4. DESCRIPTION OF THE PROPOSED DEVELOPMENT

4.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) describes the development and its component parts which is the subject of a proposed application for planning permission to An Bord Pleanála in accordance with Section 37(E) of the Planning and Development Act 2000, (as amended) ('the Proposed Development').

The Proposed Development comprises:

i. *Construction of up to 17 No. wind turbines with a maximum overall blade tip height of up to 150 metres;*
ii. *1 no. Meteorological Mast with a maximum height of up to 112 metres;*
iii. *Construction of 1 no. staff welfare and storage facility including waste water holding tank;*
iv. *1 no. permanent 110 kV electrical substation with 2 no. control buildings with welfare facilities, 10 no. battery containers, battery switchgear building, all associated electrical plant and equipment, security fencing, all associated underground cabling, waste water holding tank and all ancillary works;*
v. *Underground cabling connecting the turbines to the proposed substation and connection from the proposed substation to the national grid via a 110 kV loop in connection.*
vi. *Upgrade of existing tracks, roads and provision of new site access roads and hardstand areas;*
vii. *Construction of an access track in the townlands of Breeda and Rearour South to facilitate turbine delivery;*
viii. *Junction improvement works in the townland of Killea to facilitate turbine delivery;*
ix. *3 no. borrow pits;*
x. *2 no. temporary construction compounds;*
xi. *Site Drainage;*
xii. *Forestry Felling;*
xiii. *Signage; and*
xiv. *All associated site development works.*

All elements of the proposed project as described in this chapter, including grid connection, forestry felling and replanting and any works required on public roads to accommodate turbine delivery, have been assessed as part of this EIAR.

This application seeks a ten-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm.

4.2 Development Layout

The layout of the Proposed Development has been 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 through the site. A constraints study, as described in Section 3.6.1 of this EIAR, has been carried out to ensure that turbines and ancillary infrastructure are located in the most appropriate areas of the site. The Proposed Development layout makes maximum possible use of the existing access roads and tracks within the site.

The overall layout of the Proposed Development is shown on Figure 4-1. This drawing shows the proposed locations of the wind turbines, electricity substation, borrow pits, construction compounds, internal roads layout and the main site entrance. Detailed site layout drawings of the Proposed Development are included in Appendix 4-1 to this EIAR.

4.3 Development Components

This section of the EIAR describes the components of the proposed development. Further details regarding Site Drainage (Section 4.6), Constructing Phasing (Section 4.7) and Construction Methodologies (Section 4.8) are provided subsequently in this chapter.

4.3.1 Wind Turbines

4.3.1.1 Turbine Locations

The proposed wind turbine layout has been optimised using industry standard wind farm design software to maximise the energy yield from the site, while maintaining sufficient distances between the proposed turbines to ensure turbulence and wake effects do not compromise turbine performance. The Grid Reference coordinates of the proposed turbine locations are listed in Table 4-1 below.

The *'Wind Energy Development Guidelines for Planning Authorities'* (Department of the Environment, Heritage and Local Government, 2006) state at Section 5.3 that the extent of flexibility built into wind farm planning permissions with regard to turbine locations should not extend beyond 20 metres.

Table 4-1 Proposed Wind Turbine Locations and Elevations

Turbine No.	Irish Transverse Mercator Co-ordinates		Elevation (m OD)
	Easting (m)	Northing (m)	
1	603992	587718	167
2	603109	587386	174
3	603575	587412	156
4	603876	587091	146
5	603176	586974	174
6	604338	586514	142
7	603959	586377	152
8	603869	585916	167
9	603486	585581	178
10	603622	585230	181
11	603482	586139	168
12	599804	588402	176
13	599365	588089	197
14	599702	587808	187
15	600078	587585	183
16	599590	587320	191
17	600260	587156	172

MAP TITLE: Proposed Layout	MAP NO.: Figure 4.1	SCALE: 1:20,000
PROJECT TITLE: 170749 - Lyrenacarriga Wind Farm		DATE: 18-11-2020
DRAWING BY: L Meehan	CHECKED BY: Michael Watson	ISSUE NO.: 170749-2020.11.18-D2

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4.3.1.2 Turbine Type

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

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

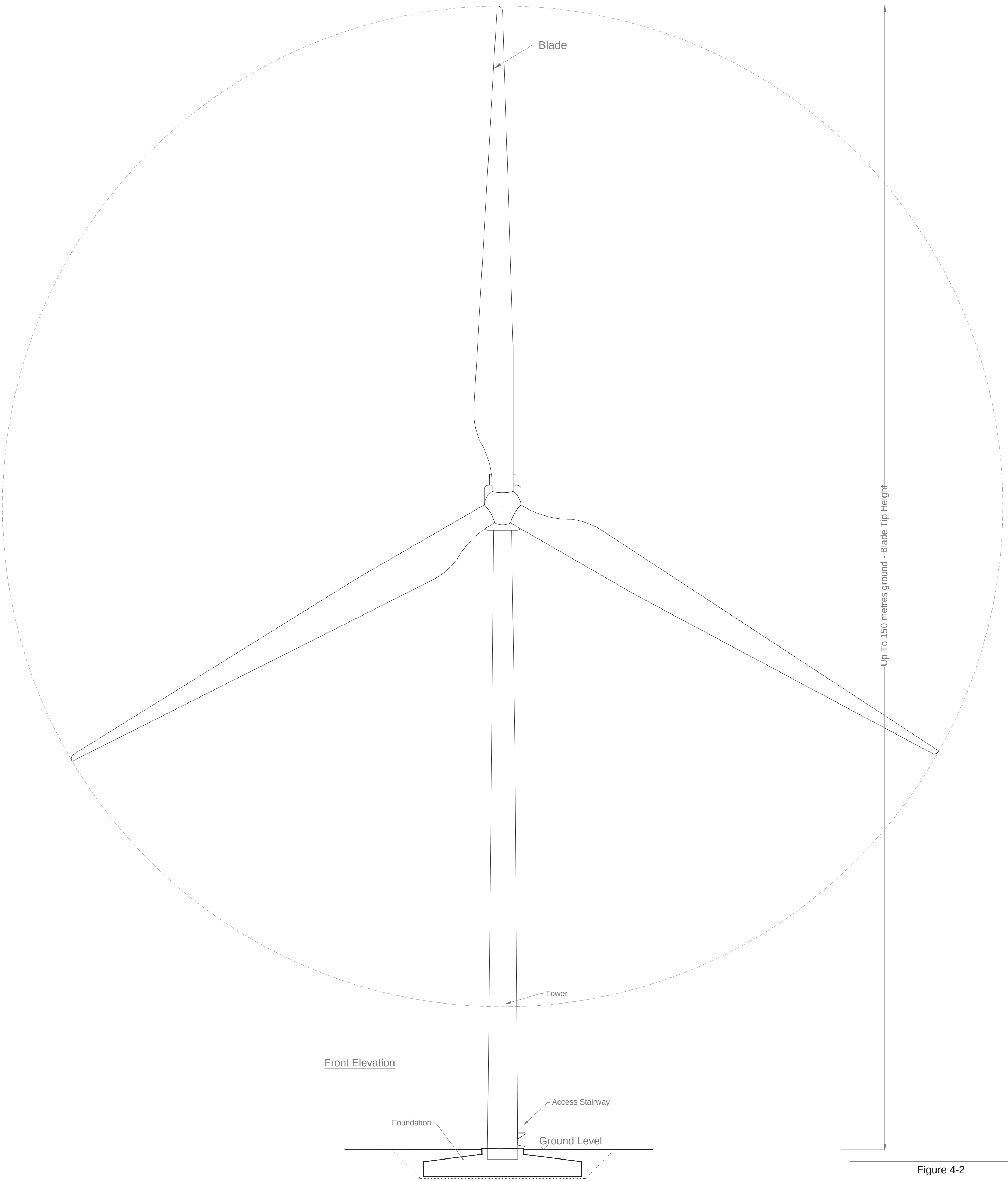
Plate 4-1 Wind turbine components

The proposed wind turbines will have a tip height of up to 150 metres. Within this size envelope, various configurations of hub height, rotor diameter and ground to blade tip height may be used. The exact make and model of the turbine will be dictated by a competitive tender process, but it will not exceed a tip height of up to 150 metres. Modern wind turbines from the main turbine manufacturers have evolved to share a common appearance and other major characteristics, with only minor cosmetic differences differentiating one from another. The wind turbines that will be installed on the site will be conventional three-blade turbines, that will be geared to ensure the rotors of all turbines rotate in the same direction at all times. The turbines will be grey matte in colour.

For the purposes of this EIAR, various types and sizes of wind turbines within the 150-metre tip height envelope have been selected and considered in the relevant sections of the EIAR to assess the worst-case scenario. 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. In each EIAR section that requires the consideration of turbine parameters as part of the impact assessment, the worst-case turbine design parameters that have been used in the impact assessment are specified.

A drawing of the proposed 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.

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



Drawing Notes

1. Proposed wind turbines to have a maximum ground to blade tip height of up to 150m.
2. Exact make and model of the turbine to be dictated by a competitive tender process.
3. Installed wind turbine not to exceed maximum size envelope set out above in any blade length and hub-height configuration.

Figure 4-2

DRAWING TITLE:
Typical Wind Turbine Elevation

PROJECT TITLE: Lyrenacarriga Wind Farm, Co. Cork & Co. Waterford

DRAWING BY: Joseph O Brien	CHECKED BY: Lorraine Meehan
PROJECT No.: 170749	DRAWING No.: 170749 - 37
SCALE: 1:500 @A3	DATE: 04.01.2021

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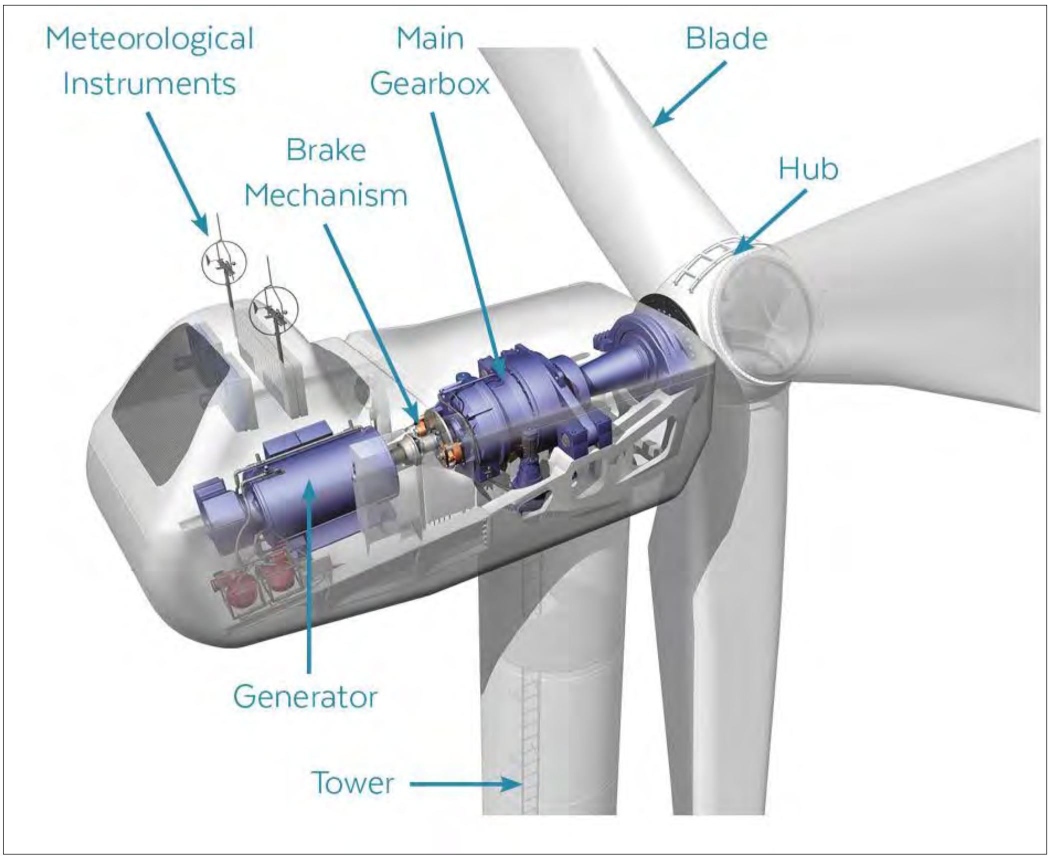

Figure 4-3 Turbine nacelle and hub components

Drawing Notes

1. Typical Layout, final dimensions and configuration will be based on manufacturer's specifications

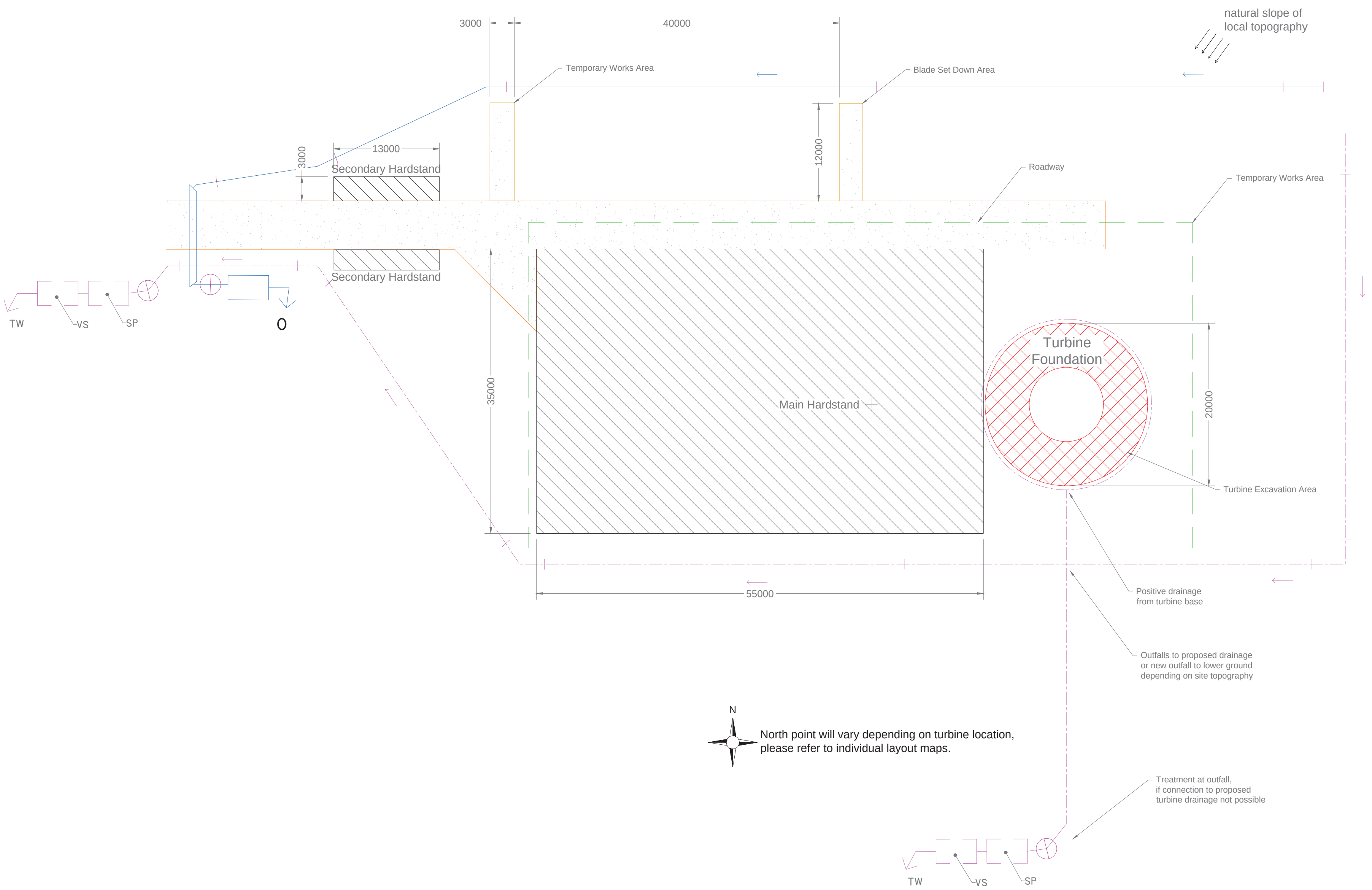

Figure 4-4

DRAWING TITLE:
Drawing Legend

	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

Proposed Drainage

Typical Turbine Hardstand Layout Standard Detail

PROJECT TITLE: Lyrenacarriga Wind Farm, Co. Cork & Co. Waterford

DRAWING BY: Joseph O Brien	CHECKED BY: Lorraine Meehan
PROJECT No.: 170749	DRAWING No.: 170749 - 36
SCALE: 1:500 @A3	DATE: 04.01.2021

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4.3.1.3 Turbine Foundations

Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground level. The size of the foundation will be dictated by the turbine manufacturer based on the site geotechnical characteristics, and the final turbine selection will be the subject of a competitive tender process. Different turbine manufacturers use different shaped turbines foundations, ranging from circular to hexagonal and square, depending on the requirements of the final turbine supplier, and a foundation area large enough to accommodate these modern turbine models has been assessed in this EIAR. The turbine foundation transmits any load on the wind turbine into the ground. The typical horizontal and vertical extent of a turbine's foundation is shown above in Figure 4-2.

After the foundation level of each turbine has been formed on competent strata or using piling methods, the bottom section of the turbine tower "Anchor Cage" is levelled and reinforcing steel is then built up around and through the anchor cage. The outside of the foundation is shuttered with demountable formwork to allow the pouring of concrete and is backfilled accordingly with appropriate granular fill or ballast to finished surface level (Plate 4-2 below). The reinstated ballast material can maintain a stoned running surface for maintenance vehicle access.

Plate 4-2 Turbine 'Anchor Cage' (left) and finished turbine base (right)

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 areas are extended to cover the turbine foundations once the turbine foundation is in place. The sizes, arrangement and positioning of hard standing areas are dictated by turbine suppliers, therefore this EIAR assesses an envelope area in which the hard-standings will be located. The hard-standing area is intended to accommodate a crane during turbine assembly and erection. The proposed hard standing areas shown on the detailed layout drawings included in Appendix 4-1 to this report are indicative of the sizes required, but the extent of the required areas at each turbine location may be optimised on-site within the design envelope assessed in this EIAR, depending on topography, position of the site access road, the proposed turbine position and the turbine supplier's exact requirements.

4.3.1.5 Assembly Area

Levelled assembly areas will be located on either side of the hard-standing area as shown on Figure 4-4. These assembly areas are required for offloading turbine blades, tower sections and hub from trucks until such time as they are ready to be lifted into position by cranes and to assist the main crane during turbine assembly. The exact location and number of assembly areas will be determined by the selected turbine manufacturer, therefore this EIAR assesses an envelope area in which the assembly areas will be located.

4.3.1.6 Power Output

It is anticipated the proposed wind turbines will have a rated electrical power output in the range of 3.5 to 5.0 Megawatts (MW) per turbine. Turbines of the exact same make, model and dimensions can also have different power outputs depending on the capacity of the electrical generator installed in the turbine nacelle. For the purposes of this EIAR, a rated output of between 3.5 MW and 5.0 MW per turbine has been chosen to calculate the power output of the proposed 17-turbine wind farm, which would result in an estimated installed capacity of between 60 MW and 85 MW.

Assuming a minimum installed capacity of 60 MW, the Proposed Development therefore has the potential to produce approximately 183,960 MWh (megawatt hours) of electricity per year, based on the following calculation:

A x B x C = Megawatt Hours of electricity produced per year

where:

A = The number of hours in a year: 8,760 hours

B = The capacity factor, which takes into account the intermittent nature of the wind, the availability of wind turbines and array losses etc. A standard capacity factor of 35% is applied here

C = Rated output of the wind farm: 60 MW

The 183,960 MWh of electricity produced by the Proposed Development would be sufficient to supply 43,800 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 189,991 occupied households in Counties Waterford and Cork (excluding Cork City). Per annum, based on a capacity factor of 35%, the Proposed Development would therefore produce sufficient electricity for the equivalent of approximately 23% of all households in Counties Waterford and Cork (excluding Cork City).

4.3.2 Site Roads

4.3.2.1 Road Construction Types

To provide access within the site of the Proposed Development and to connect the wind turbines and associated infrastructure existing tracks will need to be upgraded and new access roads will need to be constructed.

The Proposed Development makes use of the existing forestry road network insofar as possible. It is proposed to upgrade approximately 10.7 kilometres of existing site roads and tracks, and to construct 4.1 kilometres of new access road on the site, plus 0.3 kilometres of temporary new access road on the turbine delivery route.

4.3.2.1.1 *Upgrade to Existing Roads or Tracks*

The existing tracks onsite were constructed using the excavate and replace construction technique. The general construction methodology for upgrading of existing sections of excavated roads or tracks, as

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

presented in the Geotechnical Assessment Report prepared by Fehily Timoney engineering consultants (see Appendix 4-2 of this EIAR), is summarised below.

i. *Excavation will be required on one or both sides of the existing access track to a competent stratum.*
ii. *Granular fill to be placed in layers in accordance with the designer's specification.*
iii. *The surface of the existing access track will be overlaid with up to 300mm of selected granular fill.*
iv. *Access roads to be finished with a layer of capping across the full width of the road.*
v. *A layer of geogrid/geotextile may be required at the surface of the existing access road in areas of excessive rutting (to be confirmed by onsite engineer).*
vi. *For excavations in spoil, side slopes shall be not greater than 1 (v): 2. This slope inclination will be reviewed during construction, as appropriate.*
vii. *The finished road width will be approximately 5m.*
viii. *On side long sloping ground any road widening works required will be done on the upslope side of the existing access road, where possible.*
ix. *A final surface layer shall be placed over the existing access track, as per design requirements, to provide a suitable road profile and graded to accommodate wind turbine construction and delivery traffic.*

A typical section of existing excavated road for upgrade is shown in Figure 4-5. .

4.3.2.1.2 Construction of New Excavated Roads

Due to the ground conditions, new access tracks proposed on site are proposed to be founded. The typical make-up of the founded access tracks is a minimum stone thickness of 500mm. The requirement for a layer of geotextile and geogrid and the necessary stone thickness will be confirmed during site engineering.

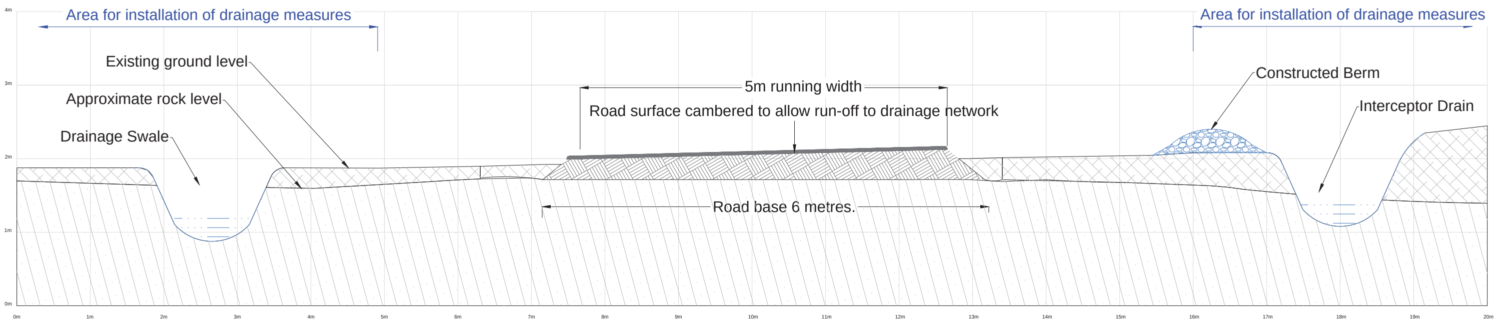
The general construction methodology for construction of excavated roads, as presented in the Geotechnical Assessment Report in Appendix 4-2 of this EIAR, is summarised below:

a. *Interceptor drains will be installed upslope of the access road alignment to divert any surface water away from the construction area.* (Typically, interceptor drains preserve existing watercourses as a 'clean water drainage system / network'; see Section 4.6.4.1 of this chapter under Drainage Design for further details.)
b. *Excavation will take place to a competent stratum beneath the topsoil (as agreed with the site designer and resident engineer).*
c. *Road construction will be carried out in sections of approximately 50m lengths i.e. no more than 50m of access road to be excavated without re-placement with stone fill.*
d. *The surface of the excavated access roads will be overlaid with up to 500mm of selected granular fill. Granular fill to be placed in layers in accordance with the designer's specification.*
e. *Access roads to be finished with a layer of capping across the full width of the road.*
f. *A layer of geogrid/geotextile may be required at the surface of the competent stratum.*
g. *A final surface layer shall be placed over the excavated road, as per design requirements, to provide a suitable road profile and graded to accommodate wind turbine construction and delivery traffic.*

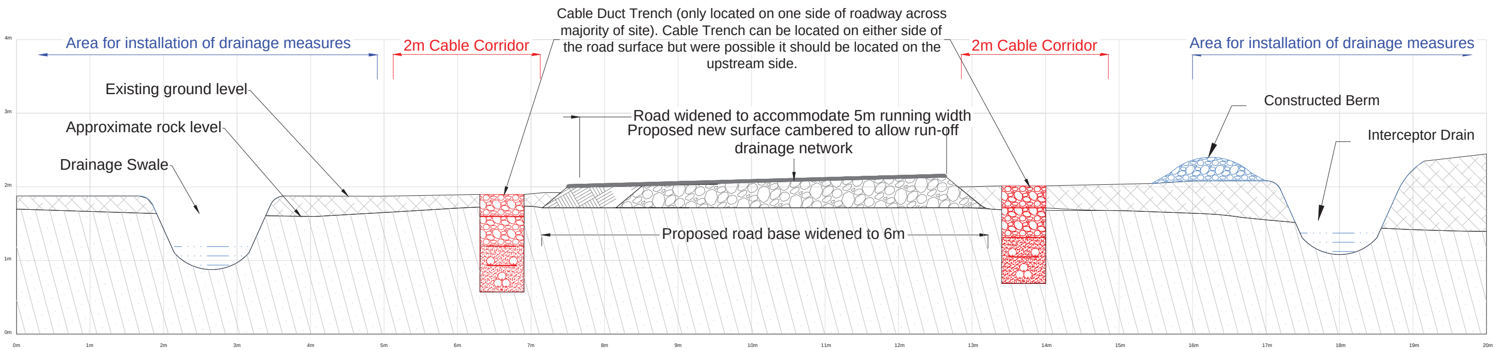
A typical section of a new excavated road is also shown in Figure 4-5.

Drawing Notes

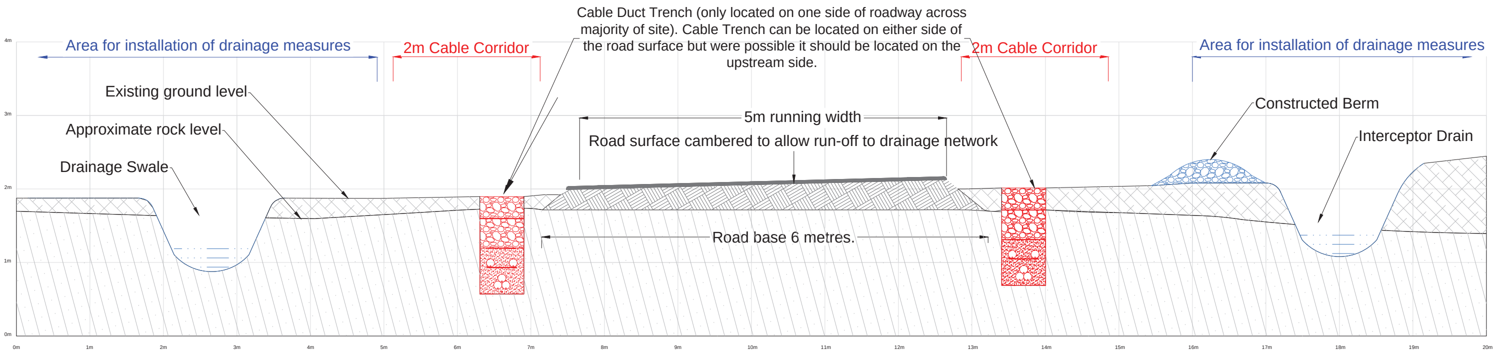
1. Widening can occur to either side of existing roads dependent on site conditions.
2. Depths of road fill to vary dependent on site conditions.



Typical new excavated access track section at Breeda Bridge.



Typical existing excavated road widening section.



Typical new excavated road section.

Figure 4-5

DRAWING TITLE:
Typical Excavated Road Sections

PROJECT TITLE: Lyrenacarriga Wind Farm, Co. Cork & Co. Waterford

DRAWING BY: Joseph O Brien	CHECKED BY: Lorraine Meehan
PROJECT No.: 170749	DRAWING No.: 170749 - 39
SCALE: 1:75@A3	DATE: 04.01.2021

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4.3.2.2 Watercourse Crossings

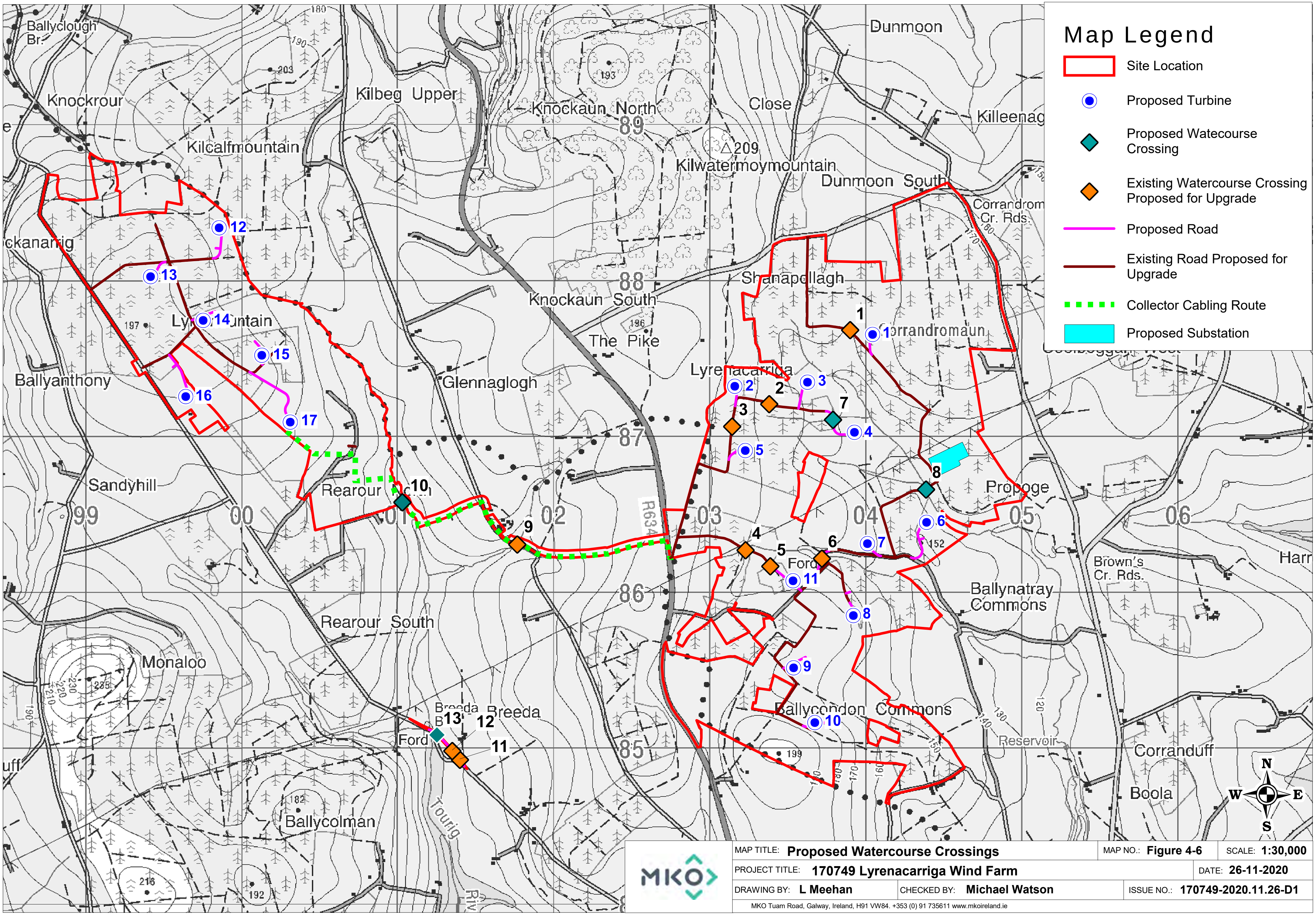
It is proposed that 2 no. new stream crossings and 6 no. existing stream crossing upgrades will be required as part of access road construction and upgrades on the wind farm site. In addition, a total of 3 no. existing crossings will be upgraded and 2 no. new crossings constructed on the proposed collector cabling route between the two turbine clusters and at the proposed new link road near Breeda Bridge.

The locations of the watercourse crossings are shown on Figure 4-6 and in the layout drawings in Appendix 4-1 of this EIAR. Watercourse crossings will be constructed using bottomless, pre-cast concrete structures, and avoid the requirement for in-stream works. Section 4.8.2.1 below presents further details on the construction methodology that will be utilised for crossings.

Table 4-2 below summaries the watercourse crossings proposed as part of the development, as shown on Figure 4-6:

Table 4-2 Proposed New Watercourse Crossings and Existing Crossings for Upgrade

No.	Description	ITM Coordinates (m)	
		Easting	Northing
Wind Farm Access Roads			
CR 1	Existing crossing proposed for upgrade	603,848	587,745
CR 2	Existing crossing proposed for upgrade	603,329	587,270
CR 3	Existing crossing proposed for upgrade	603,092	587,126
CR 4	Existing crossing proposed for upgrade	603,177	586,333
CR 5	Existing crossing proposed for upgrade	603,336	586,231
CR 6	Existing crossing proposed for upgrade	603,667	586,280
CR 7	Proposed new crossing	603,738	587,170
CR 8	Proposed new crossing	604,334	586,722
Collector Cabling Route Between Clusters			
CR 9	Existing crossing proposed for upgrade	601,715	586,371
CR 10	Proposed new crossing	600,979	586,641
Access Road on Turbine Delivery Route			
CR 11	Existing crossing proposed for upgrade	601,347	584,990
CR 12	Existing crossing proposed for upgrade	601,298	585,047
CR 13	Proposed new crossing	601,200	585,150



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4.3.3 Borrow Pits

4.3.3.1 Description

It is proposed to develop three on-site borrow pits as part of the Proposed Development. It is proposed to obtain the majority of all rock and hardcore material that will be required during the construction of the proposed development from the on-site borrow pits. Usable rock may also be won from other infrastructure construction including the substation and the turbine base excavations. Following removal of the rock from a borrow pit, it is proposed to partially restore the borrow pit by storing excavated spoil generated from construction activities.

The locations of the proposed borrow pits are shown in Figure 4-1 above.

4.3.3.2 Borrow Pit Design

The borrow pits will typically be constructed as follows:

1. The rock within the proposed borrow pit footprint will be removed by either breaking or blasting depending on its suitability for excavation, which will be confirmed from a follow-up ground investigation carried out at the proposed borrow pit location prior to construction. The ground investigation shall comprise rotary core drilling with associated engineering logging including rock quality designation and strength testing, as required.
2. It is proposed to construct the borrow pit so that the base of the borrow pit is below the level of the adjacent section of access road. This may vary and as excavation progresses into the back edge of the borrow pit, the base of the borrow pit may be raised to suit local conditions. Localised deepening of the borrow pit floor may be required depending on extraction operations.
3. Depending on the depth and type of rock present in the borrow pits it may be possible to excavate the rock from the borrow pit whilst leaving in place upstands/segments of intact rock which will help to retain the placed spoil. The upstands/segments of intact rock will essentially act as engineered rock buttresses.
4. Slopes within the excavated rock formed around the perimeter of the borrow pits will be formed at stable inclinations to suit local in-situ rock conditions. Exposed sections of the rock slopes will be left with irregular faces and declivities to promote re-vegetation and provide a naturalistic appearance.
5. The stability of the rock faces within the borrow pit will be inspected by competent personnel upon excavation to ensure stability during construction works and in the long term. This inspection will allow unfavourable rock conditions to be identified and suitable mitigation measures to be applied such as removal of loose rock.
6. Where it is not possible to leave upstands/segments of intact rock in place it may be necessary to construct rock buttresses founded on in-situ rock within the borrow pits. The rock buttresses will be constructed of rock fill from the borrow pit excavation. The founding stratum for each rock buttress will be inspected and approved by a competent person.

Borrow pit No. 1 (BP1) located approximately 350 metres to the west of Turbine No. 12, measures approximately 5,850 m^2 in area and is intended to supply hardcore materials for the construction of turbines in the western cluster, access roads thereto, the grid connection, temporary construction compound and the anemometry mast.

Borrow pit No. 2 (BP2) located approximately 100 metres to the southwest of Turbine No. 14, measures approximately 14,220 m^2 in area and is intended to supply hardcore materials for the construction of turbines in the western cluster, access roads thereto, the grid connection, temporary construction compound and the anemometry mast.

Borrow pit No. 3 (BP3) located approximately 50 metres to the southeast of Turbine No. 10, measures approximately 25,900 m^2 in area and is intended to supply hardcore materials for the construction of the turbines in the eastern cluster, access roads thereto, the electricity substation and the temporary construction compound.

All borrow pits are shown on Figure 4-1 and on the detailed site layout drawings included as Appendix 4-1 to this EIAR. Figure 4-7 to 4-9 below show detailed sections through the proposed borrow pits. The borrow pits will, on removal of all necessary and useful rock, be reinstated with excavated subsoils as described in Section 4.3.4 below. Post-construction, the borrow pits areas will be reinstated using spoil excavated onsite, leaving no excessive embankments, leaning edges or angles of repose. The reinstated borrow pits will be capped with a 3-500 mm layer of topsoil and re-planted as appropriate.

At certain turbine foundation and hardstand locations, depending on local ground conditions, the extraction of rock may be required in order to obtain a level construction area. Any rock obtained from a turbine location will be used to supply the hardcore materials requirement for that turbine's hardstand and access road.

Hardcore materials will be extracted from the borrow pits (and some turbine locations, if necessary), principally by means of rock breaking. Depending on the hardcore volume requirements, blasting may also be used as a more effective rock extraction method, capable of producing significant volumes of rock in a matter of milliseconds. Blasting, if required, will only be carried out after notifying local residents. The potential noise and vibration impacts associated with the rock extraction measures, detailed below (i.e. rock breaking and rock blasting), are assessed in Chapter 13 of this EIAR. The two proposed extraction methods are detailed below.

4.3.3.3 Rock Extraction Methods

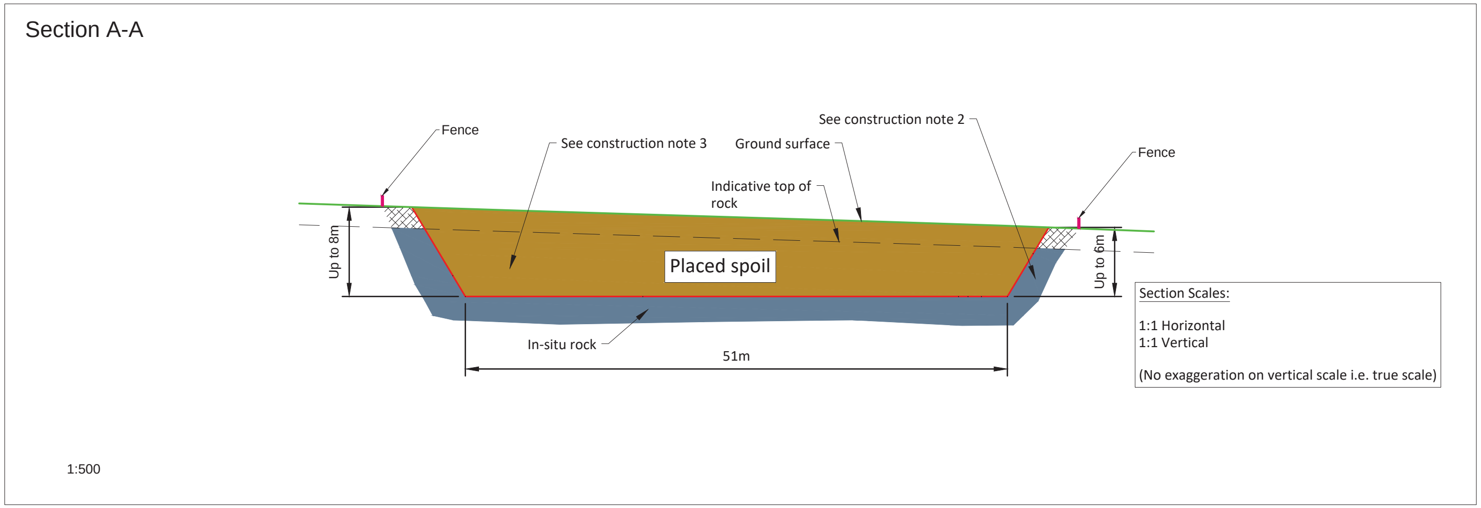
The extraction of rock from the borrow pit is a work stage of the Proposed Development which will be a temporary operation run over a short period of time relative to the duration of the entire project. Where present, overburden will be stripped back and stockpiled using standard tracked excavators. Any stockpiled material will be shaped and sealed to a suitable and safe height, with retaining bunds if required. Borrow pit drainage is addressed in Section 4.6.6 below.

Two extraction methods have been assessed for breaking out the useful rock; rock breaking and blasting, as described below.

4.3.3.3.1 *Rock Breaking*

Weathered or brittle rock can be extracted by means of a hydraulic excavator and a ripper attachment. This is a common extraction methodology where fragmented rock is encountered as it can be carefully excavated in layers by a competent operator. In areas where rock of a much higher strength is encountered and cannot be removed by means of excavating then a rock breaking methodology may be used. Where rock breaking is required, a large hydraulic 360-degree excavator with a rock breaker attachment is typically used. Given the power required to break out tight and compact stone at depth, the machines are generally large and in the 40-60 tonne size range. Even where rock might appear weathered or brittle at the surface, the extent of weathering can quickly diminish with depth resulting in strong rock requiring significant force to extract it at depths of only a few metres.

A large rock breaking excavator progressively breaks out the solid rock from the ground in the borrow pit area. The large rock breaker is typically supported by a smaller rock breaker which can often be in the 20-40 tonne size range, and works to break the rocks down to a size that they can be fed into a crusher. The extracted broken rock is typically loaded into a mobile crusher using a wheeled loading shovel, and crushed down to the necessary size of graded stone required for the on-site civil works. The same wheeled loader takes the stone from the crusher conveyor stockpile, and stockpiles it elsewhere away from the immediate area of the crusher until it is required elsewhere on the site of the Proposed Development.



Construction Notes Borrow pit

(1) It is proposed to construct the borrow pit so that the base of the borrow pit is below the level of the adjacent section of access road. Depending on the type and condition of rock present in the borrow pit it may be possible to excavate the rock from the borrow pit whilst leaving in place upstands/segments of intact rock which will help to retain the placed peat & spoil. The upstands/segments of intact rock will essentially act as engineered rock buttresses within the borrow pit.

(2) Slopes within the excavated rock formed around the perimeter of the borrow pit should be formed at stable inclinations to suit local in-situ rock conditions.

(3) Infilling of the peat & spoil should commence at the back edge of the borrow pit and progress towards the borrow pit entrance/rock buttress. Excavation and infilling of the borrow pit will need to be sequenced and programmed. Leaving in place upstands/segments of intact rock which will help to retain the placed peat & spoil and will allow the borrow pit to be developed and infilled in cells.

(4) The contractor excavating the rock will be required to develop the borrow pit in a way which will allow the excavated peat & spoil to be reinstated safely.

(5) A rock buttress is required at the downslope edge of the borrow pit to safely retain the infilled peat and spoil. The height of the rock buttresses constructed should be greater than the height of the infilled peat & spoil to prevent any surface peat & spoil run-off. A buttress up to 7m (approx.) in height is likely to be required.

(6) The rock buttress will be founded on competent strata. The founding stratum for the rock buttress should be inspected and approved by a competent person.

(7) In order to prevent water retention occurring behind the buttresses, the buttresses should be constructed of coarse boulder fill with a high permeability.

(8) Where possible, the surface of the placed peat & spoil should be shaped to allow efficient run-off of surface water from the placed arising's.

(9) Control of groundwater within the borrow pit may be required and measures will be determined as part of the ground investigation programme.

(10) All the above-mentioned general guidelines and requirements should be confirmed by the designer prior to construction.

(11) Further guidelines on the construction of the borrow pit is included within Section 7.4 of the Peat & Spoil Management Plan

N

Figure 4-7

DRAWING TITLE:

Borrow Pit 1
Layout & Section

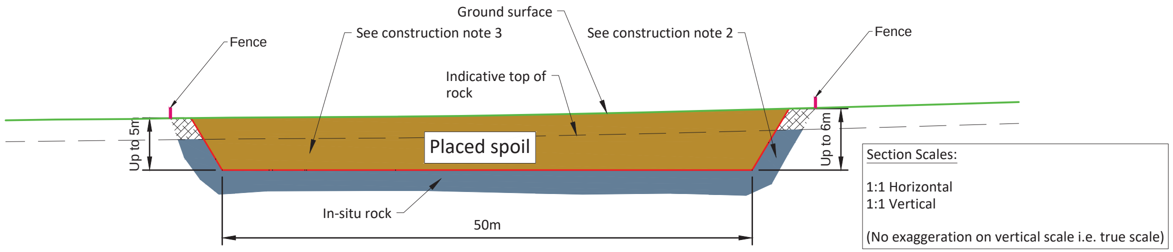
PROJECT TITLE: Lyrenacarriga Wind Farm, Co. Cork & Co. Waterford

DRAWING BY: **POR**	CHECKED BY: **IH**
PROJECT No.: **170749**	DRAWING No.: **170749 - 31**
SCALE: **As Shown @ A3**	DATE: **04.01.2021**

OS SHEET No.: 6108, 6109, 6110, 6111, 6112, 6154, 6155, 6156, 6157, 6158, 6201,6202,6203, 6204,6205, 6249, 6250, 6251, 6252, 6253

FEHILY TIMONEY Cork | Dublin | Carlow www.fehilytimoney.ie

Section B-B



1:500

Construction Notes Borrow pit

(1) It is proposed to construct the borrow pit so that the base of the borrow pit is below the level of the adjacent section of access road. Depending on the type and condition of rock present in the borrow pit it may be possible to excavate the rock from the borrow pit whilst leaving in place upstands/segments of intact rock which will help to retain the placed peat & spoil. The upstands/segments of intact rock will essentially act as engineered rock buttresses within the borrow pit.

(2) Slopes within the excavated rock formed around the perimeter of the borrow pit should be formed at stable inclinations to suit local in-situ rock conditions.

(3) Infilling of the peat & spoil should commence at the back edge of the borrow pit and progress towards the borrow pit entrance/rock buttress. Excavation and infilling of the borrow pit will need to be sequenced and programmed. Leaving in place upstands/segments of intact rock which will help to retain the placed peat & spoil and will allow the borrow pit to be developed and infilled in cells.

(4) The contractor excavating the rock will be required to develop the borrow pit in a way which will allow the excavated peat & spoil to be reinstated safely.

(5) A rock buttress is required at the downslope edge of the borrow pit to safely retain the infilled peat and spoil. The height of the rock buttresses constructed should be greater than the height of the infilled peat & spoil to prevent any surface peat & spoil run-off. A buttress up to 7m (approx.) in height is likely to be required.

(6) The rock buttress will be founded on competent strata. The founding stratum for the rock buttress should be inspected and approved by a competent person.

(7) In order to prevent water retention occurring behind the buttresses, the buttresses should be constructed of coarse boulder fill with a high permeability.

(8) Where possible, the surface of the placed peat & spoil should be shaped to allow efficient run-off of surface water from the placed arising's.

(9) Control of groundwater within the borrow pit may be required and measures will be determined as part of the ground investigation programme.

(10) All the above-mentioned general guidelines and requirements should be confirmed by the designer prior to construction.

(11) Further guidelines on the construction of the borrow pit is included within Section 7.4 of the Peat & Spoil Management Plan

N

Figure 4-8

DRAWING TITLE: **Borrow Pit 2 Layout & Section**	
PROJECT TITLE: Lyrenacarriga Wind Farm, Co. Cork & Co. Waterford	
DRAWING BY: **POR**	CHECKED BY: **IH**
PROJECT No.: **170749**	DRAWING No.: **170749 - 32**
SCALE: **As Shown @ A3**	DATE: **04.01.2021**
OS SHEET No.: 6108, 6109, 6110, 6111, 6112, 6154, 6155, 6156, 6157, 6158, 6201,6202,6203, 6204,6205, 6249, 6250, 6251, 6252, 6253	

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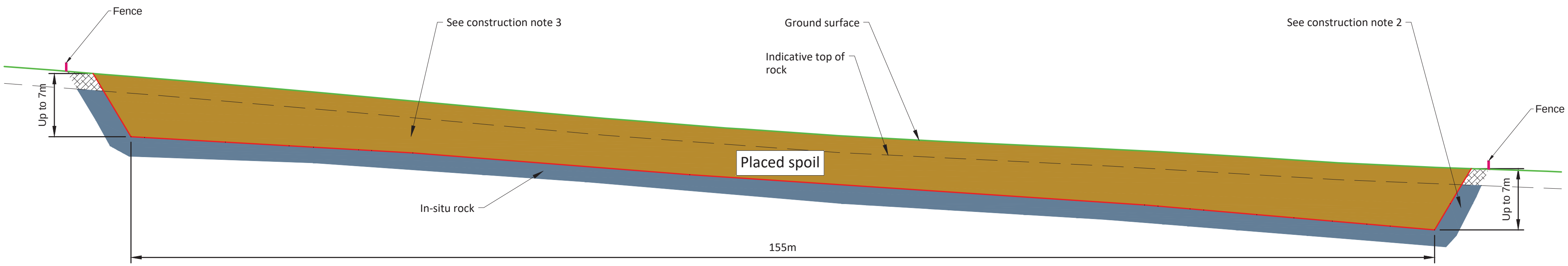
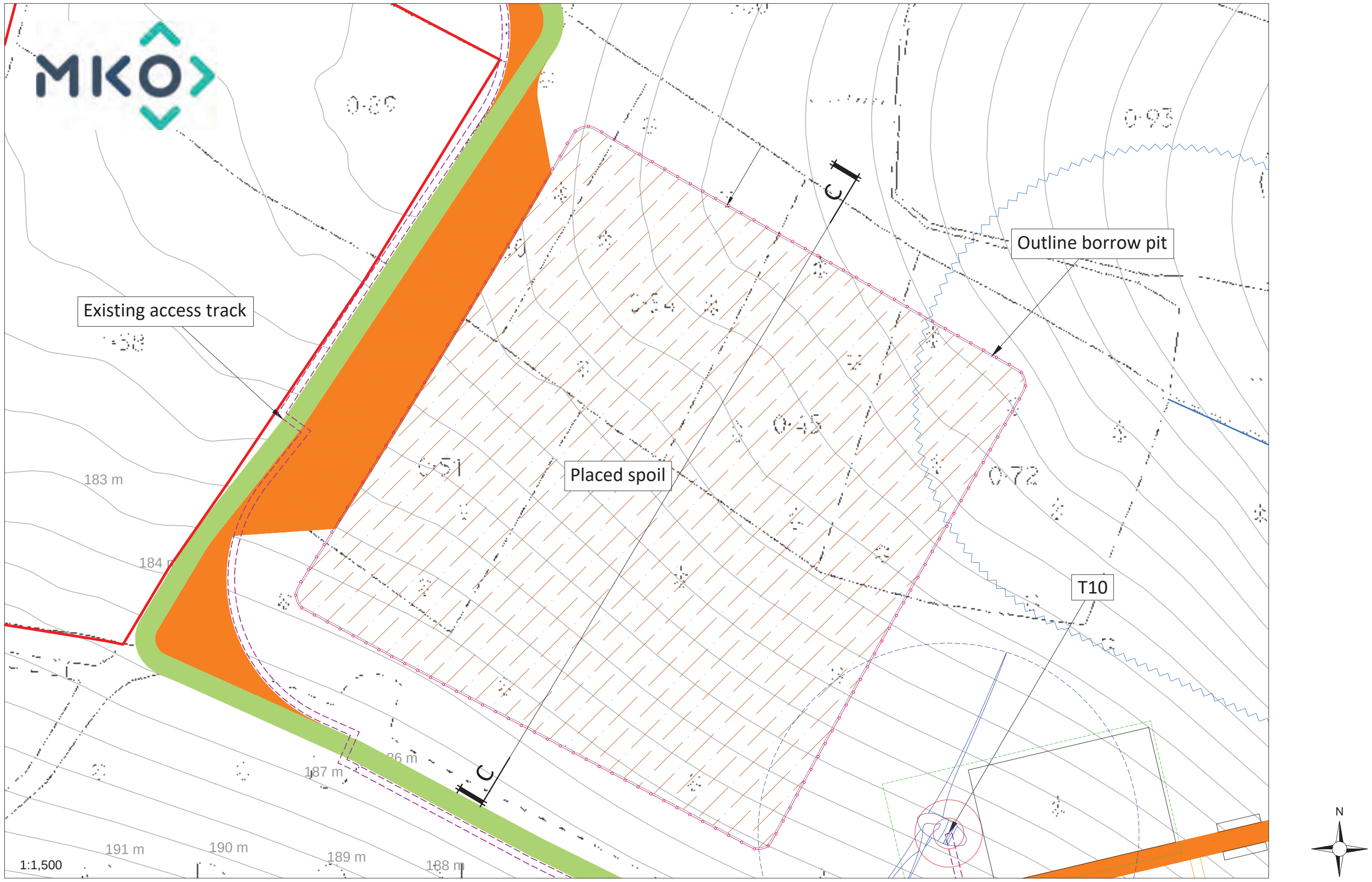


Section Scales:

1:1 Horizontal
1:1 Vertical

(No exaggeration on vertical scale i.e. true scale)

Section C-C



Construction Notes Borrow pit

(1) It is proposed to construct the borrow pit so that the base of the borrow pit is below the level of the adjacent section of access road. Depending on the type and condition of rock present in the borrow pit it may be possible to excavate the rock from the borrow pit whilst leaving in place upstands/segments of intact rock which will help to retain the placed peat & spoil. The upstands/segments of intact rock will essentially act as engineered rock buttresses within the borrow pit.

(2) Slopes within the excavated rock formed around the perimeter of the borrow pit should be formed at stable inclinations to suit local in-situ rock conditions.

(3) Infilling of the peat & spoil should commence at the back edge of the borrow pit and progress towards the borrow pit entrance/rock buttress. Excavation and infilling of the borrow pit will need to be sequenced and programmed. Leaving in place upstands/segments of intact rock which will help to retain the placed peat & spoil and will allow the borrow pit to be developed and infilled in cells.

(4) The contractor excavating the rock will be required to develop the borrow pit in a way which will allow the excavated peat & spoil to be reinstated safely.

(5) A rock buttress is required at the downslope edge of the borrow pit to safely retain the infilled peat and spoil. The height of the rock buttresses constructed should be greater than the height of the infilled peat & spoil to prevent any surface peat & spoil run-off. A buttress up to 7m (approx.) in height is likely to be required.

(6) The rock buttress will be founded on competent strata. The founding stratum for the rock buttress should be inspected and approved by a competent person.

(7) In order to prevent water retention occurring behind the buttresses, the buttresses should be constructed of coarse boulder fill with a high permeability.

(8) Where possible, the surface of the placed peat & spoil should be shaped to allow efficient run-off of surface water from the placed arising's.

(9) Control of groundwater within the borrow pit may be required and measures will be determined as part of the ground investigation programme.

(10) All the above-mentioned general guidelines and requirements should be confirmed by the designer prior to construction.

(11) Further guidelines on the construction of the borrow pit is included within Section 7.4 of the Peat & Spoil Management Plan

Figure 4-9

DRAWING TITLE:
Borrow Pit 3 Layout & Section

PROJECT TITLE:
Lyrenacarriga Wind Farm,
Co. Cork & Co. Waterford

DRAWING BY: POR	CHECKED BY: IH
PROJECT No.: 170749	DRAWING No.: 170749 - 33
SCALE: As Shown @ A3	DATE: 04.01.2021

OS SHEET No.: 6108, 6109, 6110, 6111, 6112, 6154, 6155, 6156, 6157, 6158, 6201,6202,6203, 6204,6205, 6249, 6250, 6251, 6252, 6253

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4.3.3.3.2 Rock Blasting

Where blasting is used as an extraction method, a mobile drilling rig is used to drill vertical boreholes into the area of rock that is to be blasted. The drilling rigs used are normally purpose built, self-propelled machines, designed specifically for drilling blast boreholes. A drilling rig working for 3-4 days would typically drill the necessary number of boreholes required for a single blast. The locations, depth and number of boreholes are determined by the blast engineer, a specialist role fulfilled by the blasting contractor that would be employed to undertake the duties.

The blast engineer would then arrange for the necessary quantity of explosive to be brought to site to undertake a single blast. The safe management of explosives onsite and the actual blasting operation would be agreed in advance with and supervised by An Garda Siochána. The blast engineer sets the explosives in place in the boreholes, sets the charges, and fires the blast. The blast takes only a matter of milliseconds but may be perceived to take slightly longer as blast noise echoes around the area.

A properly designed blast should generate rock of a size that can be loaded directly into a mobile crusher, using the same wheeled loader description outlined above. From that point on, the same method is used for processing the rock generated from a blast, as would be used to process rock generated by rock breaking. It would be likely that a drilling rig would recommence drilling blast holes for the next blast as soon one blast finished. The potential impacts associated with blasting are assessed in Chapter 13 Noise and Vibration.

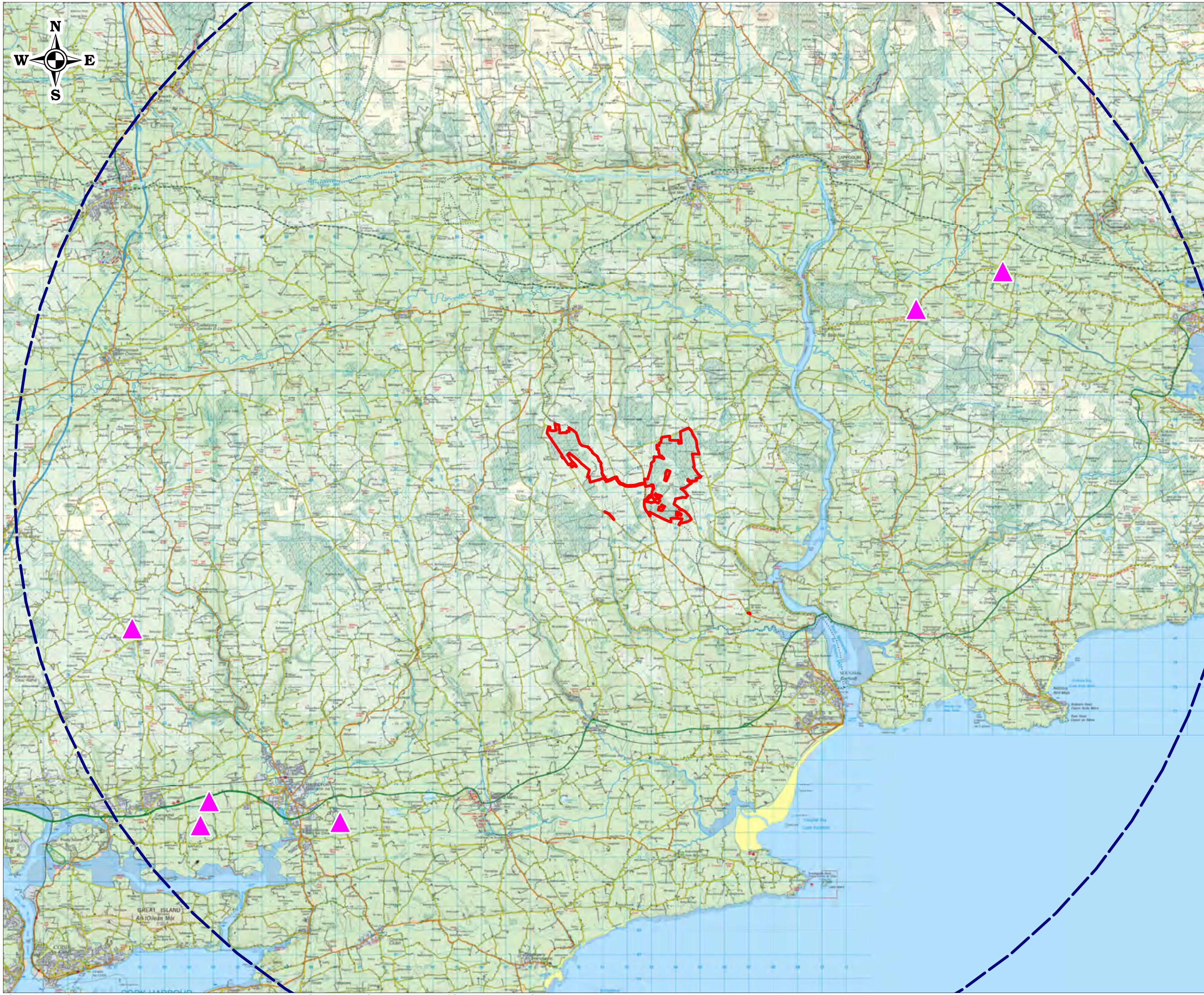
As with all works during the construction phase of the proposed development, the above rock extraction methods will be carried out in accordance with all relevant Health and Safety legislation, including:

- Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005);
- Safety, Health and Welfare at Work (General Application) Regulations 2007 (S.I. No. 299 of 2007), as amended;
- Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. 291 of 2013), as amended; and
- Safety, Health and Welfare at Work (Work at Height) Regulations 2006 (S.I. No. 318 of 2006).

A Health and Safety Plan covering all aspects of the construction process will address the Health and Safety requirements in detail. This will be prepared at the procurement stage and developed further at construction stage. All hazards will be identified, and risks assessed. Where elimination of the risk is not feasible, appropriate mitigation and/or control measures will be established. Further details on Health and Safety during all stages of the project are provided in Chapter 5 of this EIAR on Population and Human Health.

4.3.3.4 Offsite Material

It is proposed to obtain the majority of all rock and hardcore material that will be required during the construction of the proposed development from the on-site borrow pits, as described above. Additional rock and hardcore material may be sourced from offsite and it is anticipated that a certain volume of finer, crushed stone, used to provide the final surface layer for site roads and hardstanding areas will also be brought to the site from local, appropriately authorised quarries. Six quarries located within 25 km of the proposed development have been selected for the purposes of assessment throughout this EIAR. The locations of these quarries are shown in Figure 4-10.



Map Legend

Site Location

Existing Quarry Location

Distance from Site Centre: 25 km

MAP TITLE:
Quarry Locations

PROJECT TITLE:
Lyrenacarriga Wind Farm

MAP NO.: **Figure 4-10**

DRAWING BY: **L Meehan**

CHECKED BY: **M Watson**

SCALE: **1:210,000**

DATE: **11-24-2020**

OS SHEET NO.: **2006, 2008**

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4.3.4 Spoil Management Plan

4.3.4.1 Quantities

The quantity of spoil, requiring management on the site of the Proposed Development has been calculated, as presented in Table 4-3 below. These quantities were calculated as part of the Geotechnical Assessment Report in Appendix 4-2 of this EIAR.

Table 4-3 Spoil Volumes requiring management

Development Component	Typical Dimensions	Spoil Volume (m^3) (approx.)
17 no. Turbines and Hardstanding Areas	22m diameter excavation footprint for turbine foundation with hardstand area	42,890
Access Roads	Assumed 5m running surface with 6m wide development footprint	35,235
Substation	21,930 m^2	26,320
Temporary Construction Compound (2 no.)	Hardstanding area of 1,925m^2	4,420
Borrow Pits (3 no.)	Various	90,115
Total Spoil to be managed		**198,980**

Note a factor of 20% (bulking factor of 15% and contingency factor of 5%) has been applied and is included to the excavated spoil volumes above to allow for expected increase in volume upon excavation and to allow for a variation in ground conditions across the site.

4.3.4.2 Spoil Usage in Restoration of Borrow Pits

Once the required volume of rock has been extracted from the borrow pit areas, it is intended to reinstate these areas with overburden excavated from the works areas of the Proposed Development.

The general construction methodology for the construction of the borrow pits, as presented in the Geotechnical Assessment Report in Appendix 4-2 of this EIAR, is summarised below.

As rock is being extracted from the borrow pit, upstands of rock will be left in place, depending on the type of rock, to act as intermediate retaining buttresses. Where this is not achievable, stone buttresses will be constructed within the borrow pit. The upstands or buttresses will form individual restoration areas within the borrow pit which will be filled once the required volume of rock has been extracted from each individual area. The buttresses will be wide enough to allow construction traffic access for the tipping of spoil into the individual cells.

1. As rock is being extracted from the borrow pit, upstands of rock will be left in place, depending on the type of rock, to act as intermediate retaining buttresses. Where it is not possible to leave upstands/segments of intact rock in place it may be necessary to construct rock buttresses founded on in-situ rock within the borrow pits. The rock buttresses will be constructed of rock fill from the borrow pit

excavation. The founding stratum for each rock buttress will be inspected and approved by a competent person.

2. It may be necessary to construct the rock buttress within the borrow pit in stages as infilling of spoil behind the buttresses progresses. The buttress will be constructed of selected rock fill and placed and compacted in suitable layers to form a buttress of sufficient stability to retain the placed spoil, as necessary.
3. Infilling of the spoil will commence at the back edge of the borrow pit and progress towards the borrow pit entrance. The contractor excavating the rock will be required to develop the borrow pits in a way which will allow the excavated spoil to be placed safely.
4. The height of the rock buttresses constructed will be greater than the height of the placed spoil to prevent any surface spoil run-off.
5. The use of temporary access ramps and long reach excavators during the placement of the excavated spoil is likely to be required.
6. Where possible, the surface of the placed spoil will be shaped to allow efficient run-off of surface water from borrow pit areas.
7. An interceptor drain will also be installed upslope of the borrow pit. This drain will divert any surface water away from the borrow pit and hence prevent water from ponding and lodging on the re-instated borrow pit area.
8. Control of groundwater within the borrow pits may be required during construction, including a temporary pump and suitable outfall locations. Outfall controls are shown on the Drainage Design drawings which are included in the planning application drawings and presented in Appendix 4-6 of this EIAR.
9. Stilling ponds may be required at the lower side/outfall location of the borrow pit. Further details on stilling ponds are provided in Section 4.4.4.7 below.
10. Supervision by a geotechnical engineer or appropriately competent person will be carried out during works.

4.3.4.2.1 Placement of Spoil alongside Access Roads

In some areas of the site of the Proposed Development excavated materials will be placed temporarily alongside the access roads before movement to the borrow pit. The following best practice guidelines for the placement of spoil alongside the access road will be adhered to during the construction of the Proposed Development:

1. The potential spoil placement locations are alongside the existing excavated and proposed new access tracks with cross slopes of less than 10 degrees.
2. As a general guide, the spoil placed adjacent to the existing and proposed excavated access tracks will be restricted to a maximum height of 1.0m over a 3m wide corridor on both sides of the access tracks. It should be noted that the site engineer will define/confirm the maximum restricted height for the placed spoil.
3. The placement of excavated spoil will be avoided without first establishing the adequacy of the ground to support the load
4. Where there is any doubt as to the stability of the ground then no material will be placed on to the surface.
5. Where practical, it will be ensured that the surface of the placed spoil is shaped to allow efficient run-off of surface water. Where possible, shaping of the surface of the spoil will be carried out as placement of spoil within the area progresses. This will reduce the likelihood of debris run-off and ensure stability of the placed spoil.
6. Finished/shaped side slopes in the placed spoil will be not greater than 1 (v): 2 or 3 (h).
7. Supervision by a geotechnical engineer or appropriately competent person will be carried out during this work.
8. An interceptor drain will be installed upslope of the designated spoil placement areas to divert any surface water away from these areas. This will help ensure stability of the placed spoil and reduce the likelihood of debris run-off.

9. All the above-mentioned general guidelines and requirements will be confirmed by the site engineer prior to construction.

The management of excavated overburden and the methods of placement and/or reinstatement are described in detail in the Geotechnical Assessment Report in Appendix 4-2 of this EIAR.

4.3.5 Electricity Substation

It is proposed to construct a 110 kV electricity substation within the site, as shown in Figure 4-1. The proposed substation site is located within an area of forestry adjacent to an existing access road.

The footprint of the proposed onsite electricity substation compound measures approximately 2.9 hectares, and will include two wind farm control buildings and the electrical substation components necessary to consolidate the electrical energy generated by each wind turbine, and export that electricity from the wind farm substation to the national grid. The layouts and elevations of the proposed substation are shown on Figure 4-1111 and 4-12. The construction and exact layout of electrical equipment in the onsite electricity substation will be to EirGrid / ESB Networks specifications.

Further details regarding the connection between the site substation and the national electricity grid are provided in Section 4.3.7 below.

The substation compound will be surrounded by an approximately 2.4-metre high steel palisade fence in line with standard ESB requirements, and internal fences will also segregate different areas within the main substation.

4.3.5.1 Wind Farm Control Buildings

The wind farm control buildings will be located within the substation compound. Control building 1 (the substation control building) will measure approximately 375 square metres in area and 8 metres in height. Control building 2 (switchgear room) will measure approximately 215 square metres in area and 7 metres in height. Layout and elevation drawings of the control buildings are included in Figures 4-13 and 4-14.

The wind farm control buildings will include staff welfare facilities for the staff that will work on the Proposed Development during the operational phase of the project. Toilet facilities will be installed with a low-flush cistern and low-flow wash basin. Due to the specific nature of the Proposed Development there will be a very small water requirement for occasional toilet flushing and hand washing and therefore the water requirement of the Proposed Development does not necessitate a potable source. It is proposed to harvest rainwater from the roofs of the buildings, and if necessary, bottled water will be supplied for drinking.

It is proposed to manage wastewater from the staff welfare facilities in the control buildings by means of a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. It is not proposed to treat wastewater on-site, and therefore the EPA's 2009 '*Code of Practice: Wastewater Treatment and Disposal Systems Serving Single Houses (p.e. 10)'* does not apply. Similarly, the EPA's 1999 manual on *'Treatment Systems for Small Communities, Business, Leisure Centres and Hotels'* also does not apply, as it too deals with scenarios where it is proposed to treat wastewater on-site.

Such a proposal for managing the wastewater arising on site has essentially become standard practice on wind farm sites, which are often proposed in areas where finding the necessary percolation requirements for on-site treatment would be challenging, and has been accepted by numerous Planning Authorities and An Bord Pleanála as an acceptable proposal.

The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. The wastewater storage tank alarm will be part of a continuous stream of data from the site's turbines, wind measurement devices and electricity substation that will be monitored remotely 24 hours a day, 7 days per week. 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. There are licenced wastewater treatment facilities at Youghal and Midleton, located approximately 7.8 km southeast and 18.7 km southwest respectively from the proposed wind farm site.

4.3.5.2 Battery Storage

A Battery storage compound is proposed to be located adjacent to the substation. This compound is proposed to include 10 No. battery modules contained within steel units with dimensions of approximately 12.2 m x 2.4 m x 2.8 m high. The enclosures will be similar in appearance to standard shipping containers and shall be placed on concrete foundations or plinths.

The system proposed includes lithium-ion batteries, connected to inverters that convert direct current (DC) to alternating current (AC), which are in turn connected to step up/down MV/LV (medium voltage/low voltage) unit transformers feeding a common busbar located in the Independent Power Producer's (IPP) control building within the substation. Depending on the size and type of the transformers they may be bunded with drainage via an oil interceptor unit.

The battery storage compound includes a switchgear (control) room which measures approximately 135 square metres and 7 metres in height.

The battery storage compound is shown on the substation layout and elevation drawings in Figure 4-11 and 4-12 above. The layout and elevation of the battery switchgear room are shown in Figure 4-15.

Figure 4-11

NOTES :
1. This drawing is to be used only for the purpose of the planning application and is subject to detailed design.
2. Layout and Arrangements of Substation Building and Electrical Equipment is shown indicatively and for illustration purposes only.
3. Dimensions shown are as per current Eirgrid Specifications at the time of submission. Dimensions may vary at time of construction to reflect any revisions to Eirgrid Specififications.
4. Final Specifications of Buildings and Electrical Equipment is to be as per Eirgrid and ESB Specifications.

ISO A1 594mm x 841mm

Project Management Initials: Designer: GD Checked: DT Approved: RG

tli GROUP

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PROJECT

Innogy Lyre Wind Farm OHL Front End Engineering

CLIENT

INNOGY

CONSULTANTS

NOTES: -

LEGEND: -

	Description
SA	Surge Arrester.
DL/DE	Line / Earth Disconnect.
DT/DEM1	Trafo / Earth Disconnect.
VT	Voltage Transformer.
CT	Current Transformer.
CB	Circuit Breaker.
DA	Busbar Disconnect.
PI	Post Insulator.
LM	Lighting Mast.

Proposed UGC Cable
CCTV Camera
Existing Road to be Upgraded
Proposed Road
Electrical Cable Trench

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P01	15.12.20	Issued for Planning
P00	26.05.20	Issued for Planning

Drawn By : Ger Donnellan

Approved : Ruairi Geary

PROJECT NUMBER

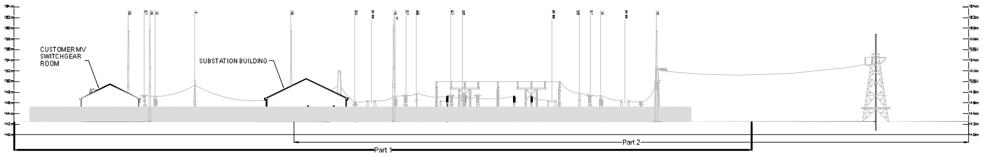
05-664

SHEET TITLE

Loop in Station Battery Storage & Layout Plan

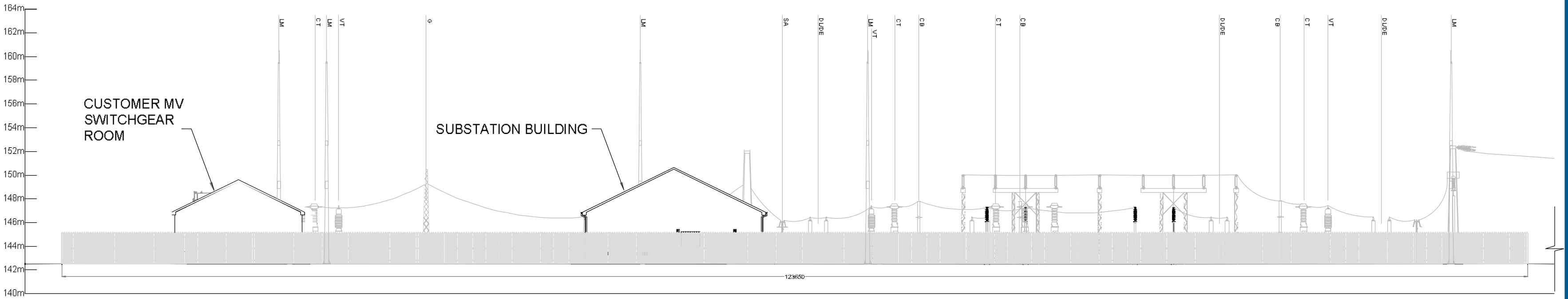
SHEET NUMBER

170749-22 _ (05664-DR-202)



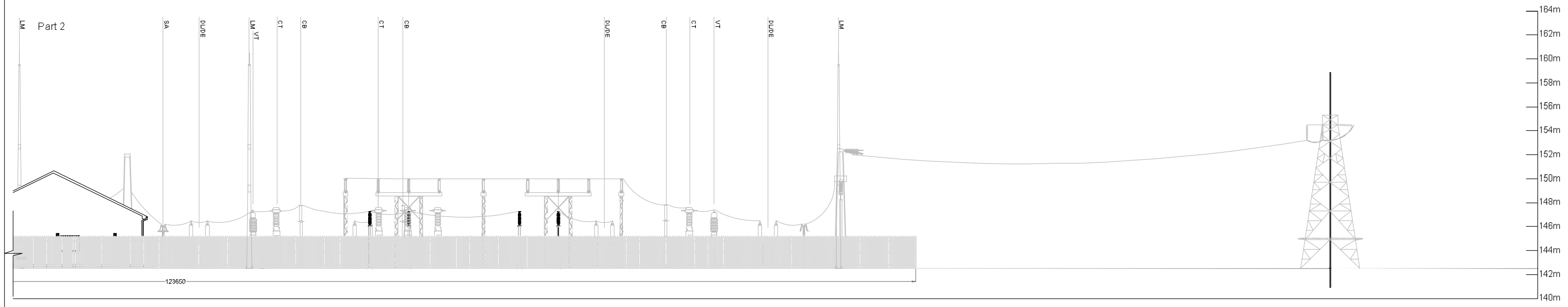
North East Elevation
SCALE 1:500

ELEVATION - Part 1



North East Elevation
SCALE 1:200

ELEVATION - Part 2



North East Elevation
SCALE 1:200

Figure 4-12a

tli GROUP

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PROJECT

Innogy Lyre Wind Farm OHL Front End Engineering

CLIENT

INNOGY

CONSULTANTS

NOTES: -

1. Layout and Arrangements of Substation Building and Electrical Equipment is shown indicatively and for illustration purposes only.
2. Dimensions shown are as per current Eirgrid Specifications at the time of submission. Dimensions may vary at time of construction to reflect any revisions to Eirgrid Specifications.
3. Final Specifications of Buildings and Electrical Equipment is to be as per Eirgrid and ESB Specifications.
4. The Elevation of the Compound will be depicted by localized Topography such that Cut/Fill Earthworks associated with the construction of the Compound are balanced.

LEGEND: -

	Description
G	Gantry.
SA	Surge Arrester.
DL/DE	Line / Earth Disconnect.
DT/DEMI	Trafo / Earth Disconnect.
VT	Voltage Transformer.
CT	Current Transformer.
CB	Circuit Breaker.
DA	Busbar Disconnect.
PI	Post Insulator.
LM	Lighting Mast.

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P00	15.12.20	Issued for Planning

Drawn By : Ger Donnellan

Approved : Ruairi Geary

PROJECT NUMBER

05-664

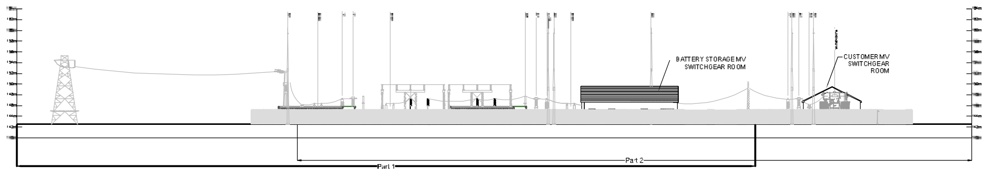
SHEET TITLE

Loop in Substation - Northeast Elevations

SHEET NUMBER

170749 - 24 _ (05664-DR-219)

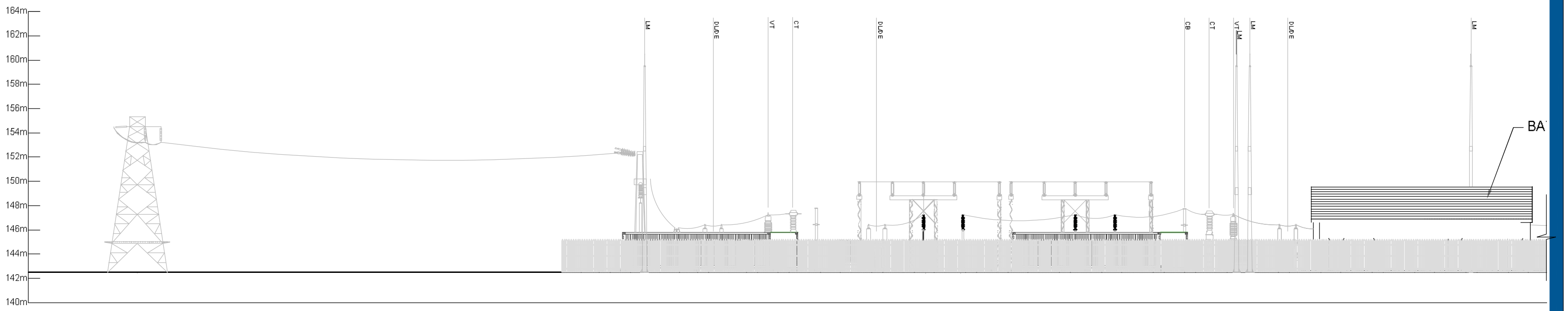
Project Management Initials: Designer: GD Checked: DT Approved: RG



North East Elevation

SCALE 1:500

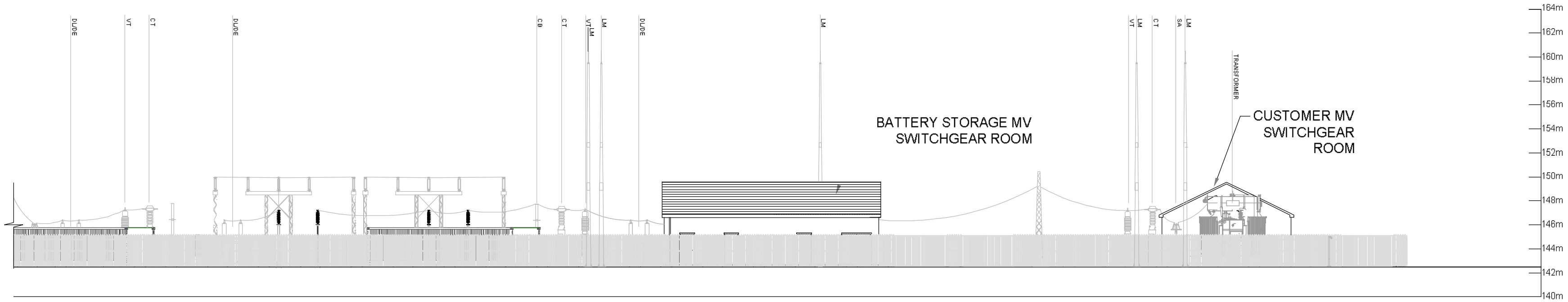
ELEVATION - Part 1



Southwest Elevation

SCALE 1:200

ELEVATION - Part 2



Southwest Elevation

SCALE 1:200

Figure 4-12b

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PROJECT

Innogy Lyre Wind Farm OHL Front End Engineering

CLIENT

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CONSULTANTS

NOTES: -

1. Layout and Arrangements of Substation Building and Electrical Equipment is shown indicatively and for illustration purposes only.
2. Dimensions shown are as per current Eirgrid Specifications at the time of submission. Dimensions may vary at time of construction to reflect any revisions to Eirgrid Specifications.
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LEGEND: -

	Description
G	Gantry.
SA	Surge Arrester.
DL/DE	Line / Earth Disconnect.
DT/DEMI	Trafo / Earth Disconnect.
VT	Voltage Transformer.
CT	Current Transformer.
CB	Circuit Breaker.
DA	Busbar Disconnect.
PI	Post Insulator.
LM	Lighting Mast.

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P00	15.12.20	Issued for Planning

Drawn By : Ger Donnellan

Approved : Ruairi Geary

PROJECT NUMBER

05-664

SHEET TITLE

Loop in Substation - Southwest Elevations

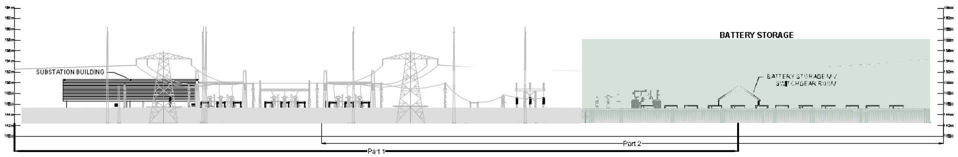
SHEET NUMBER

170749 - 25 _ (05664-DR-220)

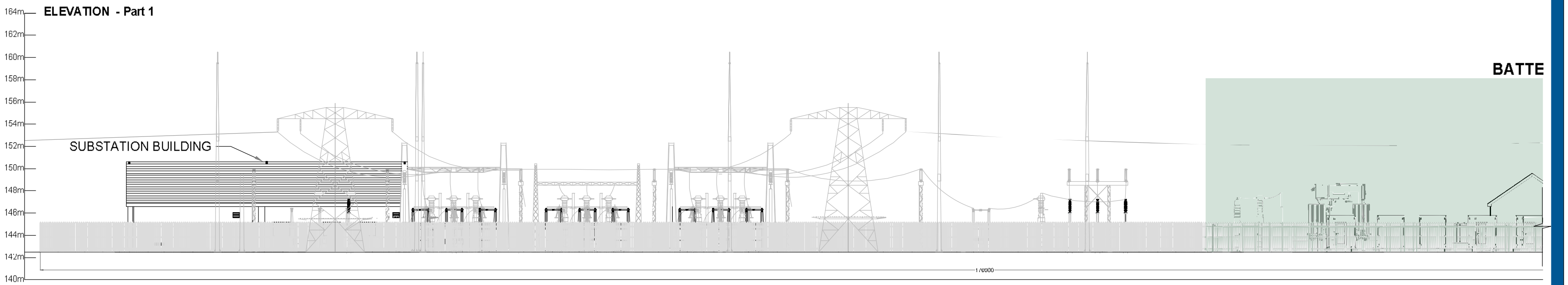
ISO A1 594mm x 841mm

Project Management Initials: Designer: GD Checked: DT Approved: RG

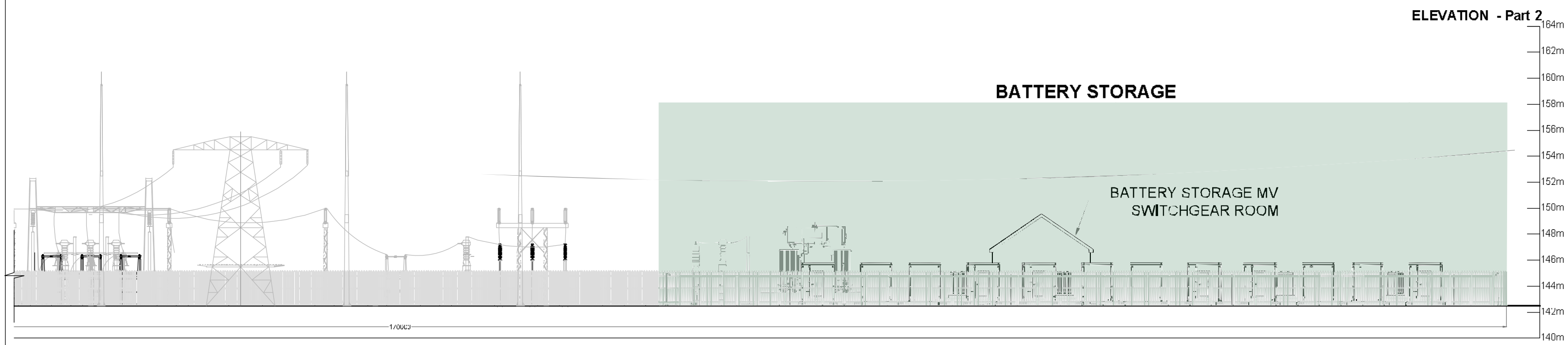
ISO A1 594mm x 841mm



Northwest Elevation
SCALE 1:500



Northwest Elevation
SCALE 1:200



Northwest Elevation
SCALE 1:200

Figure 4-12c

Approved: RG
Checked: DT
Designer: GD
Project Management Initials:

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PROJECT
Innogy Lyre Wind Farm
OHL Front End
Engineering

CLIENT
INNOGY

CONSULTANTS

NOTES: -

1. Layout and Arrangements of Substation Building and Electrical Equipment is shown indicatively and for illustration purposes only.
2. Dimensions shown are as per current Eirgrid Specifications at the time of submission. Dimensions may vary at time of construction to reflect any revisions to Eirgrid Specifications.
3. Final Specifications of Buildings and Electrical Equipment is to be as per Eirgrid and ESB Specifications.
4. The Elevation of the Compound will be depicted by localized Topography such that Cut/Fill Earthworks associated with the construction of the Compound are balanced.

LEGEND: -

	Description
G	Gantry.
SA	Surge Arrester.
DL/DE	Line / Earth Disconnect.
DT/DEMI	Trafo / Earth Disconnect.
VT	Voltage Transformer.
CT	Current Transformer.
CB	Circuit Breaker.
DA	Busbar Disconnect.
PI	Post Insulator.
LM	Lighting Mast.

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P00	15.12.20	Issued for Planning

Drawn By : Ger Donnellan

Approved : Ruairi Geary

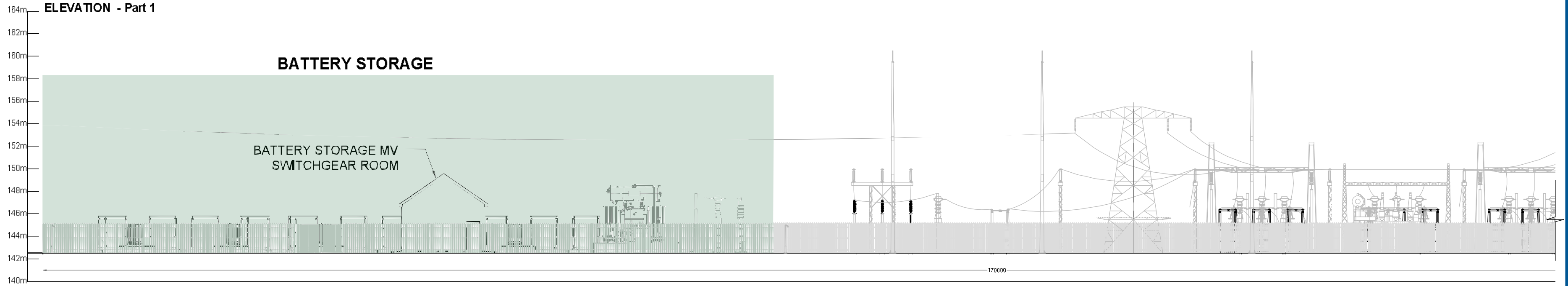
PROJECT NUMBER
05-664

SHEET TITLE
Loop in Substation - Northwest Elevations

SHEET NUMBER
170749 - 26 _ (05664-DR-221)

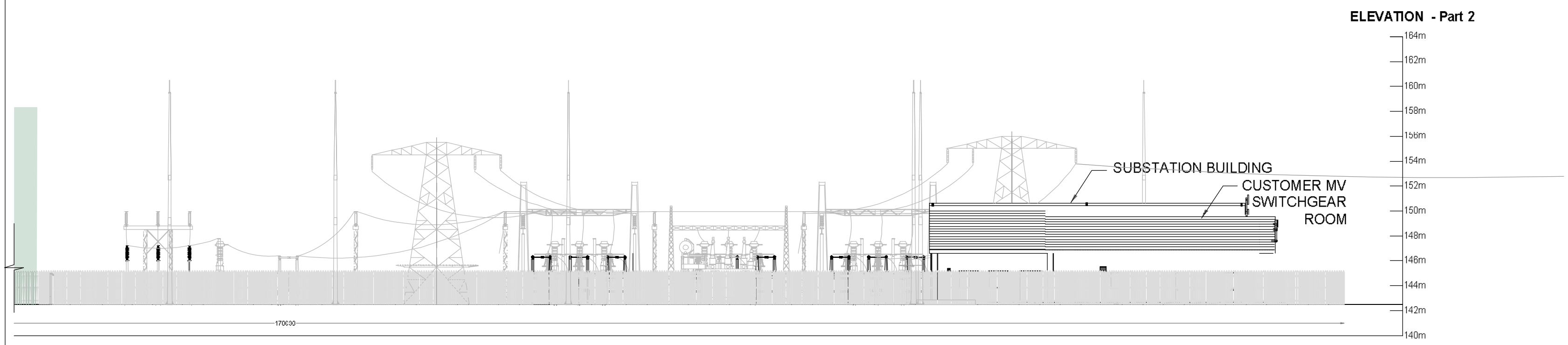
Southeast Elevation

SCALE 1:500



Southeast Elevation

SCALE 1:200



Southeast Elevation

SCALE 1:200

Figure 4-12d

Project Management Initials: Designer: GD Checked: DT Approved: RG

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PROJECT

Innogy Lyre Wind Farm OHL Front End Engineering

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LEGEND: -

	Description
G	Gantry.
SA	Surge Arrester.
DL/DE	Line / Earth Disconnect.
DT/DEMI	Trafo / Earth Disconnect.
VT	Voltage Transformer.
CT	Current Transformer.
CB	Circuit Breaker.
DA	Busbar Disconnect.
PI	Post Insulator.
LM	Lighting Mast.

ISSUE/REVISION

I/R	DATE	DESCRIPTION
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Drawn By : Ger Donnellan

Approved : Ruairi Geary

PROJECT NUMBER

05-664

SHEET TITLE

Loop in Substation - Southeast Elevations

SHEET NUMBER

170749 - 27 _ (05664-DR-222)

Drawing Notes

1. Layout and arrangements of substation buildings and electrical equipment is shown indicatively and for illustration purposes only as final specifications of buildings and electrical equipment is to be dictated by Eirgrid/ESB networks requirements.

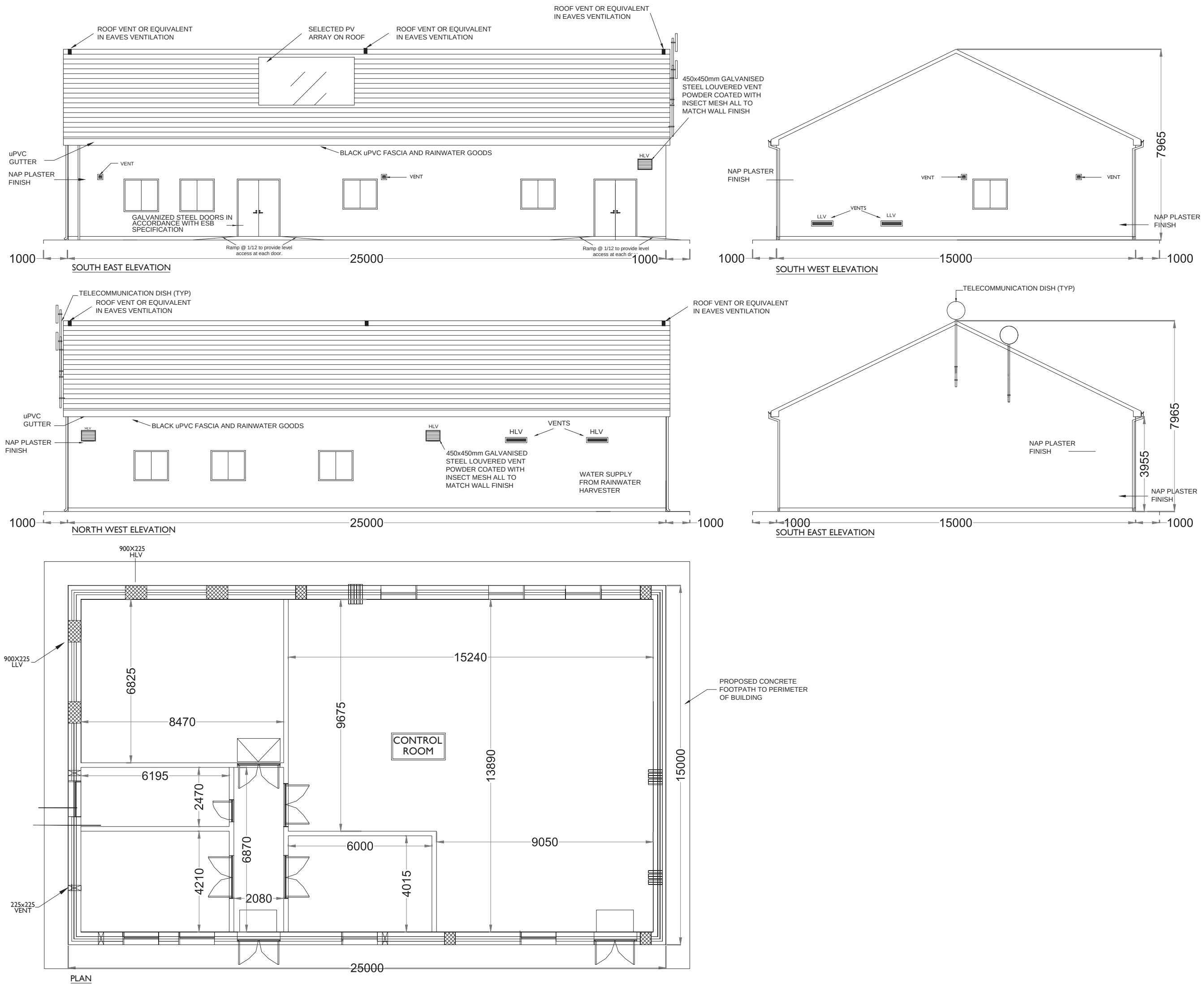

Figure 4-13

DRAWING TITLE: **Substation Control Building**	
PROJECT TITLE: **Lyrenacarriga Wind Farm, Co. Cork & Co. Waterford**	
DRAWING BY: CH	CHECKED BY: DG
PROJECT No.: 170749	DRAWING No.: 170749 - 27
SCALE: 1:200 @ A3	DATE: 05.01.2021

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Drawing Notes

1. Layout and arrangements of substation buildings and electrical equipment is shown indicatively and for illustration purposes only as final specifications of buildings and electrical equipment is to be dictated by Eirgrid/ESB networks requirements.

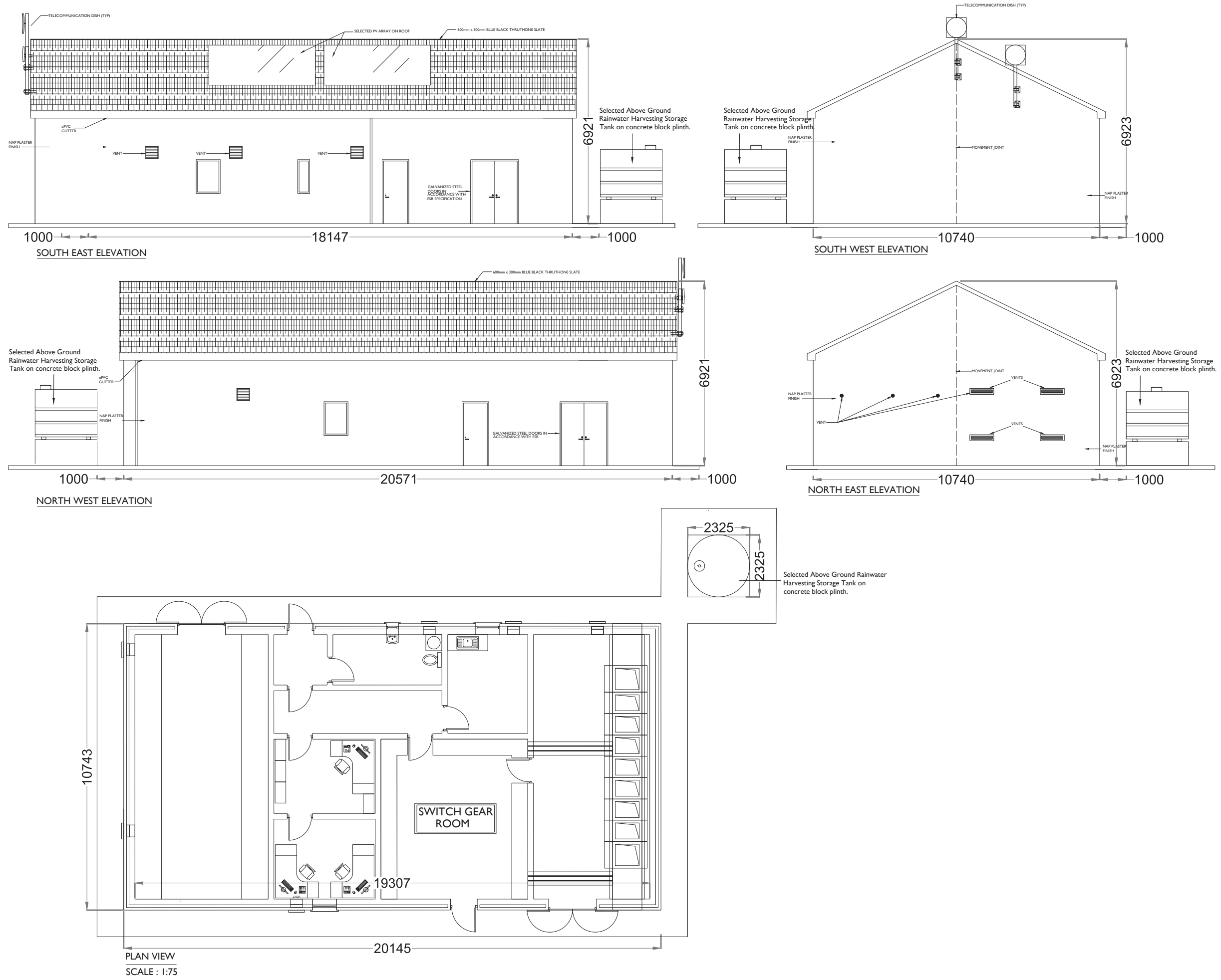

Figure 4-14

DRAWING TITLE: **Substation Switchgear Building**	
PROJECT TITLE: **Lyrenacarriga Wind Farm, Co. Cork & Co. Waterford**	
DRAWING BY: CH	CHECKED BY: DG
PROJECT No.: 170749	DRAWING No.: 170749 - 28
SCALE: 1:200 @ A3	DATE: 05.01.2021

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Drawing Notes

1. Layout and arrangements of substation buildings and electrical equipment is shown indicatively and for illustration purposes only as final specifications of buildings and electrical equipment is to be dictated by Eirgrid/ESB networks requirements.

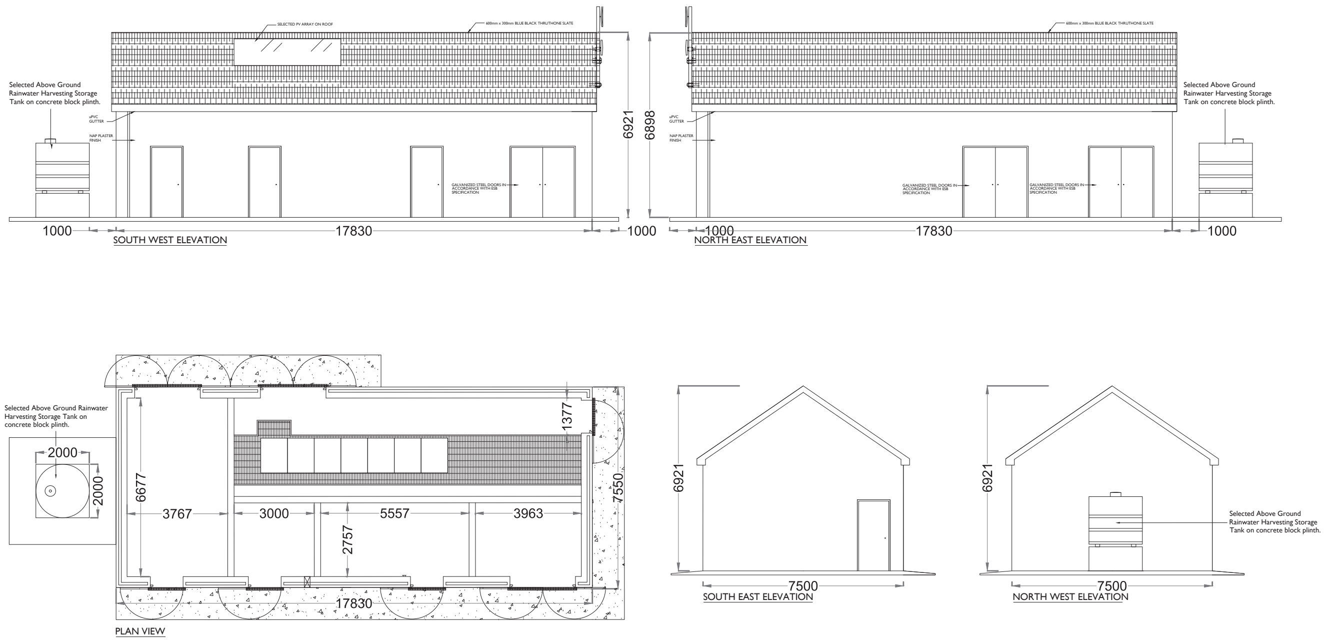

Figure 4-15

DRAWING TITLE: **Battery Switchgear Building**	
PROJECT TITLE: **Lyrenacarriga Wind Farm, Co. Cork & Co. Waterford**	
DRAWING BY: **CH**	CHECKED BY: **DG**
PROJECT No.: **170749**	DRAWING No.: **170749 - 29**
SCALE: **1:200 @ A3**	DATE: **05.01.2021**

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4.3.6 Site Cabling

Each turbine will be connected to the on-site electricity substation via an underground 20 or 33 kV (kilovolt) electricity cable. Fibre-optic cables will also connect each wind turbine to the wind farm control building in the onsite substation compound. The electricity and fibre-optic cables running from the turbines to the onsite substation compound will be run in cable ducts approximately 1.3 metres below the ground surface, along the sides of roadways. The route of the cable ducts will follow the access track to each turbine location and are visible on the site layout drawings included as Appendix 4-1. Figure 4-16 below shows two variations of a typical cable trench, one for off-road trenches (to be installed on areas of soft ground that will not be trafficked) and one for on-road trenches (to be used where trenches run along or under a roadway).

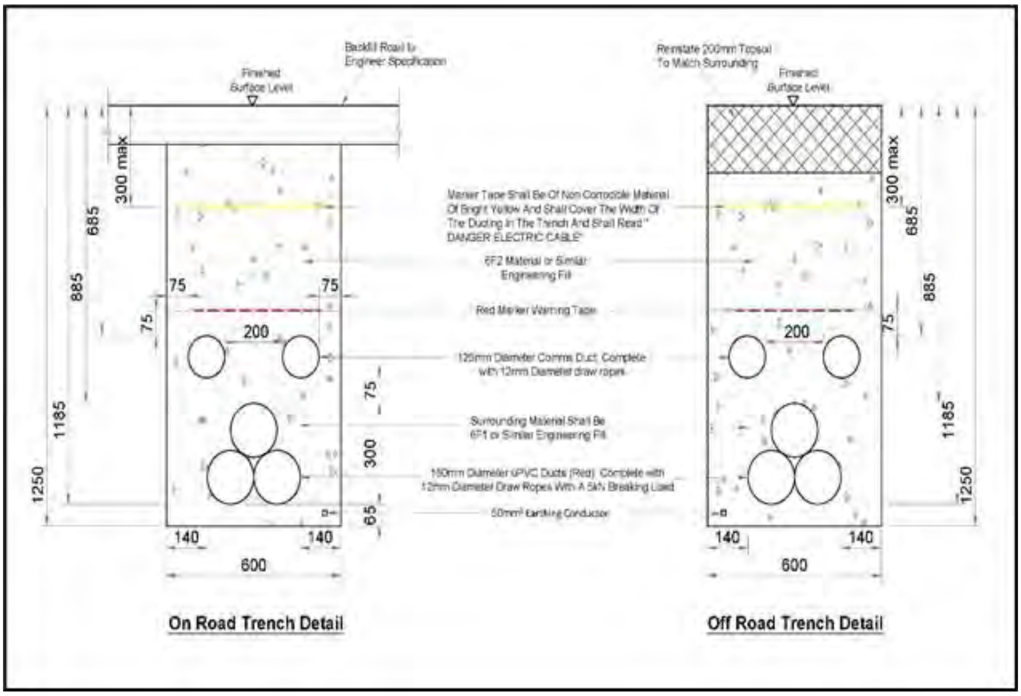
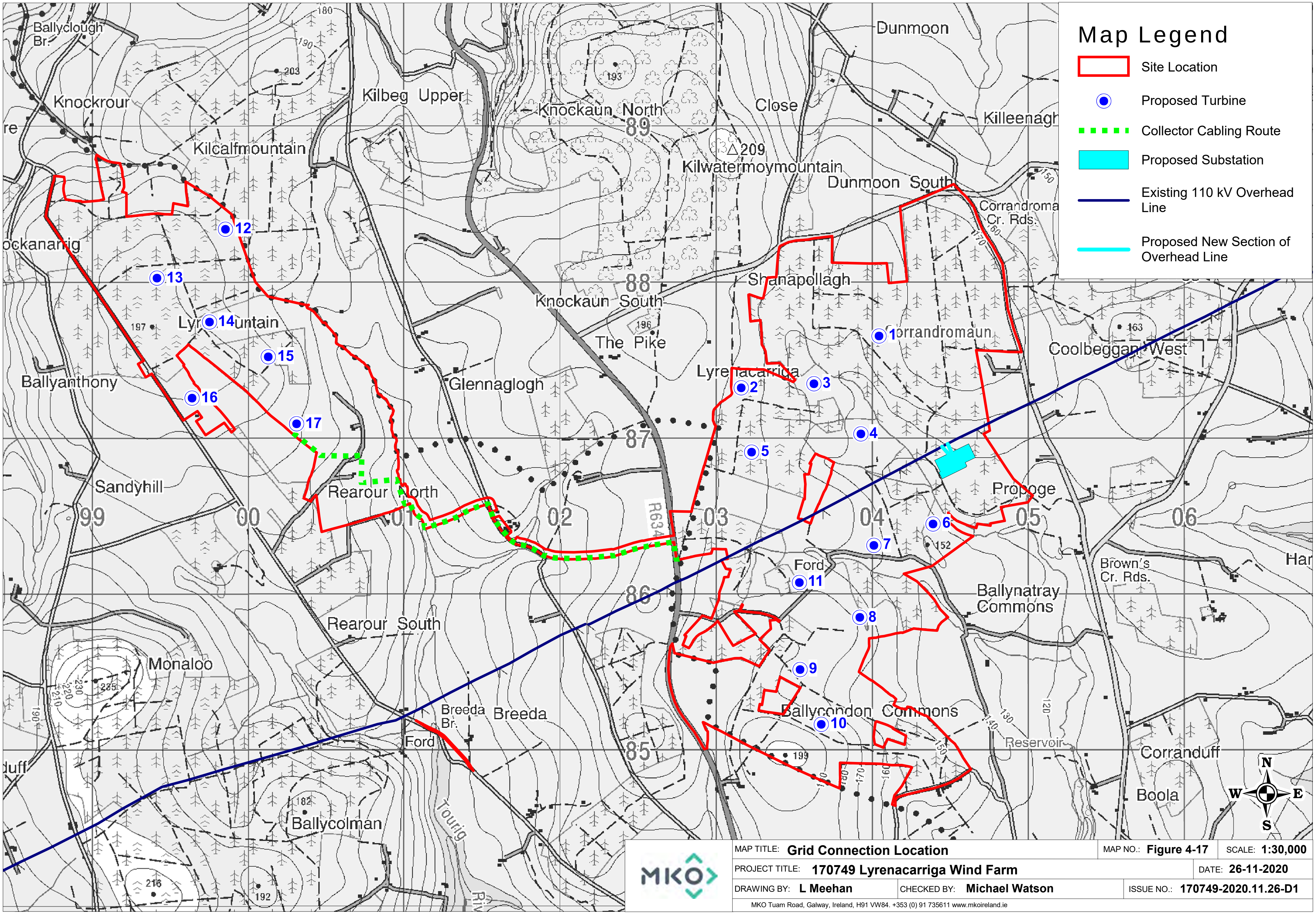


Figure 4-16 Typical Cable trench cross-section detail

Clay plugs will be installed at regular intervals of not greater than 50 metres along the length of the trenches to prevent the trenches becoming conduits for runoff water. While the majority of the cable trenches will be backfilled with native material, clay subsoils of low permeability will be used to prevent conduit flow in the backfilled trenches. This material will be imported onto the site should sufficient volumes not be encountered during the excavation phase of roadway and turbine foundation construction.

It is proposed to connect the two sections of the site via underground cabling located within existing agricultural land and within the public road corridor. This collector cabling route measures approximately 3.3 km and is shown on Figure 4-17. The cable, ducting and trenching specifications provided within this application (see Section 4.8.5 below) are in accordance with ESB and EirGrid standard specifications. The exact final specification for the cable, ducting and trench to be lain within the proposed route as shown on Figure 4-17 will be agreed with ESB/EirGrid, subject to the securement of planning permission.



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4.3.7 Grid Connection

A connection between the proposed development site and the national electricity grid will be necessary to export electricity from the proposed wind farm. It is proposed to construct a 110 kV substation within the site and to connect from here via a 110 kV loop-in connection to the existing 110kV network which runs through the site. This will entail the construction of two sections of approximately 40 metres of overhead line to connect the substation to the existing overhead line, via two angle masts (13 metres in height). The methodology for this is presented in Section 4.9.5 below. The grid connection route is illustrated in Figure 4-17.

4.3.8 Meteorological Mast

One permanent meteorological (met) mast is proposed as part of the Proposed Development. The met mast will be equipped with wind monitoring equipment at various heights. The mast will be located approximately 410 metres southeast of Turbine 17, as shown on the site layout drawing in Figure 4-1.

The mast will be a self-supporting slender structure up to 112 metres in height. The mast will be constructed on a hard-standing area sufficiently large to accommodate the crane that will be used to erect the mast, adjacent to an existing track. The met mast structure is shown in Figure 4-18.

A proposed welfare and storage one-storey building measuring approximately 54 square metres and 4.3 metres in height will be located adjacent to the met mast, as shown on Figure 4-18 also. This building will comprise space for parts storage, and welfare facilities for use by maintenance staff. A 2.4-metre palisade fence will encompass the met mast and storage building.

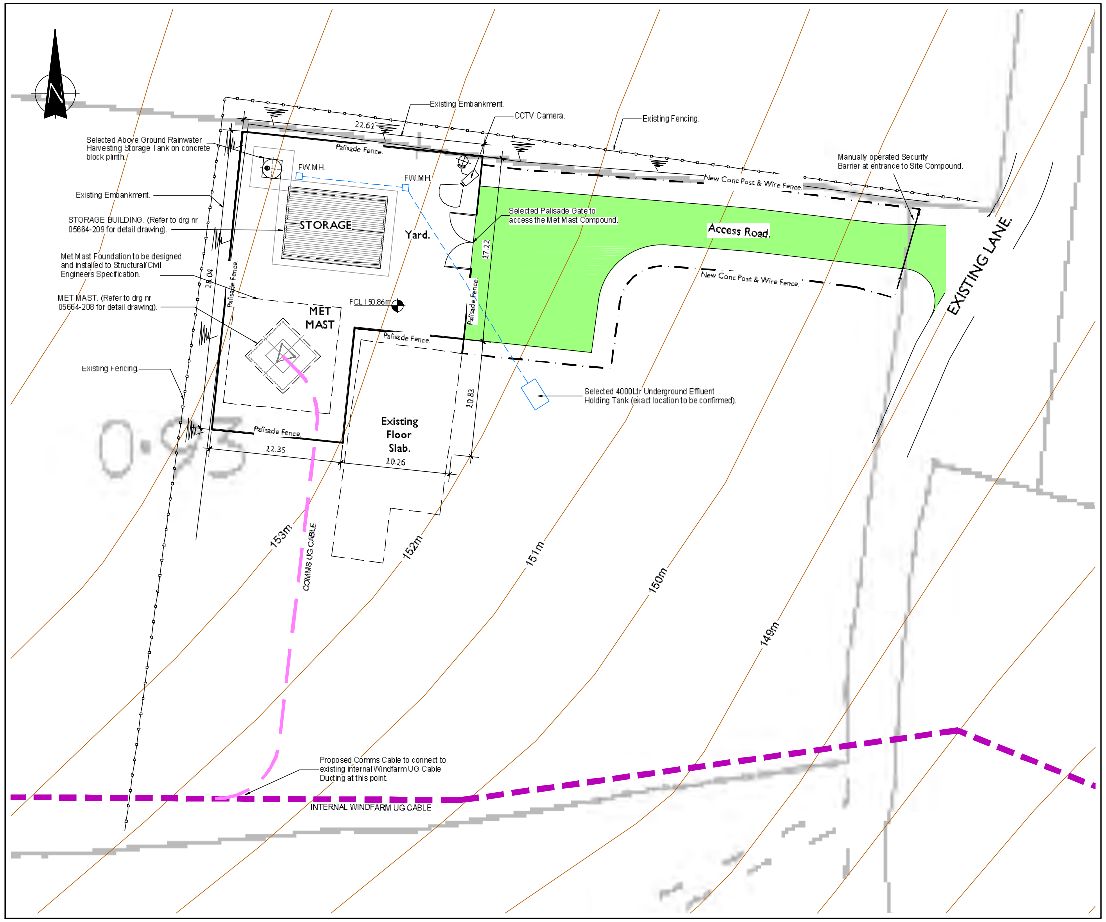
4.3.9 Temporary Construction Compounds

Two temporary construction compounds are proposed as part of the proposed development. They are located approximately 150 metres northeast of Turbine 13 (compound 1 or CPD1) and 600 metres southeast of Turbine 1 (compound 2 or CPD2) respectively.

Each compound measures 80 metres by 50 metres, with a footprint of 4,000 m^2 in area. The location of the proposed construction compounds is shown on the site layout drawing in Figure 4-1.

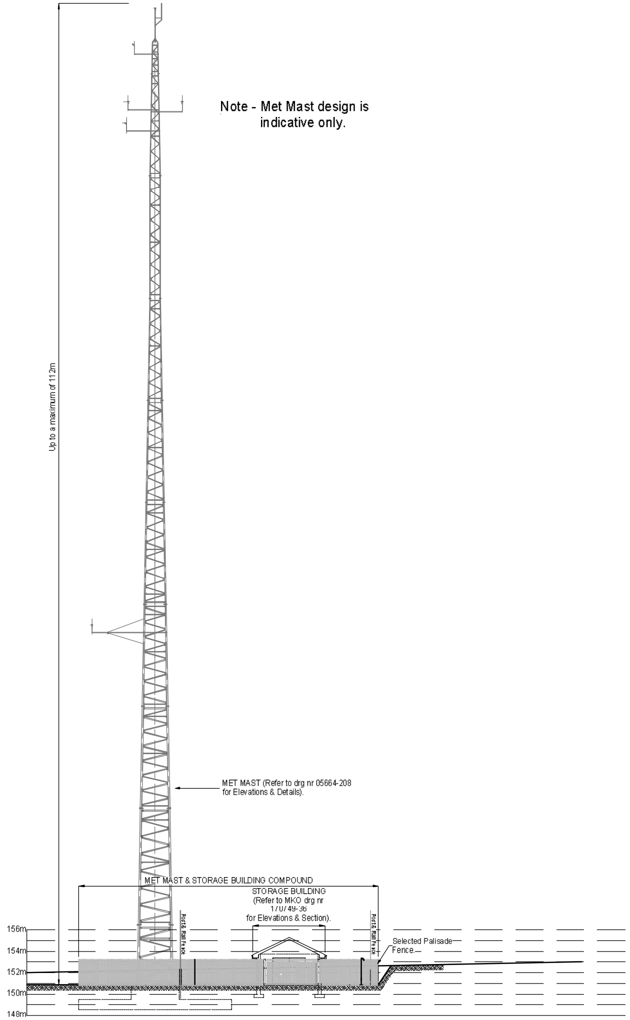
The construction compounds will consist of temporary site offices, staff facilities and car-parking areas for staff and visitors. The layout of the construction compounds is shown on Figures 4-19 and 4-20. Construction materials and turbine components will be brought directly to the proposed turbine locations following their delivery to the site.

Temporary port-a-loo toilets located within a staff portacabin will be used during the construction phase. Wastewater from staff toilets will be directed to a sealed storage tank, with all wastewater being tankered off site by an appropriately consented waste collector to wastewater treatment plants. There are licenced wastewater treatment facilities at Youghal and Midleton, as referred to in Section 4.3.5 above.



SITE LAYOUT PLAN

Scale: - 1:250



EAST ELEVATION

Scale: - 1:250

Figure 4-18

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PROJECT

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OHL Front End
Engineering

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NOTES: -

LEGEND: -

Proposed UGC Cable	
CCTV Camera	
Existing Road to be Upgraded	

ISSUE/REVISION

I/R	DATE	DESCRIPTION
01	15.12.20	Issued for Planning
00	26.05.20	Issued for Planning

Drawn By : Ger Donnellan

Approved : Ruairi Geary

PROJECT NUMBER

05-664

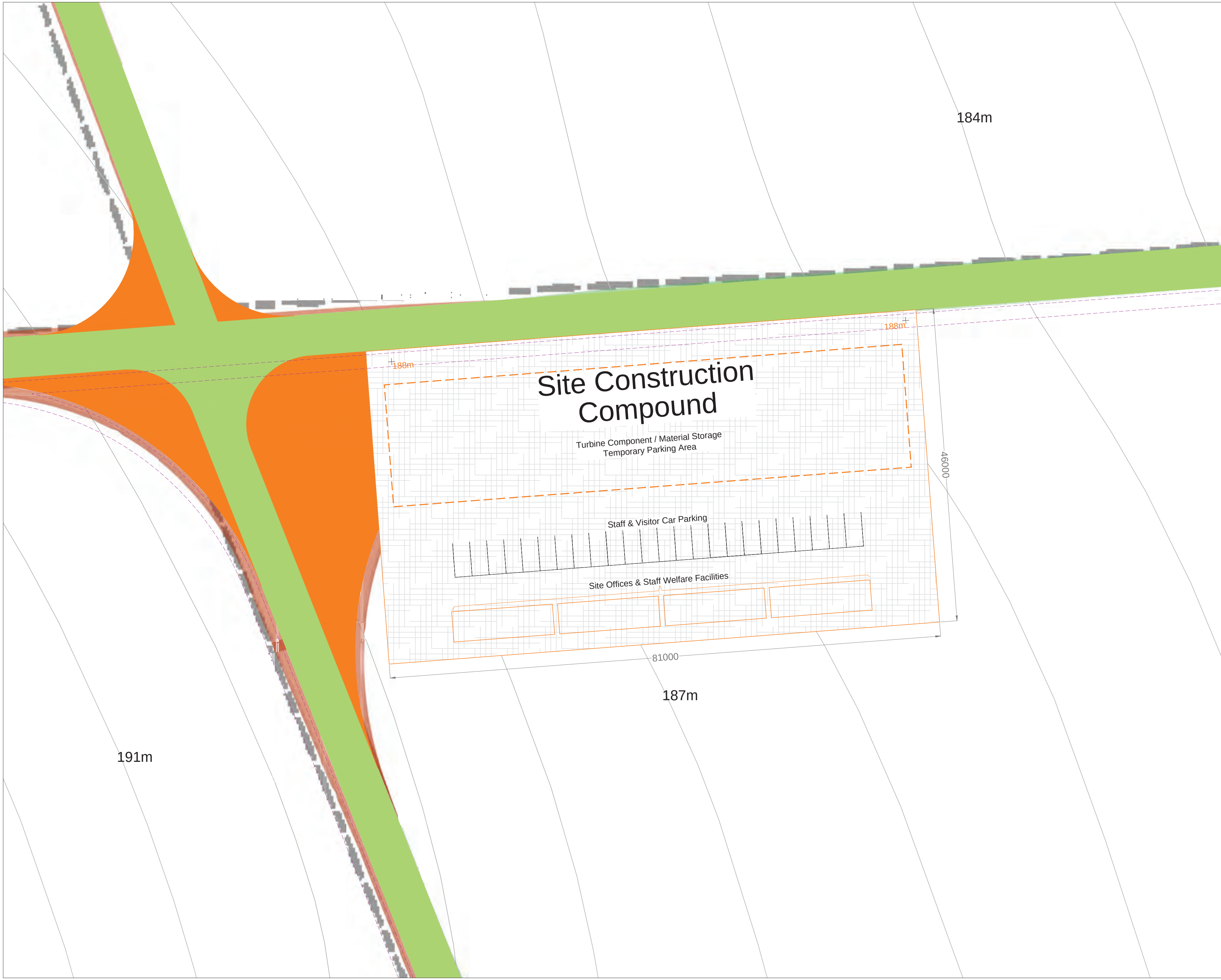
SHEET TITLE

Proposed Met Mast -
Site Layout Plan & Site Elevation

SHEET NUMBER

170749-34 _ (05664-DR-207)

Project Management Initials: Designer: GD Checked: RG Approved: RG



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7. Layout plans show typical Turbine rotor diameter as per turbine drawing.
8. Final levels may vary depending on local ground conditions.

Drawing Legend

- Planning Application Boundary
- Existing Road to be Upgraded
- Proposed Road
- Electrical Cable Trench
- Cut
- Fill

N

Figure 4-19

DRAWING TITLE:
Temporary Construction Compound 1

PROJECT TITLE:
Lyrenacarriga Wind Farm, Co. Cork & Co. Waterford

DRAWING BY: **Joseph O Brien**	CHECKED BY: **Lorraine Meehan**
PROJECT No.: **170749**	DRAWING No.: **170749 - 20**
SCALE: **1:500 @ A3**	DATE: **05.01.2021**

OS SHEET No.: 6108, 6109, 6110, 6111, 6112, 6154, 6155, 6156, 6157, 6158, 6201,6202,6203, 6204,6205, 6249, 6250, 6251, 6252, 6253

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Drawing Legend

- Planning Application Boundary
- Existing Road to be Upgraded
- Proposed Road
- Electrical Cable Trench
- Cut
- Fill

N

Figure 4-20

DRAWING TITLE:
Temporary Construction Compound 2

PROJECT TITLE:
Lyrenacarriga Wind Farm, Co. Cork & Co. Waterford

DRAWING BY: Joseph O Brien	CHECKED BY: Lorraine Meehan
PROJECT No.: 170749	DRAWING No.: 170749 - 21
SCALE: 1:500 @ A3	DATE: 05.01.2021

OS SHEET No.: 6108, 6109, 6110, 6111, 6112, 6154, 6155, 6156, 6157, 6158, 6201,6202,6203, 6204,6205, 6249, 6250, 6251, 6252, 6253

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