4. DESCRIPTION OF THE PROPOSED DEVELOPMENT

4.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) describes the Proposed Development and its component parts which is the subject of a proposed application for planning permission by Hibernian Wind Power Ltd. (Hibernian) to Wexford County Council. Hibernian are a wholly owned subsidiary of ESB.

The Proposed Development (all elements pre-existing) comprises:

a. *14 no. Vestas 850 kilowatt (kW) wind turbines with a maximum overall blade tip height of 75 metres (m);*
b. *1 no. 38 kilovolt (kV) permanent electrical substation and control building with total footprint of approximately 575 square metres (m^2), including welfare facilities, associated electrical plant and equipment, security fencing, associated underground cabling and a 1,000 litre septic tank;*
c. *1 no. permanent meteorological mast with a maximum height of 50m, an associated 153m^2 fenced compound containing an 18m^2 site cabin, with an air monitoring mast of 10m total height;*
d. *All associated underground electrical and communications cabling connecting the turbines to the on-site substation;*
e. *Existing site access tracks of circa 4.0 kilometres (km) total length, 5 no. car parking spaces and 14 no. turbine hardstands;*
f. *Existing gated site entrance way from Nethertown Lane (local public road);*
g. *Site drainage; and,*
h. *Associated site fencing and signage.*

This application seeks a fifteen (15) year planning permission for extension of the operational life of the existing wind farm from the date of expiration (August 2022) of the current An Bord Pleanála (ABP) permission (ABP Ref. PL26.116487).

All elements of the existing facility as described in this chapter, including the development as described above, have been assessed as part of this EIAR. All elements of the project are pre-existing and it is not proposed to make any alterations to the current site layout, wind turbines or associated infrastructure. All elements of the existing wind farm were constructed in accordance with Hibernian's specifications and requirements.

The planning application for the wind farm's extension of operational period does not include the pre-existing connection to the national electricity grid. The 38kV grid connection was permitted by ABP in September 2001 (ABP Ref. PL26.124600) and is composed of approximately 1.2km of buried 38kV transmission line and approximately 11.2km of overhead line, running in a general north and northwest direction from the wind farm to the Killinick 38kV substation, located at the junction of the R740 and N25, approximately 9.4km northwest of the wind farm (straight line distance).

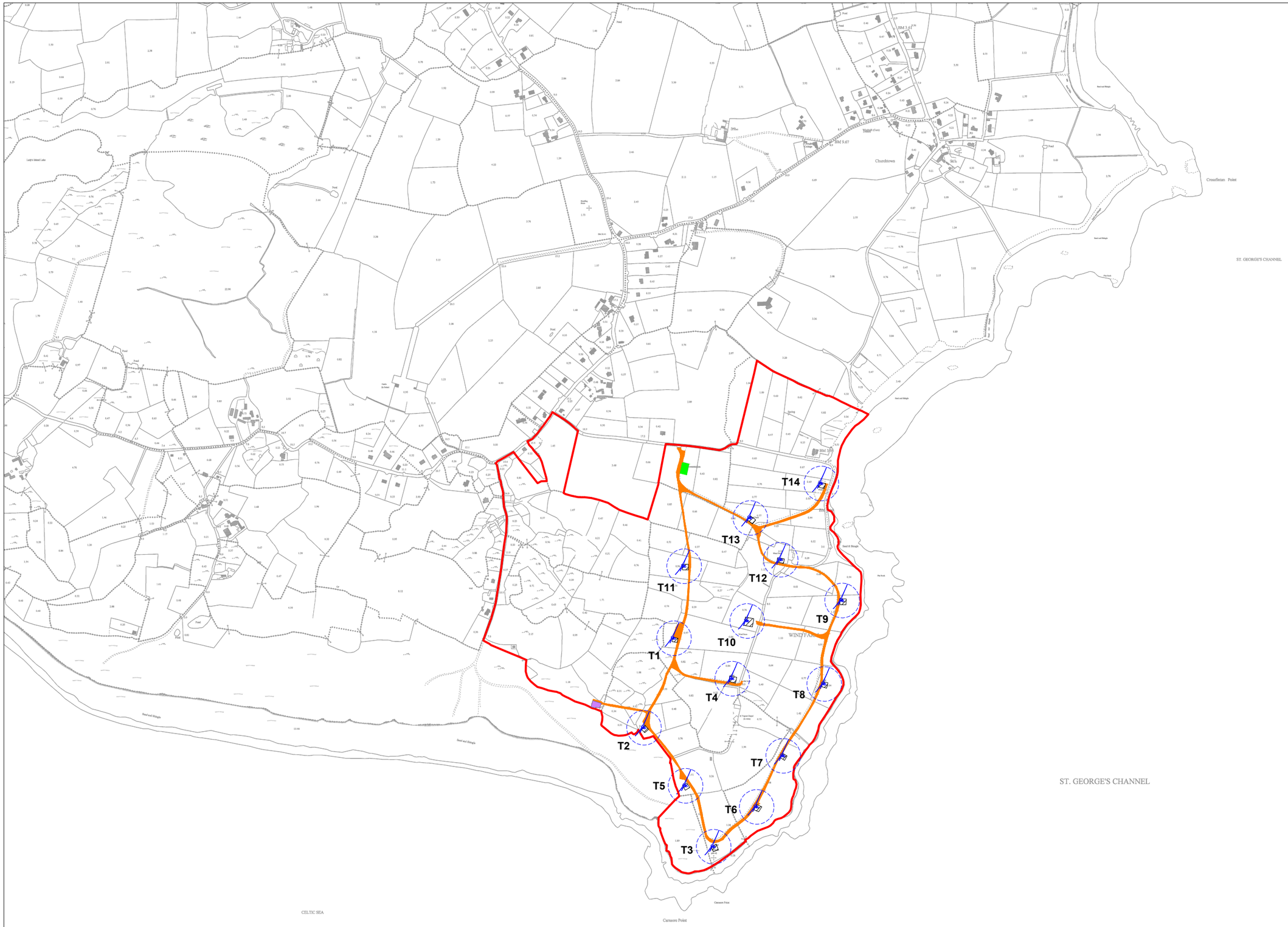
It is considered that any routine maintenance works required to the turbines and/or substation as part of the extended operation of the wind farm would be minor in nature and would not have any significant environmental effects. In addition, the ESB are currently in discussions with Wexford County Council with a view to maximising the public amenity and historic value of this site.

4.2 Development Layout

The layout of the Proposed Development (the existing Carnsore Wind Farm) was originally designed to minimise the potential environmental effects of the wind farm, while at the same time maximising the energy yield of the wind resource passing over the site. The Carnsore site was chosen initially by Hibernian as being particularly suited to a wind energy development due to the favourable conditions, with mean wind speeds recorded above 8 metres per second (m/s) at a height of 30m above ground level.

A constraints study carried out at the initial pre-planning stage (before the original wind farm planning application in 2000), as outlined in Section 3.3.1 of this EIAR, was used to inform the design of the existing development, ensuring that turbines and ancillary infrastructure were located in the most appropriate areas of the site. The development layout was chosen so as to locate as much of the wind farm's footprint as possible within pre-existing farmland, avoiding areas of ecological and archaeological interest, and reducing potential interactions with birds and bats. In addition, pre-existing farm access roads were suitable for use and required limited upgrading. Portions of the existing site are currently used for agricultural grazing of cattle and it is proposed to continue this practice.

The overall layout of the Proposed Development is shown on Figure 4-1. This drawing shows the current locations of the wind turbines, electricity substation, meterological mast, access roads and the main site entrance. Detailed site layout drawings of the existing development are included in Appendix 4-1 to this EIAR.



Drawing Legend

- EIAR Study Boundary
- Existing Site Road
- Existing 38kV Substation
- Existing Met Mast
- Existing Hardstand Area
- Existing Turbines

N

DRAWING TITLE:

Site Layout

PROJECT TITLE:

Carnsore Wind Farm

DRAWING BY: Joseph O Brien	CHECKED BY: Eoin Hurst
PROJECT No.: 210202	DRAWING No.: Figure 4-1
SCALE: 1:10,000 @ A3	DATE: 09.07.2021
OS SHEET No.: 5855, 5856	

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4.3 Development Components

The existing wind farm consists of a number of components. The various components of the existing wind farm are discussed in this section. Table 4-1 provides a summary of the footprint of the existing wind farm components. The Proposed Development is limited to an extension of the operational life of the existing wind farm. As such there are no changes proposed to the existing development components described in this section. The various elements of the existing wind farm will remain in their current condition and will be subject to ongoing standard maintenance.

Table 4-1 Proposed Development components footprint

Component Description	Approx. Area (m^2)
14 no. Turbines and associated hardstandings	3,364
1 no. Substation building, compound and hardstanding	575
1 no. Meteorological mast, control cabin and hardstanding	153
Internal site access roads and parking area (assumed 4m running width for site roads)	12,892
Total	16,984

4.3.1 Wind Turbines

4.3.1.1 Turbine Locations

The existing wind turbine layout was optimised using industry standard wind farm design software at the initial design stage in order to maximise the energy yield from the site, while maintaining sufficient distances between the proposed turbines to ensure turbulence and wake effects did not compromise turbine performance. The Grid Reference coordinates of the turbine locations are listed in Table 4-2 below.

Table 4-2 Existing Wind Turbine Locations and Elevations

Turbine No.	Irish Transverse Mercator (ITM) Co-ordinates		Turbine Base Elevation (m OD)
	Easting (m)	Northing (m)	
1	711836	604272	11.8
2	711756	604032	9.5
3	711942	603713	9.2
4	711992	604163	9.1
5	711867	603876	12.6
6	712058	603820	12.3

7	712129	603956	8.3
8	712238	604148	5.4
9	712287	604373	4.0
10	712032	604318	10.4
11	711863	604464	12.5
12	712122	604482	7.4
13	712041	604594	9.2
14	712231	604686	4.3

4.3.1.2 Turbine Type

Wind turbines use the energy from the wind to generate electricity. A wind turbine, as shown in Plate 4-1 below, typically consists of four main components:

- Foundation
- Tower
- Nacelle (turbine housing)
- Rotor

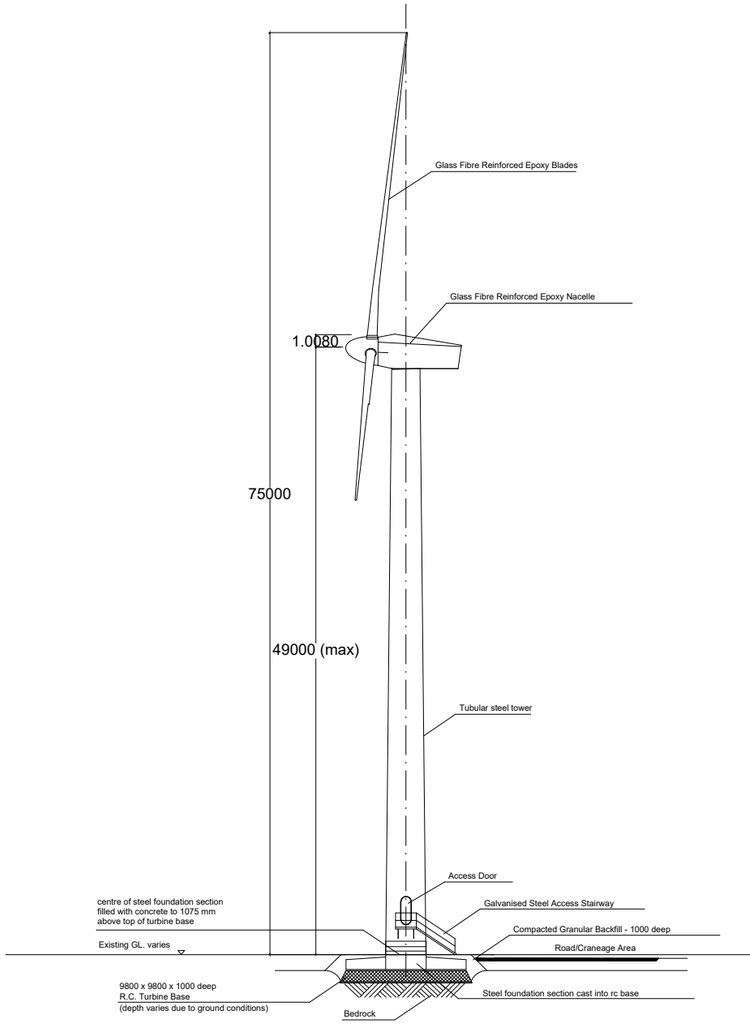
Plate 4-1 Wind turbine components

The existing wind turbines have a tip-height of up to 75m, a hub height of 50m, rotor diameter of 50m, and a ground to blade tip-height of 25m. The wind turbines that are installed on the site are

conventional three-blade turbines, that are geared to ensure the rotors of all turbines rotate in the same direction at all times.

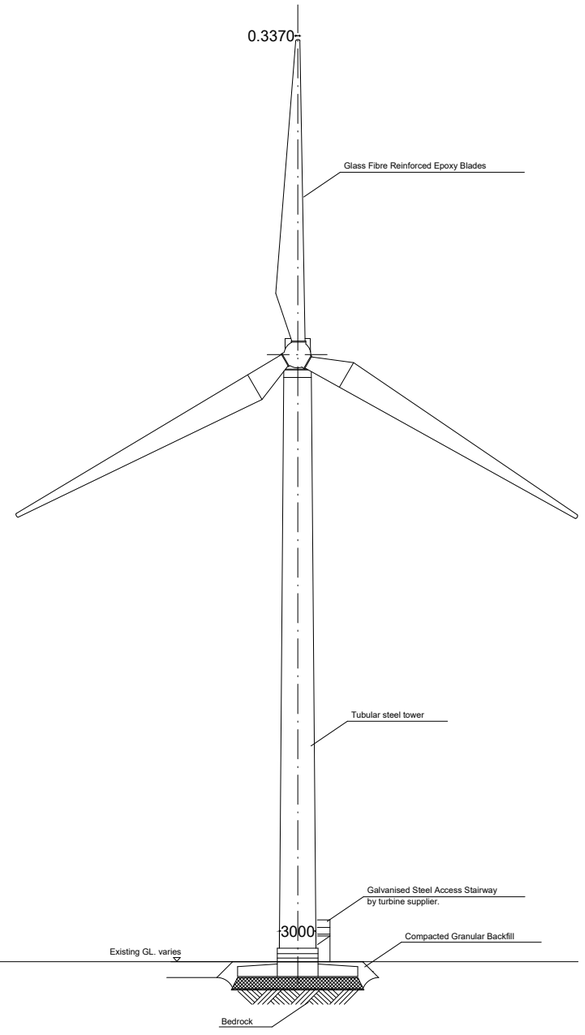
The existing wind turbines at the Carnsore Wind Farm were manufactured by the leading Danish turbine manufacturer, Vestas. Each turbine is capable of producing 850kW of electricity. Turbine design parameters have a bearing on the assessment of shadow flicker, noise, visual impact, traffic and transport, and ecology (specifically birds), as addressed elsewhere in this EIAR. Since there are no changes proposed to the existing turbines at the site, the turbine parameters of the existing turbines have been used in each EIAR section that requires the consideration of turbine parameters, as part of the impact assessment.

A drawing of the existing wind turbine is shown in Figure 4-2. The individual components of a typical geared wind turbine nacelle and hub are shown in Figure 4-3 below.



Side Sectional Elevation

Scale 1:200



Front Sectional Elevation

Scale 1:200

DRAWING TITLE:

Wind Turbine Elevations

PROJECT TITLE:

Carnsore Wind Farm

DRAWING BY:	CHECKED BY:
Joseph O Brien	Eoin Hurst
PROJECT No.: 210202	DRAWING No.: Figure 4-2
SCALE: 1:500 @ A3	DATE: 20.07.2021

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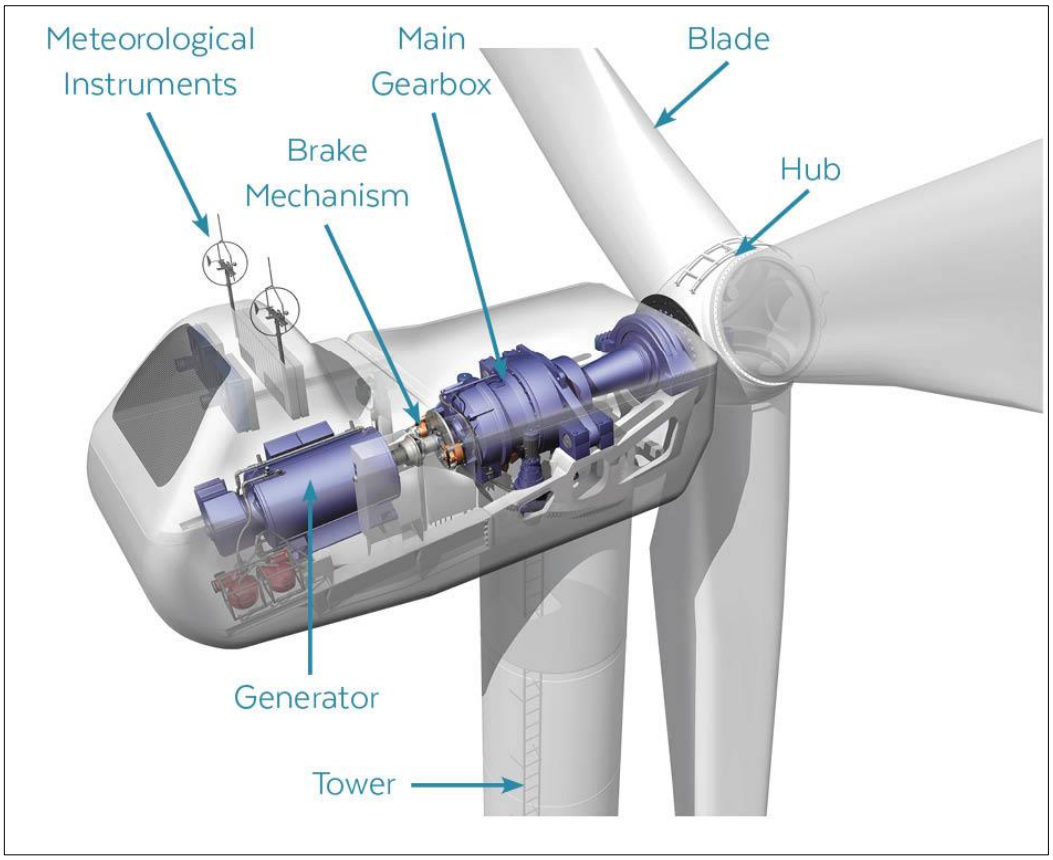


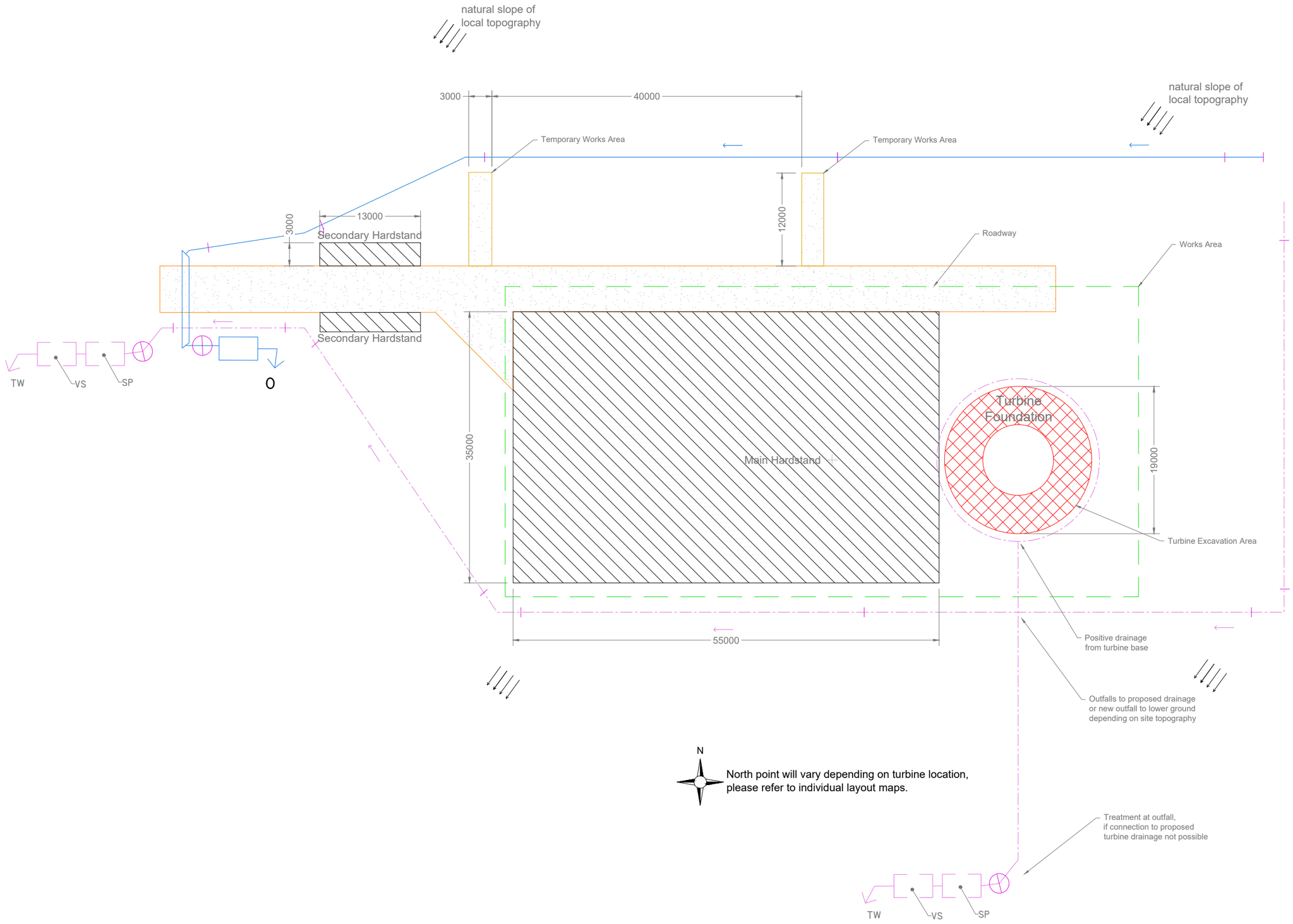
Figure 4-3 Turbine nacelle and hub components

Figure 4-4 shows a typical turbine base layout, including turbine foundation, hard standing area, assembly area, access road and surrounding works area.

4.3.1.3 Turbine Foundations

Each wind turbine is secured to a reinforced concrete foundation that has been installed below the finished ground level. The turbine foundation transmits any load on the wind turbine into the ground. The existing turbine foundations are square in plan with each side measuring 9.8 metres in length, and with founding levels from 1.2 to 3.0m below ground level (bgl). The turbine foundations as designed for the Carnsore Wind Farm are shown in Figure 4-5.

There are no changes to the existing turbine foundations required as part of the proposed development.



Drawing Legend

Proposed Drainage

- Upstream Interceptor Drain
- Swales/Downstream Collector Drain
- Direction of flow
- Settlement Pond - Vegetation Filter - Level Spreader
- Check Dam 'Type A'
- Check Dam 'Type B'
- Interceptor Ditch Culvert
- Collector Ditch Culvert
- O — Overland Flow Discharge
- TW — Treated Water Discharge
- SP — Settlement Pond
- VS — Semi-Natural Vegetation Swale / Filter Bed /secondary SP

Figure 4-4

DRAWING TITLE:

Typical Turbine Hardstand Layout Standard Detail

PROJECT TITLE: ESB Carnsore Wind Farm

DRAWING BY:	CHECKED BY:
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PROJECT No.: 210202	DRAWING No.: Figure 4-4
SCALE: 1:500 @A3	DATE: 04.06.2021

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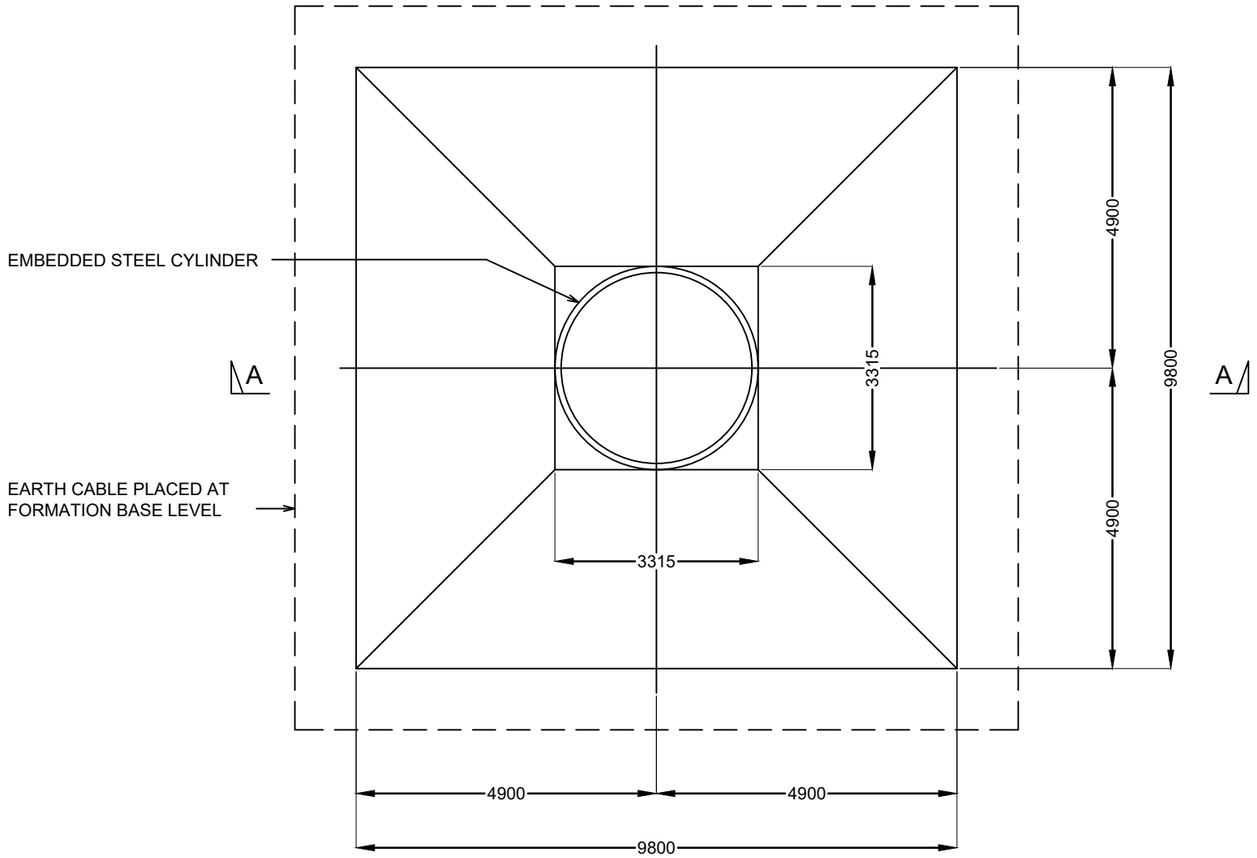
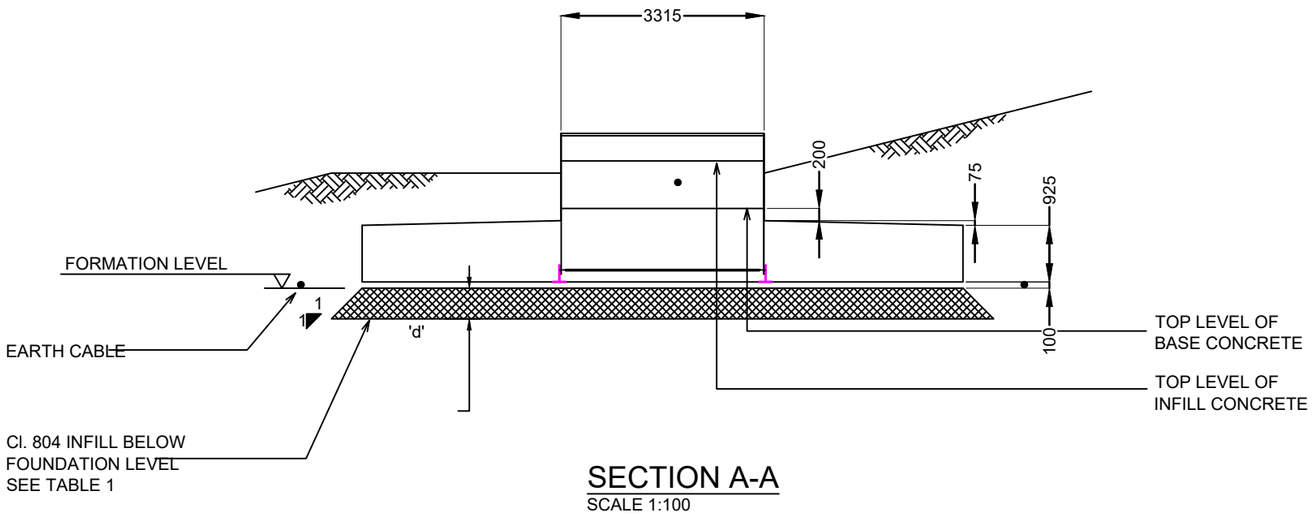
NOTE:

1. ALL DIMENSIONS IN mm UNLESS NOTED



PLAN
SCALE 1:100



SECTION A-A
SCALE 1:100

DRAWING TITLE:
Typical Turbine Foundation

PROJECT TITLE:
Carnsore Wind Farm

DRAWING BY:	CHECKED BY:
Joseph O Brien	Eoin Hurst
PROJECT No.: 210202	DRAWING No.: Figure 4-5
SCALE: 1:100 @ A3	DATE: 20.07.2021

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4.3.1.4 Hard Standing Areas

Hard standing areas consisting of levelled and compacted hardcore are required around each turbine base to facilitate access, turbine assembly and turbine erection. The hard-standing areas are typically used to accommodate cranes used in the assembly and erection of the turbine, offloading and storage of turbine components, and generally provide a safe, level working area around each turbine position. The hard-standing area is intended to accommodate a crane during turbine assembly and erection, and if necessary during maintenance works.

There will be no changes to the existing hardstanding areas required as part of the Proposed Development. Turbine hard stand areas vary significantly at each of the 14 no. turbines, with an average of approximately 240m^2. The existing hard standing areas shown on the detailed layout drawings included in Appendix 4-1 to this report will be maintained.

4.3.1.5 Power Output

The existing wind turbines have a rated electrical power output in the range of 0.85 megawatt (MW). No changes are proposed to the existing wind turbines, therefore for the purposes of this EIAR, a rated output of 0.85MW has been chosen to calculate the power output of the 14-turbine wind farm, which results in an estimated installed capacity of 11.9MW. The existing wind farm has an average annual power output of 40,000 megawatt-hours per year (MWh/yr). It is anticipated that this power output would continue for the life of the Proposed Development.

The 40,000MWh/yr of electricity produced by the proposed development would be sufficient to supply 9,500 Irish households with electricity per year, based on the average Irish household using 4.2 MWh[1] of electricity.

The 2016 Census of Ireland recorded a total of 54,289 occupied households in Co. Wexford. Per annum, based on the current average power output of 40,000MWh/yr, the Proposed Development would therefore produce sufficient electricity for the equivalent of approximately 17% of all households in Co. Wexford.

4.3.2 Site Roads

During the initial construction of the existing wind farm, existing farm tracks were upgraded and new access roads were constructed to provide access within the wind farm site and to connect the wind turbines and associated infrastructure. Site roads were constructed of consolidated gravel with a running width of 4m. A typical section through an excavated site road is shown in **Error! Reference source not found.**6. A photograph of a typical existing site road in included as Plate 4-2.

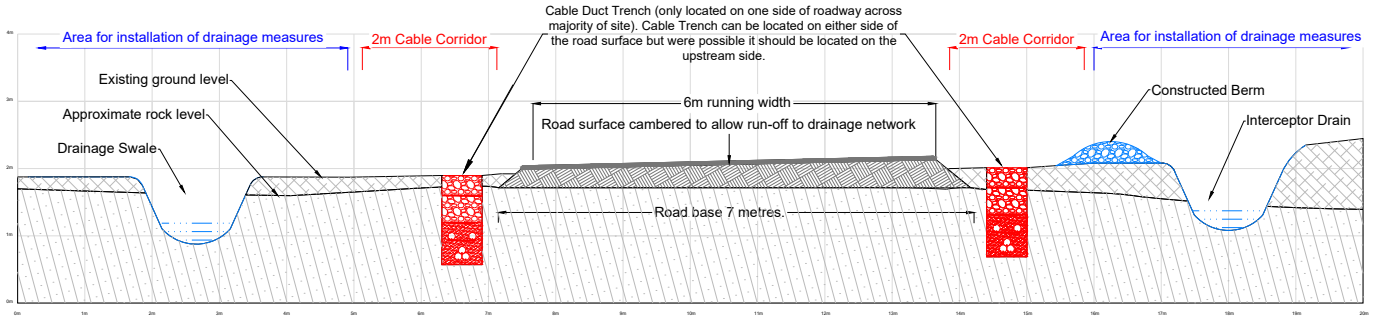
There will be no changes to the existing site roads required as part of the proposed development.

1 March 2017 CER (CRU) Review of Typical Consumption Figures Decision https://www.cru.ie/document_group/review-of-typical-consumption-figures-decision-paper/

Plate 4-2 Typical existing site road

Drawing Notes

1. Widening can occur to either side of existing roads dependent on site conditions.
2. Depths of road fill to vary dependent on site conditions.



Typical excavated road section.

Figure 4-6

DRAWING TITLE:
Typical Excavated Road Sections

PROJECT TITLE:
ESB Carnsore Wind Farm

DRAWING BY:	CHECKED BY:
Joseph O Brien	Eoin Hurst
PROJECT No.: 210202	DRAWING No.: Fig 4-6
SCALE: 1:75@A3	DATE: 22.07.2021

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4.3.3 Electricity Substation

There is an existing 38kV electricity substation located in the northern portion of the site adjacent to the site entrance as shown in Figure 4-1. The plan layout of the existing substation are shown on Figure 4-77. The existing substation and electrical components were constructed by, and will be maintained to Hibernian specifications. The footprint of the existing on-site electricity substation compound measures approximately 575m^2.

The substation compound includes a wind farm control building and the electrical components (e.g. transformers) necessary to consolidate the electrical energy generated by each wind turbine, and export that electricity from the wind farm substation to the national grid. Further details regarding the connection between the site's substation the national electricity grid are provided in Chapter 1: Introduction of this EIAR.

The substation compound is surrounded by an approximately 2.4m high steel palisade fence, and internal fences segregate different areas within the main substation. There will be no changes to the existing substation required as part of the Proposed Development.

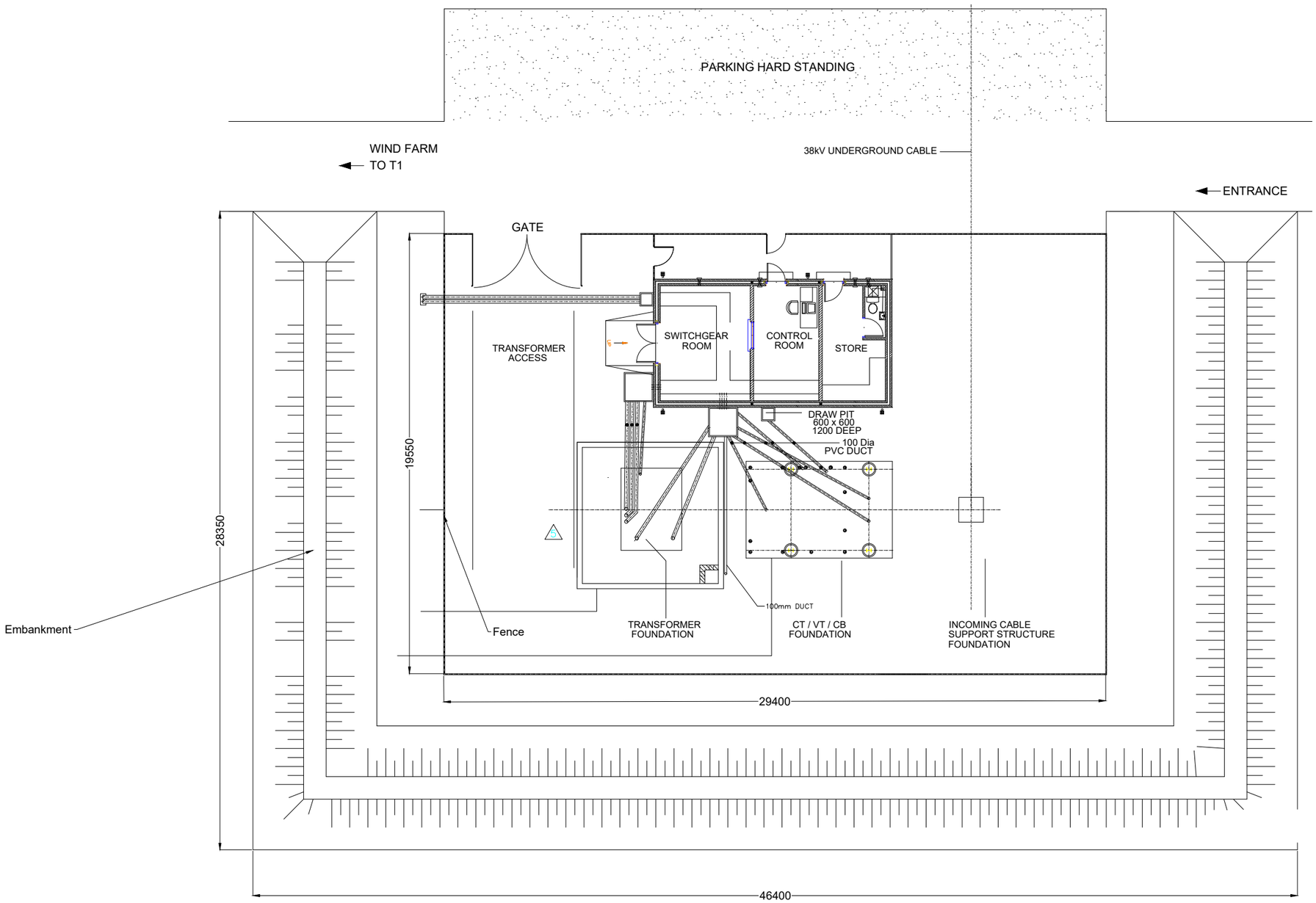
4.3.3.1 Wind Farm Control Building

A wind farm control building is located within the substation compound. The control building area measures approximately 62 m^2 and it is 4.25m high. Plan and elevation drawings of the control building are included in Figure 4-88.

The wind farm control building includes staff welfare facilities for the staff that work on the site during the operational phase of the project. Toilet facilities are installed with a low-flush cistern and low-flow wash basin. Due to the specific nature of the Proposed Development there is a very small water requirement for occasional toilet flushing and hand washing. There is an existing Irish Water mains water supply to the control building, with the source reported as from the Fardystown Water Supply Zone (WSZ).

Wastewater from the staff welfare facilities in the control buildings is managed by means of an existing 1,000 litre capacity septic tank, located approximately 15m east of the building. As wastewater is treated on-site, the Environmental Protection Agency's (EPA) 2009 *Code of Practice: Wastewater Treatment and Disposal Systems Serving Single Houses (p.e. 10)* applies. Similarly, the EPA's 1999 manual *Treatment Systems for Small Communities, Business, Leisure Centres and Hotels* also applies, as it too deals with scenarios where it is proposed to treat wastewater on-site. The existing septic tank will continue to be maintained according to current best practice. The septic tank is inspected and maintained at regular intervals and drainage conditions at the site are very good.

Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007 (as amended), will be employed to transport wastewater away from the site to a licensed facility.



DRAWING TITLE:
As Built Substation Layout

PROJECT TITLE:
Carnsore Wind Farm

DRAWING BY:	CHECKED BY:
Joseph O Brien	Eoin Hurst
PROJECT No.: 210202	DRAWING No.: Figure 4-7
SCALE: 1:200 @ A3	DATE: 20.07.2021

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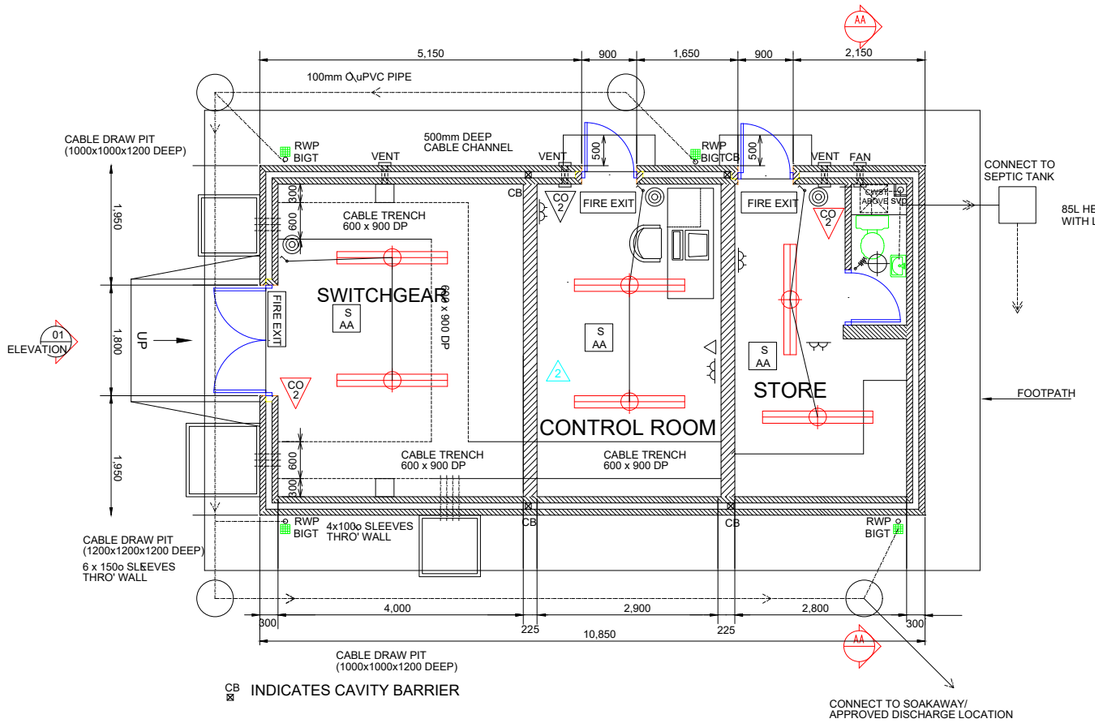
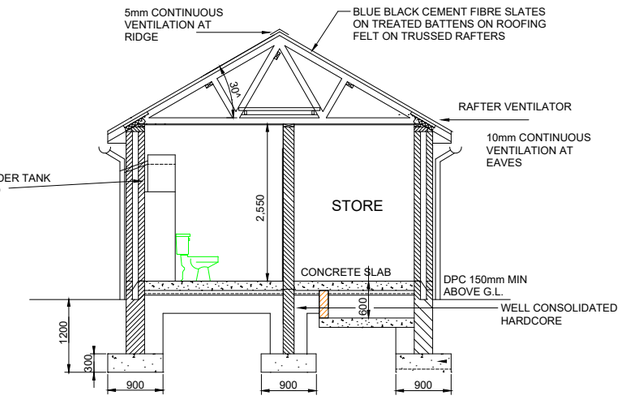
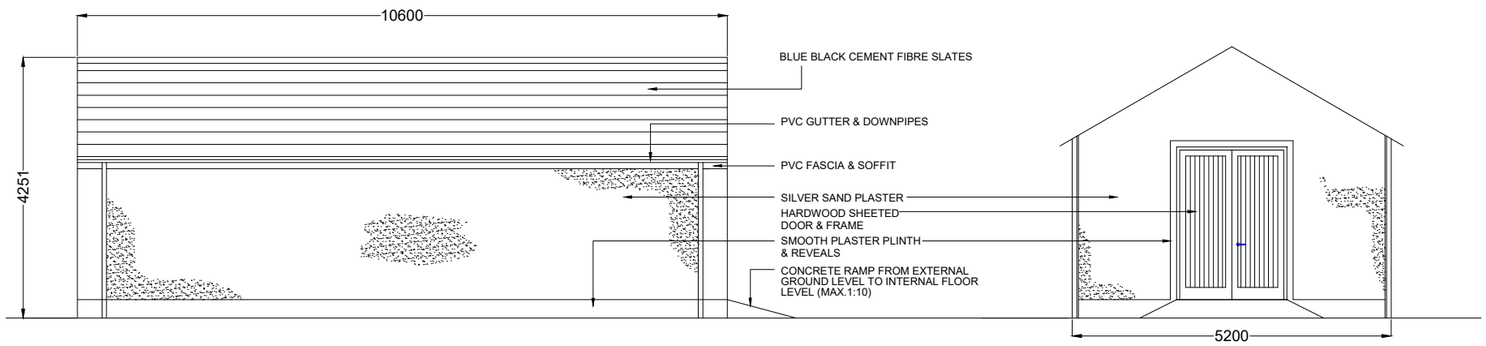


CB ⊠ INDICATES CAVITY BARRIER

PLAN

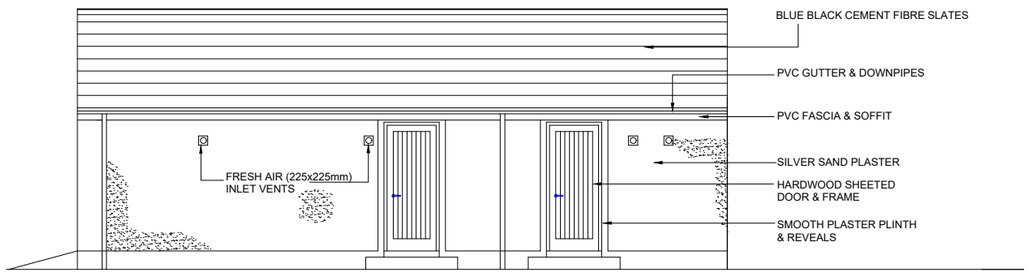


SECTION A-A



REAR ELEVATION

SIDE ELEVATION 1



FRONT ELEVATION

	1800mm LONG DOUBLE FLOURESCENT LIGHT FITTED WITH SEALED DIFFUSER
FIRE EXIT	ILLUMINATED EXIT SIGN
	CEILING ROSE
S AA	SMOKE DETECTOR
	LIGHT SWITCH
	PULL CORD LIGHT SWITCH
	DOUBLE SOCKET OUTLET
	TELEPHONE POINT
	BREAK GLASS POINT

DRAWING TITLE:
As Built Substation Building

PROJECT TITLE:
Carnsore Wind Farm

DRAWING BY: Joseph O Brien	CHECKED BY: Eoin Hurst
PROJECT No.: 210202	DRAWING No.: Figure 4-8
SCALE: 1:100 @ A3	DATE: 20.07.2021

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4.3.4 Site Cabling

Each turbine is connected to the on-site electricity substation via an underground 20kV electricity cable. Copper communication cables also connect each wind turbine to the wind farm control building in the on-site substation compound. The electricity and communication cables running from the turbines to the on-site substation compound run in cable trenches approximately 0.8m bgl, typically along the side of roadways and through cable ducts at road crossings. The route of the cable follows the access track to each turbine location.

Figure 4-99 below shows two variations of a typical cable trench designed for Carnsore Wind Farm, one for off-road trenches (installed on areas of soft ground that are not trafficked) and one for on-road trenches (where trenches run along or under a roadway). The cable route is marked above ground at intervals with cable location markers. While the majority of the cable trenches were backfilled with native material, clay subsoils of low permeability were also used to prevent conduit flow in the backfilled trenches.

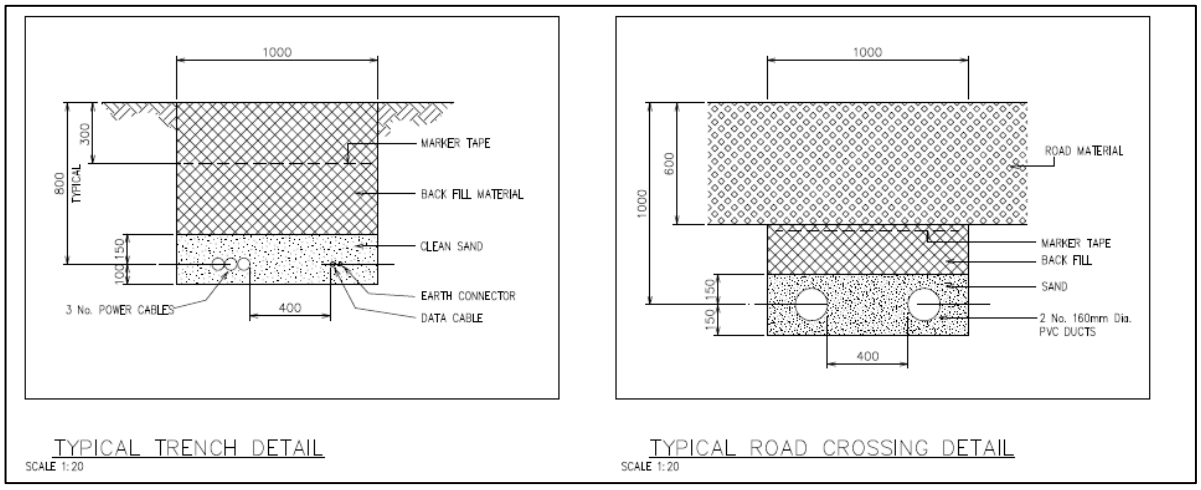
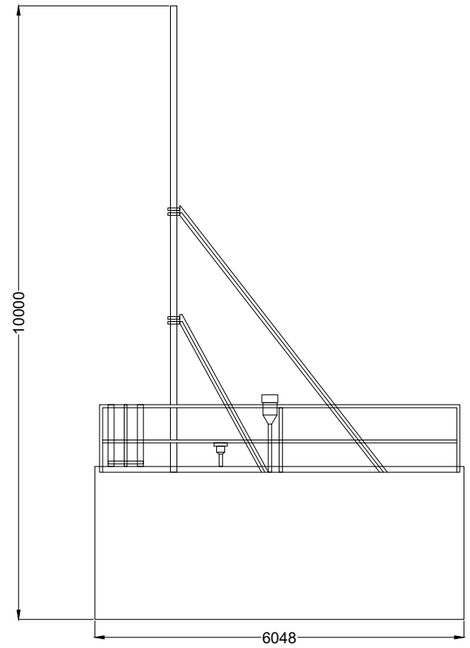


Figure 4-9 Typical Cable Trench Cross-section Detail

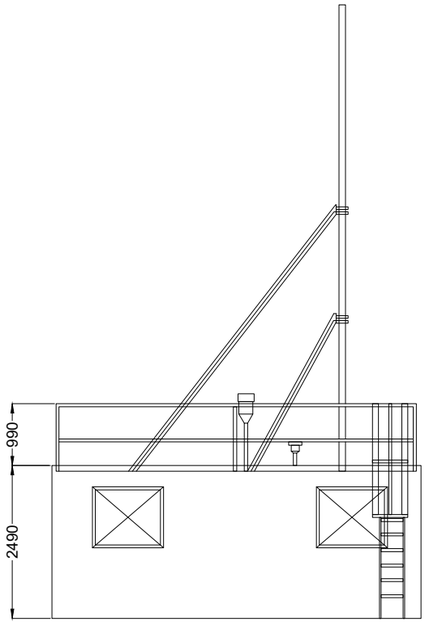
4.3.5 Meteorlogical Mast

One existing permanent metrological mast is included as part of the Proposed Development, located adjacent to the southwest site boundary. The metrological mast is equipped with wind monitoring equipment at various heights. The mast is a self-supporting slender structure of 50m in height. Also included is an existing associated 153m^2 fenced compound containing an 18m^2 site cabin, with an air monitoring mast mounted on the cabin to a total height of 10m. The mast is located at E711617 N604102 as shown on the site layout drawing in Figure 4-1. The metrological mast, site cabin, and associated compound are shown in Figure 4-1010 and in Plate 4-3. There will be no changes to the existing meteorlogical mast as part of the Proposed Development.

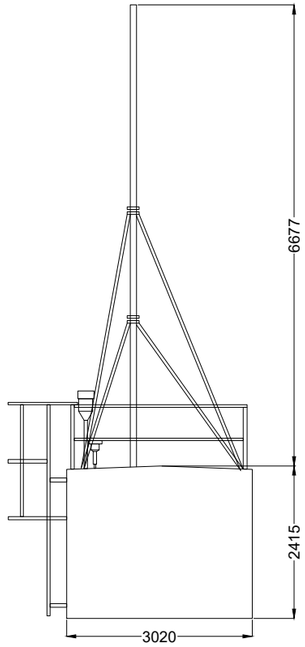
Plate 4-3 Existing meteorological mast and air monitoring mast



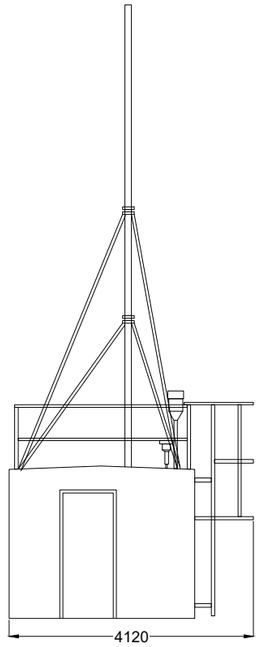
Side Elevation



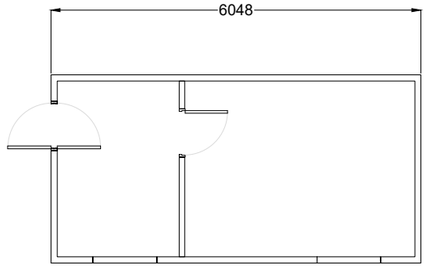
Side Elevation



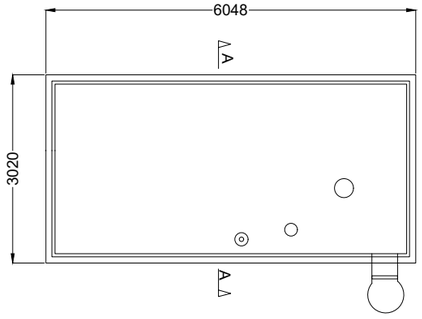
Rear Elevation



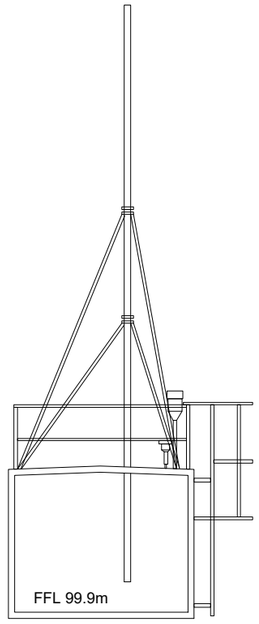
Front Elevation



Floor Plan



Roof Plan



Section A-A

Figure 4-10

DRAWING TITLE:
As Built Met Mast & Control Cabin

PROJECT TITLE:
Carnsore Wind Farm

DRAWING BY:	CHECKED BY:
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PROJECT No.: 210202	DRAWING No.: Figure 4-10
SCALE: 1:100 @ A3	DATE: 19.07.2021

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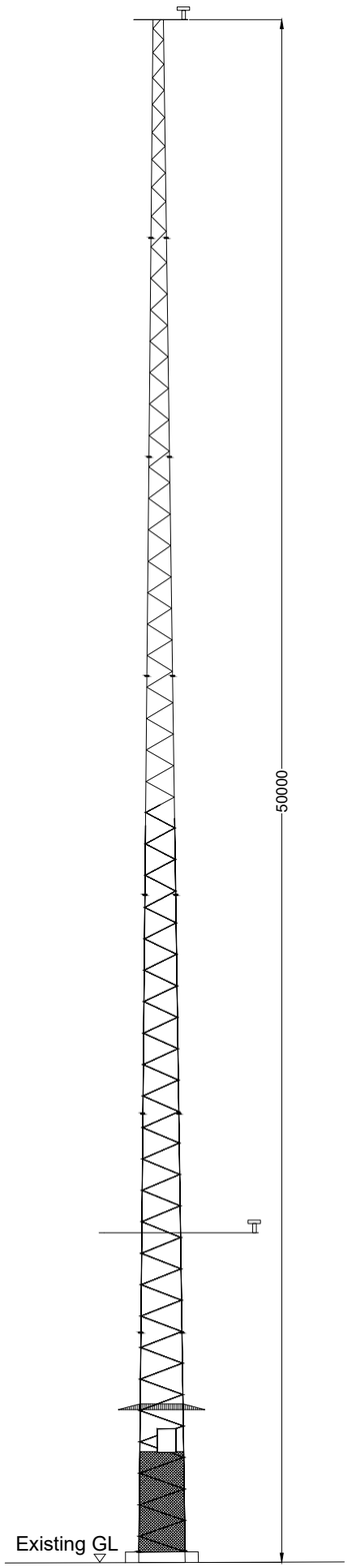
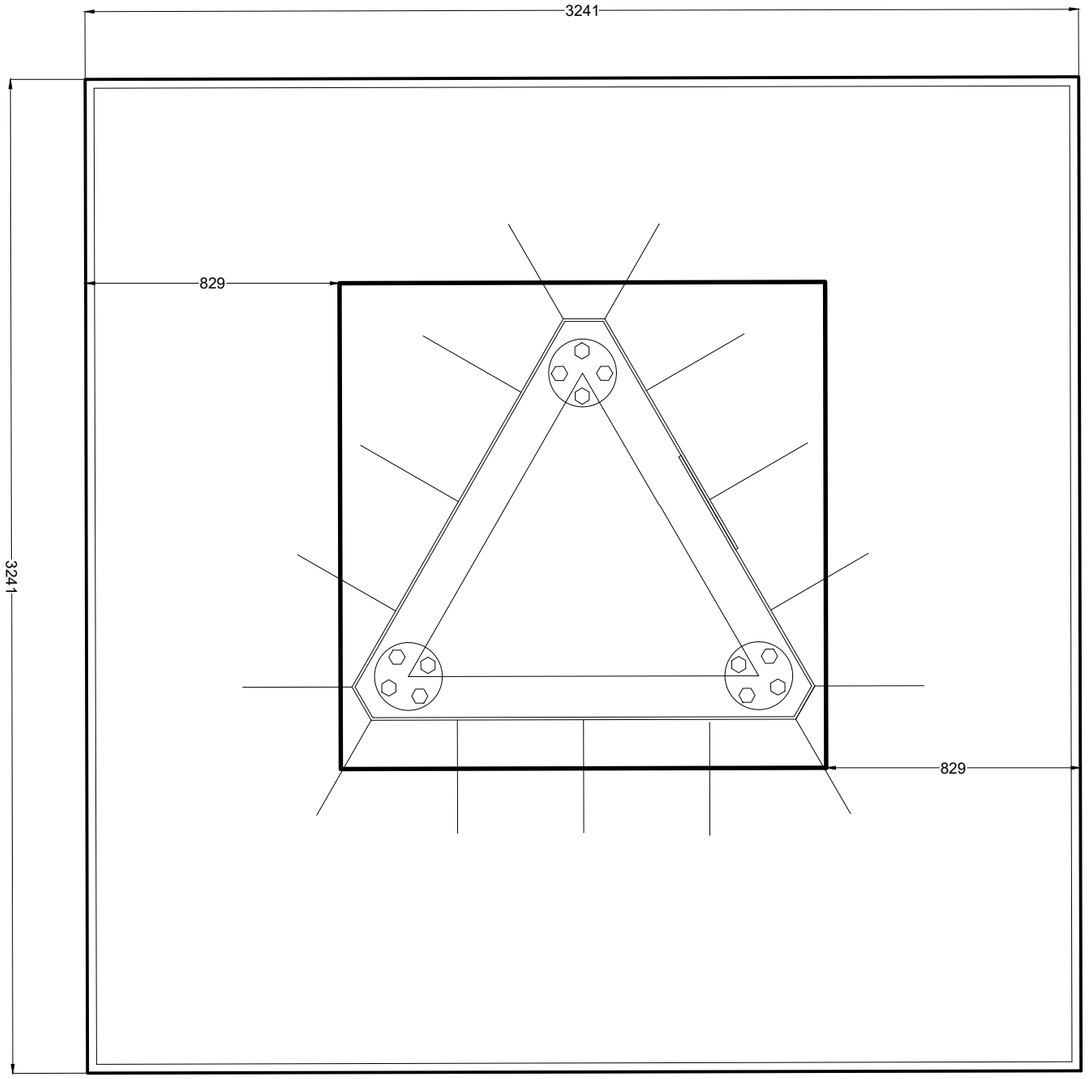


Elevation
Scale 1:200



Plan
Scale 1:20

Figure 4-11

DRAWING TITLE:
Met Mast Plan & Elevation

PROJECT TITLE:
Carnsore Wind Farm

DRAWING BY:	CHECKED BY:
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PROJECT No.: 210202	DRAWING No.: Figure 4-11
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4.4 Access and Transportation

4.4.1 Site Entrance

Access to the wind farm site is via an existing site entrance off the local road (Nethertown Lane) to the north of the site. This site entrance is used for day to day maintenance and monitoring of the wind farm and substation. No changes to this entrance are proposed.

4.5 Site Drainage

The topography across the site slopes generally east-southeast towards the coastline with a maximum elevation of 16 metres Ordnance Datum (m OD) in the south-centre of the site, between turbine T4 and T5. No significant watercourses were recorded within or adjacent to the site boundary. Three existing shallow surface drainage crossings were recorded on the east of the site, along the access road between turbine T12 and T7. At the time of the site walkover (16th April 2021) these drainage channels were observed to be very low or dry. A spring identified on historic OS maps as St. Vouge's well was observed on the southeast of the site, draining southeast to the sea on the north side of Turbine No. 7.

During the original construction of the Carnsore Wind Farm new internal site roads were constructed of consolidated gravel. The new site roads were constructed with a designed running width of 4m. Existing roads on the site were also widened to 4m. During the construction process both cross and longitudinal drainage provisions were made to enable existing drainage patterns to be maintained.

There are no ground disturbing works proposed as part of the Proposed Development. Therefore, no existing natural drainage features will be altered as part of the Proposed Development and there will be no direct or indirect discharges to natural watercourses. The Proposed Development will not result in any changes to the existing drainage within the project site.

4.6 Construction

No construction activities or alterations to the existing wind farm are proposed beyond routine maintenance during the operational phase of the Proposed Development.

4.7 Operation

The Proposed Development is expected to have a lifespan of 15 years. Planning permission is being sought for a 15-year operational period commencing from the date of expiration of the existing wind farm planning permission (ABP Ref. PL26.116487) on August 2022. During the operational period, on a day-to-day basis the wind turbines will operate automatically, responding by means of anemometry equipment and control systems to changes in wind speed and direction.

The wind turbines will be connected together and data relayed from the wind turbines to an off-site control centre. Each turbine will also be monitored off-site by the wind turbine supplier. The monitoring of turbine output, performance, wind speeds, and responses to any key alarms will be monitored at an off-site control centre 24-hours per day. An existing operational phase Health and Safety Plan will be updated by Hibernian and act as the primary document dealing with health and safety issues on the operational wind farm.

Each turbine will be subject to a routine maintenance programme involving a number of checks and changing of consumables, including oil changes. In addition, there will be a requirement for unscheduled maintenance, which could vary between resetting alarms to major component changes requiring a crane. Typically, maintenance traffic will consist of four-wheel drive vehicles or vans. The

electricity substation and site tracks will also require periodic maintenance. The wind farm manager will continue to attend the site regularly to perform inspections and oversee maintenance works.

4.8 Decommissioning

The wind turbine manufacturer has determined that the existing wind turbines at the Carnsore Wind Farm have a remaining lifespan of at least 15 years. Hibernian have provided details of technical feasibility assessments undertaken concerning the lifetime extension of the Carnsore Wind Farm turbines, included as Appendix 3-1 to Chapter 3 of this EIAR. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the Proposed Development will be decommissioned fully.

Condition 9 of the original Planning Application (ABP Ref. PL26.116487) states the following in relation to decommissioning of the wind farm:

> *'On full or partial decommissioning of the wind farm or if the wind farm ceases operation for a period of more than one year the masts and turbines concerned (including foundations) shall be dismantled and removed from the site. The site shall be reinstated (including all access roads) and all decommissioned structures shall be removed within three months of decommissioning.'*

It is considered that this current planning condition is not appropriate, from an environmental perspective, for the Proposed Development. Upon decommissioning of the Proposed Development, the wind turbines will be disassembled in reverse order to how they were erected. All above-ground turbine components will be separated and removed off-site for reuse or recycling. It is proposed to leave turbine foundations in place underground and to cover them with earth and reseed as appropriate. Leaving the turbine foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in significant environment nuisances such as noise, dust and/or vibration.

It is proposed that site roadways will be left in situ, as appropriate, to facilitate on-going agricultural and leisure uses by the local community. If it were to be confirmed that the roads were not required in the future for any other useful purpose, they could be removed where required, however, this is not envisaged at this time. It is proposed to leave underground cables in place where they are below a level likely to be impacted by typical agricultural works.

During decommissioning, it may be possible to reverse or at least reduce some of the potential impacts caused during the initial construction of the wind farm by rehabilitating construction areas such as turbine bases and hard standing areas. This will be done by covering with local topsoil and reseeding with a local native mix to encourage vegetation growth and reduce run-off and sedimentation. A decommissioning plan will be agreed with the local authorities at least three months prior to decommissioning of the Proposed Development.

As noted in the Scottish Natural Heritage (SNH) report *Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms* (SNH, 2013) reinstatement proposals for a wind farm are typically made approximately 30 years in advance, so within the lifespan of the wind farm, technological advances and preferred approaches to reinstatement are likely to change. According to the SNH guidance, it is therefore:

> *'best practice not to limit options too far in advance of actual decommissioning but to maintain informed flexibility until close to the end-of-life of the wind farm'.*