions to allow for the design of foundations and locating of turbines, along tracks, and at construction compound and wind farm substation locations. This would provide support to the project team to develop further phases of detailed design work. The geotechnical fieldwork undertaken may include (but not be limited to): visual inspections; machine and hand excavated trial pits; windowless sample boreholes; rotary core boreholes; and sampling and laboratory based geotechnical and geochemical testing. This information would inform the detailed track design, the turbine foundation design and identify any micro-siting requirements.

4.5 Construction Activities

Enabling works

4.5.1 Prior to the main construction phase commencing, a number of enabling works may be necessary, including:

- geotechnical investigations: excavation of trial pits or boreholes;
- construction of new access point;
- upgrading of existing tracks and construction of new access tracks and passing places inter-linking the turbine locations and sub-station; this will require import of suitable roadstone;
- any required upgrades to public roads, including road widening to allow the abnormal loads to negotiate corners, protection of any below ground services and the temporary removal or resiting of infrastructure (ie signage); and
- establishment of Site compounds.

Local sources of stone

4.5.2 It is anticipated that stone would need to be imported from existing quarries and would be sourced from one or more of the local established sources, such as Tarmac Hendy Quarry.

Site infrastructure

4.5.3 The following components would be required for the Proposed Development and typical design detail for these is shown on the accompanying figures listed:

- proposed Grid connection corridor (**Figure 4.3**);
- typical wind turbine (**Figure 3.1**);
- illustrative wind turbine foundation (**Figure 4.4**);

  illlustrative wind turbine crane hard standing (**Figure 4.5**);
- illustrative internal site track cross sections (**Figure 4.6**);
- typical cable trench details (**Figure 4.7**);

  illlustrative switch room and substation compound (**Figures 4.8**);
- substation building elevations (**Figure 4.9**); and
- construction Programme (**Figure 4.10**).

Micrositing

4.5.4 In carrying out the various surveys that are necessary in advance of construction activities, environmental, geotechnical and health and safety sensitivities, as well as wind-related sensitivities such as turbulence, might be identified that could be avoided if the locations of turbines or tracks are re-sited to a relatively small degree (i.e. 'microsited'). It is therefore proposed that some flexibility for infrastructure micrositing be retained and that appropriate limits of deviation would be up to 50m for turbines and 100m for internal wind farm tracks and other infrastructure such as the substation and site compound. This mitigation may be restricted further in terms of specific locational hard constraints, for example not micrositing closer to a watercourse if within 50m of a watercourse.

Wind turbines

4.5.5 The turbines of the Proposed Development would be three bladed variable speed pitch regulated, with the rotor and nacelle mounted on a cylindrical tower. This is a typical modern, horizontal axis design comprising four main components: a rotor (consisting of a hub and three blades); a nacelle (containing the generator and also often a gearbox) to which the rotor is mounted; a tower; and a foundation. The specific choice of wind turbine to be installed (hereafter called the 'reference turbine') is dependent on the final commercial and technical choice by the Applicant but would not exceed the physical parameters specified in the consent. A typical turbine is shown on **Figure 3.1.**

4.5.6 Wind turbines convert the kinetic energy of the wind into electrical energy, the air passing over the blades causing them to rotate. This low-speed rotational motion of the blades is converted into electrical energy by a generator located inside the nacelle at a nominal voltage of 690V.

4.5.7 A transformer located immediately adjacent to the turbine tower in a small kiosk (typically 5.0m x 2.5m x 2.5m (L x W x H)) steps up the voltage which is then fed to the control building via underground electrical cabling linking all of the turbine unit transformers. Some turbine options may allow transformers to be incorporated into the nacelle, or into the base of the tower itself. An external kiosk is more likely and therefore has been considered by this assessment as a worst-case assessment. The electricity generated by

the Proposed Development would be metered and fed into the electricity transmission network to which it is connected.

4.5.8 The hub height and rotor diameter may vary depending on the final turbine type selected following competitive tender. For reference the turbine used to inform this assessment is an indicative 3.45MW machine with a hub height of 97.5m and rotor diameter of 136m.

4.5.9 The design process has considered an appropriate colour for the wind turbines. They would be painted in a neutral colour (colour specification, light grey RAL 7035) with a semi-matt finish so as to minimise the visual intrusion. Note however that the montages supporting **Chapter 6: Landscape and Visual Impact** are shown in white to ensure adequate contrast in the imagery. The components for each turbine would be brought to the Site separately, with the towers being delivered in three or four sections. The overall assembly process for each turbine takes approximately two to four days, depending on weather conditions.

4.5.10 Wind turbine towers, nacelles and blades will be transported to site via low bed trailers, incorporating rear steering. The towers will be delivered in three or four sections, which will be stored at each turbine lay-down area until lifted into position. Some storage of components may also be required at the Site compound dependent on weather conditions and access track construction progress at the time of delivery.

4.5.11 Two teams will carry out erection, each using either two road-going cranes (of approximately 100 tonne capacity and 500 or 800 tonne capacity) or crawler cranes. The construction contractors would determine the actual cranes used, together with the exact programme and number of teams on site.

Wind turbine foundations

4.5.12 Where rockhead, or suitable bearing, is relatively shallow (<2m), the wind turbine foundations will bear directly onto rock. Where rockhead or suitable bearing is between 2-5m depth, the existing overburden will be excavated and replaced with suitable load-bearing material, most likely to be imported stone.

4.5.13 The foundation design will depend on the results from detailed ground investigation, it is currently expected that turbines will not require piled foundations. Should piling be necessary, it is proposed to agree the methodologies for this and any conditions which may be appropriate with the determining authority prior to construction. It is expected that the conditions would vary depending on the relative location of the turbine to potential receptors for any adverse environmental impacts.

4.5.14 Foundations will usually comprise a reinforced concrete base slab with dimensions of approximately 20m diameter x 4m depth. This will include a circular steel support plinth to suit the base profile of the wind turbine steel tower and will then be overlaid by stone and previously excavated overburden and dressed back with topsoil to allow re-vegetation. The design of these foundations in terms of size and depth minimises excavation requirements, minimises visible projection above the ground and allows the re-establishment of surface vegetation following construction. The final choice of foundation design will be based on the most efficient use of materials and local ground conditions. A typical wind turbine foundation is shown on **Figure 4.6.**

Crane pads

4.5.15 Each wind turbine requires an area of hardstanding to be built adjacent to the turbine foundation. This provides a stable base on which to lay down turbine components ready for assembly and erection, and to site the two cranes necessary to lift the three-tower

section, nacelle and rotor into place. Areas for crane pads were identified to avoid sensitive ecology habitats, archaeological constraints and areas of steeper gradients where possible. The crane hardstanding will be left in place following construction in order to allow for the use of similar plant should major components need replacing during the operation of the wind farm. These could also be utilised during de-commissioning at the end of the wind farms life. The total area of hardstanding at each turbine location including the turbine foundations and the crane pad will be sized to suit the turbine manufacturer's requirements but will be approximately 2,500m^2. A typical crane hardstanding is illustrated in **Figure 4.7**.

Internal wind farm tracks

4.5.16 Approximately 5.2km of site access tracks will be required. The track construction will be approximately (~)5m wide, ~0.6m deep (dependent of ground conditions), with a ~2m grass verge either side. Typical track cross sections are shown in **Figure 4.8.**

4.5.17 Further details relating to the movement of traffic on and off the site are reported in **Chapter 12: Traffic and Transport** and the Draft Construction Traffic Management Plan (**Appendix 12A**).

Track layout design

4.5.18 There are various constraints which have influenced the track layout design, some generic and some site-specific:

- track length is kept to a minimum and utilises existing access tracks where possible to reduce environmental impact, construction time and material quantities (imported stone);
- new track gradients are to be kept to 8 percent (1 in 12.5) up to a maximum of 12.5 percent (1 in 8) and radius curves to 50m where practicable to accommodate the requirements of delivery vehicles and also to allow construction plant to move safely around the Site;
- track layout is designed to reflect contours and avoid cross slopes and deep cut and fill into existing terrain where possible; and
- tracks are routed to avoid sensitive ecological, archaeological and hydrological features.

4.5.19 The track design resulted from optimisation of these criteria.

Electrical connection

4.5.20 Following turbine foundation construction, some of the required electrical infrastructure would be installed such as the small transformers to be located either internally within the turbine towers or adjacent to each turbine in a small kiosk (5.0m x 2.5m x 2.5m (L x W x H)) according to the selected turbine specification.

4.5.21 Underground cables will link the turbines to each other and to the on-site substation. Detailed construction and trenching specifications will depend on the ground conditions encountered at the time, but typically cables will be laid in a trench ~750mm deep and ~450mm wide. To minimise ground disturbance, cables will be routed along the side of the access tracks wherever practicable. **Figure 4.8** shows a typical cable trench detail.

4.5.22 The site substation will connect the wind farm into the national distribution system on site (to be via a 33kv connection in the substation compound).

4.5.23 The arrangement of the substation will depend on WPD's requirements and shall be determined by the rating of the grid connection and requirement for a step-up transformer. If required, a transformer would be provided within the substation compound which would comprise a stoned area of approximately 37.5m x 35m containing the transformer and associated equipment (isolators, circuit breakers). If a transformer is not required then all electrical equipment would be housed within the substation building. The substation building (approximately 14m x 10m) would be a single storey building which will house metering, protection and control equipment, storage and welfare facilities. The substation building would be traditional blockwork construction and faced in stone with a slate roof. Associated fencing would be either moorland green/brown or dark grey in order to blend with either the existing landscape colours or traditional building colours for the area. **Figure 4.9** provides an illustration of the switchroom and substation compound.

4.5.24 Further details on the proposed grid connection to the wider electricity distribution network are provided in **Section 4.3.**

Site accommodation and construction compounds

4.5.25 A temporary site office comprising a portacabin, a single parking space and a vehicle layby would be located as close to the Site entrance off the A4233 as possible. This office would be manned during construction hours and provide a sign-in / out function for the Site. This would prevent unauthorised vehicular access to the Site and allow supervision of anyone remaining on-site beyond agreed working hours.

4.5.26 The location of the two construction compounds are illustrated on **Figure 4.1**. These compounds would be a maximum of 50m x 50m in area but this may be reduced depending on site requirements at the start of the construction phase. The current construction compound locations will be confirmed at final ES.

4.5.27 Other temporary fenced compound areas will be established on turbine craneage areas as appropriate for security of plant in remote parts of the Site. These will not require any additional hardstanding to that proposed for the craneage areas.

4.5.28 Once the erection and commissioning of the wind turbines is complete, the main construction compound would be removed and the land reinstated.

Site security and lighting

4.5.29 The construction compound would be lit with security lighting, which would face inwards to minimise light pollution. The construction compound may be enclosed within a security fence around the perimeter of the substation and the access to electrical compounds would be via a locked access gate.

4.5.30 It is also anticipated that a small security area would be established at the junction to the public highway during the construction period. These would be manned to monitor the flow of traffic into and out of the Site with a small, manned security kiosk installed.

Proposed working hours

Development timescales and programme

4.5.31 It is anticipated that the construction period for the Proposed Development would be approximately 24 months in duration. An indicative programme for construction activities is shown in **Figure 4.10.** The start date for construction activities is largely dependent upon the date that consent might be granted and grid transmission availability;

subsequently the programme would be influenced by constraints on the timing and duration of any mitigation measures confirmed in the individual technical chapters or by the application decision.

4.5.32 Where possible, operations would be carried out concurrently (thus minimising the overall length of the construction programme). In addition, development would be phased such that, at different parts of the Site, the civil engineering works would be continuing whilst wind turbines are being erected. Site restoration would be programmed and carried out to allow restoration of disturbed areas as early as possible and in a progressive manner.

4.5.33 The final length of the programme would be dependent on seasonal working and weather conditions. Summer months are favoured for construction due to longer periods of daylight allowing longer (and safer) working days. Summer months are generally also drier which aids construction progress and reduces the impact of site debris (mud etc) reaching the public highway, although wheel wash facilities would be installed at the main site entrance / exit points.

4.5.34 For the purposes of this Draft ES, subject to the caveats noted below, construction activities have been assumed to take place between 07:00 to 19:00 hours on weekdays and 07:00 to 13:00 on Saturdays. Quiet on-site working activities such as electrical commissioning have been assumed to extend outside the core working times, noted above, where required. No working will be undertaken on Sundays. Working hours may be reduced at times due to seasonal or weather restrictions or in certain locations where required as mitigation (for example during the breeding bird season should a stand-off from an active nest be required).

4.5.35 Weather, in particular wind, has a strong influence on the timing of construction activities. Crane activities are generally limited during strong winds (>9 m/s) and erection during these weather conditions may be avoided for safety reasons, with the actual limiting conditions being reviewed as part of the crane lifting plan. As a result of this, it may be necessary to carry out turbine erection activities outwith the standard working times and during periods of calm weather. During periods of cold weather, concrete pouring of the turbine bases may be prohibited (temperatures <4°C) or subject to specific cold weather working practices.

Development phasing

4.5.36 Construction of the Proposed Development would consist of two main elements. Firstly, civil and electrical construction of the infrastructure and secondly, erection and commissioning of turbines. Construction of the control building and the grid connection are lengthy processes which would commence early in the construction programme to allow a live grid connection to coincide with the commissioning of the turbines. As noted, many individual construction processes would run partly or fully concurrently whilst others would progress in a sequence with or without some overlap in time.

4.5.37 There are constraints which will require cessation of construction of specific parts of the Site during certain times of the year. These are discussed in later technical chapters as appropriate. Construction phasing to avoid those constraints will be agreed with the determining authorities and relevant consultees should development consent be agreed.

Site material quantities

4.5.38 A number of materials will be required to construct the different elements of the Proposed Development. **Chapter 12: Traffic & Transport** provides a detailed breakdown of the estimated material requirements for each element (e.g. site track, crane pads,

hardstanding areas, turbine foundations etc), and a summary of total tonnages for each material to be used is provided in **Table 4.2**.

Table 4.2 Estimated tonnages of materials required for construction of the Proposed Development

Material	Estimated total tonnage
Stone	43,400
Tarmac	100
Sand	1,400
Concrete	9,800

4.5.39 All materials required for construction of the Proposed Development would be delivered from quarries and batching plants in the local area.

Waste management

4.5.40 At this stage it is not possible to estimate quantities of waste and surplus materials which would be produced on site. Any such waste materials produced, which are expected to be minimal, and surplus material excavated from constructing turbine bases, access roads and other infrastructure would be removed from Site in HGVs and taken to an appropriate waste recycling or disposal facility. No other discharges are anticipated from the development. Site waste management procedures are discussed further in the Draft CEMP provided alongside this Draft ES.

Vulnerability to major accidents and disasters

4.5.41 The Draft CEMP details measures to manage the environmental impacts of the Proposed Development during the post consent phase. Such measures will minimise the likelihood of major accidents or disasters arising from construction of the Proposed Development, for example through pollution prevention, management of waste, and water management measures (see **Section 4.8** for further details).

4.5.42 The construction works for the Proposed Development would also be undertaken in accordance with primary health and safety legislation, including:

- The Health and Safety at Work Act 1974;
- The Management of Health and Safety and Work Regulations 1999 (as amended); and
- The Construction (Design and Management) (CDM) Regulations 2015.

4.5.43 As required by the CDM Regulations a Construction Phase (Health & Safety) Plan will be prepared for the works by the site contractors, setting out emergency procedures to be followed in the event of such an incident.

Employment proposals

4.5.44 Potential job creation levels are discussed in detail in **Chapter 16: Socio-economics.**

4.6 Operation

Wind turbine characteristics

4.6.1 The power output from a wind farm largely depends on the strength of the wind blowing across the site. Wind turbines start to generate electricity at a wind speed of about 4m/s, their output increasing up to their maximum rated power at a wind speed of about 12m/s. As the wind speed increases further, the output is limited to the maximum until the wind speed reaches 25m/s when the wind turbine shuts down automatically.

4.6.2 The proportion of time which the turbines will be generating electricity is therefore dependent on the time that the wind speed is between 4 and 25m/s. Generation output from a wind farm is also seasonally dependent, such that approximately two thirds of the total annual energy yield from the wind farm is expected to be delivered in the six months between October and March, with the remaining six months delivering the other third.

4.6.3 Wind data to inform final turbine design and selection is being gathered using a temporary anemometry mast.

Meteorological effects

4.6.4 Although the wind farms require wind for electricity generation, at high wind speeds (>25m/s or 56mph) they shut themselves down to avoid excessive wear on the components; the rotor is both aerodynamically and mechanically braked. However, modern wind turbines are designed to withstand much higher wind speeds and are normally certified against structural failure for wind speeds up to 150mph. Lightning generally has no effect on turbines, though as with all structures there is risk of damage if hit directly by lightning. Turbines are fitted with a lightning protection system as part of their design.

Servicing and emergency repairs

4.6.5 Turbines would be maintained by a local team of technicians. Turbines would be typically maintained at 6 monthly internals, with each service requiring on average two technicians over two days per turbine. Technicians operate in transit vans or 4x4 vehicles.

4.6.6 Technicians would also visit turbines to repair faults, again typically working in pairs in a transit van or 4x4. Most components would be replaced by hoisting to the nacelle using onboard cranes / hoists within the turbine. In instances of a major fault requiring major component replacement (e.g. blade failure), cranes would be required to remove components.

4.6.7 High Voltage equipment (substation) would be inspected and maintained at 6 monthly intervals, typically by two technicians over two days.

4.6.8 Servicing and emergency works would be covered by the *Construction (Design and Management) Regulations 2015*[2].

Extended services

4.6.9 At regular period through the project life, oils and components will require changing which will increase the service time on site per machine.

[2] UK Government (2015). Construction (Design and Management) Regulations 2015. [online] Available at: https://www.legislation.gov.uk/uksi/2015/51/contents [Accessed April 2022].

4.6.10 Gearbox oil changes are required approximately every 18 months. Changing the oil and worn components will extend each turbine service by one day.

4.6.11 Blades would be inspected annually, either by drone or rope access. Repairs may be carried out every few years using a cherry picker or rope access.

4.6.12 Blade inspection and repair work is especially weather-dependent. Light winds and warm, dry conditions are required for blade repairs. Hence mid-summer (June, July and August) is the most appropriate period for this work.

Emergency operations

4.6.13 The following factors could have significant effects on the duration of emergency operations:

- working with cranes is highly weather dependant; wind speed and cloud cover being the key factors (due to crane and manhandling safety limits);
- the availability of spares will determine delivery times to site for a replacement; and
- the duration of repair on a component where there is no spare available is event specific.

4.6.14 It has been found that operation in the first three or four years will highlight any manufacturing and/or installation issues which may require multiple replacements. In general, unscheduled maintenance is more likely to be required at the project start up and towards the end of the 30-year period at the end of the design life.

Track maintenance

4.6.15 Site tracks are likely to be maintained annually with a JCB, dumper and a roller taking around 5 to 10 days and will generally be undertaken in the summer months when the tracks have dried out.

4.7 Decommissioning

Wind farm decommissioning requirements

4.7.1 There are two options available at the end of the operational lifetime of the Proposed Development. As wind energy is a renewable resource and thus a sustainable method of generation, the first is to re-power the site with new machines, which would require a new application and a further ES. The second option is to remove the wind turbines and re-instate the Site.

4.7.2 Wind turbines can easily be removed and the hardstanding areas re-instated. Prior to wind turbine removal, due consideration would be given to any potential impacts arising from these operations. Some of the potential issues could include:

- potential disturbance by the presence of a crane, HGVs and engineers on-site;
- on-site temporary compound would need to be located appropriately;
- time of year and timescale (to be outside sensitive periods); and
- access tracks may remain in use for the benefit of the landowner and other stakeholders.

Wind turbine decommissioning

4.7.3 Wind turbines (towers, nacelle, hub, blades and electrical kiosk) can be dismantled using a crane and removed from site. When dismantling and removing the turbines the bases would be broken out to below ground levels and all cables cut at depth below ground level and left in the ground. Roads would either be left for use by the landowner or covered with topsoil. No stone would be removed from the Site. The decommissioning works are estimated to take six months. This approach is considered to be less environmentally damaging than seeking to remove foundations and cables entirely.

4.7.4 The turbine components themselves will be taken to an appropriate recycling facility where applicable. Due to the timescales, it is not possible to identify a specific facility at this time.

4.7.5 It should be noted that the developer will set up a decommissioning fund during the life of the Proposed Development.

Substation and distribution system decommissioning

4.7.6 The control building, substation and associated equipment would be removed and the components reused or recycled. It is likely that the plant would be re-used as it has a life well in excess of the Proposed Development itself. The buried distribution cables would be de-energised and would be cut off below ground level at the ends. Any disturbed areas would be reinstated and re-vegetated.

Access track decommissioning

4.7.7 Following decommissioning of the Proposed Development, some wind farm tracks may remain in perpetuity for future use by landowners, other stakeholders and for recreational purposes. It is also considered that the disturbance associated with their removal and disposal of the material would have a much greater environmental effect than leaving them in situ.

Transmission system decommissioning

4.7.8 There may well be other users of the wider transmission system at the end of the project. In this case, the relevant circuits would not be removed when the Proposed Development is decommissioned.

4.8 Embedded environmental measures

Introduction

4.8.1 A key benefit of the EIA process is the opportunity it gives to integrate environmental considerations into the iterative design of a project. Embedded environmental (mitigation) measures are those measures which are inherent to the Proposed Development and are integral to and should be included in consideration of the application. Embedded measures include those assumed to be in place during construction, operation and decommissioning. Embedded measures include those considered as industry standard or best practice.

4.8.2 Embedding environmental measures has been a feature of the process that has led to the final design of the Proposed Development (see **Chapter 3** for further details); these

embedded measures therefore form part of the Proposed Development which is assessed.

4.8.3 In addition to the plans and management plans described in **Section 4.5**, the following provides an overview of some of the general environmental management considerations for the construction of the Proposed Development. These provisions do not replace or affect the implementation of specific environmental measures detailed in the specialist assessment chapters which follow.

Construction Environmental Management Plan (CEMP)

4.8.4 The CEMP will be the master document for consolidating all environmental requirements and undertakings that relate to the Site. As such it aims to ensure that construction activities for the Proposed Development are carried out in accordance with legislation and best practice for minimising the effects of construction on the environment and local communities.

4.8.5 The CEMP will be produced prior to the commencement of works and made available to the appointed civil engineers and construction company, and its objectives will be to:

- provide a mechanism for delivering many of the embedded environmental measures described in the ES;
- ensure compliance with legislation through setting out the need for consultation with 'consultation bodies' (see Regulation 2 in the EIA Regulations), and by obtaining necessary consents and licences from relevant bodies;
- provide a framework for monitoring and compliance auditing and inspection to ensure the environmental measures included in the Proposed Development are being implemented;
- ensure environmental best practices are adopted throughout the construction stage;
- provide a framework for dealing with adverse effects as they occur; and
- ensure a prompt response should unacceptable adverse effects be identified during the works.

4.8.6 The CEMP will remain a live document throughout the pre-construction and construction processes and some provisions may extend into the operational phase. The CEMP will consolidate all appropriate embedded measures, and additional mitigation and enhancement strategies where required, and would clearly outline what should be implemented, where, and by whom. A Draft CEMP is provided alongside this Draft ES.

Construction Method Statement (CMS)

4.8.7 The CMS would be prepared following the grant of consent and be subject to approval with individual elements and the supporting CEMP. The proposed content of the CMS is as follows:

- Ground Investigation (GI) methods including appropriate reference to the CEMP;
- turbine and infrastructure locations following post GI micro-siting involving a number of technical specialists;
- good practice guidance relevant to H&S, design details etc;

- design detail for infrastructure (e.g. foundation specification, foundation and crane hardstanding configuration, confirmation of track sections to be excavated, external finish to buildings, security fencing form and location, etc) - see **Section 4.6**;
- design detail for pollution control measures (location specific arrangements and design for management of dewatering activities) - see **Section 4.6**;
- material import requirements and confirmation of stone and concrete source - see **Section 4.6**;
- programme of works and working hours controls -see **Section 4.6**; and
- site restoration plan to be implemented to restore areas affected by construction activity.

Transport Management Plan

4.8.8 A detailed Transport Management Plan (TMP) would be produced and agreed with the relevant authority in advance of commencement of development. The TMP would address traffic related planning conditions and would include, but not be limited to:

- Communication – The TMP would include a strategy for communication with local residents and businesses. The strategy would include procedures to keep affected parties aware of when works would be carried out, if / when roads would be closed (and diversionary routes to be used if there are closures) and how to contact the construction team with a query or complaint;
- Traffic Management – Detailed traffic management strategies would be provided for each stage of the construction works alongside finalised road traffic signage arrangements and a proposed programme of safety inspections on the public highway. This would include details of proposed timings of deliveries and transportation during the construction period;
- Road Condition Survey pre and post construction;
- Remedial Works – Details of procedure for conducting emergency road maintenance, on-going remedial work and final remedial work along with an agreed maintenance period for any repairs carried out on the public road; and
- Contact and Liaison – Details would be outlined with respect to road safety and condition monitoring, including a named individual who would be responsible for liaising and coordinating with PEDW and Rhondda Cynon Taf County Borough Council.

Water Management Plan

4.8.9 A Water Management Plan (WMP) would be produced and agreed prior to the commencement of development. The WMP would provide specific information in relation to the management of water on the construction site. Practices set out in the WMP would be incorporated into the project CEMP once agreed and where they relate to the construction phase. This would draw on the specific measures set out in **Chapter 10: Water Environment**. A Draft WMP is provided as part of the Draft CEMP.

Habitat Management Plan

4.8.10 A Habitat Management Plan (HMP) would be produced and would include the location and approach to implementing ecological and other enhancements and mitigation where applicable. A Draft HMP is provided as **Appendix 8F** of this Draft ES.

Dust and Air Quality

4.8.11 Particular care would be required to maintain dust emissions at a practicable minimum when working in the vicinity of residential properties and environmentally sensitive areas. Good practice mitigation would be required during dry conditions. The use of Best Practicable Means (as defined in Part III of the Environmental Protection Act 1990) would be employed.

4.8.12 The environmental measures to be implemented to control dust emissions during construction and decommissioning are:

- the use of dust suppression facilities on-site. This would include the provision of water bowsers with sufficient capacity and range to dampen down all areas which may lead to dust escape on-site;
- any storage on-site of aggregate or fine material would be properly enclosed and screened so that dust escape is avoided. Adequate sheeting would also be provided for the finer materials which are prone to 'wind whipping';
- wheel wash facilities would be installed for vehicles entering and exiting the Development Site where required. This facility would be able to automatically clean the lower parts of the HGVs by removing mud, clay etc from the wheels and chassis in one drive through operation;
- HGVs entering and exiting the Site would be fitted with adequate sheeting to totally cover any load carried which has the potential to be 'wind whipped' from the vehicle;
- good housekeeping or 'clean up' arrangements would be employed so that the Site is kept as clean as reasonably practicable. There will be daily inspections of the working areas and immediate surrounding areas to ensure that any dust accumulation or spillages are removed / cleaned up as soon as reasonably practicable; and
- the appointment of a contact to whom complaints / queries about construction dust can be directed. Any complaints to be investigated and action taken where appropriate.

4.8.13 Dust and air quality are not considered any further within this Draft ES because no likely significant effects are anticipated in this regard and have been scoped out of the assessment. This approach was set out in the Scoping Report and no objections were raised in the Scoping Direction.

Site Waste Management

4.8.14 Site waste management practices to be implemented by the appointed contractor for the construction works for the Proposed Development are included in the Draft CEMP provided alongside this Draft ES.

Re-Use and Recycling of Decommissioned Materials

4.8.15 All decommissioned materials would be stored on site in segregated areas. The principal contractor would provide method statements for the collection, storage and transportation of materials / waste. Where appropriate, materials / waste would be segregated on the Site in skips or bunded tanks and transported to appropriate sites or recycling facilities.

4.8.16 No materials would be burned on the Site. Hazardous waste would be held in a separate skip (or suitable bunded facility) and disposed of at a suitably licensed site.

4.8.17 No waste would leave the Site until the appropriate waste carriers' license and management certificates for the disposal site or transfer station have been inspected and authenticated by the relevant parties.

Control of Hazardous Materials

4.8.18 All hazardous materials and substances stored on the Site would be stored in a 'Haz-bin' or similar secure lockable container located within the temporary decommissioning compound.

4.8.19 Control of Substances Hazardous to Health (CoSHH) assessments would be completed by all contractors for activities using hazardous substances.

4.8.20 Any on site facilities for the storage, transportation or refuelling of chemicals, oils or fuels shall be sited on suitable impervious bunds. No discharge to any watercourse, land or underground strata would be permitted.

4.9 Implementation of environmental measures

4.9.1 **Table 4.3** summarises the environmental measures that form part of the Proposed Development, as well as the mechanisms which would be used to ensure that these measures are implemented as part of the Proposed Development. Greater detail on these measures can be found in each of the technical assessment chapters.

Table 4.3 Summary of environmental measures to be implemented

Environmental measure	Responsibility for implementation	Compliance mechanism	Draft ES section reference
Revegetation and reinstatement of temporary losses of habitats in working areas.	Developer/Contractor	CEMP via DNS planning condition	Section 6.6
The design of the Proposed Development has ensured that losses are minimised. Retained trees would be protected in accordance with BS 5837:2012 Trees in relation to design, demolition and construction. Recommendations	Developer/Contractor	CEMP via DNS planning condition	Section 6.6
Safety signage, temporary closures and provision of a banksman to minimise impacts on the use of PRoW network on site.	Developer/Contractor	CEMP via DNS planning condition	Section 6.6
Construction works would be undertaken using all necessary and practical measures to minimise the release of dust including: wheel wash facilities on site, enclosed and screened storage of aggregates; damping down haul roads during dry weather; and ensuing that lorries transporting material onto or off site are sheeted when conditions warrant, e.g. during dry periods or when carrying fine materials. **Best practices air quality management measures will be applied as described in Institute of Air Quality Management (IAQM) (2014) guidance on the Assessment of Dust from Demolition and Construction 2014, version 1.1.**	Developer/Contractor	CEMP/CMS via DNS planning condition	Section 8.6
The existing known archaeology within the Site will be mitigated through archaeological recording such as an excavation or watching brief in any areas of impact. The exact method of archaeological recording would need to be agreed and would subsequently be secured through a DNS condition.	Developer/Contractor	DNS planning condition	Section 7.6
To ensure construction works don't encroach into the area of the asset it will be temporarily fenced off.	Developer/Contractor	DNS planning condition	Section 7.6

Environmental measure	Responsibility for implementation	Compliance mechanism	Draft ES section reference
Construction works would be undertaken using all necessary and practical measures to minimise the release of additional sediment-laden run-off into nearby watercourses	Developer/Contractor	CEMP/CMS via DNS planning condition	Section 8.6
• **Appropriate pre-construction surveys or inspections will be carried out.** • **A method statement would be prepared under which:** • **Vehicle movement outside of daylight hours would be restricted, vehicle speeds controlled, and operatives warned of the presence of certain species in order to reduce the risk of collisions.** • **All excavations would have sloped sides or have a means of escape for entrapped animals. Excavations to be checked each morning by operatives prior to work within the excavation.** • **Construction activities would be restricted to normal working hours (so largely avoiding the hours of darkness, particularly in the summer when species are most active).** • **Site lighting will be controlled to prevent incidental spillage on to features that may be used by nocturnal species.**	Developer/Contractor	CEMP via DNS planning condition	Section 8.6
• **Reptiles are confirmed present on Site and individual reptiles will be protected during construction using standard best-practice techniques. Effects on individual reptiles during construction can be avoided or mitigated using standard best-practice displacement techniques, due to the spatially discrete nature of the works and the large amounts of suitable habitat that would remain accessible.** • **Removal of habitat or features that could support reptiles (e.g. scrub, dense tussocky grassland, rocks) will be kept to a minimum, and works in these areas will take place outside the hibernation period.** • **Refugia features will be retained on site as far as possible.** • **Areas of long grass and other similar vegetation that need to be removed will be strimmed prior to construction to reduce their suitability for reptiles, and hand-searched as necessary to disperse individuals from the construction area.** • **Vegetation clearance will be sequenced to direct reptiles away from the construction area.**	Developer/Contractor	CEMP via DNS planning condition	Section 8.6

Environmental measure	Responsibility for implementation	Compliance mechanism	Draft ES section reference
The wind farm infrastructure layout has been designed to avoid the loss of key habitats on-site (wetland habitats/semi-natural habitats) as far as is practicable, i.e. the infrastructure is generally located within improved grassland, semi-improved grassland and areas of bracken.	Developer/Contractor	DNS planning condition	Section 8.6
Habitats which would be subject to temporary loss, will be re-vegetated and reinstated as soon as possible after construction.	Developer/Contractor	CEMP secured via DNS planning condition	Section 8.6
An Outline Habitat Management Plan (oHMP) will be devised which will include measures that compensate and enhance the SINC impacted by proposals and produce a net gain in nature conservation across the Site by designing in wildlife, and ensuring any avoidable impacts are appropriately mitigated.	Developer/Contractor	Outline Habitat Management Plan	Section 8.6
<u>Goshawk:</u> **Construction methods and programme will consider the location of identified nest sites with the timing and duration of works managed to avoid direct conflict.** **Where works cannot be scheduled to avoid the main breeding season, additional measures such as the employment of "no-disturbance buffers" around nest sites or the use of sound buffers would be considered.**	Developer/Contractor	Construction Environmental Management Plan (CEMP) secured via DNS condition	Section 9.6
Measures to prevent impacts on breeding birds will be included in final construction methodologies. This will include steps such as: - **Clearance of construction and other working areas outside of the breeding bird season** - **The use of dedicated working areas and construction access routes** - **Where works cannot be completed outside of the breeding bird season the construction methodology will include employment of Ecological Clerk of Works to carry out pre-works checks and monitoring of construction areas to identify potential bird nests**	Developer/Contractor	Construction Method Statement secured via DNS Condition	Section 9.6

Environmental measure	Responsibility for implementation	Compliance mechanism	Draft ES section reference
Any active bird nests in or immediately adjacent to working areas would be identified and suitable "no working" buffers established around nest sites.			
ID1 - Good working practices **Good working practices will be implemented during construction, with adherence to the Construction Environmental Management Plan (CEMP), which will be secured through a planning consent requirement, and relevant guidance. A monitoring schedule will be implemented by the contractor to ensure that the measures taken to protect the water environment are effective.** **ID2- Water Management Plan (WMP)** **Implementation of an appropriate Water Management Plan (WMP) for the construction phase of the Proposed Development, utilising SuDS principles, including collection, conveyance and attenuation/infiltration storage where suitable. Suitable temporary silt fencing, bunding and water quality measures (i.e., silt capture to maintain storage volume) will be included in the design of these works. Sufficient capacity will be provided onsite to hold runoff prior to discharge runoff to ground and/or any water discharge into watercourses is limited to greenfield rates. A water quality monitoring programme will be agreed with NRW and implemented prior, during and following construction.** **ID3 – Water discharges** **Further investigation of the viability of infiltration as a means by which surface water runoff could be discharged to ground will be undertaken through liaison with RCTCBC and by undertaking soakaway testing exercise. In the case that the soakaway testing concludes that infiltration is not solely sufficient in managing runoff, and discharge to the watercourses is required, this will be subject to a Consent from the NRW and RCTCBC and dewatering would be suspended if a flood alert or flood warning is in place downstream (and the on-site discharges could feasibly contribute to the flood event).** **Any groundwater dewatered from excavations (e.g., excavations associated with turbine foundation, OHL wooden poles and underground cables linking the turbines to the substation) will be discharged to adjacent ground, away from watercourses as far as possible. If infiltration is not possible, and discharge to the watercourses is required, this will be subject to a Consent from the NRW and RCTCBC and dewatering would be suspended if a flood alert or flood warning is in place downstream (and the on-site discharges could feasibly contribute to the flood event).**	Developer/Contractor	CEMP	Section 10.6

Environmental measure	Responsibility for implementation	Compliance mechanism	Draft ES section reference
Any discharge to surface water would be restricted to the greenfield runoff rate and will be treated in a suitable basin/trench before discharging. **ID4 - Materials Management Plan** **Excavated materials during construction works should be segregated and stored/ re-used on-site in accordance with a Materials Management Plan (in compliance with the CL:AIRE Definition of Waste: Code of Practice). Any temporary onsite storage of excavated materials suspected or confirmed to be contaminated will be on impermeable sheeting, covered over and with adequate leachate / runoff drainage to prevent migration of contaminants from the stockpile. Materials will be segregated where possible to prevent cross-contamination occurring. Such materials will only be reused if they are confirmed as suitable for use in line with the requirements of the Materials Management Plan.** **ID5 – Soil stockpiles** **Stockpiles will be appropriately maintained and have the minimum lifespan possible, with materials being reinstated as construction works progress. Where these remain in situ for 3 months or longer, seeding management techniques will be used.**			
ID6 - Standoff distance **No works will be undertaken within 20 m of any watercourse (other than for watercourse crossings and drainage mitigation).** **ID7 - Watercourse crossings** **If watercourse crossings are required to enable access over any watercourses, these would be appropriately sized to maintain existing flow conveyance.** **ID8 - Underground cables** **The underground cables linking the turbines to the substation will be constructed in discrete sections with the reinstatement process commenced in as short a timeframe as practicable.**	Developer/Contractor	CEMP	Section 10.6
ID9 – Fuel, oil and chemicals storage (construction phase) **Areas of construction compounds that are used for fuel storage, plant maintenance and refuelling will be surfaced with fully impermeable materials to prevent any infiltration of contaminated runoff**	Developer/Contractor	CEMP	Section 10.6

Environmental measure	Responsibility for implementation	Compliance mechanism	Draft ES section reference
and contain bunding. An effective accident response protocol will be developed to ensure any spillages or potential pollution incidents are dealt with appropriately including the provision of containment for spills of contaminated liquids. Plant and machinery will be maintained to minimise the risks of oil leaks or similar. Any tanks containing oils, fuels and chemicals will be double skinned. There will be a bunded capacity of 100% of the maximum tank volume for non-hazardous fluids. For fuels or oils the bund capacity will be the larger of 110% of the largest tank volume for single tank bunds, (or, in the case of multi tank bunds, 110% of the largest tank capacity or 25% of the combined tank capacity, whichever is the largest). Fuel storage will be in accordance with Pollution Prevention Guidelines (PPGs). All stores of fuel will be located at least 20m from any watercourses and away from areas at risk of flooding			
ID10 - Crossing of surface water flow paths **Where the proposed access tracks cross mapped surface water flow paths, a pipe culvert will be provided beneath the access track to convey flows from existing drainage pathways. The design of the pipe culvert will be confirmed as part of the detailed drainage design with the Lead Local Flood Authority (LLFA).** **Where the proposed underground cable crosses mapped surface water flow paths, each crossing will be individually reviewed / surveyed during detailed design (which will occur subsequent to gaining relevant consents) to confirm the crossing methodology employed. It is anticipated that open cut crossing methodology will predominantly be used.** **Crossings will be subject to a Land Drainage Consent from RCTCBC.**	Developer/Contractor	CEMP	Section 10.6
Storage and handling of soil will be informed by the Defra (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites to avoid damage to soil structure and help to minimise soil compaction. This measure is integrated into the CEMP submitted alongside this ES. **If ground conditions require it, a temporary trackway of either metal, wood, or plastic, would be used for vehicles to access the working areas. This would be removed once construction is complete.** **During topsoil stripping, machinery with low ground pressure will be used to minimise soil compaction, including during construction of the access tracks, the tracks will then be available for heavier vehicles to use to avoid impacts on other areas.**	Developer/Contractor	CEMP and Materials Management Plan (MMP)	Section 11.6

Environmental measure	Responsibility for implementation	Compliance mechanism	Draft ES section reference
Temporary storage of soils will be carried out in accordance with the MMP. This document will outline where excavated non-waste materials will be reused in line with the CL:AIRE Definition of Waste Code of Practice (DoWCoP). The MMP will include a declaration by a Qualified Person that the MMP has been completed in accordance with the DoWCoP and that best practice is being followed. The CEMP refers to the MMP			
Storage and handling of soil will be informed by the Defra (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites to avoid damage to soil structure and help to minimise soil erosion from surface water runoff. This measure is integrated into the CEMP. **Measures to avoid soil compaction (which can result in soil erosion by increasing surface run-off) are integrated into the CEMP to avoid damage to soil.** **The CEMP refers to the MMP which will detail how temporary storage of soils is to be managed.** **Soil stockpiles will be stored for the shortest amount of time possible.**	Developer/Contractor	CEMP and MMP	Section 11.6
Elements of the Proposed Development which require removal of topsoil during construction and where topsoil cannot be reinstated will be kept to the minimum footprint required for the Proposed Development. **Storage and handling of soil will be informed by the Defra (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites to avoid damage to soil structure. This measure is integrated into the CEMP.** **Permanently displaced soil will be reused within the Proposed Development Site where practicable in accordance with the MMP, as referenced in the CEMP.**	Developer/Contractor	CEMP and MMP	Section 11.6
A Phase 1 geo-environmental desk study has been completed for all elements of the Proposed Development (Appendix 11A). This has identified potential contamination sources within agricultural areas.	Developer/Contractor	CEMP, MMP and DNS condition	Section 11.6

Environmental measure	Responsibility for implementation	Compliance mechanism	Draft ES section reference
A Phase 2 geo-environmental ground investigation will be completed at the pre-construction stage to characterise soil chemistry at target areas. This will include environmental testing of soil for potential contaminants, including metals and hydrocarbons as identified in the Phase 1 Geo-environmental desk study, in addition to geotechnical testing to inform the design and material selection. Deeper soil testing will be carried out as needed to inform the detailed (post consent) design of the Proposed Development in relation to infrastructure within former landfill, former colliery tip areas or other areas of suspected made ground. The results of the soil testing will be used to carry out a contaminated land risk assessment to confirm that the soils are suitable for use in the Proposed Development. The contaminated land risk assessment will be completed in accordance with the Environment Agency LCRM guidance. **Prior to construction, an MMP will be prepared outlining where excavated non-waste materials will be reused in line with the CL:AIRE Definition of Waste Code of Practice (DoWCoP).** **The CEMP includes a procedure for encountering unexpected contamination or suspected contamination, which will require additional testing and risk assessment to determine appropriate measures. Materials will be segregated where possible to prevent cross-contamination occurring and will only be reused if confirmed to be suitable for use and in accordance with other requirements of the MMP.** **Any temporary onsite storage of excavated materials suspected or confirmed to be contaminated will be placed on impermeable sheeting, covered over and with adequate leachate/ runoff drainage to prevent migration of contaminants from the stockpile.**			
The Proposed Development will avoid significant impacts on peat through design, based upon peat survey to date and additional peat survey to be completed in October 2022. There is currently no NRW or Welsh Government guidance for developments on peat, therefore the SEPA guidance 'Developments on Peat and Off-site Uses of Waste Peat'[3] will be applied. This includes use of the peat management hierarchy, where peat should be avoided through design, and if this is not possible, further measures are needed. The guidance applies only in Scotland, however it is designed for wind farm developments and can be applied to all types of development on peat.	Developer/Contractor	CEMP and DNS condition	Section 11.6

[3] SEPA (2017) SEPA Guidance – WST-G-52: Developments on Peat and Off-Site Uses of Waste Peat. [online]. Available at: https://www.sepa.org.uk/media/287064/wst-g-052-developments-on-peat-and-off-site-uses-of-waste-peat.pdf. Checked October 2022.

Environmental measure	Responsibility for implementation	Compliance mechanism	Draft ES section reference
A Phase 1 geo-environmental desk study has been completed for all elements of the Proposed Development (Appendix 11A). **Phase 2 intrusive geoenvironmental ground investigation will be completed during the pre-construction phase, including soil sampling and chemical testing, to confirm the ground conditions.** **Potential risks to human health from any known, suspected or unexpected ground contamination will be avoided by adopting appropriate working methods and all aspects of construction will be completed in compliance with the Construction (Design and Management) Regulations 2015, CAR 2012 and the Health and Safety at Work Act (1974) and regulations made under the Act. These legal obligations include the requirement for risk assessments and method statements for all construction related activities and the use of appropriate working methods, training and Personal Protective Equipment (PPE).** **Temporary storage of excavated materials will be in accordance with the MMP.** **Contamination if found will be subject to appropriate risk assessment and if necessary, either removed, treated and/or mitigated as part of the Proposed Development. The CEMP includes an unexpected contamination protocol.** **Best practice air quality management measures will be applied as described in Institute of Air Quality Management (IAQM) (2014) guidance on the Assessment of Dust from Demolition and Construction 2014, version 1.1.**	Developer/Contractor	CEMP, MMP and DNS condition	Section 11.6
A Phase 1 geo-environmental desk study has been completed for all elements of the Proposed Development and the report is appended (Appendix 11A). **Generally, the Phase 1 Geo-environmental desk study indicates that the Proposed Development Site is well drained and shallow groundwater is unlikely to be encountered. However, if water is present and requires to be pumped from excavations and is suspected to be contaminated, appropriate measures will be taken in accordance with NRW guidance and the Environmental Permitting Regulations to prevent uncontrolled or unauthorised releases of this water to ground or to the water environment.**	Developer/Contractor	CEMP and DNS condition	Section 11.6

Environmental measure	Responsibility for implementation	Compliance mechanism	Draft ES section reference
Phase 2 intrusive geoenvironmental ground investigation will be completed during the pre-construction phase, including soil sampling and chemical testing, to confirm the ground conditions.			
A Phase 1 geo-environmental desk study has been completed for all elements of the Proposed Development and the report is appended to the ES (Appendix 11A). **The Phase 1 Geoenvironmental Desk Study and the Coal Mining Risk Assessment have identified shallow mining related risk in the north of the Wind Farm site, and a more widespread risk of displacement has been identified based on the occurrence of subsidence and fissuring/fault reactivation across the site. Although there is no record of any recent subsidence, either anecdotal or from the Coal Authority. This requires further assessment including clarification with the Coal Authority regarding the definition of shallow mining risk areas and to obtain a better understanding of the subsidence claims and a consideration of fault reactivation/fissuring. This additional assessment forms an embedded measure to be completed preconstruction and pre – ground investigation. The Phase 1 Geoenvironmental Desk Study, and the follow-on desk-based assessment described above, will inform a programme of Phase 2 intrusive investigation and testing to allow better quantification of the identified constraints in the proposed wind farm infrastructure locations, in particular those arising from filled/disturbed ground and historic mineworkings.** **Consideration of the risks from ground gas will be given in the design of the preconstruction Phase 2 ground investigation, in areas of the Proposed Development where there could be potential for ground gas accumulation to take place in enclosed spaces (this depends on the detailed design of these buildings/structures in addition to the presence of ground gas).** **All aspects of the Proposed Development from construction to operation will comply with the Health and Safety at Work etc. Act and regulations made under the Act.** **The design for the Proposed Development will comply with good practice in structural design including compliance with the Eurocodes and relevant British Standards. The design will account for the expected ground conditions and design loads, accounting for the effects of climate**	Developer/Contractor	DNS condition	Section 11.6

Environmental measure	Responsibility for implementation	Compliance mechanism	Draft ES section reference
change. The design of the Proposed Development will be completed in accordance with CDM 2015.			
A Phase 1 geo-environmental desk study has been completed for all elements of the Proposed Development and the report is appended to the ES (Appendix 11A). **Phase 2 intrusive geo-environmental ground investigation will be completed during the pre-construction phase, including soil sampling and chemical testing, to confirm the ground conditions. The design for the Proposed Development will be based on the data obtained from the investigation and will comply with good practice in structural design to mitigate risks from aggressive ground conditions.**	Developer/Contractor	DNS condition	Section 11.6
Wheel washing facilities will be installed on Site.	Developer/Contractor	DNS Planning condition/Draft Construction Traffic Management Plan (CTMP)	Section 12.6
Sheeting installed prior to leaving site.	Developer/Contractor	DNS Planning condition/Draft CTMP	Section 12.6
Specific travel routes to and from Site are defined for delivery vehicles.	Developer/Contractor	DNS Planning condition	Section 12.6
All construction activities undertaken in accordance with good practice as set out in BS5228-1:2009+A1:2014[Error! Bookmark not defined.]**.**	Developer/Contractor	CEMP	Section 13.6
All employees on the construction site will be advised of quieter methods of operating plant and tools. Noise control measures (silencers, mufflers, any noise barriers, etc.) are to be subject to regular inspection and maintenance.	Developer/Contractor	CEMP	Section 13.6

Environmental measure	Responsibility for implementation	Compliance mechanism	Draft ES section reference
Where practicable, for any particular activity, suitable plant, machinery and working practices will be adopted.	Developer/Contractor	CEMP	Section 13.6
Construction plant capable of generating significant noise and vibration levels will be operated in a manner to minimise noise emissions.	Developer/Contractor	CEMP	Section 13.6
PRoW RH|ANT|75/1 crosses the access road near the Site entrance on the A4233. **The footpath will require closure during the access road construction phase only to allow for the creation of the access road. Following construction of the road the route could then remain open. However, a change to the definitive map will be required to show the route as being stopped up as it crosses the access road (see Figure 16.2). However, following construction of the access road equivalent access could be provided through appropriate permissive path crossing provision.** **This route will also require management with information boards and signage provided to advise recreational users of the construction works taking place. Users may have to wait for a short period of time before crossing the access road (with such restrictions likely to last for minutes rather than hours) when abnormal loads or high traffic loads are expected. At such times staff (a banksman) will manage such temporary restrictions.**	Developer/Contractor	Changes to the Definitive Map and Statement via application to RCTCBC under Town and Country Planning Act S257 or Highways Act 1980 S119 following consent of the DNS. Construction Method Statement (CMS)	Section 16.6
These footpaths merge along the route of the proposed access route to the east of the western construction compound. It is envisaged that similar measures outlined above would ensure that access is appropriately managed during construction of the access road and the wind farm development.	Developer/Contractor	Changes to the Definitive Map and Statement via application to RCTCBC under Town and Country Planning Act S257 or	Section 16.6

Environmental measure	Responsibility for implementation	Compliance mechanism	Draft ES section reference
		Highways Act 1980 S119 following consent of the DNS. CMS	
The site will remain open for access. However, temporary measures, such as fencing of construction sites, will be required during construction to restrict access and ensure safety of potential users.	Developer/Contractor	CMS	Section 16.6
Operation			
The turbine rotors and upper towers will be largely visible against the sky and therefore a non-reflective pale grey colour (e.g. RAL 7035) will be selected to minimise contrast.	Developer/Contractor	DNS planning condition	Section 6.6
	Developer/Contractor	DNS planning condition	Section 6.6
A minimum of 50m stand-off will be maintained between turbine blade tips and the nearest point of linear/foraging features likely to be well-used by bats such as treelines, woodland, wetland habitats and waterbodies.	Developer/Contractor	DNS planning condition	Section 8.6
Collision and barotrauma risk to bats will be reduced by pitching the blades out of the wind ("feathering") to reduce rotation speeds below ~2 rpm while idling at all eight turbines.	Developer/Contractor	Collision Mitigation Monitoring Strategy (CMMS)	Section 8.6
The positioning and number of turbines effects the potential risk for collision with specific species	Developer/Contractor	Collision Mitigation	Section 9.6

Environmental measure	Responsibility for implementation	Compliance mechanism	Draft ES section reference
		Monitoring Strategy	
Goshawk: **Routine and emergency maintenance of turbines may require the use of heavy plant or machinery and substantial levels of noise or human activity on Site.** **Measures to ensure that routine maintenance of turbines within potential disturbance distance would be included as part of ongoing working practices for the Site. As part of collision monitoring, site operations would be encouraged to maintain ongoing monitoring of breeding Schedule 1 bird species to identify the presence and location of nest sites that could result in a constraint. This would enable planning of works to avoid sensitive periods for species such as Goshawk and Barn Owl and ensure that measures, similar to those adopted during the construction phase are included in maintenance methodologies.**	Developer/Contractor	Collision Mitigation Monitoring Strategy	Section 9.6
ID11 – Detailed drainage design **Detailed drainage design for the operational wind farm development, utilising SuDS principles, including attenuation storage where necessary, to ensure sufficient capacity is available onsite to discharge runoff to ground and/or any water discharge into watercourses is limited to greenfield rates. The detailed design will be prepared in accordance with the Drainage Strategy for the operational wind farm development, which will accompany the ES.** **ID12 – Fuel, oil and chemicals usage (operational phase)** **Following the construction phase there will be no requirement for fuel, oil or chemicals to be stored on site, however, small quantities of fuel/oil/chemicals may need to be brought onto site for maintenance activities. In these cases, only the minimum quantities possible should be brought on to site and must be removed from site following completion of works, The fuel/oil/chemicals must be kept in the appropriate containers and sealed when not used for refuelling. An effective accident response protocol will be developed to ensure any spillages or potential pollution incidents are dealt with appropriately including the provision of containment for spills of contaminated liquids. Plant and machinery will be maintained to minimise the risks of oil leaks or similar.**	Developer/Contractor	DNS Planning Condition	10.6

Environmental measure	Responsibility for implementation	Compliance mechanism	Draft ES section reference
See measures: ID3 (Water discharges), ID7 - Watercourse crossings, ID10 (Crossing of surface water flow paths) ID11 (Detailed Drainage Design) and ID12 (Fuel/oil/chemicals storage (operational phase))			
Maintenance activities requiring ground disturbance will be infrequent and limited in extent and are therefore likely to require minimal disturbance to soil.	Developer/Contractor	Standard operating procedures (SOPs)	Section 11.6
During operation, vehicle maintenance and refuelling of machinery will be undertaken within defined areas where spillages can be easily contained, and machinery will be routinely checked to ensure it is in good working condition. These areas at risk of spillage or containing hazardous materials, such as vehicle maintenance areas and hazardous substance stores (including fuel, oils, and chemicals) will comply with industry good practice, be bunded, have appropriate containment and segregation. Additionally, the bunded areas will have impermeable bases to limit the potential for migration of contaminants into groundwater following any leakage/spillage.	Developer/Contractor	Standard operating procedures (SOPs)	Section 11.6
A Phase 1 geo-environmental desk study has been completed for all elements of the Proposed Development and the report is appended to the ES (Appendix 11A). **A Phase 2 geo-environmental ground investigation will be completed at the pre-construction stage to assess the presence of contaminants in the shallow soil that could subsequently be mobilised e.g., as dust or loose fibres that can be inhaled, or tracked back into vehicles/enclosed spaces. this will include a human health risk assessment to confirm whether additional measures are needed. The contaminated land risk assessment will be completed in accordance with the Environment Agency LCRM guidance. The assessment will determine whether the soil is suitable for use and this information will inform the MMP. If material is not suitable for use, then it will be disposed of offsite in accordance with the Waste Management Regulations.** **All aspects of construction will be completed in compliance with the Construction (Design and Management) Regulations 2015, CAR 2012 and the Health and Safety at Work Act (1974) and regulations made under the Act.** **The CEMP includes an unexpected contamination protocol.**	Developer/Contractor	DNS planning condition	Section 11.6

Environmental measure	Responsibility for implementation	Compliance mechanism	Draft ES section reference
A Phase 1 geo-environmental desk study has been completed for all elements of the Proposed Development and the report is appended to the ES (Appendix 11A). **A Phase 2 geo-environmental ground investigation will be completed at the pre-construction stage where the potential for gas accumulation in enclosed spaces is identified (e.g., substation buildings). This will include adequate gas monitoring so that a ground gas risk assessment can be completed in accordance with CIRIA C665[4], which is likely to entail a minimum of six monitoring rounds over a minimum period of three months.**	Developer/Contractor	DNS planning condition	Section 11.6
The Phase 1 Geoenvironmental Desk Study and the Coal Mining Risk Assessment have identified that there is documented, and visual evidence of subsidence associated with mining across the Wind Farm development site in the form of resolved mining subsidence claims and fractures/fissures identified by the current site occupier anecdotally. To allow the potential subsidence risk to be better understood, further specialist desk based mining risk assessment, as recommended in the Coal Mining Risk Assessment, is being undertaken, which will then inform intrusive investigation during the pre-construction phase e.g., boreholes. Remediation may subsequently be needed. The design of the intrusive investigation will be based upon the findings of the further desk study work. The planned intrusive investigations and any remediation work required based on the findings of these investigations will be communicated to the Coal Authority in advance of undertaking the works. **The basis of the structural design for the Proposed Development will be completed in general accordance with design standards to minimise the risk of future structural or geotechnical instability.**	Developer/Contractor	DNS planning condition	Section 11.6
Microsite turbines 2 and 4 out of Arqiva link safeguard zone.	Developer/Contractor	DNS Planning Condition	Section 14.6
Explore mitigation options with Arqiva in relation to turbine 7	Developer/Contractor	DNS Planning Condition	Section 14.6

[4] CIRIA (2007) Assessing risks posed by hazardous ground gases to buildings (C665). CIRIA; UK

Environmental measure	Responsibility for implementation	Compliance mechanism	Draft ES section reference
MoD may request aviation lighting to ensure turbines visible at night to their aircraft	Developer/Contractor	DNS Planning Condition	Section 14.6
Options to be discussed with Cardiff Airport – details to be finalised but agreed in principle. For example, a number of other wind farm developers are in discussion with Cardiff Airport about funding the provision of a radar upgrade, which would enable operation of wind farms without radar interference.	Developer/Contractor	DNS Planning Condition	Section 14.6
Implementation of a shadow flicker control module will reduce effects to an acceptable level	Developer/Contractor	DNS Planning Condition	Section 15.6
A permissive path to link the footpath across the road could be provided. However, the access road will be open for members of the public to use in any event. Signage will be provided to show that the PRoW route continues either site of the access road. In the operational phase very limited traffic (for maintenance) would be expected but signage could also signal to users of the potential of vehicles to be using the route.	Developer/Contractor	DNS Planning Condition	Section 16.6
Permissive paths to link the footpath across the access road could be provided. However, the access road will be open for members of the public to use in any event. Signage will be provided to show that the PRoW routes continue either site of the access road. In the operational phase very limited traffic (for maintenance) would be expected but signage could also signal to users of the potential for vehicles to be using the route.	Developer/Contractor	DNS Planning Condition	Section 16.6
In the operational phase access will be permitted. No fencing etc will be used around the wind turbines or access roads that could limit access to the site.	Developer/Contractor	DNS Planning Condition	Section 16.6

Monitoring

4.9.2 Monitoring, where it is required, is explained further within the relevant technical chapters and in the Draft CEMP.

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302000 302500 303000 303500

190000 189500 189000

TON-LYWEN
TREM-Y-GLYN
OLIVE TERRACE
TREBANOG ROAD
CEFN BRYN
RHIWGARN
WAUN-YWEN
PEN-Y-DRE
HENLLYS
A4233
COLLENNA ROAD
HIGHLANDS
LLANTRISANT ROAD
HAFOD WEN
INVESTITURE PLACE

T01
T02
T03
T06
T07

Key

- Site boundary
- Proposed turbine location
- 150m rotor
- Crane pad
- Storage area
- Access track
- Construction compound
- Electrical substation
- Proposed grid connection overhead line
- Proposed grid connection underground line

0 100 200 300 m

Scale at A3: 1:6,500

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Figure 4.1a
Site layout - western extent

October 2022

42864-WOOD-XX-XX-FG-J-0014_S2_P01.1

303000
303500
304000
304500
189500
189000
188500
N
T01
T03
T04
T05
T06
T07
Key
Site boundary
Proposed turbine location
150m rotor
Crane pad
Storage area
Access track
Construction compound
Electrical substation
Proposed grid connection overhead line
Proposed grid connection underground line
0
100
200
300 m
Scale at A3: 1:6,500

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Figure 4.1b
Site layout - eastern extent
October 2022
42864-WOOD-XX-XX-FG-J-0015_S2_P01.1
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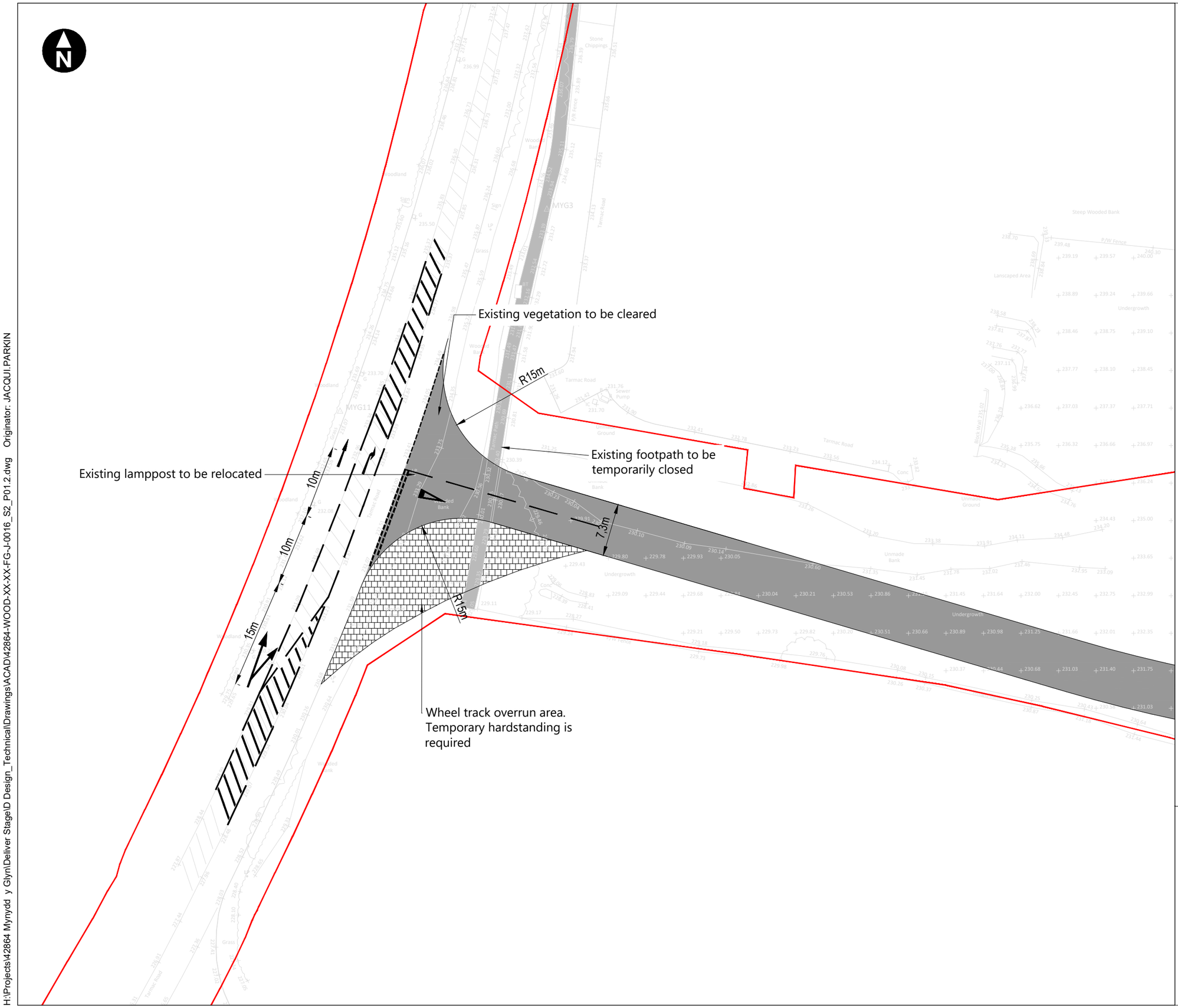

Key

- Site boundary
- Existing infrastructure
- Proposed infrastructure
- Proposed carriageway

Notes

- This proposal is a preliminary design only and it is not suitable for use for construction. Additional surveys including utility and drainage information will be required to develop this design to a detailed design.
- Reference should be made to other documents accompanying this planning application.
- Drawing to be used for planning purposes only.

0 m 30 m

Scale 1:500 @ A3

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Figure 4.2
Site access

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305000

310000

190000

185000

T01
T02
T03
T04
T05
T06
T07

Key

- Site boundary
- Proposed turbine location
- Access track
- Electrical substation
- Proposed grid connection overhead line
- Proposed grid connection underground line

0 500 1,000 1,500 m

Scale at A3: 1:30,000

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Figure 4.3
Proposed grid connection corridor

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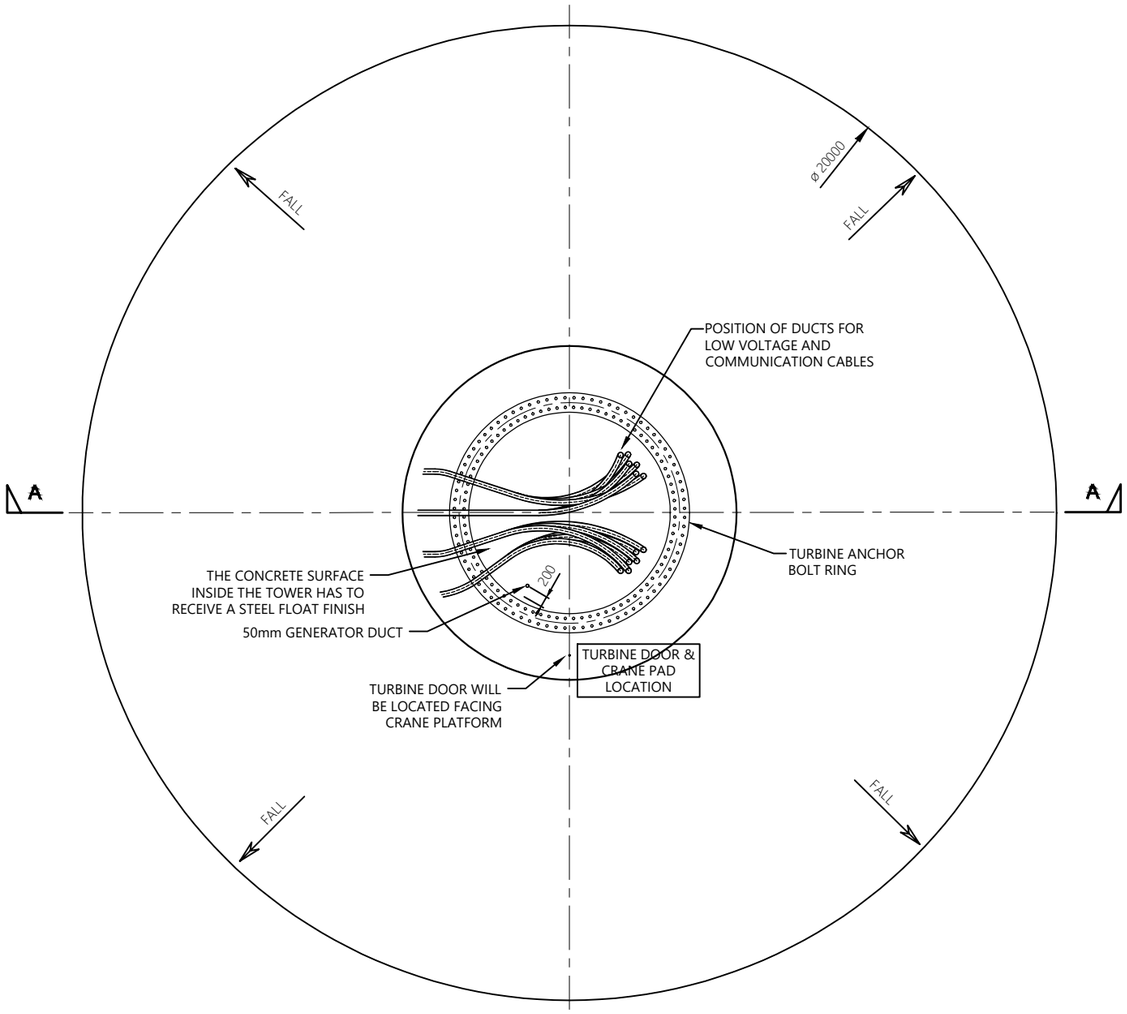
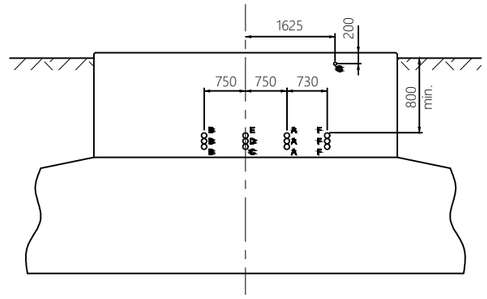
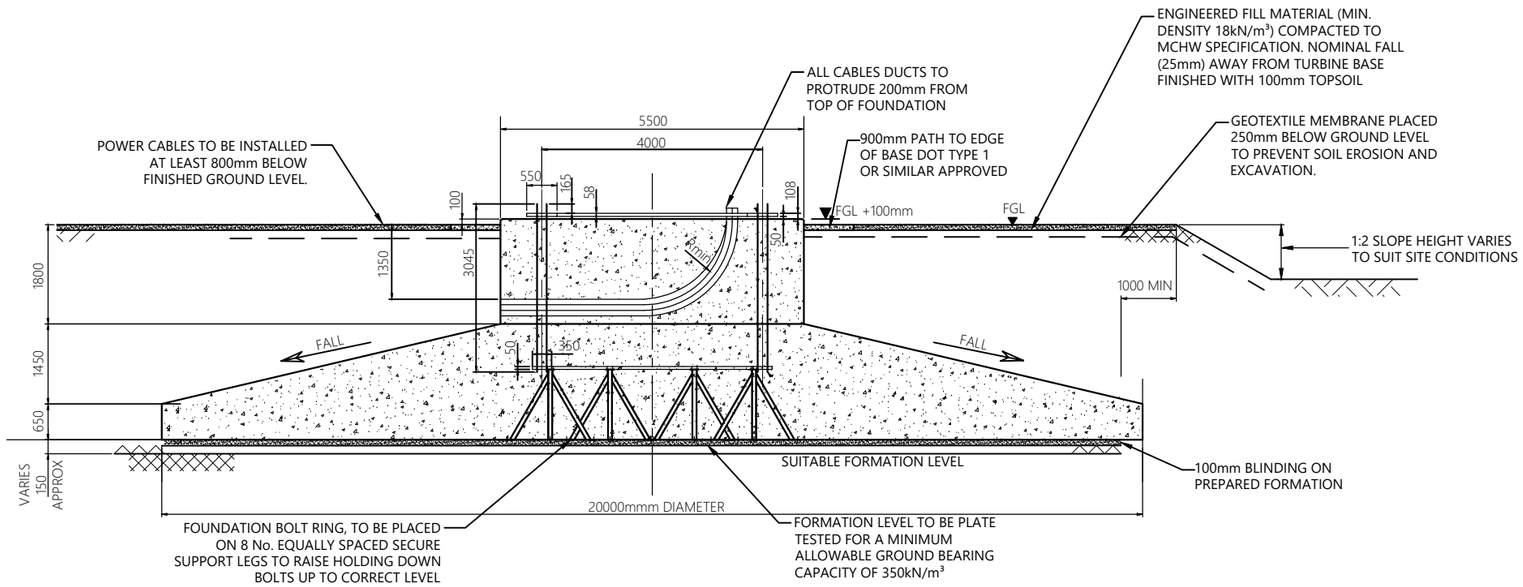


BASE PLAN



BASE DUCTS EXIT DETAIL



SECTION A-A

Notes:

1. All dimensions are in millimetres unless otherwise stated.
2. The foundation size is indicative only and will depend upon ground conditions, groundwater level and wind loadings.
3. Inserts and ducting to be supplied by turbine manufacturer.
4. Earthing details are indicative, subject to turbine supplier approval.
5. Suitable formation to be specified by turbine supplier.

0 m 5 m

Scale 1:125 @ A3

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Figure 4.4
Typical wind turbine foundation

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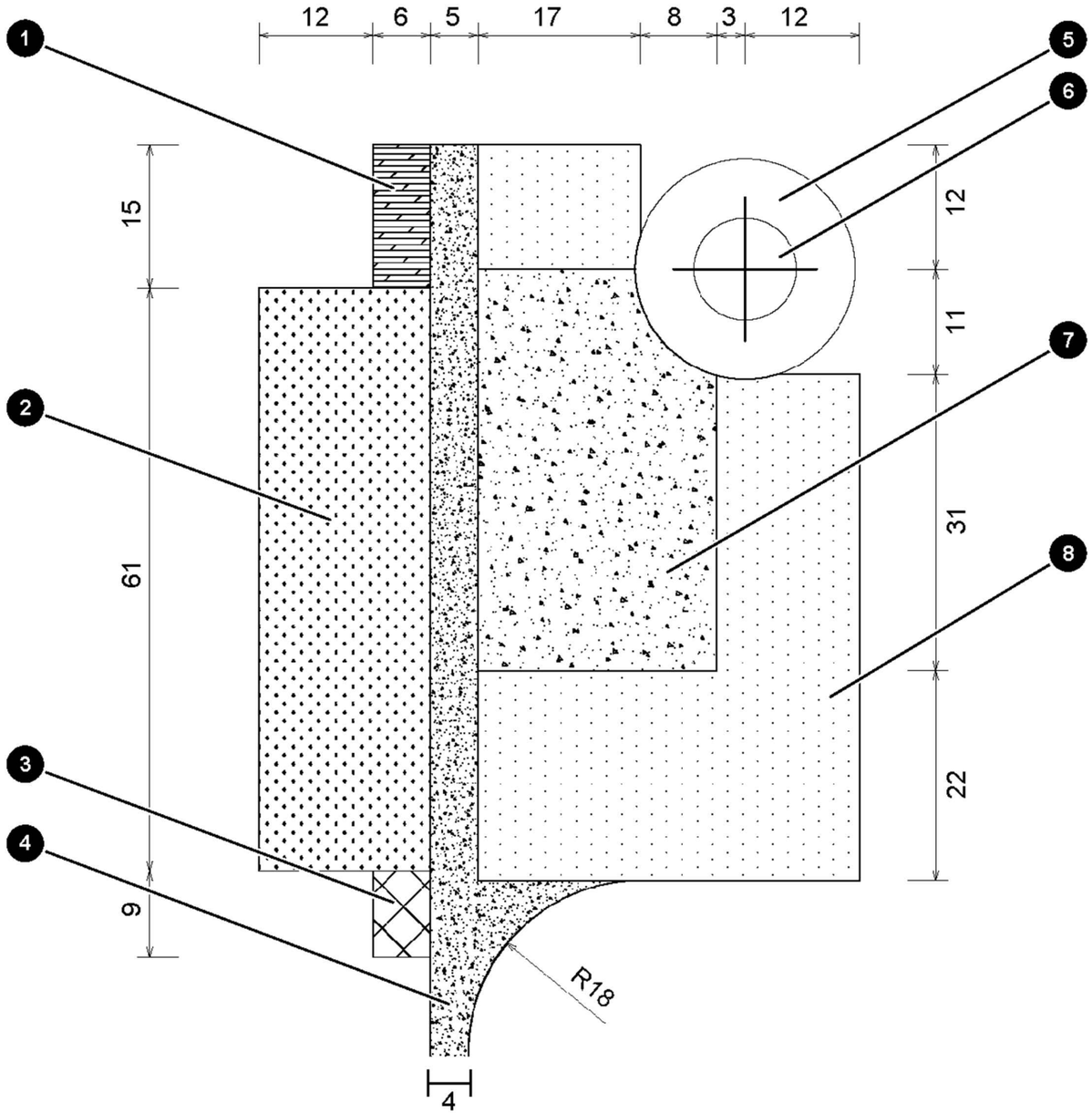

Notes

1. Parking area
2. Storage area
3. Waste collection area
4. Access road
5. Foundation
6. Tower
7. Crane platform
8. Assembly area

Not to Scale

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Figure 4.5
Typical wind turbine crane hardstanding

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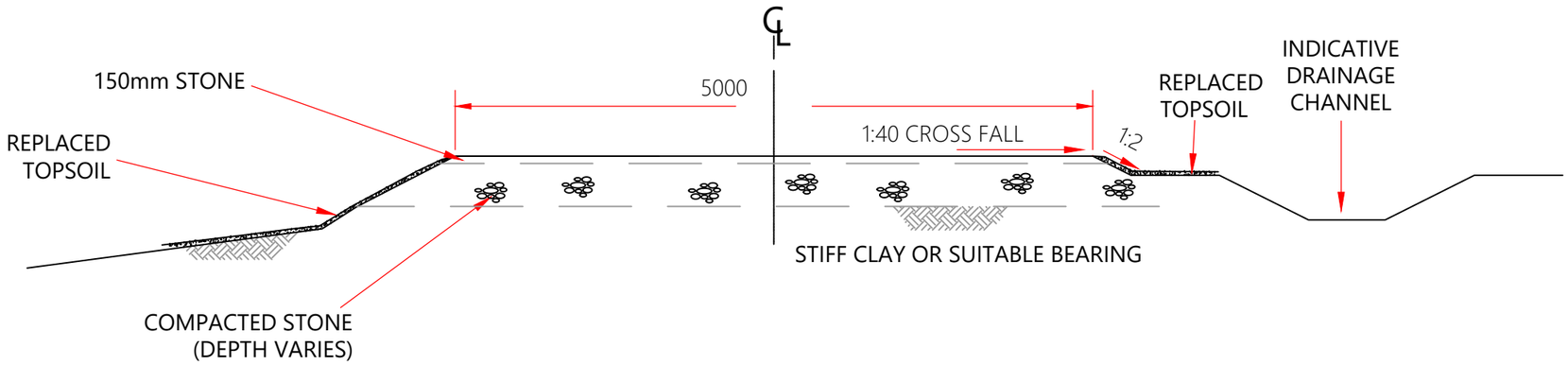

Notes:

1. All dimensions are in millimetres unless otherwise stated.
2. General roadstone to be dot type 1.
3. Running surface to be a minimum 150mm type 1.
4. Proposed track width is constant 5m with 2m verges either side apart from at site entrance.

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Figure 4.6
Typical internal site track cross section

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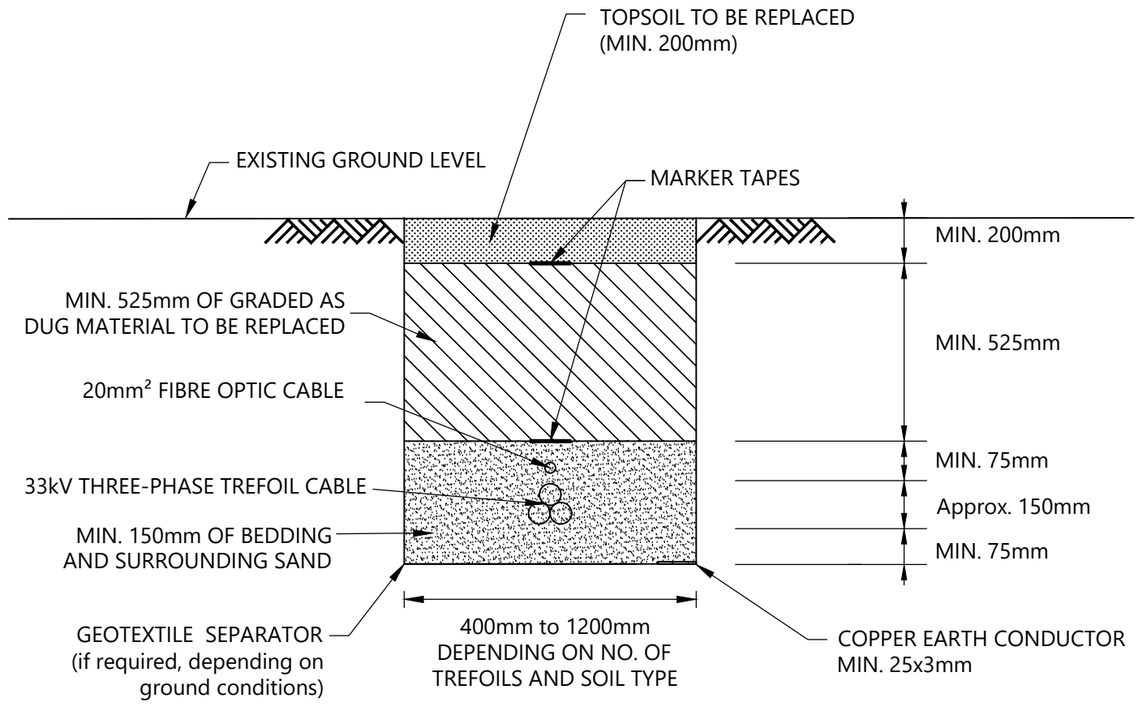

TYPICAL CABLE TRENCH DETAIL

(Typically adjacent to site tracks)

Notes:

1. Cable sites run adjacent to site roads.
2. Above ground cable markers to be located as required.

Not to Scale

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Figure 4.7
Typical cable trench details

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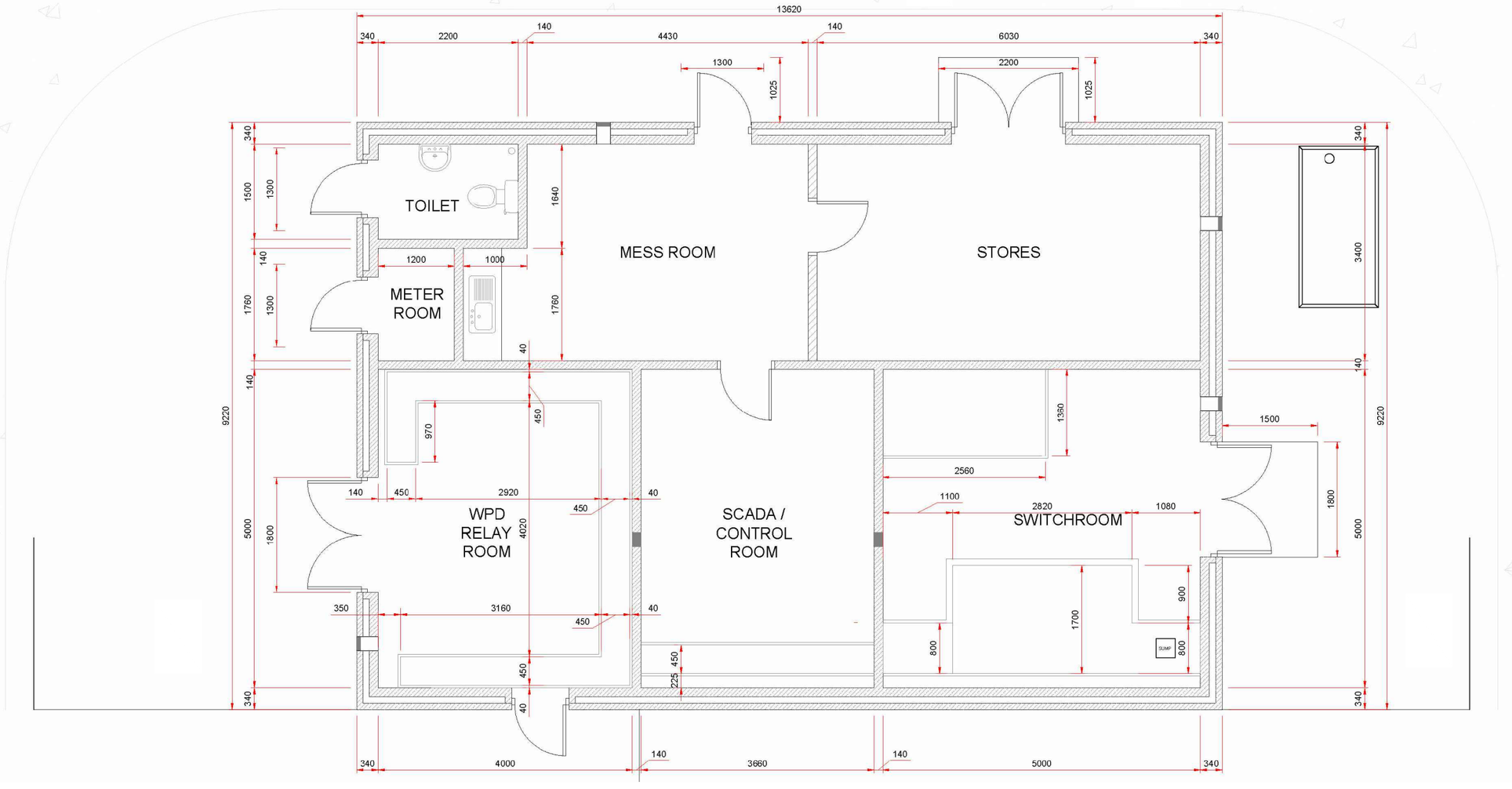

Key

1. All dimensions are in metres unless noted otherwise.
2. The control building and substation size is indicative pending further design work.
3. Septic tank and water supply to be provided by others.

0 m 40 m

Scale 1:750 @ A3

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Figure 4.8
Typical switchroom and substation compound

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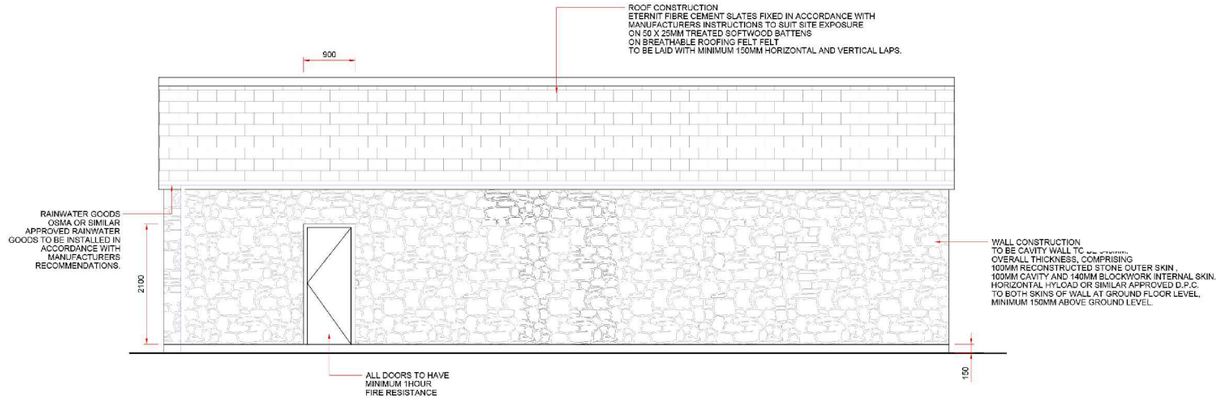
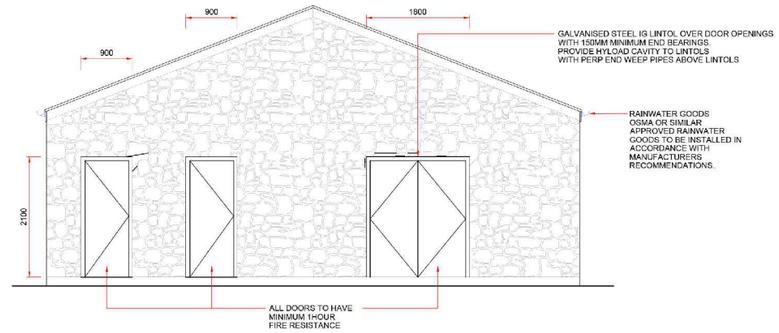
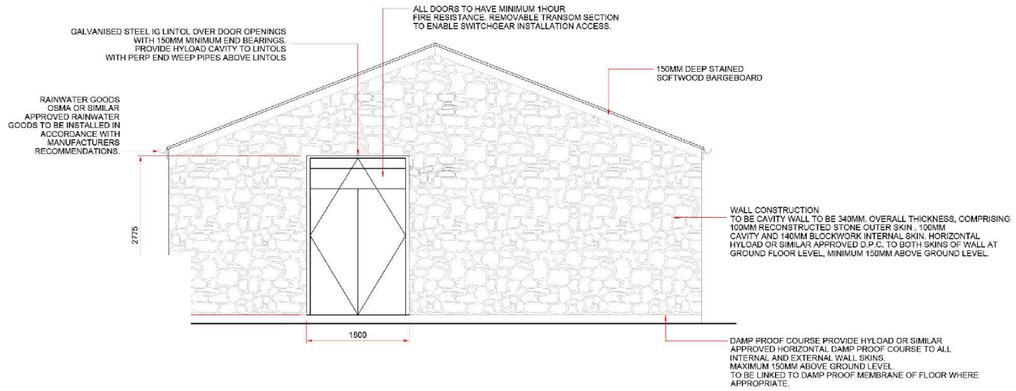


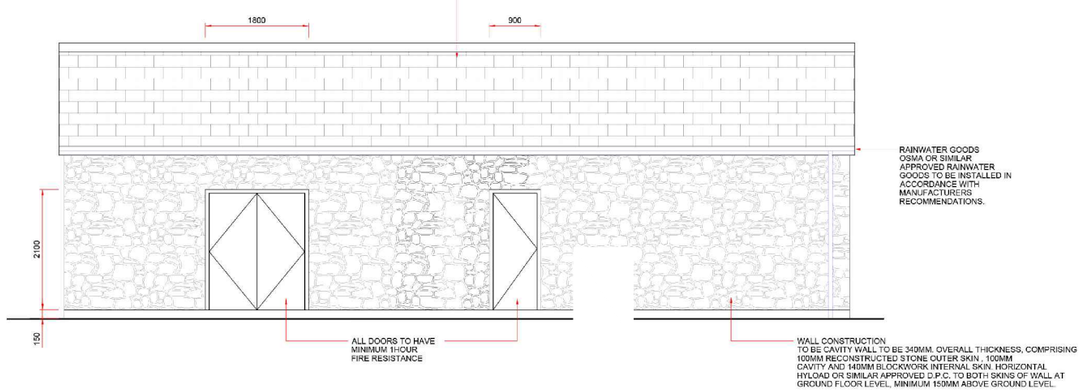
REAR REAR ELEVATION



PROPOSED GABLE END (RIGHT) ELEVATION



PROPOSED GABLE END (LEFT) ELEVATION



PROPOSED FRONT ELEVATION

TO BE READ IN CONJUNCTION WITH STRUCTURAL DESIGN
DRAWING BY TM VENTHAM (DRG No. TBC)

Not to scale

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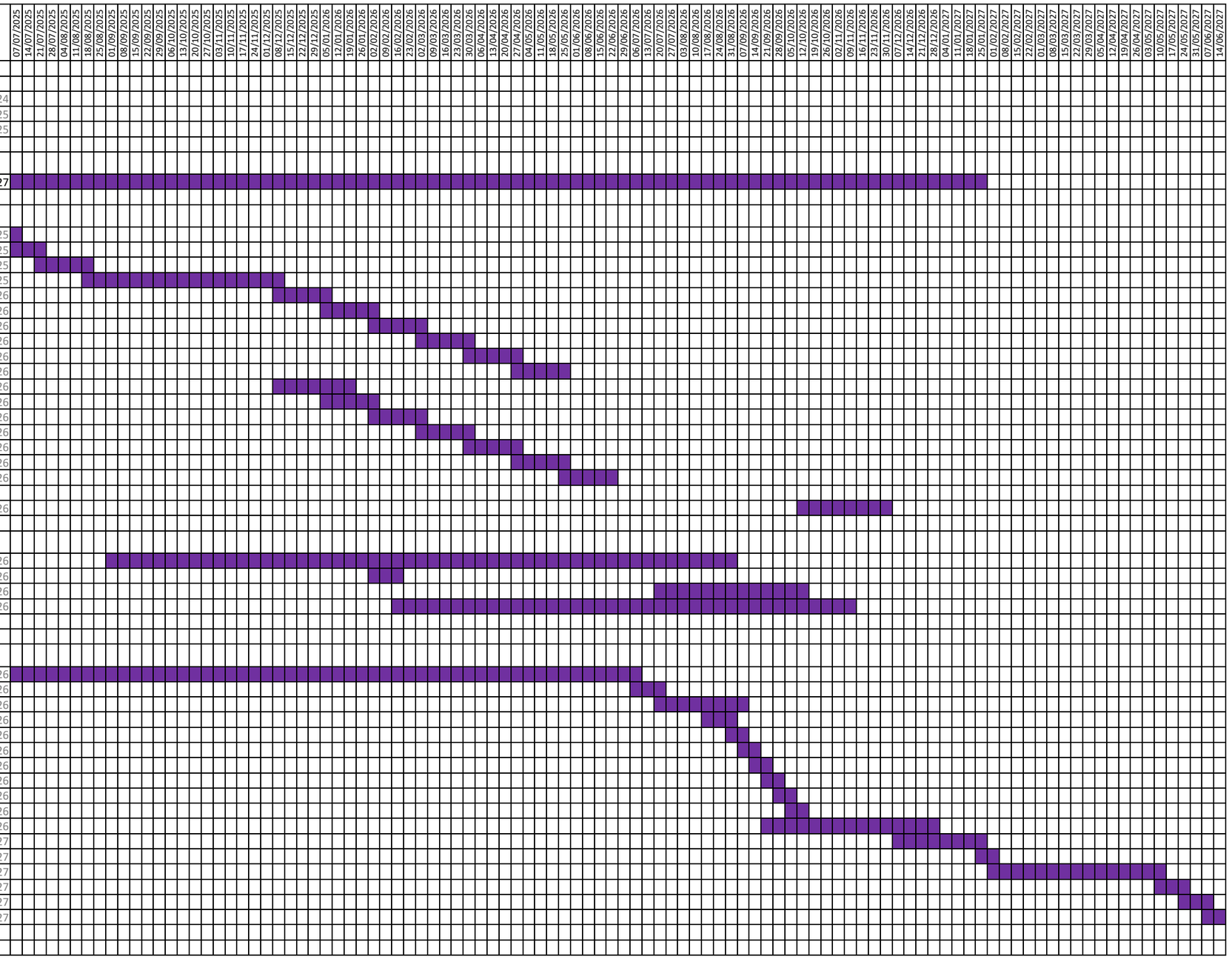
Figure 4.9
Substation building elevations

October 2022

Item	Weeks	Start	Finish
No. of WTGs	7		
Planning permission issued	1.0	01/04/2024	08/04/2024
Project Prep to construction	52.0	08/04/2024	07/04/2025
Financial Close	1.0	07/04/2025	14/04/2025
National Grid - Grid Connection			
Time available for Grid Connection	93.0	14/04/2025	25/01/2027
Civils Contract			
Lead time from Financial Close	12.0	14/04/2025	07/07/2025
Mobilisation	2.0	07/07/2025	21/07/2025
Entrance / Temp Compound	4.0	21/07/2025	18/08/2025
Track to 1st WTG	16.0	18/08/2025	08/12/2025
Track to 2nd WTG	4.0	08/12/2025	05/01/2026
Track to 3rd WTG & Substation	4.0	05/01/2026	02/02/2026
Track to 4th WTG	4.0	02/02/2026	02/03/2026
Track to 5th WTG	4.0	02/03/2026	30/03/2026
Track to 6th WTG	4.0	30/03/2026	27/04/2026
Track to 7th WTG	4.0	27/04/2026	25/05/2026
1st WTG Earthworks / Foundation / Crane pad	6.0	08/12/2025	19/01/2026
2nd WTG Earthworks / Foundation / Crane pad	4.0	05/01/2026	02/02/2026
3rdf WTG Earthworks / Foundation / Crane pad	4.0	02/02/2026	02/03/2026
4th WTG Earthworks / Foundation / Crane pad	4.0	02/03/2026	30/03/2026
5th WTG Earthworks / Foundation / Crane pad	4.0	30/03/2026	27/04/2026
6th WTG Earthworks / Foundation / Crane pad	4.0	27/04/2026	25/05/2026
7th WTG Earthworks / Foundation / Crane pad	4.0	25/05/2026	22/06/2026
Duration of Site	*50.0*	*weeks*	
Restoration (post WTG instrall)	7.0	12/10/2026	30/11/2026
Electrical BoP Contract			
Transformer lead time	52.0	01/09/2025	31/08/2026
Mob	2.0	02/02/2026	16/02/2026
Cabling	12.0	20/07/2026	12/10/2026
Substation	38.0	16/02/2026	09/11/2026
Duration of Site	*40.0*	*weeks*	
Turbine Supply Contract			
Manufacture /Deliverey Lead Time	64.0	14/04/2025	06/07/2026
Mobilisation to Site	2.0	06/07/2026	20/07/2026
Deliveries	7.0	20/07/2026	07/09/2026
Erection 1st	2.0	17/08/2026	31/08/2026
Erection 2nd	1.0	31/08/2026	07/09/2026
Erection 3rd	1.0	07/09/2026	14/09/2026
Erection 4th	1.0	14/09/2026	21/09/2026
Erection 5th	1.0	21/09/2026	28/09/2026
Erection 6th	1.0	28/09/2026	05/10/2026
Erection 7th	1.0	05/10/2026	12/10/2026
Fitout	14.0	21/09/2026	28/12/2026
HV Connections	7.0	07/12/2026	25/01/2027
HV Energisation	1.0	25/01/2027	01/02/2027
Commissioning	14.0	01/02/2027	10/05/2027
Gearbox run in (last WTG)	2.0	10/05/2027	24/05/2027
10 Day Test (last WTG)	2.0	24/05/2027	07/06/2027
Project completion	1.0	07/06/2027	14/06/2027
Duration of Site	*49.0*	*weeks*	
Project Duration on Site	*101.0*	*weeks*	



Prepared by Simon Evans
Revision 1 - 13/10/2022

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Figure 4.10
Project programme (planning only)

October 2022