Environmental Impact Assessment Report (EIAR)

Proposed Slievegrine Renewable Energy Development, Co. Waterford

Chapter 4 – Description of the Proposed Project

4. DESCRIPTION OF THE PROPOSED PROJECT

4.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) describes the Proposed Project and all its component parts. The planning application for the Proposed Project will be made to An Coimisiún Pleanála. Construction methodologies for the main infrastructural components of the Proposed Project are also included in this chapter (or its associated appendices) of the EIAR.

The development description for the current planning application as appears in the public notices is as follows:

The proposed development will consist of the provision of the following:

i. *23 no. wind turbines of varying dimensions, a meteorological mast and a telecommunications relay mast as follows:*
    a. *6 no. wind turbines with an overall turbine tip height of 185 metres, a rotor blade diameter of 162 metres, and turbine hub height of 104 metres;*
    b. *15 no. wind turbines with an overall turbine tip height of 175 metres, a rotor blade diameter of 150 metres, and turbine hub height of 100 metres;*
    c. *2 no. wind turbines with an overall turbine tip height of 170 metres, a rotor blade diameter of 150 metres, and turbine hub height of 95 metres;*
    d. *A meteorological mast with a height of 80 metres and a telecommunications relay mast with a height of 30m;*
ii. *Associated wind turbines, meteorological mast and telecommunications relay mast foundations and hardstanding areas;*
iii. *A 220kV loop-in substation compound (Including control buildings (with a combined floor area of 644Sq.m) with welfare facilities, all associated electrical plant and apparatus, security fencing, underground cabling, lightning protection poles and underground wastewater holding tank), with 220kV underground cabling connecting to 2 no. lattice-type end masts with a height of 21.5 metres to facilitate a 'Loop-in' connection to the existing 220kV Knockraha-Cullenagh overhead electricity transmission line, establishment of screening planting, all within the townland of Ballycullane;*
iv. *A 110kV substation compound (Including control buildings (with a combined floor area of 644Sq.m) with welfare facilities, all associated electrical plant and apparatus, security fencing, underground cabling, lightning protection poles and underground wastewater holding tank) in the townland of Clashbrack;*
v. *110kV underground cabling connection from the proposed 110kV substation in the townland of Clashbrack to the proposed 220kV loop-in substation in the townland of Ballycullane, primarily located within the public road corridor (including joint bays, communication chambers, earth sheath links, and ancillary works along the cabling route);*
vi. *The re-routing underground of a section of the existing Dungarvan-Foxhole 38kV overhead line with 2 no. lattice-type end masts (15m height) and 38kV underground cabling (including joint bay) in the townlands of Cloghraun and Carronbeg;*
vii. *Underground electrical (33kV) and communications cabling connecting the wind turbines and meteorological mast to the proposed 110kV substation;*
viii. *6 no. construction compounds (including temporary site offices and welfare facilities (with a combined floor area of 607.5 Sq.m));*
ix. *4 no. security compounds (including temporary security cabins with a combined floor area of 72 Sq.m);*
x. *Junction accommodation works to facilitate access to the site, including the provision of new and upgrade of existing entrances and junctions off the L2024, L2021, L2023, L99997 and L6082 local roads, including new permanent gated site entrances;*

xi. *Upgrade of existing site tracks/roads and provision of new site access roads, junctions and hardstand areas (including upgrade of a short section of the L99997 local road);*
xii. *5 no. borrow pits;*
xiii. *Spoil Management;*
xiv. *Biodiversity Management and Enhancement Plan measures (including establishment of a riparian planting, broadleaf woodland planting and hedgerow planting/enhancement);*
xv. *Tree felling and vegetation removal;*
xvi. *Site Drainage;*
xvii. *Operational stage site signage; and*
xviii. *All ancillary site development works and apparatus.*

This application seeks a ten-year planning permission and a 35-year operational period from the date of commissioning of the Proposed Project.

Section 1.1.1 of Chapter 1 of this EIAR provides a definition of the various project references used throughout the document. The 'Proposed Project', which encompasses the 'Proposed Wind Farm' and 'Proposed Grid Connection' has been assessed within this EIAR. The Proposed Project is located within the EIAR Site Boundary or the 'Site' which measures approximately 1,450 hectares (ha). Proposed Project layout is illustrated on Figure 4-1. The permanent built infrastructure footprint of the Proposed Project measures approximately 33.17ha, which represents approximately 2.29% of the Site. The permanent built infrastructure is depicted in Figure 4-2.

4.2 Proposed Project Layout

The overall layout of the Proposed Project is shown on Figure 4-1, this includes the Proposed Wind Farm and the Proposed Grid Connection. The Proposed Project footprint is depicted on Figure 4-3.

The Proposed Project has been designed to minimise potential environmental effects, while at the same time maximising the energy yield from the Proposed Wind Farm. A constraints study, as described in Section 3.2.5 of this EIAR, has been carried out to ensure that turbines and ancillary infrastructure are located in the most appropriate areas of the Site and makes use of the existing access tracks within the Site where appropriate. Similarly, as described in Section 3.2.6 of this EIAR, a route selection constraints study was undertaken to ensure that the most appropriate route for the Proposed 110kV Underground Cabling Route was selected. The Proposed Wind Farm layout is shown in Figure 4-4. The Proposed Grid Connection layout is shown in Figure 4-5.

Detailed planning drawings of the Proposed Project are included in Appendix 4-1 to this EIAR.

615000

620000

590000

585000

N

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T15 T16 T17 T18 T19 T20 T21 T22 T23

0 0.9 1.8 km

EIAR Site Boundary

Proposed Project

- Proposed Turbine Locations
- Proposed Telecommunications Relay Mast
- Proposed Hardstands
- Proposed Met Mast
- Proposed New Roads
- Upgrades to Existing Roads
- Proposed Borrow pits
- Construction Compounds
- Proposed 38kV Cable Track
- Proposed 38kV OHL Interface End Masts
- Proposed 38kV Underground Cable
- Proposed 110kV Substation
- Proposed 110kV Underground Cabling Route
- Proposed 220kV End Masts
- Proposed 220kV Loop-in Substation
- Proposed 220kV Underground Grid Connection Route
- Proposed Hedgerow Planting (5.5km)
- Proposed Native Woodland Planting (3.6ha)
- Proposed Screening Planting

Overhead Line

- Existing Knockraha-Cullenagh 220kV Overhead Line

Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator

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EIAR Site Boundary - NOT TO SCALE

Drawing Title
Proposed Project

Project Title
Slievegrine Renewable Energy Development

Project No.	Drawing No.	Scale
240740	4-1	1:30,000
Drawn By	Checked By	Date
SOR	NS	06/10/2026

MKO
Email: info@mkoireland.ie/ Website: www.mkoireland.ie

614000 616000 618000 620000 622000

592000 590000 588000 586000

N

0 0.9 1.8 km

Map Legend

EIAR Site Boundary

Permanant Built Infrastructure footprint

Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator

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EIAR Site Boundary - NOT TO SCALE

Drawing Title
Permanent Built Infrastructure Footprint

Project Title
Slievegrine Renewable Energy Development

Project No.	Drawing No.	Scale
240740	4-2	1:30,000
Drawn By	Checked By	Date
SOR	NS	06/10/2026

MKO
Email: info@mkoireland.ie/ Website: www.mkoireland.ie

614000 616000 618000 620000 622000

592000 590000 588000 586000

N

0 0.9 1.8 km

Esri, Vantor, Earthstar Geographics, and the GIS User Community

Map Legend

EIAR Site Boundary

Proposed Project Footprint

Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator

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EIAR Site Boundary - NOT TO SCALE

Drawing Title
Proposed Project Footprint

Project Title
Slievegrine Renewable Energy Development

Project No.	Drawing No.	Scale
240740	4-3	1:30,000
Drawn By	Checked By	Date
SOR	NS	06/10/2026

MKO
Email: info@mkoireland.ie/ Website: www.mkoireland.ie

616000 618000 620000 622000

590000

588000

586000

N

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T15 T16 T17 T18 T19 T20 T21 T22 T23

0 0.65 1.3 km

Map Legend

- EIAR Site Boundary

Proposed Project

- Proposed Turbine Locations
- Proposed Hardstands
- Proposed Met Mast
- Proposed New Roads
- Proposed Borrow pits
- Construction Compounds
- Proposed Telecommunications Relay Mast
- Upgrades to Existing Roads
- Proposed 38kV Cable Track
- Proposed 38kV OHL Interface End Masts
- Proposed 38kV Underground Cable
- Proposed 110kV Substation
- Proposed Hedgerow Planting (5.5km)
- Proposed Native Woodland Planting (3.6ha)
- Proposed Grid Connection Infrastructure

Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator

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N

EIAR Site Boundary - NOT TO SCALE

Drawing Title
Proposed Wind Farm

Project Title
Slievegrine Renewable Energy Development

Project No.	Drawing No.	Scale
240740	4-4	1:22,000
Drawn By	Checked By	Date
SOR	NS	01/10/2026

MKO
Email: info@mkoireland.ie/ Website: www.mkoireland.ie

614000
616000
618000
620000
592000
590000
588000
N
0
0.65
1.3 km

Map Legend

EIAR Site Boundary

Proposed Project

- Proposed 220kV End Masts
- Proposed 220kV Loop-in Substation
- Proposed 220kV Underground Grid Connection Route
- Proposed 110kV Underground Cabling Route
- Upgrades to Existing Roads
- Proposed New Roads
- Construction Compounds
- Proposed Hedgerow Planting (5.5km)
- Proposed Screening Planting
- Proposed Wind Farm Infrastructure

Overhead Line

- Existing Knockraha-Cullenagh 220kV Overhead Line

Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator

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EIAR Site Boundary - NOT TO SCALE

Drawing Title
Proposed Grid Connection

Project Title
Slievegrine Renewable Energy Development

Project No.	Drawing No.	Scale
240740	4-5	1:22,000
Drawn By	Checked By	Date
SOR	NS	25/09/2026

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4.3 Proposed Project

This section of the EIAR describes the Proposed Project. Section 4.3.1 provides a description of the Proposed Wind Farm and Section 4.3.2 provides a description of the Proposed Grid Connection. Descriptions relating to the Proposed Project (i.e. both the Proposed Wind Farm and Proposed Grid Connection) are provided in Section 4.4.3.

Further details regarding Site Activities (Section 4.4), Access and Transportation (Section 4.5), Site Drainage (Section 4.6), Construction Management (Section 4.7) and Construction Methodologies (Section 4.8) are provided subsequently in this chapter.

4.3.1 Proposed Wind Farm

4.3.1.1 Wind Turbines

4.3.1.1.1 *Turbine Locations*

The proposed wind turbine layout has been optimised using wind farm design software (WindPro) to maximise the energy yield from the Proposed Wind Farm, while maintaining sufficient distances between the Proposed Turbines to ensure turbulence and wake effects do not compromise turbine performance. The ITM Grid Reference coordinates of the Proposed Turbine locations are listed in Table 4-1 below. The final finished top of foundation level of the turbine foundations will be determined by the actual ground conditions at each Proposed Turbine location and may differ slightly from those levels listed in Table 4-1.

Table 4-1 Proposed Wind Turbine Locations and top of foundation level

Turbine	ITM X	ITM Y	Top of Foundation Levels (metre OD)
1	619870	589557	234
2	620325	589626	245.5
3	620459	589176	228
4	620938	589327	236
5	621227	589009	226.5
6	621717	589023	201
7	619339	587736	190
8	619803	587602	168.8
9	620382	587597	154
10	620784	587144	137
11	621314	587391	141.5
12	621876	587432	150

13	617902	587077	261
14	618391	587029	236.5
15	618908	587147	200
16	619106	586747	188
17	619562	586713	173
18	617635	586534	246
19	618079	586508	220
20	618468	586358	196
21	617920	586003	189.5
22	615346	586108	202
23	615933	586293	194

4.3.1.1.3 Turbine Locations and Site Investigation

As part of the design process for the Proposed Project, intrusive site investigations were undertaken across the Proposed Wind Farm site, to provide detail and clarity on the nature and extent of subsoils and bedrock as a means of characterising the Proposed Wind Farm site. This assisted in providing additional information on the most suitable location for turbines and associated infrastructure.

Geotechnical site investigations (33 no. Trial Pits) were undertaken in October (17 no. trial pits) and December 2025 (16 no. trial pits), under the supervision of MKO. The trial pits were logged in accordance with BS5930:2015+A1:2020[1] and the logs are included in Appendix 8-1 of this EIAR. Particle size distribution (PSD) analysis was undertaken for a total of 27 samples from the trial pits, and the results are discussed in Chapter 8, Section 8.2.2 and presented in full in Appendix 8-1. The geological dataset collected by MKO has been used in the preparation of this EIAR.

The objectives of the intrusive site investigations included mapping the subsoil lithology for all Proposed Turbines and other key locations (i.e. internal access tracks, borrow pit locations) and assessing the underlying bedrock. This data was used to inform the final layout of the Proposed Project.

In summary, site investigations included the following:

- A total of 33 no. trial pits, supervised by MKO, at all Proposed Turbine locations and at other key locations (i.e. internal access roads and borrow pit locations) to investigate the underlying mineral soil lithology and subsoil/bedrock interface;
- Logging of subsoil exposures across the site where mineral soils were exposed;
- Mineral subsoils and trial pits were logged according to BS: 5930.

4.3.1.1.4 Turbine Type

Wind turbines 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

[1] *BS5930:2015+A1:2020 Code of practice for ground investigations (British Standards Institute 2020)*



Plate 4-1 Wind Turbine Components

The proposed wind turbines to be installed on the Proposed Wind Farm will have the following dimensions:

Table 4-2 Proposed Turbine Dimensions

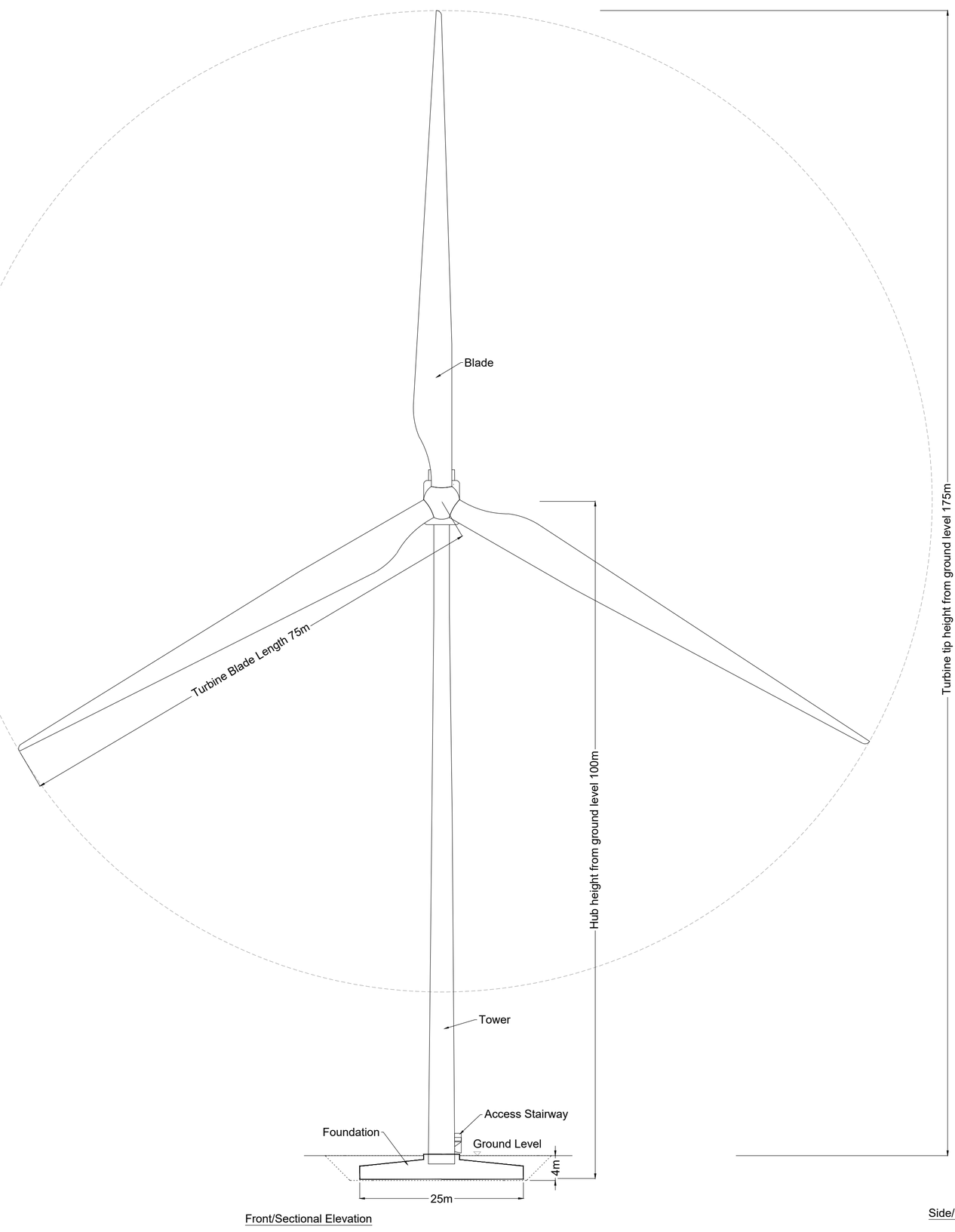
Turbine ID	Tip Height (m)	Rotor Diameter (m)	Hub Height (m)
T1 - T6, T13 - T21	175	150	100
T7 - T12	185	162	104
T22 & T23	170	150	95

Modern wind turbines from the main turbine manufacturers have evolved to share a common appearance and other major characteristics. The wind turbines that will be installed on the Site will be conventional three-blade turbines, which will be geared to ensure the rotors of all turbines rotate in the same direction at all times.

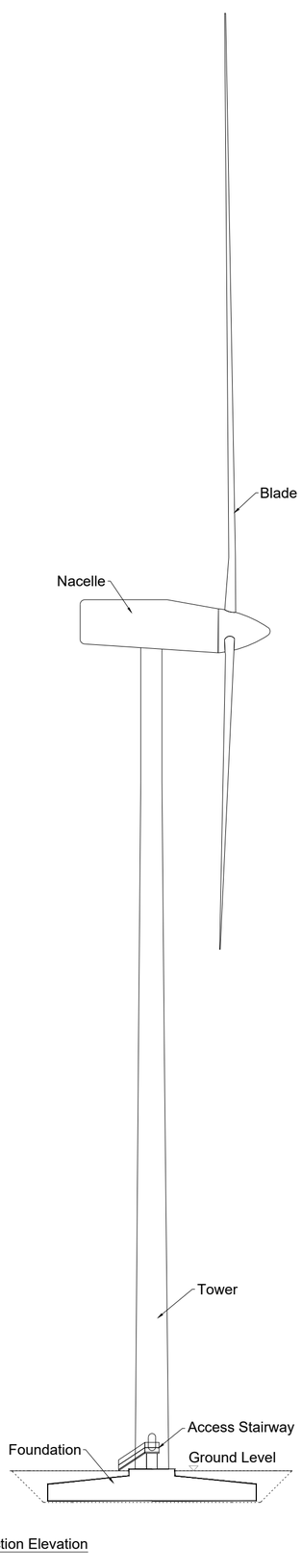
The turbines will be multi-ply coated to protect against corrosion. It is proposed that the turbines would be of a light grey colour to blend into the sky background to minimise visual impact as recommended in the Guidelines and '*The Influence of Colour on the Aesthetics of Wind Turbine Generators*' (ETSU, 1999).

Drawings of the proposed wind turbine are shown in Figure 4-6 – Figure 4-8.

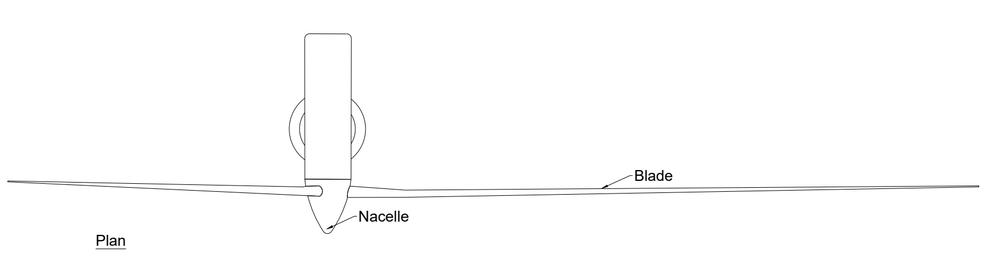
The individual components of a geared wind turbine nacelle and hub are shown in Figure 4-9 below.



Front/Sectional Elevation



Side/Section Elevation



Plan

Drawing Notes

1. Proposed wind turbines to have a maximum ground to blade tip height of 175m, blade length of 75m and hub height of 100m
2. Ground level represents the top of turbine foundation.

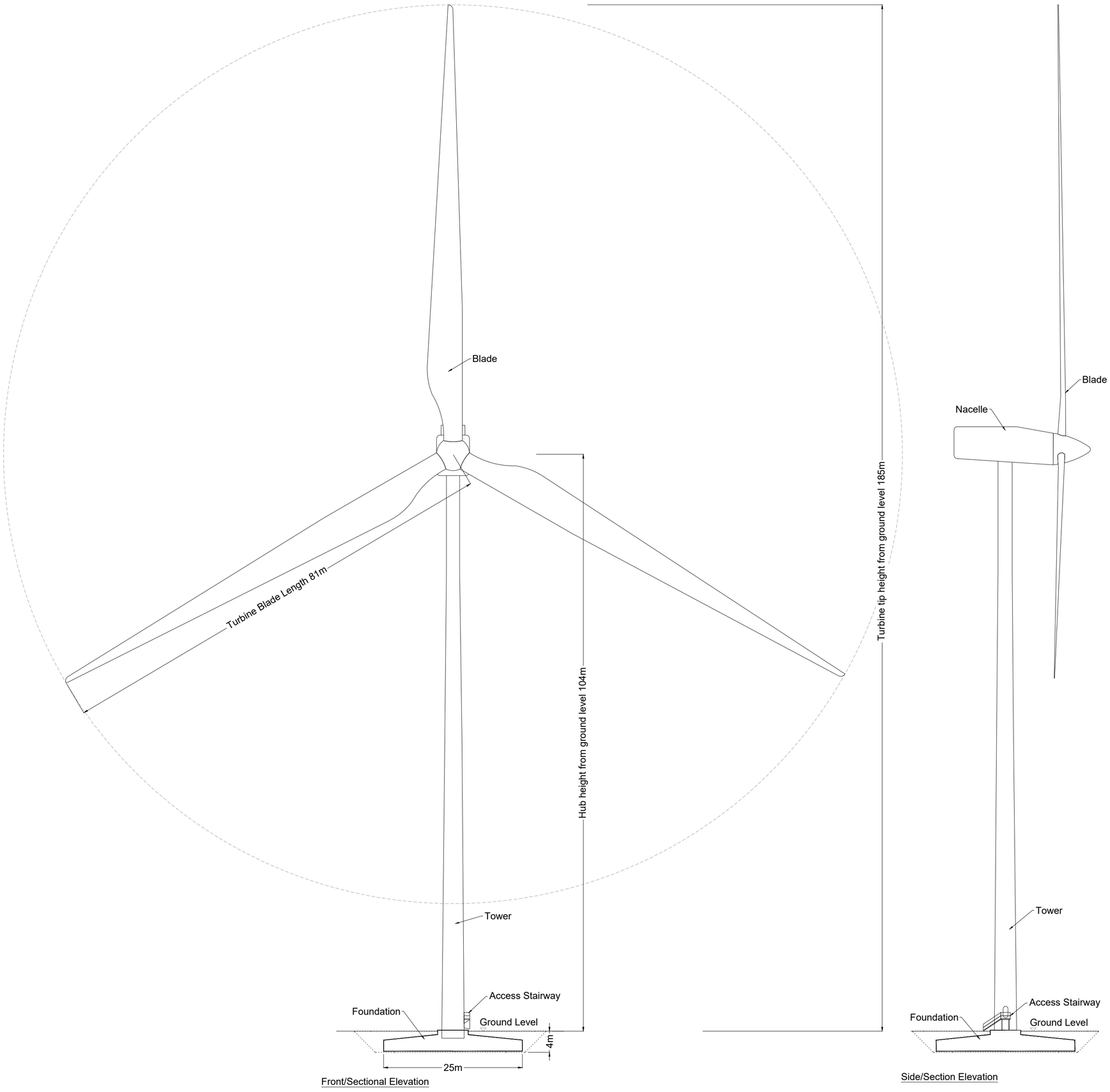
PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
Wind Turbine Elevation & Plan (175m Tip Height)

PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-6	1:500 @ A1

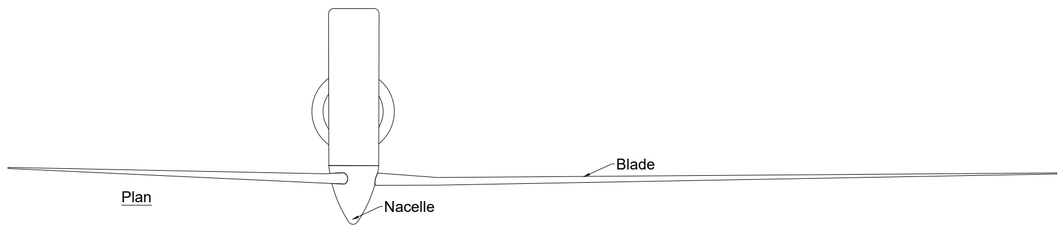
DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	AC	05.10.2026	P01

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Front/Sectional Elevation

Side/Section Elevation



Plan

Drawing Notes

1. Proposed wind turbines to have a maximum ground to blade tip height of 185m, blade length of 81m and hub height of 104m
2. Ground level represents the top of turbine foundation.

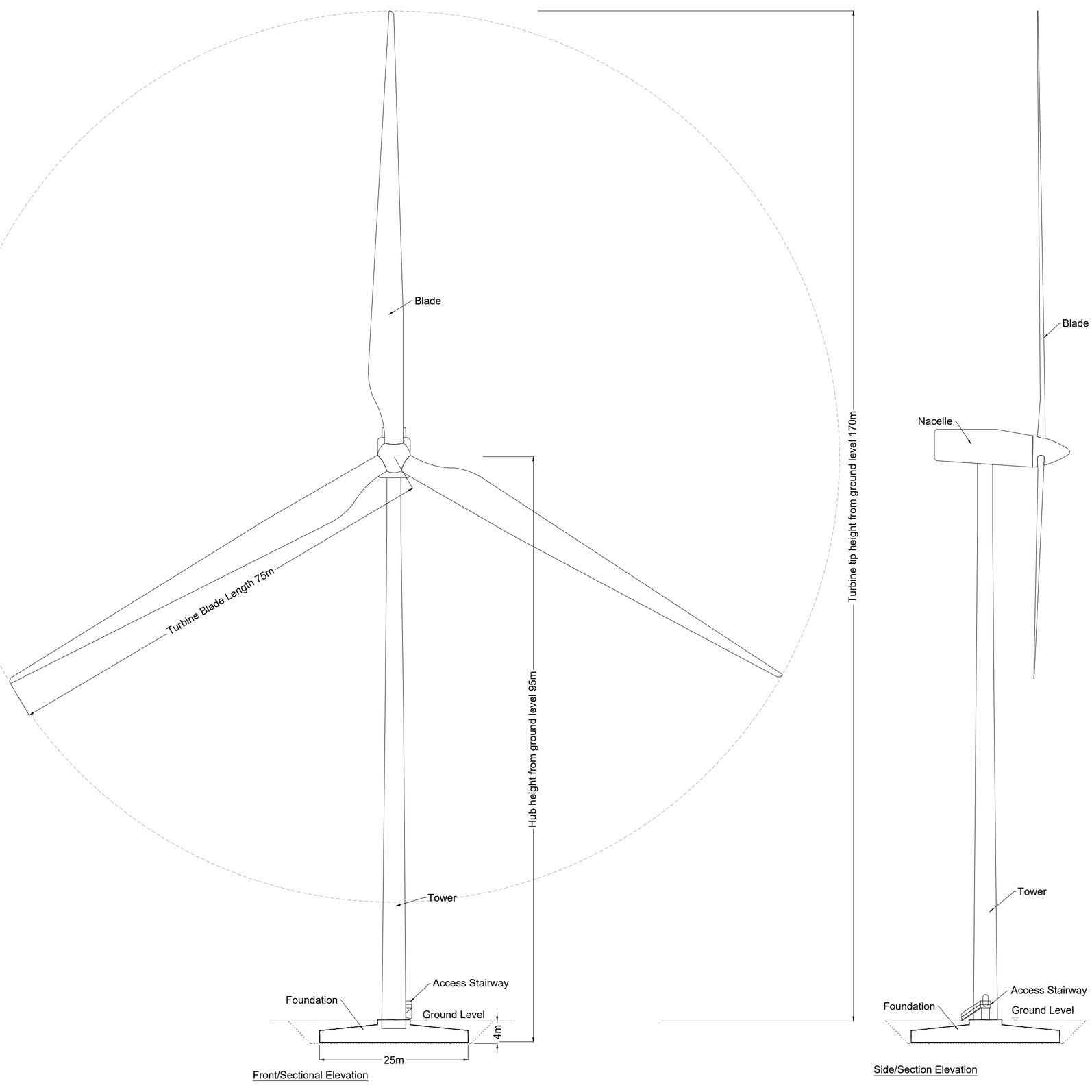
PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
Wind Turbine Elevation & Plan (185m Tip Height)

PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-7	1:500 @ A1

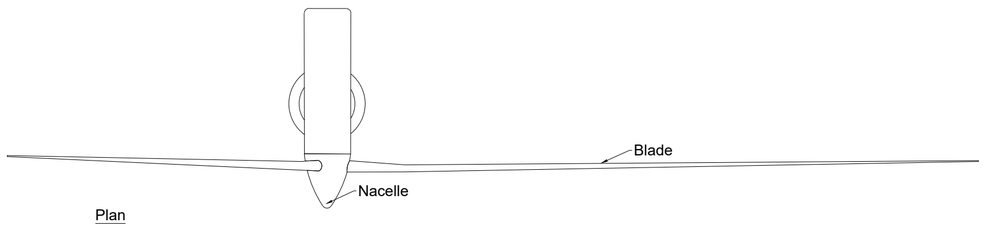
DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	AC	05.10.2026	P01

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Front/Sectional Elevation

Side/Section Elevation



Plan

Drawing Notes

1. Proposed wind turbines to have a maximum ground to blade tip height of 170m, blade length of 75m and hub height of 95m
2. Ground level represents the top of turbine foundation.

PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
Wind Turbine Elevation & Plan (170m Tip Height)

PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-8	1:500 @ A1

DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	AC	05.10.2026	P01

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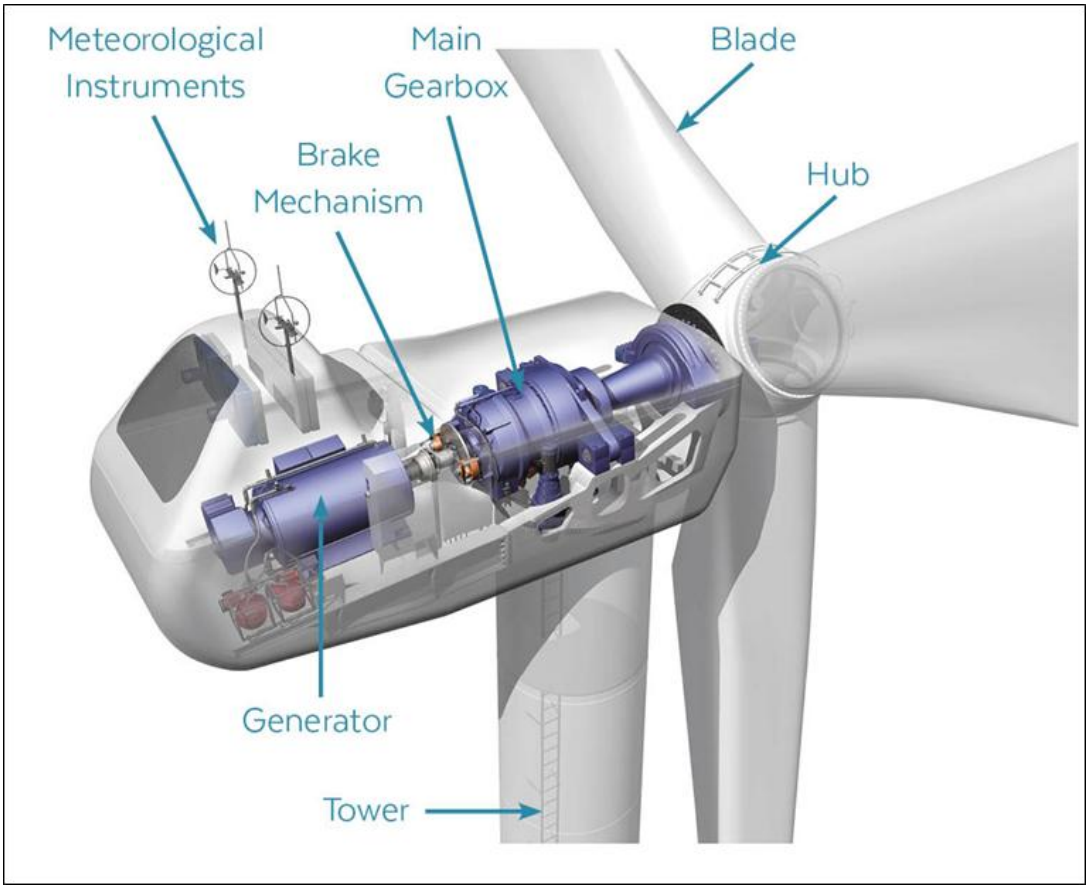


Figure 4-9 Turbine nacelle and hub components

4.3.1.1.5 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, 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. The turbine foundation transmits any load on the wind turbine into the ground. The horizontal and vertical extent of the turbine foundation will be 25m in diameter and 3 to 3.5m in depth respectively, dependant on ground conditions.

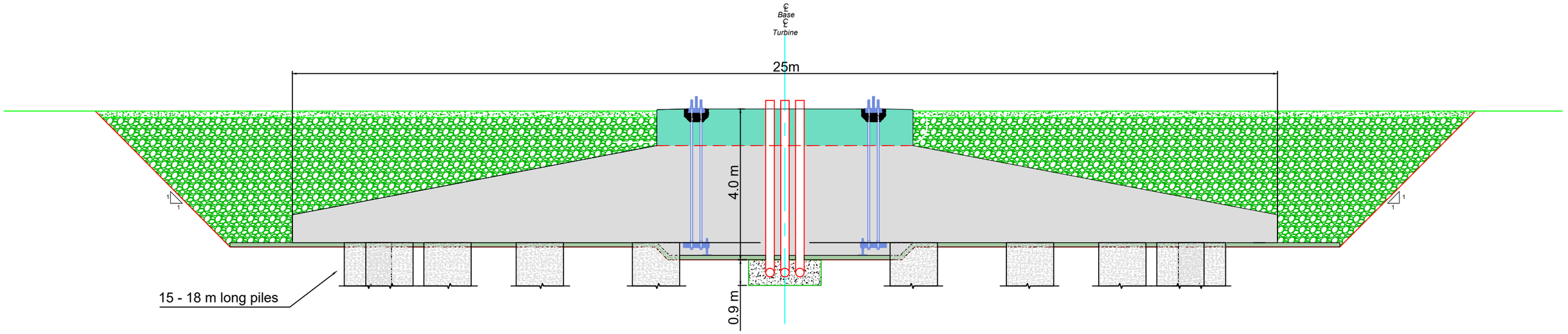
Based on site investigation work carried out at the Site, including trial pitting, it is envisaged that the following turbines will require a piled foundation:

- T8 – T12
- T14
- T21

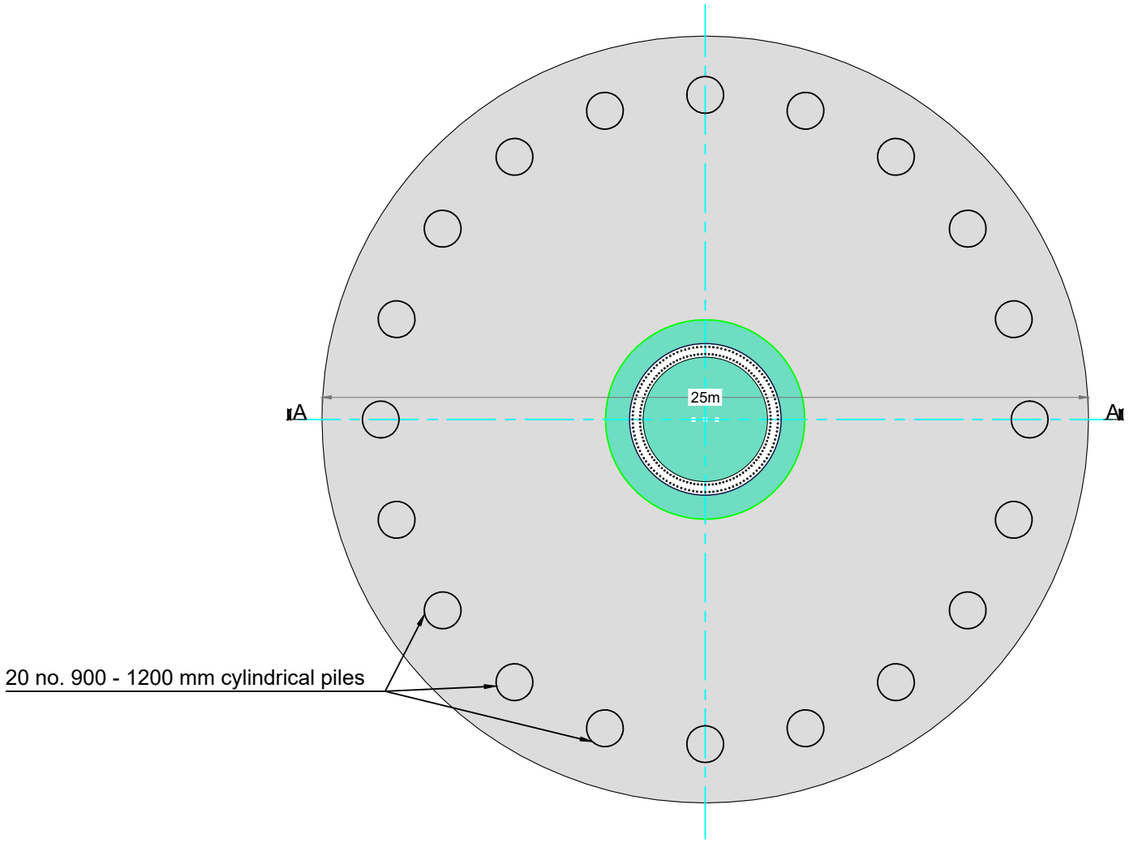
The requirement for piling at these turbines will be determined during post consent confirmatory ground investigations. Both foundation options have been assessed in this EIAR and are shown in Figure 4-10 and Figure 4-11.

After the foundation level of each turbine has been formed on competent stratum (i.e bedrock or subsoil of sufficient load bearing capacity), or piled foundation, the “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 to finished surface level (Plate 4-2 and Plate 4-3 below).

Section A-A
Scale 1:100



Plan
Scale: 1:200



PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

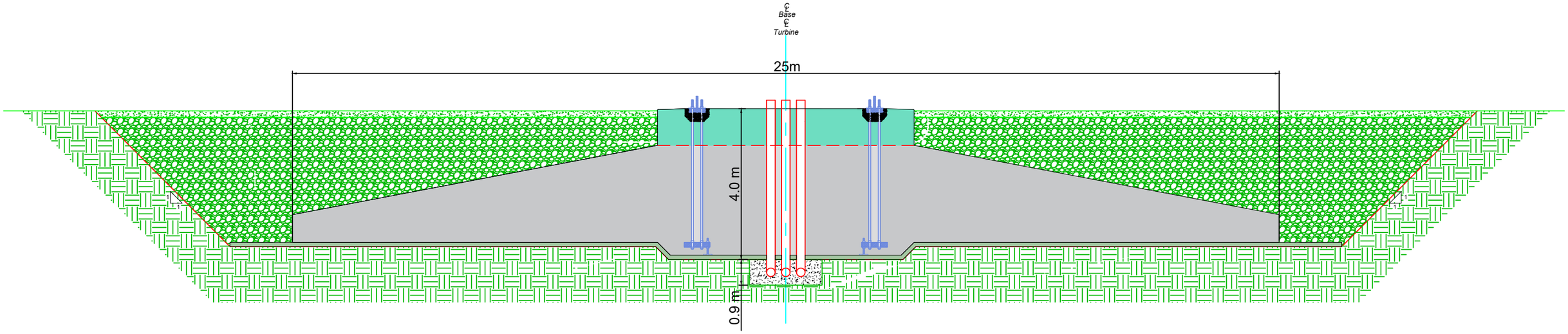
DRAWING TITLE:
Bored Pile Foundations Details

PROJECT No.:	DRAWING No.:	SCALE:
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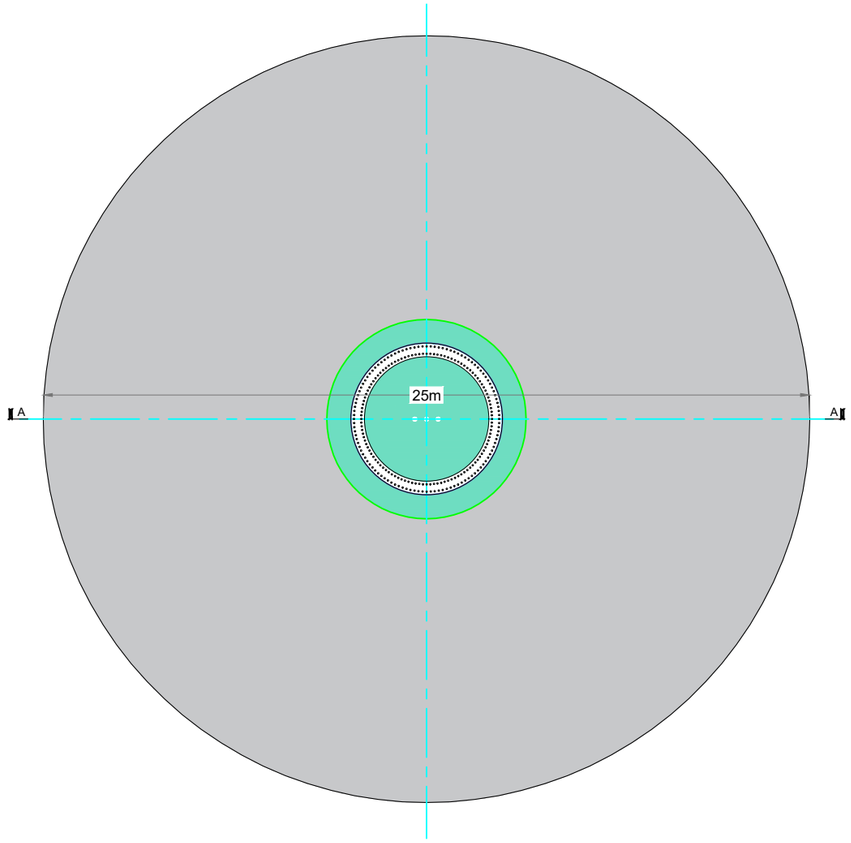
DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	**AC**	**05.10.2026**	P01

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Section A-A
Scale 1:100



Plan
Scale: 1:200



PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
Gravity Foundations Details

PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-11	As Shown @ A3

DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	AC	05.10.2026	P01

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Plate 4-2 Turbine Foundation Anchor Cage surrounded by reinforcing steel.



Plate 4-3 Finished Turbine Foundation

4.3.1.1.6 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 used to accommodate cranes used in the assembly and erection of the turbine, offloading and storage of turbine components, and 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. All crane hardstand areas will be designed taking account of the loadings provided by the turbine manufacturer and will consist of a compacted stone structure. The crane hardstands will be constructed in a similar manner to the excavated site roads. The main body of the crane hardstands (i.e. not including the blade fingers and turbine foundation) will be constructed in a similar manner to the excavated site roads. The main body of the crane hardstand area will measure approximately 35m x 55m.

The precise sizes, arrangement and positioning of hard standing areas are informed by the turbine manufacturers. The proposed hard standing areas are illustrated in the detailed drawings included in Appendix 4-1 of this EIAR. The extent of the required areas at each turbine location may be optimised on-site depending on topography, position of the Proposed Wind Farm site access road, the Proposed Turbine position and the turbine supplier's exact requirements.

A temporary works area has been identified around each of the Proposed Turbines hardstand areas; these areas will be utilised during the construction phase to facilitate all works with the construction of the Proposed Turbines and associated infrastructure. These temporary works areas are shown within the planning drawings included as Appendix 4-1 to this EIAR.

4.3.1.1.7 Generating Capacity

Modern wind turbine generators currently have a typical generating capacity in the 4 to 7 MW range, with the generating capacity continuing to evolve upwards as technology improvements are achieved by the turbine manufacturers. Turbines of the exact same make, model and dimensions can have different generating potential depending on the capacity of the electrical generator installed in the turbine nacelle. The exact generating capacity of the installed turbine will be determined by the selected manufacturer.

Please note, the MW output of the Proposed Wind Farm is considered to be a consequence of turbine design and not a physical attribute on which it is possible to measure or assess the impact of. For the purposes of this EIAR, a rated output of 6 MW for the 170m and 175m turbines and 7.2MW for the 185m turbines has been chosen to calculate the potential generating capacity of the proposed 23-turbine renewable energy development, which would result in an estimated installed capacity of 145.2MW, see Table 4-3 below.

Table 4-3 Potential MW output of the Proposed Wind Farm

Turbines	MW output per Turbine	MW output per all turbines
T1-T6, T13-T23 (17 no.)	6MW	102MW
T7 – T12 (6 no.)	7.2MW	43.2MW
Total	N/A	145.2MW

Assuming an installed capacity of 145.2 MW, the Proposed Wind Farm therefore has the potential to produce up to 445,183 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 capacity factor of 35%[2] is used here.

C = Rated output of the wind farm: 145.2 MW

The 445,183 MWh of electricity produced by the Proposed Wind Farm would be sufficient to supply approximately 106,000 Irish households with electricity per year, based on the average Irish household using 4.2 MWh of electricity[3] (this latest figure is available from the March 2017 CER Review of Typical Consumption Figures Decision Paper).

For context, the 2022 Census of Ireland recorded a total of 47,666 occupied households in Co. Waterford, therefore, based on a capacity factor of 35%, the Proposed Project could produce sufficient electricity for more than double the number of households in Co. Waterford.

4.3.1.2 Site Roads

4.3.1.2.1 *Road Construction Types*

To provide access within the Proposed Wind Farm site and to connect the wind turbines and associated infrastructure, existing roads and tracks will need to be upgraded, and new access roads will need to be constructed. The road construction design has taken into account the following key factors:

1. Buildability considerations;
2. Making use of existing infrastructure where possible;
3. Minimising excavation arisings;
4. Serviceability requirements for construction and wind turbine delivery and maintenance vehicles;

Whilst the above key factors are used to determine the road design the actual construction technique employed for a particular length of road will be determined on the prevailing ground conditions encountered along that length of road.

The Proposed Wind Farm site makes use of the existing road network insofar as possible. It is proposed to upgrade approximately 8.7 kilometres of existing roads and tracks, and to construct approximately 12.2 kilometres of new access road on the Proposed Wind Farm site. Areas such as wide junctions and proposed hardstands will be used as passing bays throughout the construction phase of the Proposed Wind Farm.

Construction of New Roads

As noted above, approximately 12.2km of new roads will be constructed in order to facilitate the Proposed Wind Farm. Due to the ground conditions, new access tracks proposed on site are proposed to be founded and located on competent stratum. The make-up of the founded access tracks is a stone thickness of c. 500mm. A cross-section detail of a new excavated road is also shown in Figure 4-13 and Figure 4-14.

[2] *https://www.eirgridgroup.com/site-files/library/EirGrid/ECP-2-2-Solar-and-Wind-Constraints-Report-Area-I-v1.0.pdf*
[3] *March 2017 CER (CRU) Review of Typical Consumption Figures Decision Paper https://www.cru.ie/document_group/review-of-typical-consumption-figures-decision-paper/*

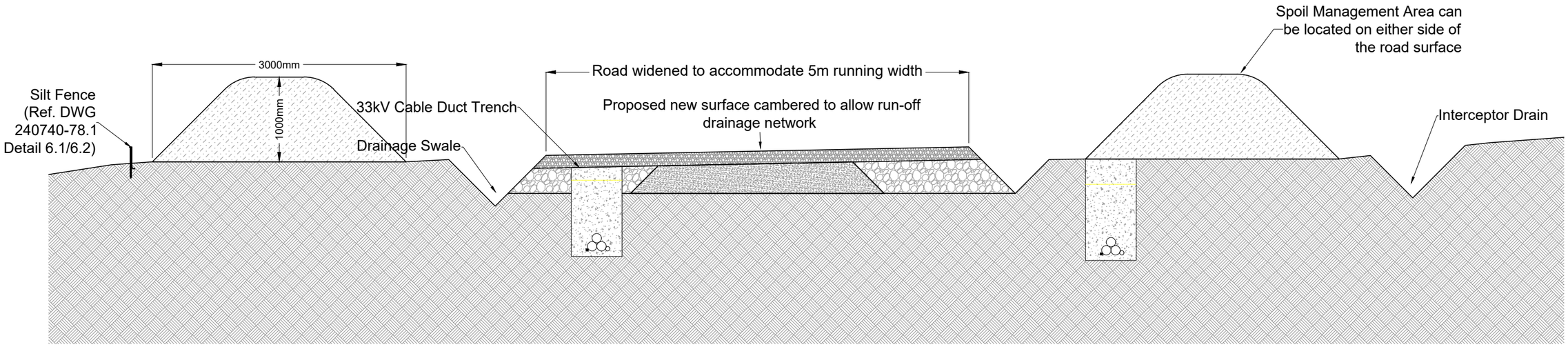
The details on the construction methodology for new excavated roads is outlined below in Section 4.8.1.2.1.

Upgrade of Existing Access Roads or Tracks

As noted above, approximately 8.7km of existing roads and access tracks will be upgraded as part of the Proposed Wind Farm construction phase. The existing tracks onsite were constructed using the excavate and replace construction technique, therefore proposed road widening will be founded on competent stratum. Cross section details of the upgrade of existing roads are shown as Figure 4-12. Details on the construction methodology for the upgrading of existing tracks and roads is outlined below in Section 4.8.1.2.2.

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.



Existing Excavated Road Widening Section

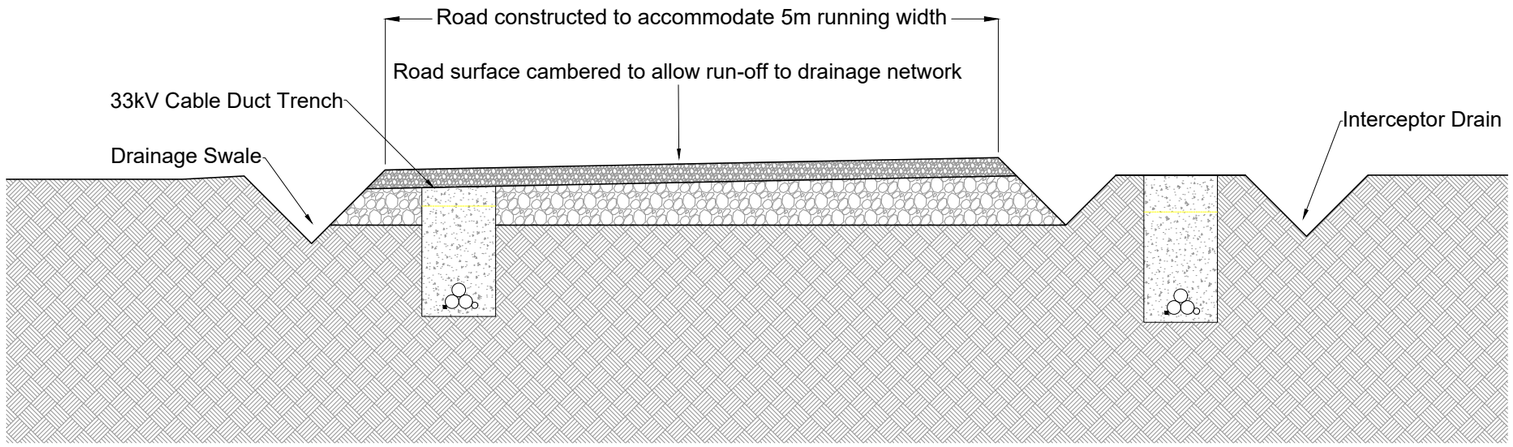
The cabling may be placed on either side of the roads, on both sides of the road or within the road. The exact configuration of the underground cabling will be set by the requirements of the electrical designers at detailed design stage.

PROJECT TITLE: **Slievegrine Renewable Energy Development, Co. Waterford**			
DRAWING TITLE: **Upgrade of Existing Excavated Access Roads Section**			
PROJECT No.: **240740**		DRAWING No.: **Figure 4-12**	SCALE: **1:50 @ A3**
DRAWN BY: **JOB**	CHECKED BY: **AC**	DATE: **05.10.2026**	REVISION.: P01

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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.



The surface of the excavated access roads will be overlaid with approximately 500mm of selected granular fill.

Excavated Road Section

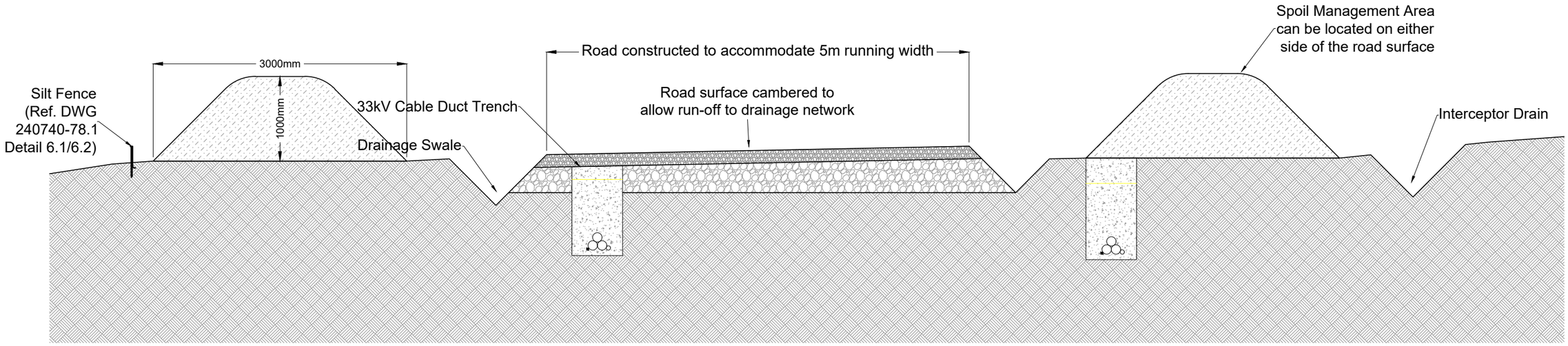
The cabling may be placed on either side of the roads, on both sides of the road or within the road. The exact configuration of the underground cabling will be set by the requirements of the electrical designers at detailed design stage.

PROJECT TITLE: **Slievegrine Renewable Energy Development, Co. Waterford**			
DRAWING TITLE: **Excavated Road Section**			
PROJECT No.: **240740**		DRAWING No.: **Figure 4-13**	SCALE: **1:50 @ A3**
DRAWN BY: **JOB**	CHECKED BY: **AC**	DATE: **05.10.2026**	REVISION.: P01

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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.



Excavated Road Section

The cabling may be placed on either side of the roads, on both sides of the road or within the road. The exact configuration of the underground cabling will be set by the requirements of the electrical designers at detailed design stage.

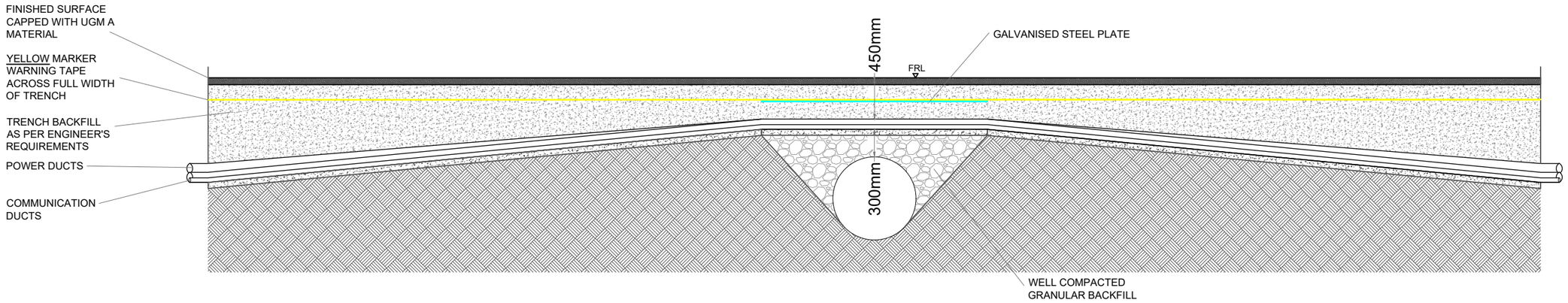
PROJECT TITLE: **Slievegrine Renewable Energy Development, Co. Waterford**			
DRAWING TITLE: **Excavated Road Section within Stockpile Exclusion Areas**			
PROJECT No.: **240740**		DRAWING No.: **Figure 4-14**	SCALE: **1:50 @ A3**
DRAWN BY: **JOB**	CHECKED BY: **AC**	DATE: **05.10.2026**	REVISION.: P01

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4.3.1.3 Underground Electrical (33kV) and Communications Cabling

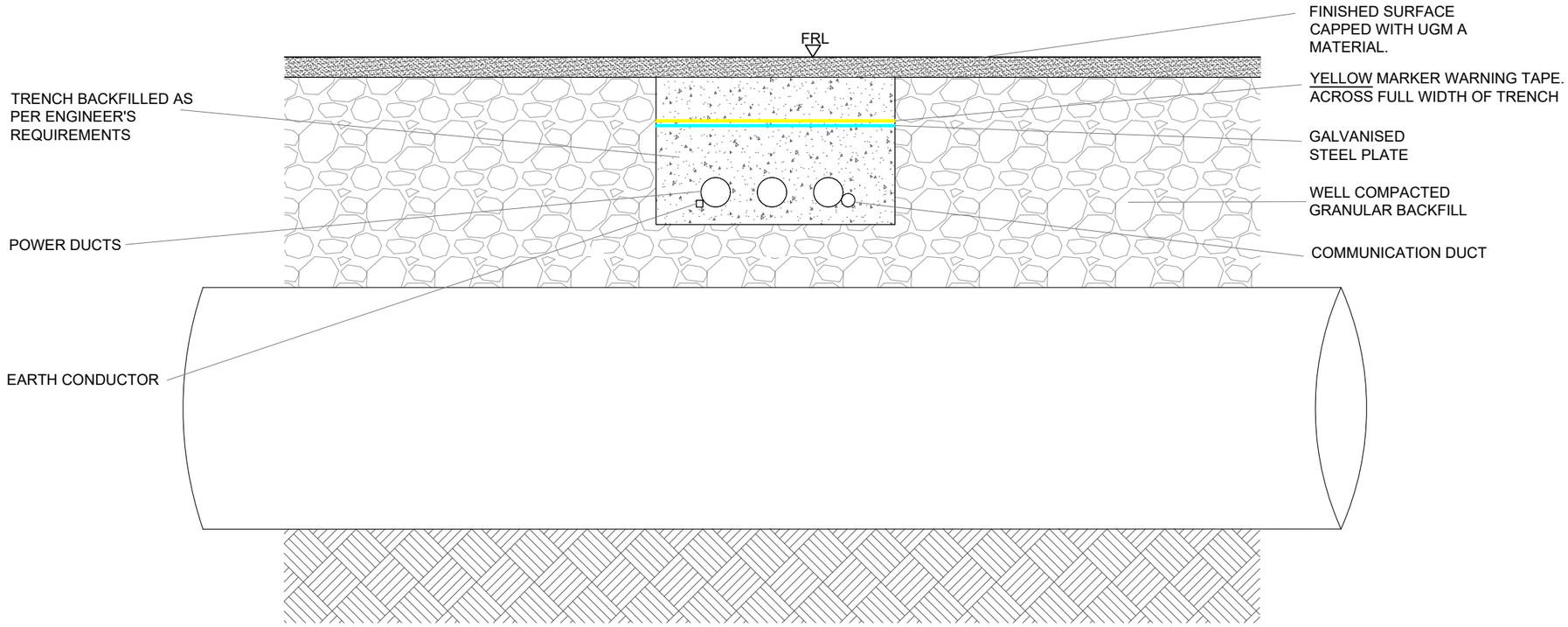
Each turbine and the meteorological mast (refer to Section 4.3.1.4 below) will be connected to the Proposed 110kV Substation via underground 33 kV electricity cabling. Fibre-optic cables will also connect each wind turbine and the met mast to the Proposed 110kV Substation. The electricity and fibre-optic cabling connecting to the Proposed 110kV Substation compound will be run in cable ducts approximately 1.2 metres beneath ground level, along the sides of roadways and/or under the roadways. The route of the cable ducts will follow the access track to each turbine location and are illustrated on the detailed site layout drawings included as Appendix 4-1, the exact number and configuration of cable ducting may vary within the cabling route. Figure 4-15 below shows two variations of a standard cable trench, one for off-road trenches and one for on-road trenches. The exact configuration of the underground cabling will be set by the requirements of the electrical designers at detailed design stage. Any existing services will be avoided.

Clay plugs (water flow barrier) will be installed at regular intervals of not greater than 50 metres along the length of the trenches where required to prevent the trenches becoming conduits for runoff water. Backfill material will be compacted in layers with approved engineer's specified material, which may be imported onto the Proposed Wind Farm site should sufficient volumes of suitable material not be encountered during the excavation phase of the proposed infrastructure.



Culvert Crossing - 33kV - Longitudinal Section

SCALE 1:50



Culvert Crossing - 33kV - Cross Section

SCALE 1:20

PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
33kV Culvert Crossing and Cable Trench Detail

PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-15	As Shown @ A3

DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	RD	05.10.2026	P01

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4.3.1.4 Meteorological Mast

One meteorological (met) mast is proposed as part of the Proposed Wind Farm. The met mast will be equipped with wind monitoring equipment at various heights. The proposed met mast will be located at E619043, N586963 (ITM) as shown on the Proposed Wind Farm layout drawing in Figure 4-4 and the detailed site layout drawings included as Appendix 4-1. The met mast will be a free-standing slender lattice structure 80 metres in height. It will be constructed on a hard-standing area sufficiently large to accommodate the equipment that will be used to erect the mast. A standard detail of a meteorological mast is shown in Figure 4-16.

4.3.1.5 Telecommunications Relay Mast

One telecommunications relay mast is proposed as part of the Proposed Wind Farm. The telecommunications relay mast will be equipped with a telecommunications dish which will function to relay 2 no. telecommunications signals. The proposed telecommunications relay mast will be located at E620855, N589081 (ITM) as shown on the Proposed Wind Farm site layout drawing in Figure 4-4 and the detailed site layout drawings included as Appendix 4-1. The telecommunications relay mast be a free-standing slender lattice structure 30 metres in height. It will be constructed on a hard-standing area sufficiently large to accommodate the equipment that will be used to erect the mast. A standard detail of a relay mast is shown in Figure 4-17.

4.3.1.6 Construction Compounds

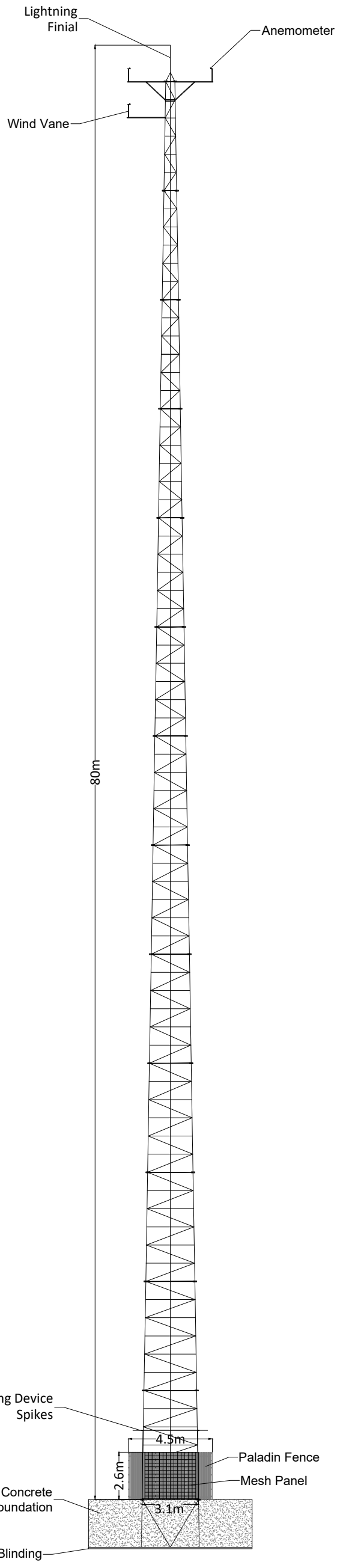
Five construction compounds will be located within the Proposed Wind Farm site, the details of which are contained in Table 4-4 below.

Table 4-4 Construction Compound Details

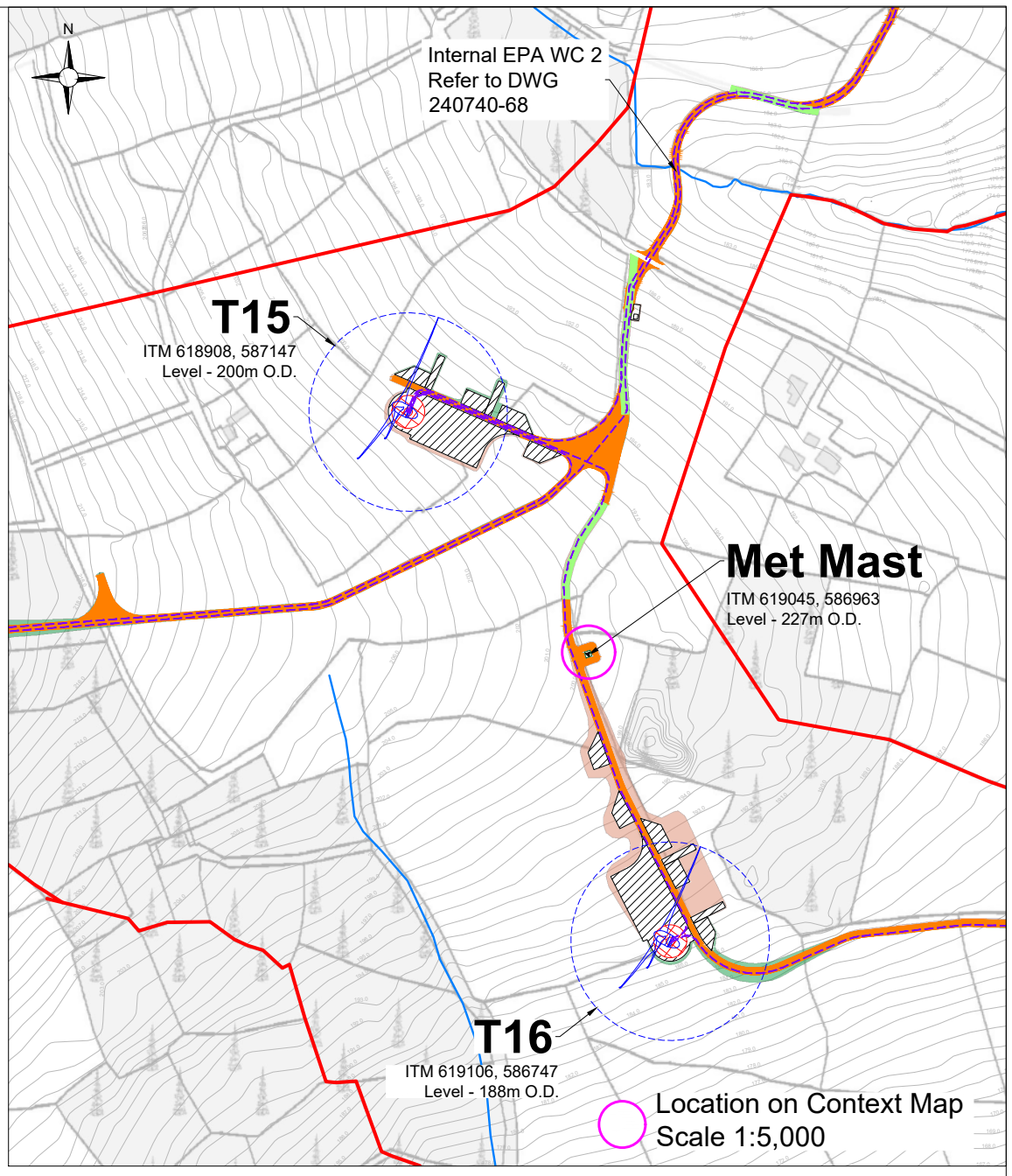
Compound Number	Dimensions (LxWm)	Location (ITM X)	Location (ITM Y)
1	35x55m	619932	588869
2	35x55m	622084	587984
3	30x65m	620102	588127
4	35x55m	617623	587030
5	25x40m	616059	586114

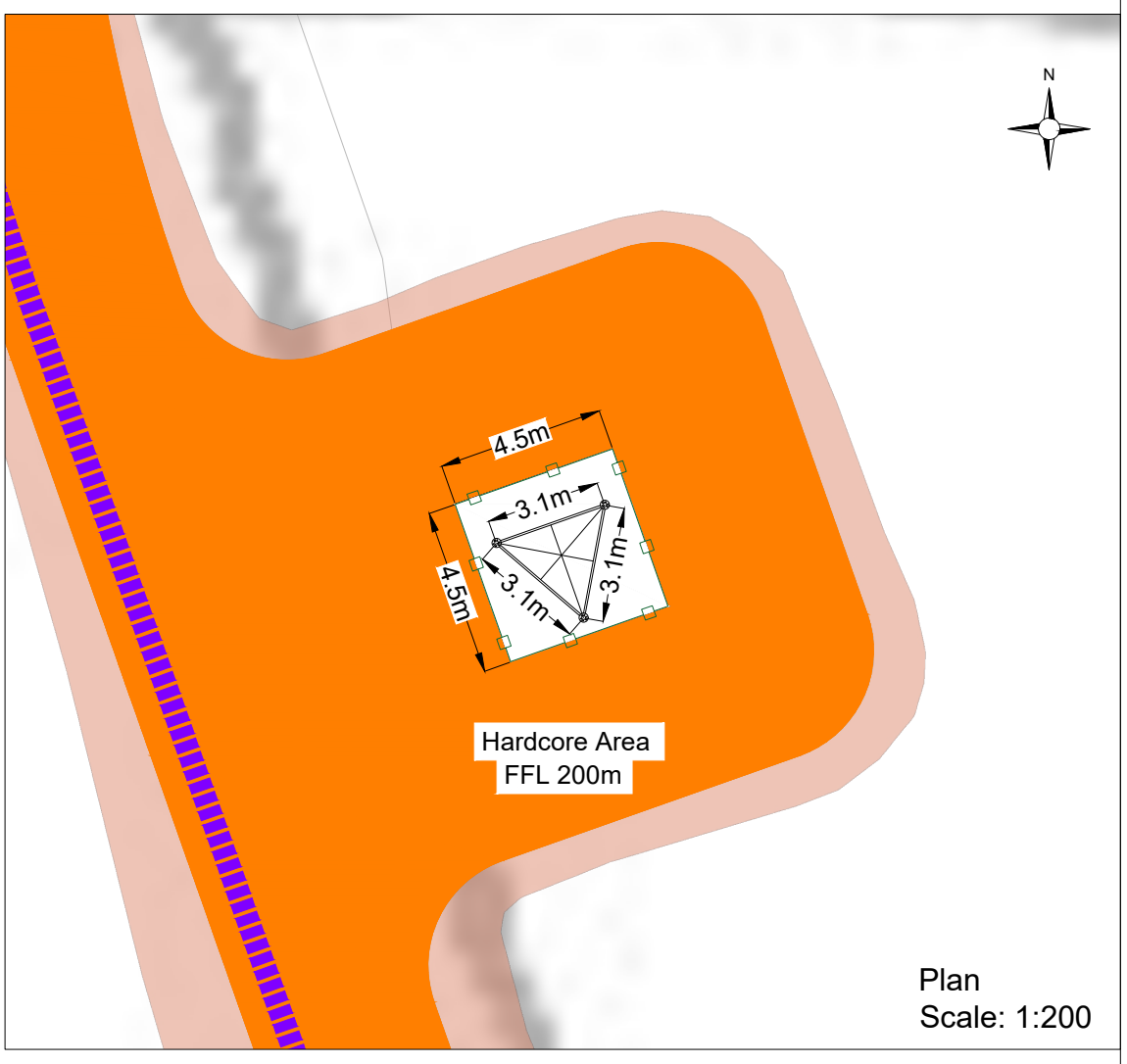
The locations of the proposed construction compounds are shown on the Proposed Wind Farm layout drawing in Figure 4-4. The layouts of these construction compounds are shown on Figure 4-18 to 4-22 below.

The construction compounds will consist of temporary site offices, staff facilities and car-parking areas for staff and visitors. Temporary port-a-loo toilets and 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 permitted waste collector to wastewater treatment plants. There will also be a water supply on site for hygiene purposes, by way of a temporary storage tank. The construction compound will also include a bunded refuelling and containment area for the storage of oil, lubricants and site generators etc, and full retention oil interceptor.



Elevation
Scale: 1:250





Plan
Scale: 1:200

Note:

1. Met Mast exact detail may differ depending on the selected manufacturer.
2. Finished level of the mast to match ground conditions.
3. Mast/foundation orientation to be confirmed with met mast supplier.
4. Earthing and ducting requirements to be confirmed with met mast supplier and forwarded to foundation designer

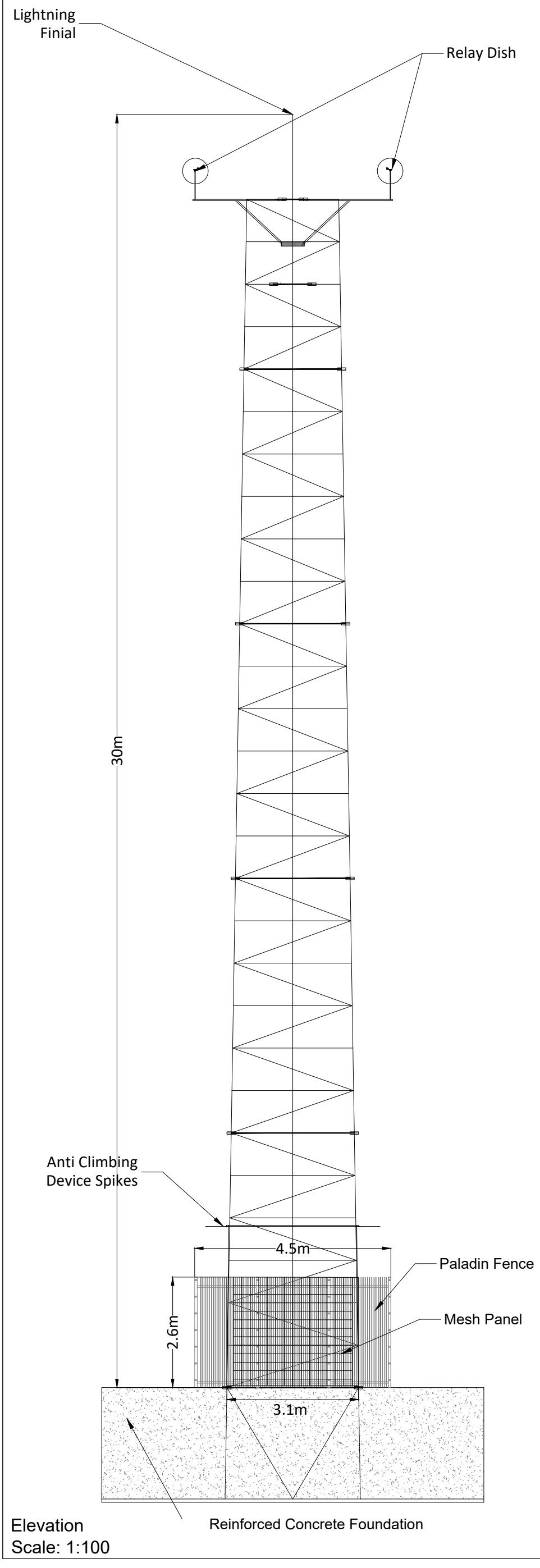
PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
Meteorological Mast Detail

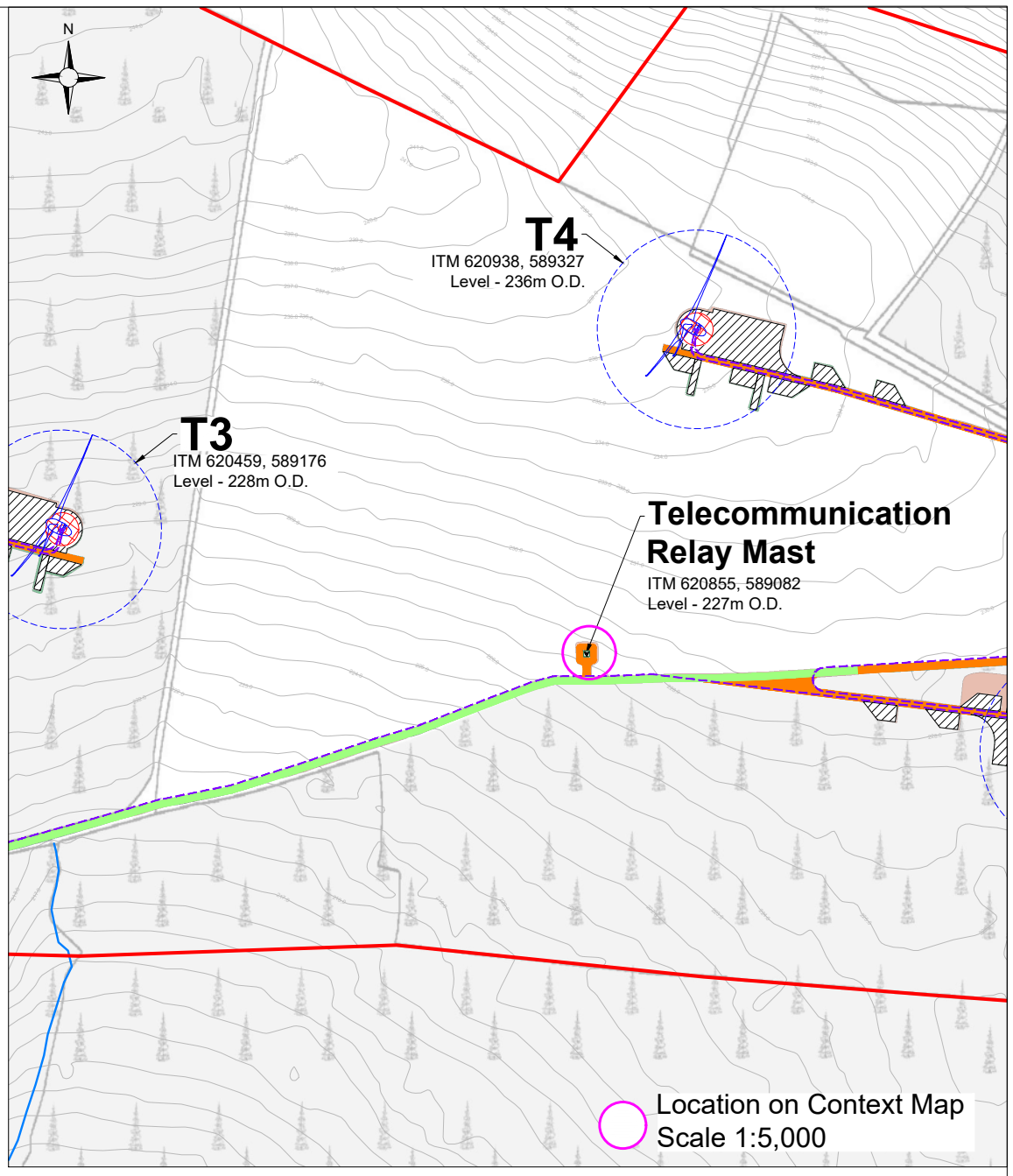
PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-16	As Shown@ A3

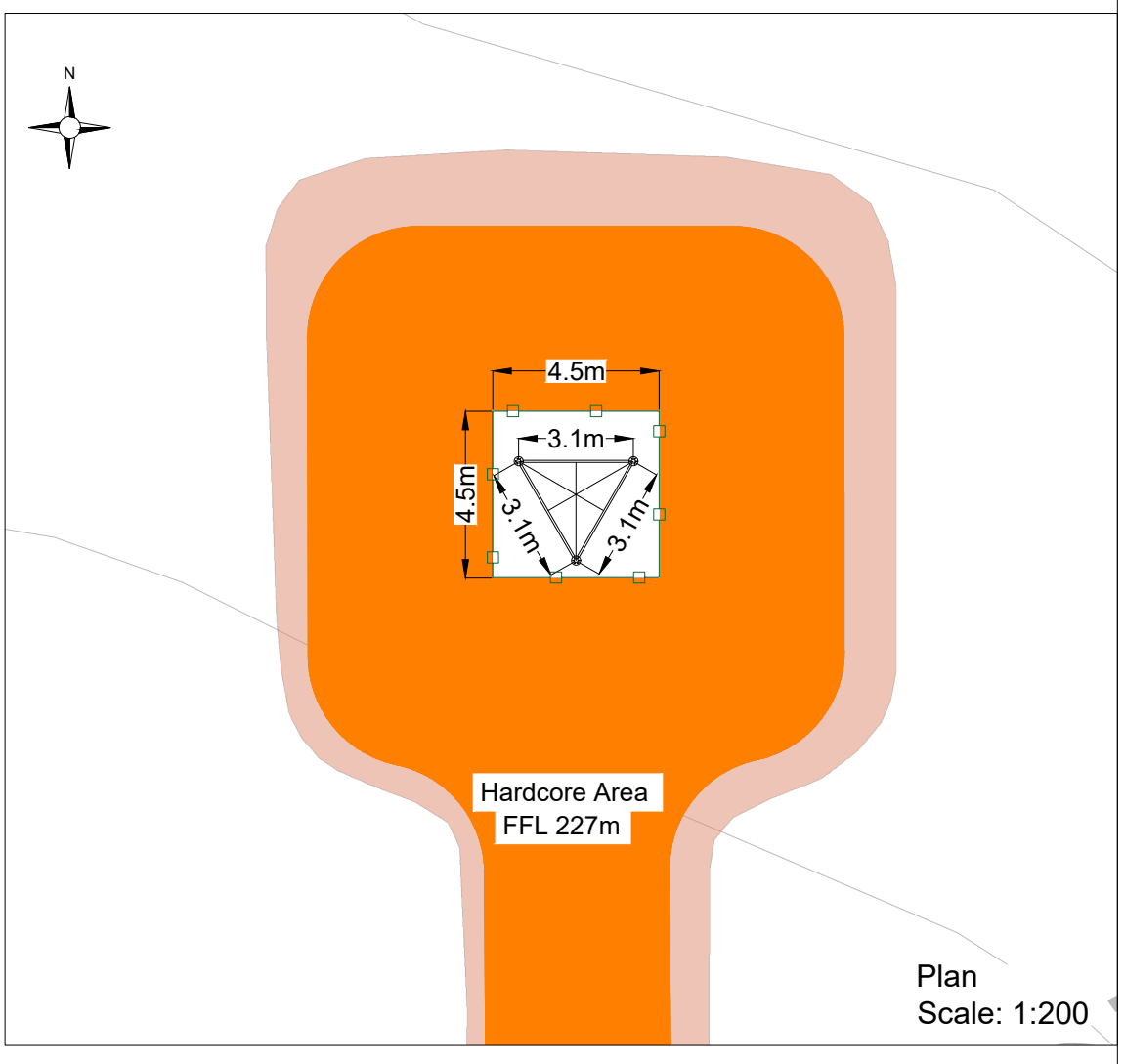
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Elevation
Scale: 1:100





Plan
Scale: 1:200

Note:

1. Telecommunication Relay Mast exact detail may differ depending on the selected manufacturer.
2. Finished level of the mast to match ground conditions.
3. Mast/foundation orientation to be confirmed with met mast supplier.
4. Earthing and ducting requirements to be confirmed with met mast supplier and forwarded to foundation designer

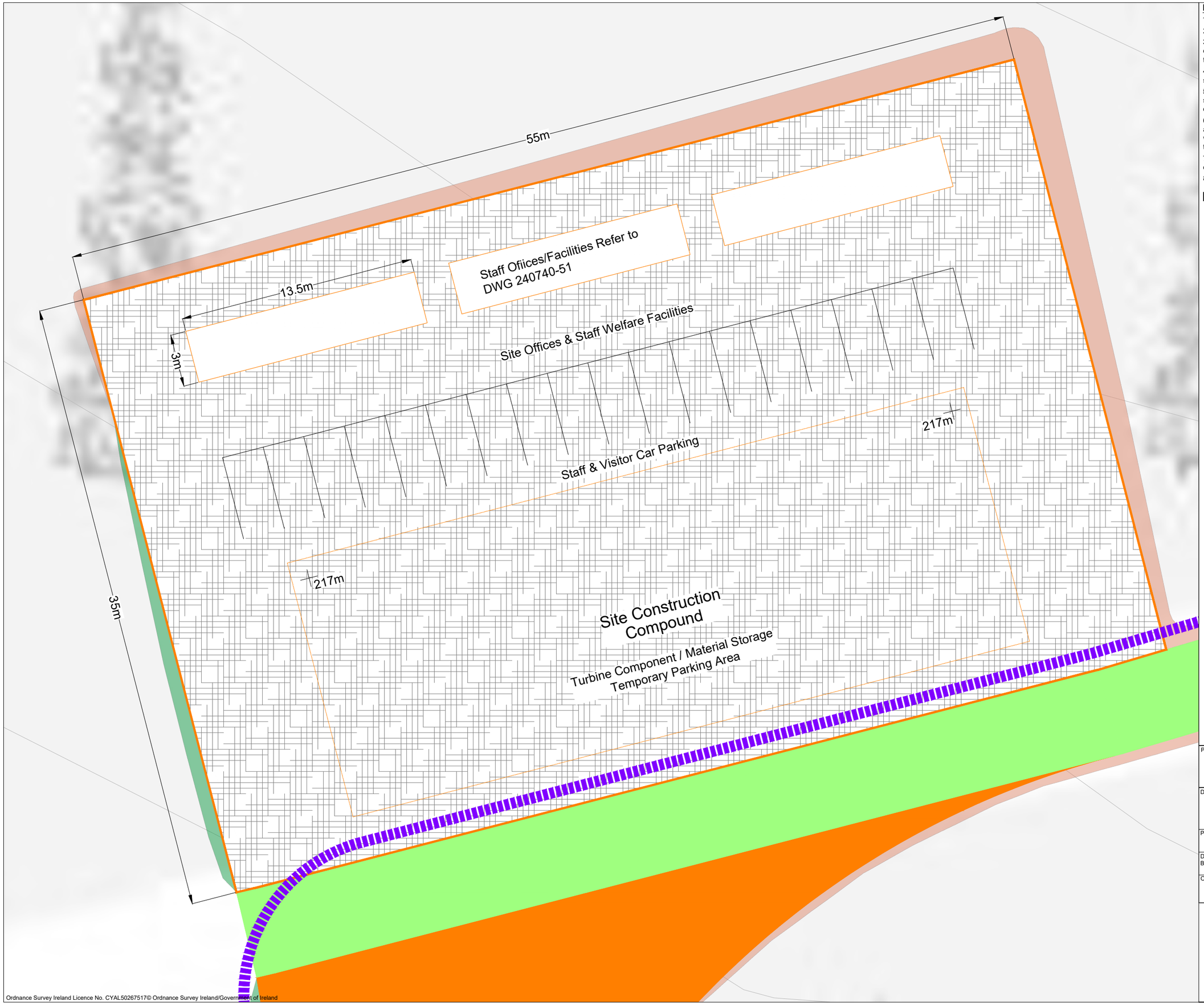
PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
Telecommunication Relay Mast Detail

PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-17	As Shown@ A3

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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

- Existing Road to be Upgraded
- Proposed New Roads
- 33kV Electrical Cable Trench
- Cut
- Fill

N

PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
Construction Compound 1

PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-18	1:200 @ A3

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Drawing Legend

- Existing Road to be Upgraded
- Proposed New Roads
- Cut
- Fill

N

PROJECT TITLE:
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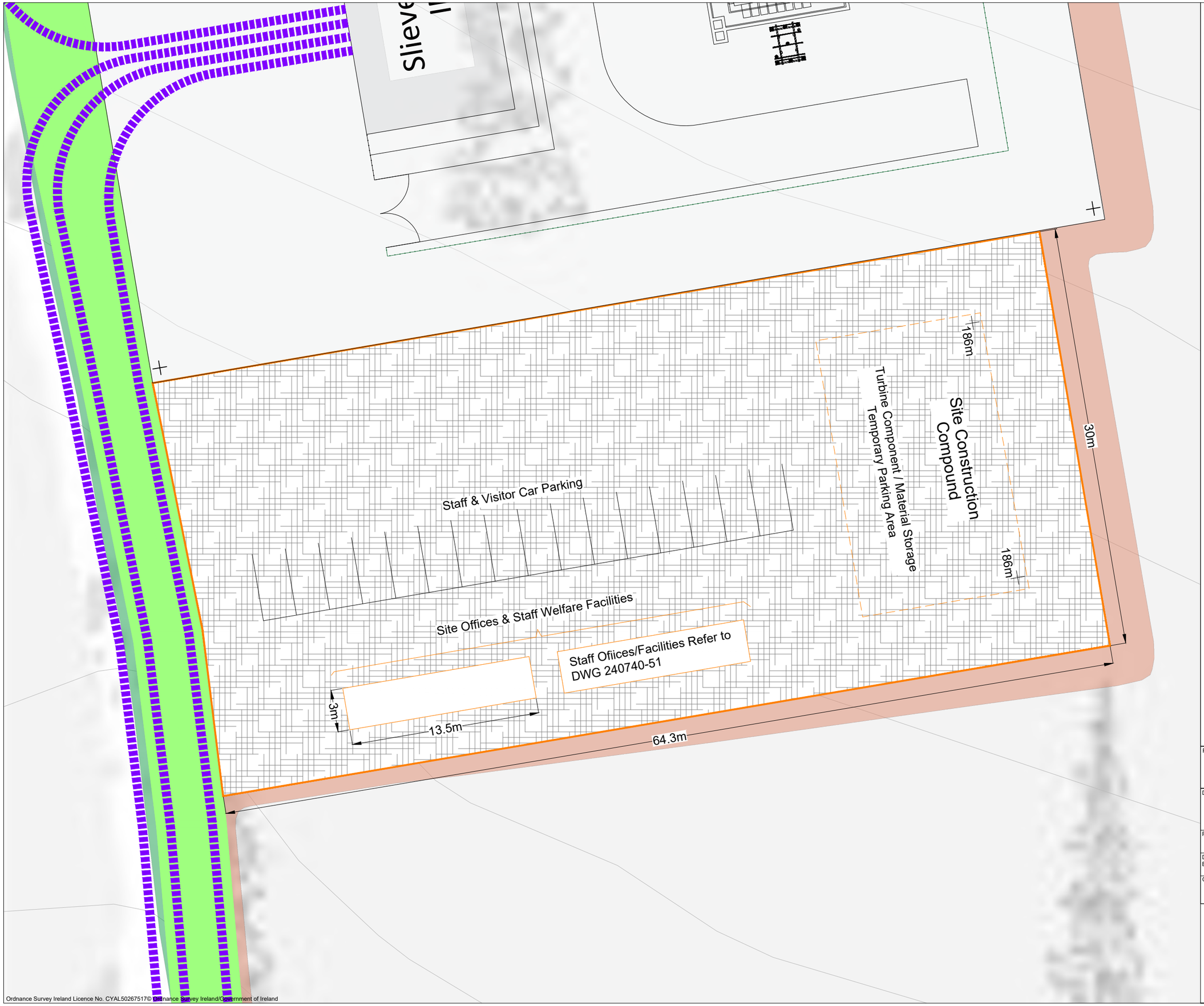
DRAWING TITLE:
Construction Compound 2

PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-19	1:250 @ A3

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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

- Existing Road to be Upgraded
- 33kV Electrical Cable Trench
- Cut
- Fill

N

PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

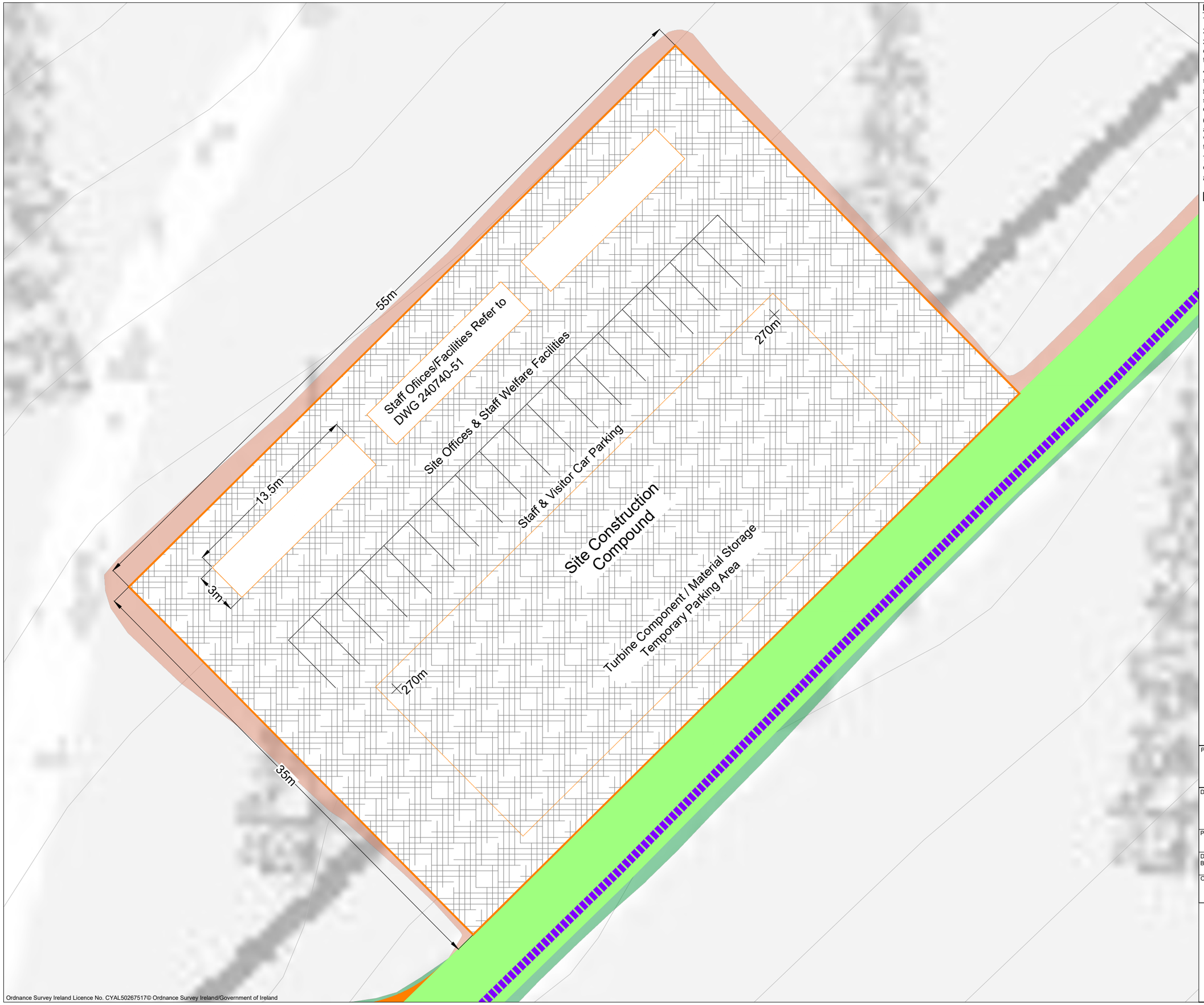
DRAWING TITLE:
Construction Compound 3

PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-20	1:250 @ A3

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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

- Existing Road to be Upgraded
- Proposed New Roads
- 33kV Electrical Cable Trench
- Cut
- Fill

N

PROJECT TITLE:
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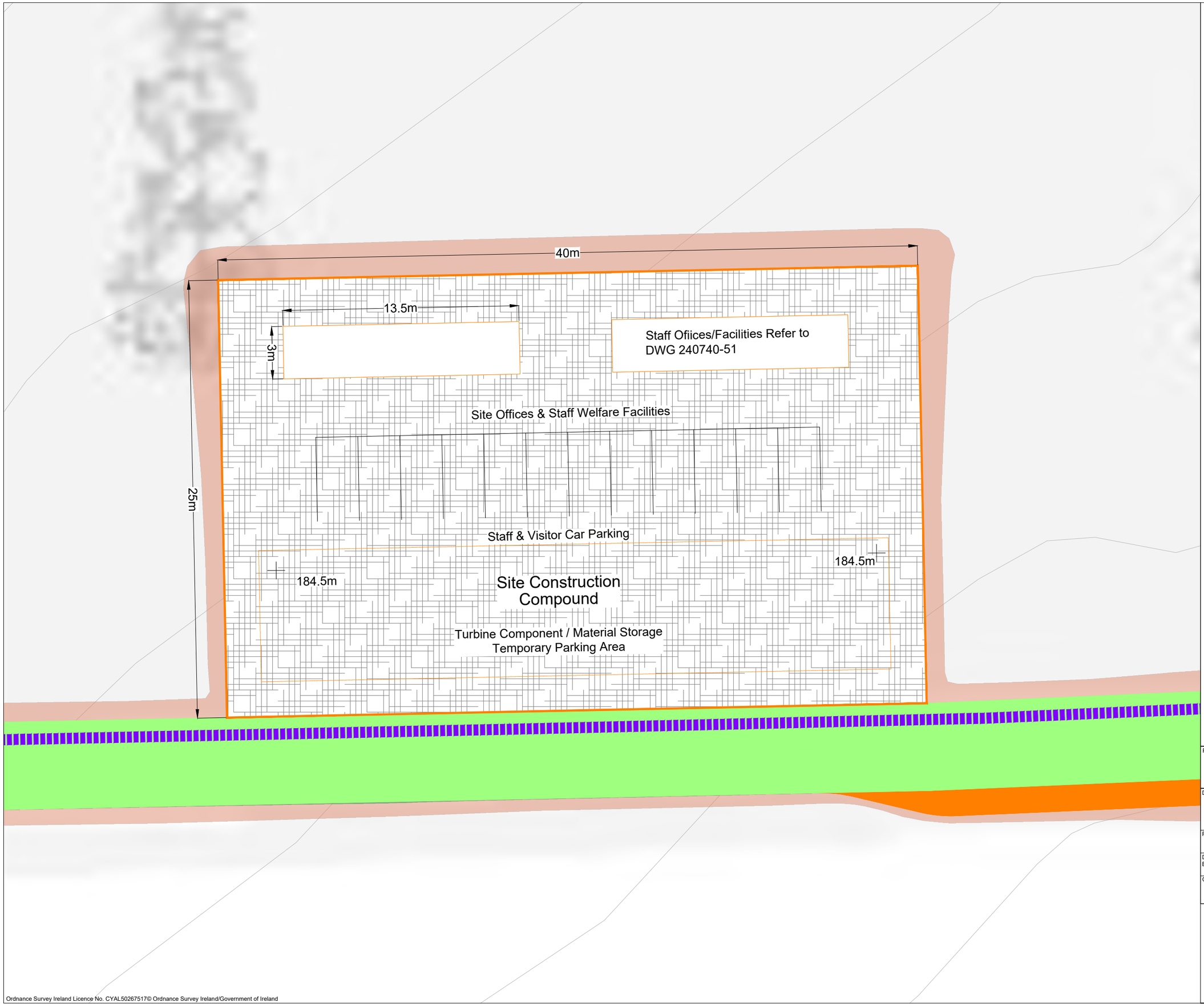
DRAWING TITLE:
Construction Compound 4

PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-21	1:250 @ A3

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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

- Existing Road to be Upgraded
- Proposed New Roads
- 33kV Electrical Cable Trench
- Cut
- Fill

N

PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
Construction Compound 5

PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-22	1:200 @ A3

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4.3.1.7 Security Compounds

Four security compounds are proposed throughout the Proposed Wind Farm site at multiple entrance points, all of which are 72.025m^2 (6m x 12m). These compounds will contain an 18m^2 security cabin (2.5m x 7.2m) and only be required during the construction phase of the Proposed Project. The approximate centrepoint of these compounds are provided in Table 4-5 below:

Table 4-5 Proposed Security Compounds

Compound Number	Dimensions (LxWm)	Location (ITM X)	Location (ITM Y)
1	6mx12m	619931	588599
2	6mx12m	620057	588509
3	6mx12m	622313	588348
5	6mx12m	619079	587222

4.3.1.8 Watercourse / Culvert Crossings

The Proposed Wind Farm site is extensively drained by a network of natural watercourses and manmade land drains. The majority of watercourses and manmade drains within the Proposed Wind Farm site drain into the River Licky which flows southwesterly through the southern part of the Site. In addition, multiple streams flow north of the Proposed Wind Farm site in a northerly direction, joining the River Brickey downstream, which flows easterly towards Dungarvan Bay. There is no infrastructure proposed within 165m of the any of these watercourses.

To facilitate the construction of the Proposed Wind Farm roads, 4 no. EPA mapped watercourse crossings are required. The following methodologies will be used:

- Bottomless box culvert
- Clear Span watercourse crossing
- Flatbed over existing watercourse crossing

Detail of the EPA mapped watercourse crossing locations within the Proposed Wind Farm site are included in Table 4-13, with construction methodologies being detailed in Section 4.8.1.5.

In addition to the natural watercourses, there are manmade agricultural and forestry drains within the Proposed Wind Farm site, which will rerouted around the Proposed Wind Farm infrastructure and/or integrated into the proposed drainage design as required.

4.3.1.8.1 *Bottomless Box Culverts*

It is proposed to construct a bottomless box culvert crossing at 2 no. locations where new watercourse crossings are required within the Proposed Wind Farm site. The construction methodology for these crossings has been designed to eliminate the requirement for in-stream works at these locations. The watercourse crossings will be constructed to the specifications of the Office of Public Work (OPW) bridge design guidelines 'Construction, Replacement or Alteration of Bridges and Culverts - A Guide to Applying for Consent under Section 50 of the Arterial Drainage Act, 1945', and in consultation with Inland Fisheries Ireland (IFI).

Abutments will be constructed from precast units combined with in-situ foundations, placed within an acceptable backfill material. Confirmatory inspections of the proposed new watercourse crossing

locations will be carried out by the Project Civil/Structural Engineer and the Project Hydrologist prior to the construction of the crossing. Please see Appendix 4-1 for the location and drawings of the bottomless box culvert crossings and Section 4.8.1.5 for the construction methodology.

4.3.1.8.2 *Clear Span Crossing*

It is proposed to construct a new clear span crossing at no. 1 location where new watercourse crossings are required within the Proposed Wind Farm site. The construction methodology for these crossings have been designed to eliminate the requirement for in-stream works at these locations. The watercourse crossings will be constructed to the specifications of the OPW bridge design guidelines 'Construction, Replacement or Alteration of Bridges and Culverts - A Guide to Applying for Consent under Section 50 of the Arterial Drainage Act, 1945', and in consultation with Inland Fisheries Ireland.

For the 1 no. clear span crossing proposed, abutments will be constructed from precast units combined with in-situ foundations, placed within an acceptable backfill material. Confirmatory inspections of the proposed new watercourse crossing locations will be carried out by the Project Civil/Structural Engineer and the Project Hydrologist prior to the construction of the crossing. Please see Appendix 4-1 for the design details and Section 4.8.1.5 for the construction methodology.

4.3.1.8.3 *Culvert Crossing*

All new proposed culverts and proposed culvert upgrades at field drain crossings required for the Proposed Wind Farm will be suitably sized for the expected peak flows in the drains.

Some culverts may be installed to manage drainage waters from works areas of the Proposed Wind Farm, particularly where the waters have to be taken from one side of an existing roadway to the other for discharge. The size of culverts will be influenced by the depth of the track or road sub-base. In all cases, culverts will be oversized to allow mammals to pass through the culvert. Culverts will be constructed as per the methodology detailed in Section 4.8.1.5. All culverts will be inspected regularly to ensure they are not blocked by debris, vegetation or any other material that may impede conveyance. Please see Appendix 4-1 for design details.

4.3.1.9 38kV Underground Electrical Cabling

It is proposed to reroute a 1230m section of the existing Dungarvan-Foxhole 38kV overhead line (OHL) underground to facilitate the Proposed Wind Farm. The route for the 38kV underground electrical cabling will be installed within a new access track across agricultural lands.

The existing 38kV OHL will be broken by two new 15m tall end masts (lattice-type towers) to facilitate the underground cabling and Proposed Wind Farm construction.

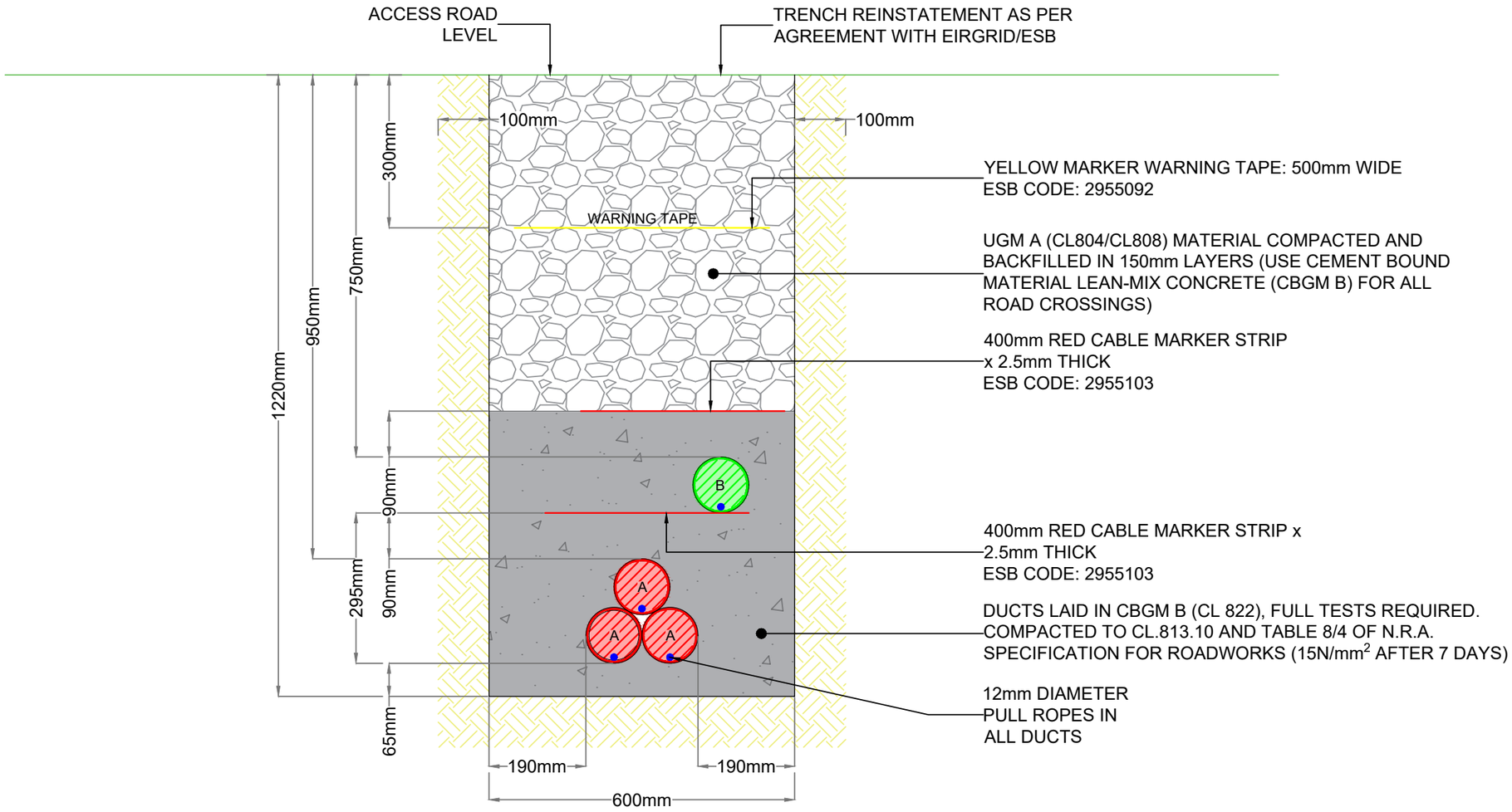
The methodology for construction of the 38kV underground electrical cabling is presented in Section 4.8.1.6 below. The 38kV underground electrical cabling trench cross sections are shown in Figure 4-23.

4.3.1.10 38kV End Masts

As discussed above, it is proposed to reroute the Dungarvan-Foxhole 38kV OHL. Two proposed 38kV end masts (lattice type towers) will be located immediately beneath the existing 38kV OHL. These masts will be 15m in height. Please see Figure 4-24 for further details. The existing 38kV OHL conductor will be terminated at these end masts to facilitate the proposed underground section. Please see section 4.8.1.7 for the construction methodology for the new 38kV end masts.

4.3.1.11 38 kV Joint Bays

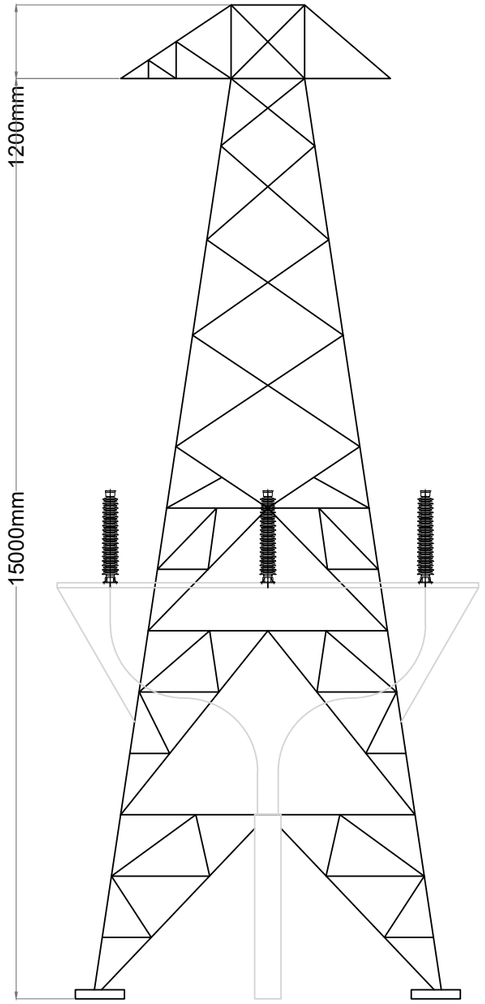
There is 1 no. joint bay proposed along the 38kV underground electrical cabling route. Please also see Section 4.8.1.8 for joint bay construction methodology.



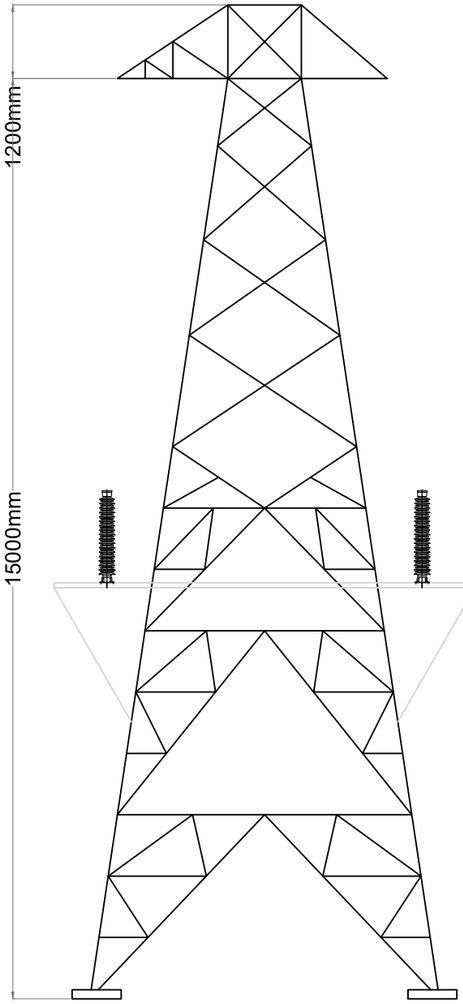
A = 110mm OUTER DIAMETER HDPE ESB APPROVED DUCT, SDR = 17.6 - POWER DUCTS
B = 110mm OUTER DIAMETER HDPE ESB APPROVED DUCT, SDR = 17.6 - COMMUNICATIONS DUCTS

PROJECT TITLE: **Slievegrine Renewable Energy Development, Co. Waterford**			
DRAWING TITLE: **38kV Trench Detail**			
PROJECT No.: **240740**		DRAWING No.: **Figure 4-23**	SCALE: **1:10 @ A3**
DRAWN BY: **JOB**	CHECKED BY: **RD**	DATE: **05.10.2026**	REVISION.: P01

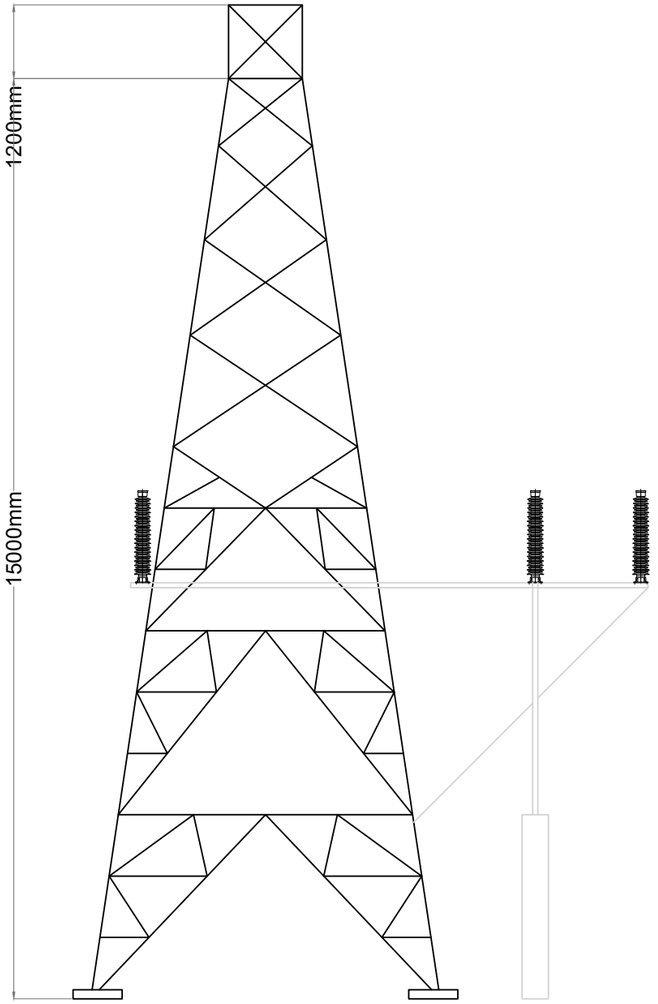
Email: info@www.mkoireland.ie /Website: www.mkoireland.ie



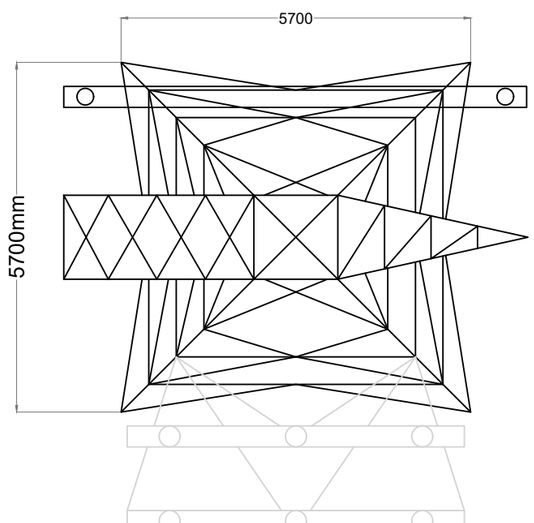
Front



Rear



Side



Plan View

PROJECT TITLE: **Slievegrine Renewable Energy Development, Co. Waterford**			
DRAWING TITLE: **38kV Tower**			
PROJECT No.: **240740**		DRAWING No.: **Figure 4-24**	SCALE: **1:100 @ A3**
DRAWN BY: **JOB**	CHECKED BY: **RD**	DATE: **05.10.2026**	REVISION.: P01

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4.3.1.12 Proposed 110kV Substation

It is proposed to construct a 110kV electricity substation within the Proposed Wind Farm site, as shown in Figure 4-1 and Figure 4-4. The Proposed 110kV Substation is located within a forestry block and will be accessed via an existing forestry access junction off the L-2024 connected to the Proposed Wind Farm access roads.

The footprint of the Proposed 110kV Substation compound measures approximately 9,148 square metres in area and will include 2 no. control building, staff parking facilities and all electrical substation components necessary to consolidate the electrical energy generated by each wind turbine, and export that electricity from the Proposed 110kV Substation to the national grid. The layout and elevations of the Proposed 110kV Substation are shown on Figure 4-25 and Figure 4-26. The construction and exact layout of electrical equipment in the Proposed 110kV Substation will be to ESB Networks specifications.

The Proposed 110kV Substation compound will include steel palisade fencing (approximately 2.6 metre high or as otherwise required by ESB), and internal fences will also segregate different areas within the main substation.

The Proposed 110kV Substation will remain in place after the operational phase of the Proposed Wind Farm as it will be under the ownership and control of the ESB Networks and will form a permanent part of the national electricity grid.

4.3.1.12.1 *Substation Control Buildings*

Two control buildings will be located within the Proposed 110kV Substation compound. The Independent Power Producer (IPP) Control Building will measure approximately 18.1 metres by 10.7 metres and 6 metres in height. It will be located at the southern edge of the Proposed 110kV Substation compound. The EirGrid Control Building will be located towards the centre of the Proposed 110kV Substation compound and will measure approximately 25 metres by 18 metre and 7 metres in height. Layout and elevation drawings of the control buildings are included in Figure 4-27 and Figure 4-28 below.

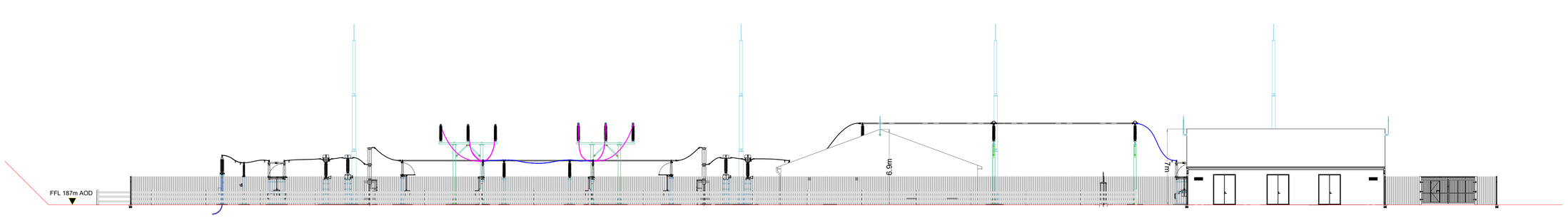
The control buildings will include staff welfare facilities. Toilet facilities will be installed with a low-flush cistern and low-flow wash basin. Due to the specific nature of the Proposed 110kV Substation, there will be a very small water requirement for occasional toilet flushing and hand washing, and therefore a potable water source is not required. It is proposed to either harvest rainwater from the roofs of the buildings or, alternatively, install a groundwater well adjacent to the Proposed 110kV Substation in accordance with the Institute of Geologists Ireland, Guide for Drilling Wells for Private Water Supplies (IGI, 2007). The well will be flush to the ground and covered with a standard manhole. A pump house is not required as an in-well pump will direct water to a water tank within the roof space of the control building. Bottled water will be supplied for drinking, if required.

It is not proposed to treat wastewater on site. Wastewater from the staff welfare facilities in the control buildings will be managed by means of a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to a licenced wastewater treatment plant.

Such a proposal for managing the wastewater arising on site has become almost 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 Coimisiún Pleanála as an acceptable proposal.

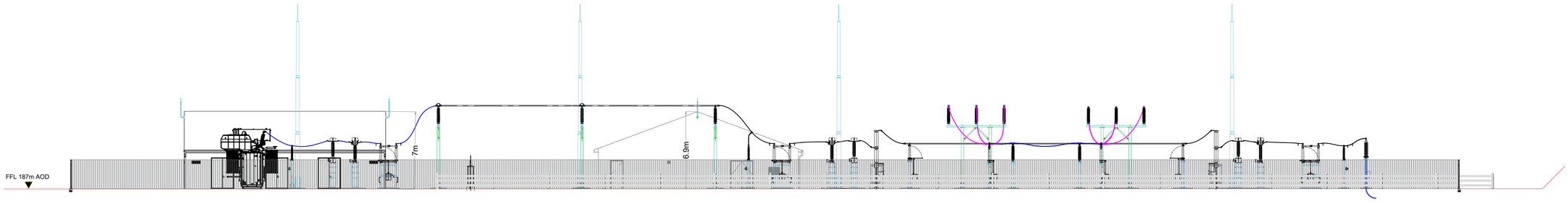
The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. Full details of the proposed tank alarm system can be submitted to the Planning Authority in advance of any works commencing on-site. The wastewater storage tank alarm will be part of a continuous stream of data from the Proposed Wind Farm turbines, wind measurement devices and Proposed 110kV 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 Proposed 110kV Substation underground storage tank.



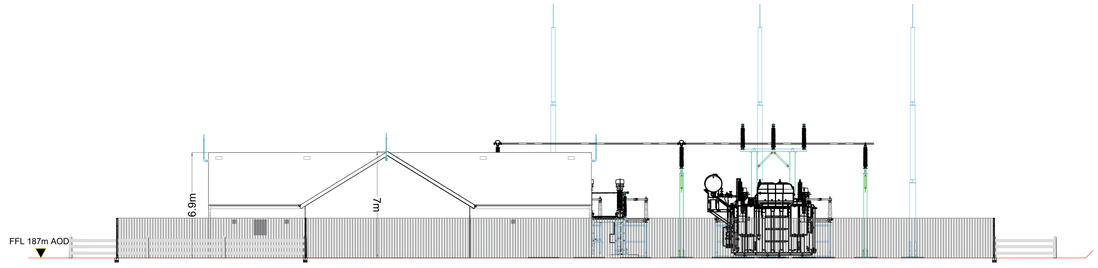
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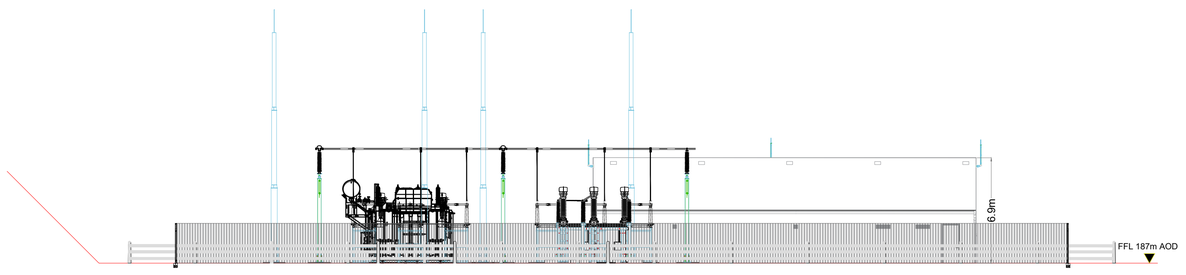
East Elevation

Scale 1:200 @ A1



South Elevation

Scale 1:200 @ A1



North Elevation

Scale 1:200 @ A1

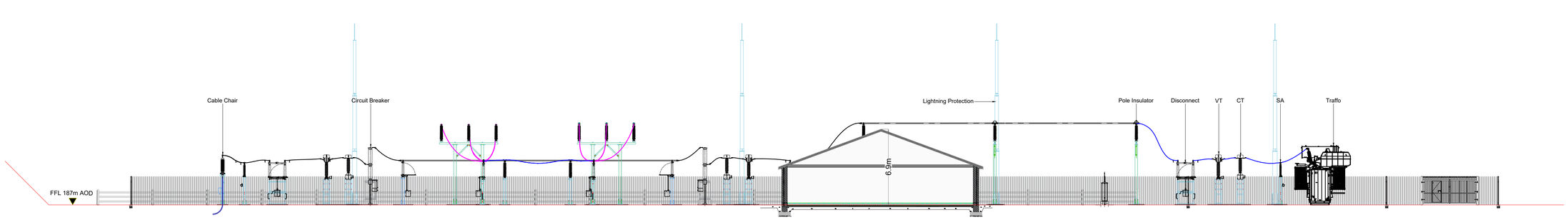
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Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
110kV Substation Elevations

PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-25	1:200 @ A1

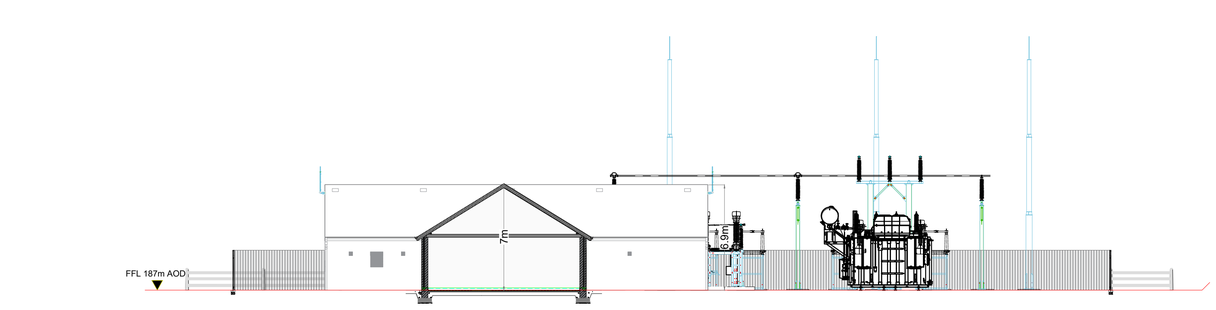
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Section A-A

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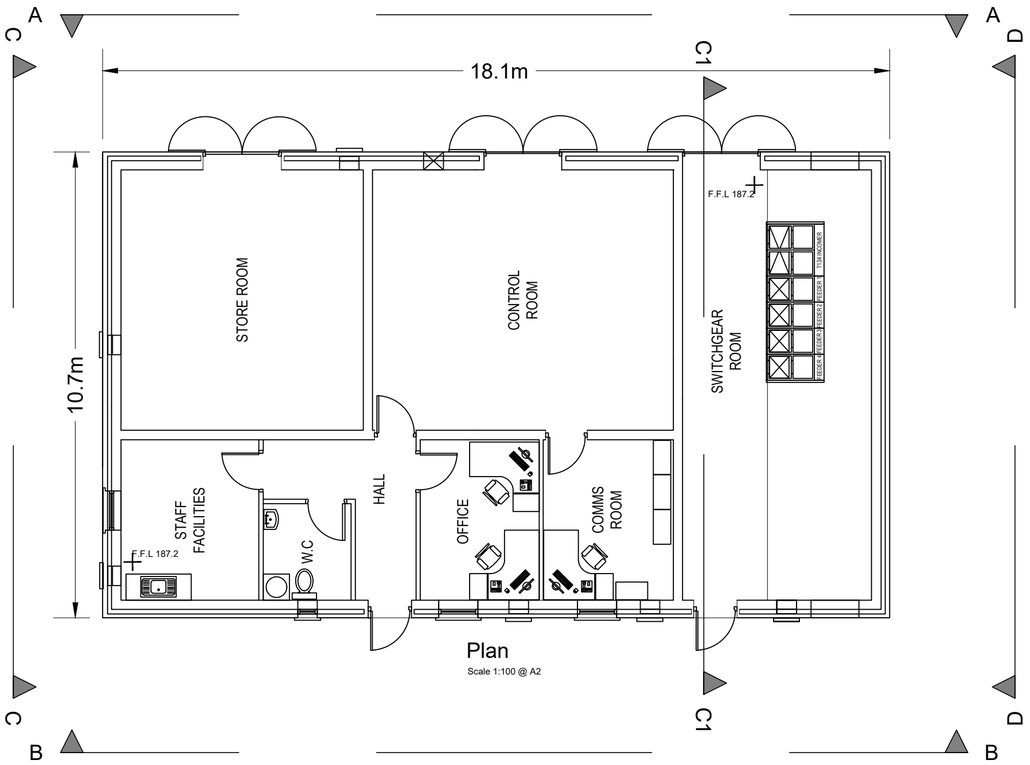


Section B-B

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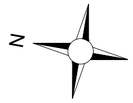
PROJECT TITLE: **Slievegrine Renewable Energy Development, Co. Waterford**			
DRAWING TITLE: **110kV Substation Sections**			
PROJECT No.: **240740**		DRAWING No.: **Figure 4-26**	SCALE: **1:200 @ A1**
DRAWN BY: **JOB**	CHECKED BY: **RD**	DATE: **05.10.2026**	REVISION.: P01

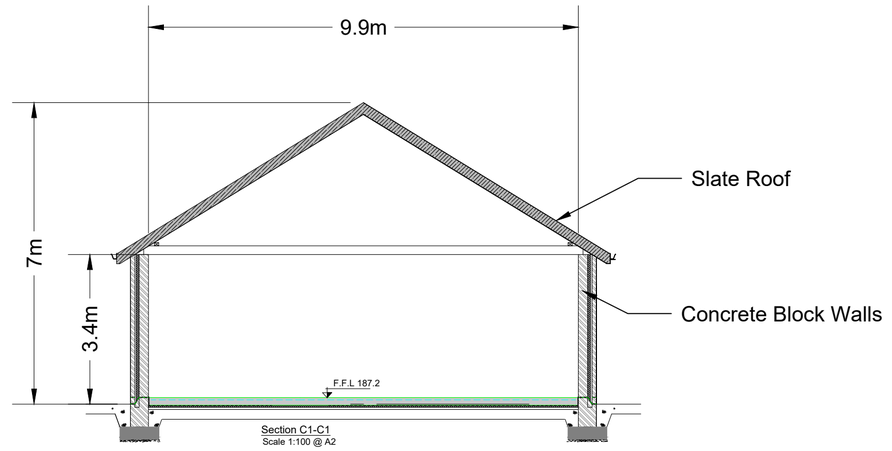
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Plan

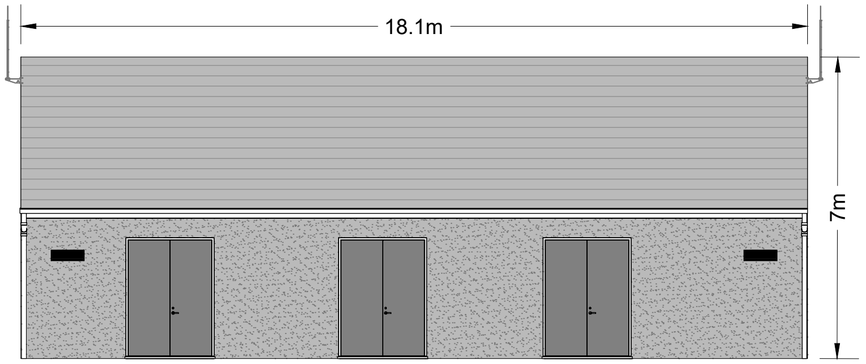
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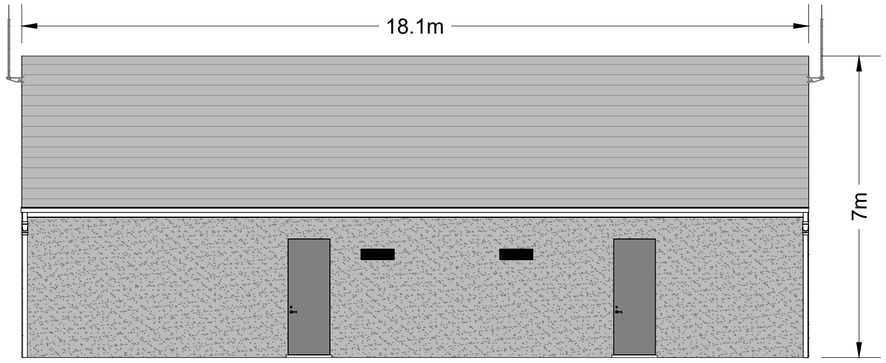
Section C1-C1

Scale 1:100 @ A2



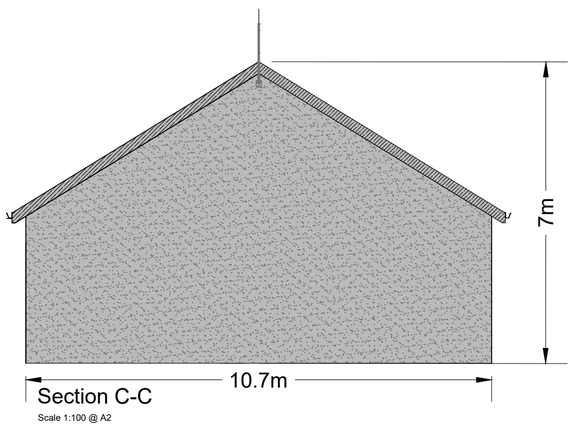
Section A-A

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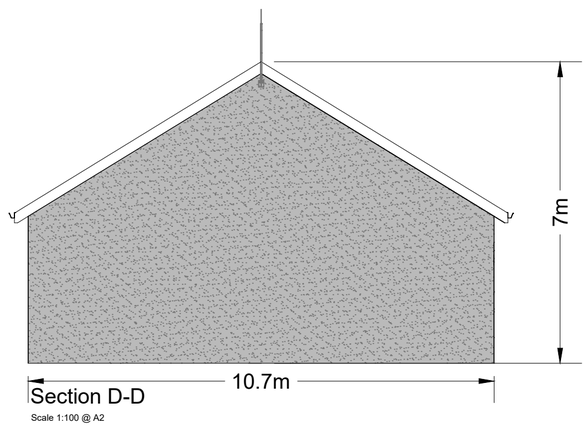
Section B-B

Scale 1:100 @ A2



Section C-C

Scale 1:100 @ A2



Section D-D

Scale 1:100 @ A2

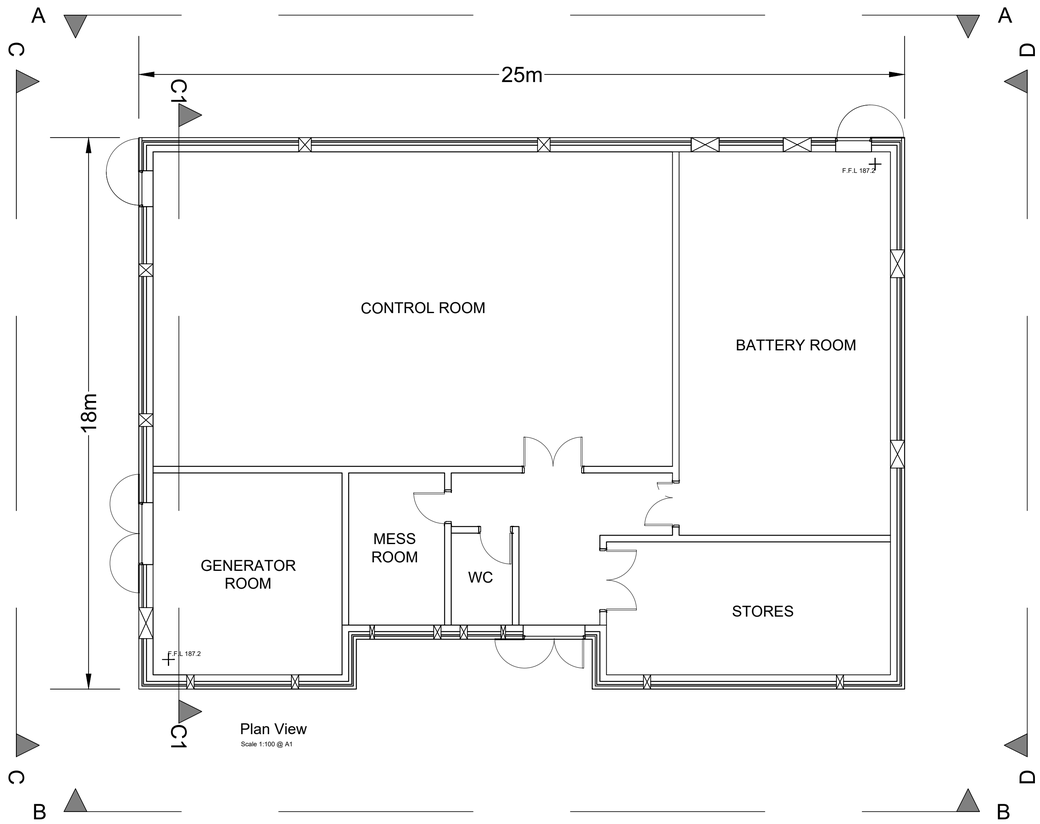
PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
110kV IPP Building

PROJECT No.:	DRAWING No.:	SCALE:
240740	**Figure 4-27**	**1:100 @ A2**

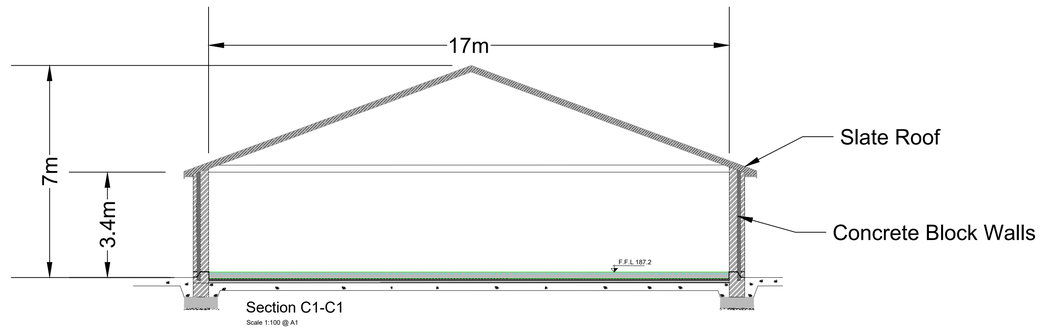
DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	**RD**	**05.10.2026**	P01

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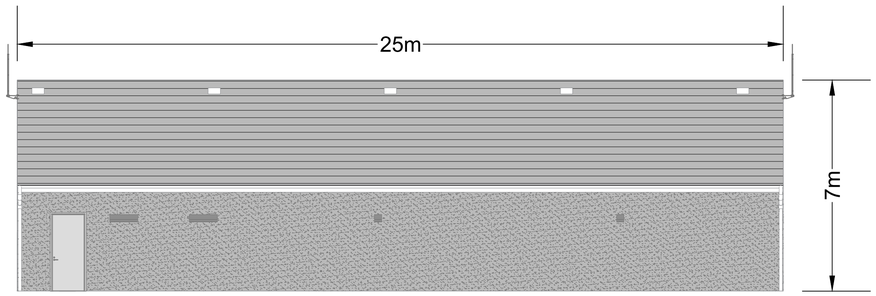


Plan View
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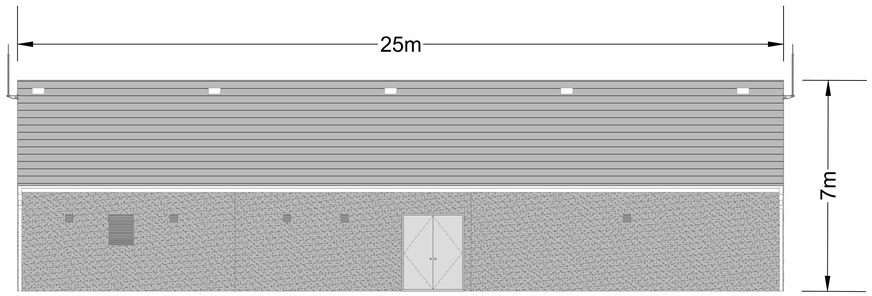




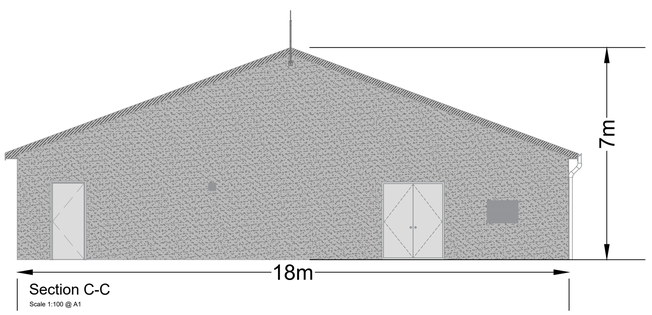
Section C1-C1
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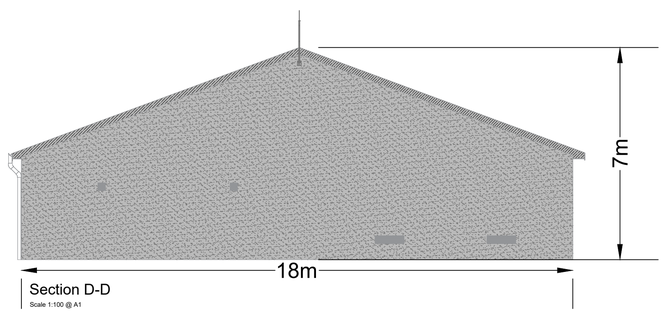
Section A-A
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Section B-B
Scale 1:100 @ A1



Section C-C
Scale 1:100 @ A1



Section D-D
Scale 1:100 @ A1

PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
110kV Eirgrid Building

PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-28	1:100 @ A1

DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	RD	05.10.2026	P01

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4.3.2 Proposed Grid Connection

4.3.2.1 Proposed 110kV Underground Cabling Route

It is proposed to connect the Proposed 110kV Substation to the Proposed 220kV Loop-in Substation in the townland of Ballycullane, Co Waterford via 110kV underground electrical cabling. The Proposed 110kV Underground Cabling Route as illustrated in Figure 4-5, is approximately 9km in length and located primarily within the public road corridor, with a short section (approximately 262m) located within a private forestry road west of the Proposed 110kV Substation and another short section (approximately 788m) being located within proposed new access roads through agricultural pastures in the townlands of Graigue and Ballycullane. 13 joint bays (described in Section 4.8.2.4 below) are required along the Proposed 110kV Underground Cabling Route.

The Proposed 110kV Underground Cabling Route will originate at the Proposed 110kV Substation and run north for approximately 262m through an existing site road towards the L2024 local road. The Proposed 110kV Underground Cabling Route continues underneath the L2024 local road network for approximately 1.6km before following the L2021 west for approximately 5.2km. The Proposed 110kV Underground Cabling Route then follows the R671 regional road north for 923m before entering the L99997 local road for approximately 188m, traversing through agricultural pastures for approximately 788m before connecting into the Proposed 220kV Loop-in Substation.

The Proposed 110kV Underground Cabling Route will remain in place after the operational phase of the Proposed Wind Farm as it will be under the ownership and control of the ESB Networks and will form a permanent part of the national electricity grid.

The methodology for construction of the Proposed 110kV Underground Cabling Route is presented in Section 4.8.2.3 below. The Proposed 110kV Underground Cabling Route is illustrated in Figure 4-5 and Figure 4-1. The trench cross sections for the Proposed 110kV Underground Cabling Route are shown in Appendix 4-1.

4.3.2.2 110kV Joint Bays

There are 13 no. joint bays proposed along the Proposed 110kV Underground Cabling Route, approximately 600 to 800 metres apart or as otherwise required by Eirgrid/ESBN and electrical requirements. The 110kV Joint Bay Locations have been tabulated below, see Table 4-6. Please also see Section 4.8.2.4 for joint bay construction methodology.

Table 4-6 Joint Bay Locations

Joint Bay	Easting	Northing	Road
JB1	620065	588515	Private Forestry Road
JB2	619371	588722	L-2024
JB3	618752	588648	L-2024
JB4	618048	588720	L2021
JB5	617220	588736	L2021
JB6	616581	588868	L2021
JB7	615889	589006	L2021

JB8	615180	589276	L2021
JB9	614511	589149	L2021
JB10	613994	588709	L2021
JB11	613364	589063	R671
JB12	613306	589464	Proposed New Access Road
JB13	613336	589925	Proposed New Access Road

4.3.2.3 Proposed 220kV Loop-in Substation

It is proposed to construct a 220kV electricity substation within the townland of Ballycullane, as shown in Figure 4-1 and Figure 4-5. The Proposed 220kV Loop-in Substation is located within agricultural pastures and will be accessed via a new proposed site entrance off of the L99997 local road in the townland of Graigue.

The footprint of the Proposed 220kV Loop-in Substation compound measures approximately 23,211 square metres in area and will include 2 no. control building, staff parking facilities and all electrical substation components necessary to export the electricity imported from the Proposed 110kV Substation to the national grid. The layout and elevations of the Proposed 220kV Loop-in Substation are shown on Figure 4-29 and Figure 4-30. The construction and exact layout of electrical equipment in the Proposed 220kV Loop-in Substation will be to ESBN/EirGrid specifications.

The Proposed 220kV Loop-in Substation compound will include steel palisade fencing (approximately 2.6 metre high or as otherwise required by ESB), and internal fences will also segregate different areas within the main substation.

Screening planting is proposed as part of the Proposed 220kV Loop-in Substation which will consist of c.250m of linear planting features consisting of native evergreen species. This planting is located surrounding the northwestern portion of the compound. The screening planting will provide screening of the 220kV Loop-in Substation compound to nearby sensitive receptors, as well as improving connectivity and linkages of the existing linear features on site which will have a positive impact for local biodiversity.

The Proposed 220kV Loop-in Substation and 220kV underground electrical cabling will remain in place after the operational phase of the Proposed Wind Farm as they will be under the ownership and control of the ESB Networks and will form a permanent part of the national electricity grid.

4.3.2.3.1 *Substation Control Buildings*

Two control buildings will be located within the Proposed 220kV Loop-in Substation compound. Control Building 1 (Generator Side) will measure approximately 18.1m metres by 10.7 metres and 6 metres in height. It will be located at the eastern edge of the Proposed 220kV Loop-in Substation compound. Control Building 2 (Transmission Side) will be located towards the western side of the Proposed 220kV Loop-in Substation compound and will measure approximately 25 metres by 18 metre and 7 metres in height. Layout and elevation drawings of the control buildings are included in Figure 4-31 to Figure 4-32 below.

The control buildings will include staff welfare facilities. Toilet facilities will be installed with a low-flush cistern and low-flow wash basin. Due to the specific nature of the Proposed 220kV Loop-in Substation, there will be a very small water requirement for occasional toilet flushing and hand washing, and therefore a potable water source is not required. It is proposed to either harvest rainwater from the roofs of the buildings or, alternatively, install a groundwater well adjacent to the Proposed 220kV Loop-in Substation in accordance with the Institute of Geologists Ireland, Guide for Drilling Wells for Private Water Supplies (IGI, 2007). The well will be flush to the ground and covered with a standard manhole. A pump house is not required as an in-well pump will direct water to a water tank within the roof space of the control building. Bottled water will be supplied for drinking, if required.

It is not proposed to treat wastewater on site. Wastewater from the staff welfare facilities in the control buildings will be managed by means of a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to a licenced wastewater treatment plant.

Such a proposal for managing the wastewater arising on site has become almost 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 Coimisiún 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. Full details of the proposed tank alarm system can be submitted to the Planning Authority in advance of any works commencing on-site. The wastewater storage tank alarm will be part of a continuous stream of data from the Proposed 220kV Loop-in 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 Proposed 220kV Loop-in Substation underground storage tank.

4.3.2.3.2 220kV Underground Electrical Cabling

It is proposed to construct a 220kV underground cabling connection between the Proposed 220kV Loop-in Substation and the existing 220kV Knockraha to Cullenagh overhead line (OHL). The route for the 220kV underground electrical cabling will be approximately 564m long and within proposed new roads adjacent to the Proposed 220kV Loop-in Substation.

The existing 220kV OHL will be broken by two new end masts (lattice-type towers) 21.5 metres in height, to facilitate the connection to the Proposed 220kV Loop-in Substation via the 220kV underground electrical cabling. The 220kV underground electrical cabling route will consist of two cable trenches, and once constructed, electricity on the Knockraha-Cullenagh 220kV OHL will be transmitted through the Proposed 220kV Loop-In Substation, hence the 'loop-in/loop-out' configuration of the substation.

The construction methodology for the 220kV underground electrical cabling is presented in Section 4.8.2.6 below. The 220kV underground electrical cabling route is illustrated in Figure 4-5. The trench cross sections for the 220kV underground electrical cabling are illustrated in Appendix 4-1.

4.3.2.3.3 220kV End Masts

It is proposed to connect the Proposed 220kV Loop-In Substation to the existing 220kV Knockraha-Cullenagh OHL. Two proposed 220kV end masts (lattice type towers) will be located immediately beneath the existing 220kV OHL. Please see Figure 4-5 for location details. The existing 220kV OHL conductor will be terminated at these end masts to facilitate a new OHL loop connection following the proposed 220kV underground electrical cabling route leading to and out of the Proposed 220kV Loop-In Substation. Please see section 4.8.2.7 for the construction methodology for the new 220kV end masts. Please see Figure 4-33 for details of the proposed 220kV end masts.

Refer to Dwg 240740 - 43.1 to 240740 - 43.4 for Details

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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
- Proposed New Roads
- 220kV Cable Service Track
- 110kV Electrical Cable Trench
- 220kV Electrical Cable Trench
- Existing 38kV OHL to be Undergrounded
- 110kV Joint Bay/Comms Chamber (Refer to DWG 240740 - 54 - for details)
- Cut
- Fill
- Linear Loss
- Proposed Replanting
- Proposed Screen Planting

148.5m
170.5m
A
B
+60m
Site Compound
80m
+90m
Temporary Parking Area
Turbine Component / Material Storage
Site Offices & Staff Welfare Facilities
Staff & Visitor Car Parking
Control Building
10.7m
18.1m
Emgrid Building
19m
25m
66m
35m

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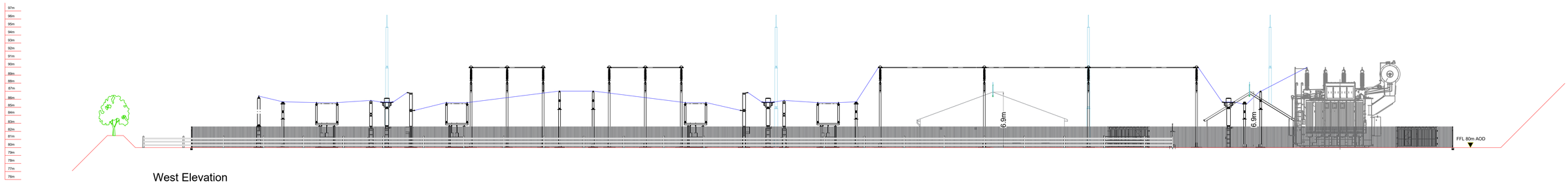
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Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
220kV Substation

PROJECT No.	DRAWING No.	SCALE
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DRAWN BY: JOB / CHECKED BY: AC	DATE: 05.10.2026	REVISION: P01

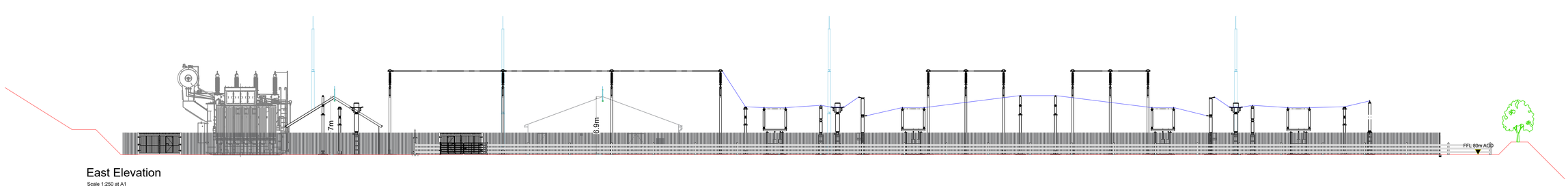
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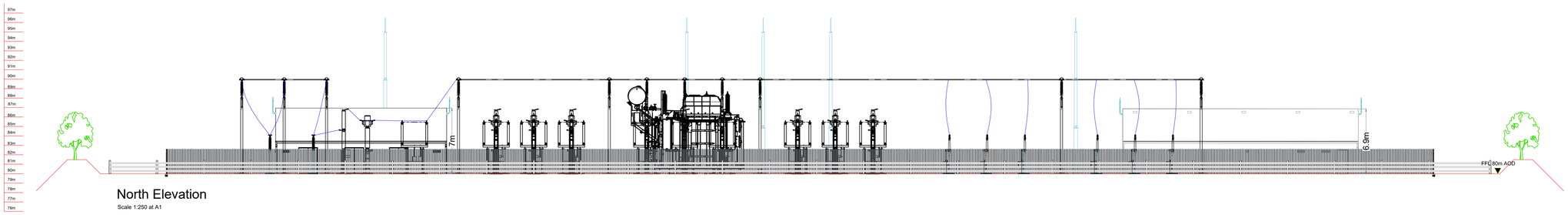
West Elevation

Scale 1:250 at A1



East Elevation

Scale 1:250 at A1



North Elevation

Scale 1:250 at A1



South Elevation

Scale 1:250 at A1

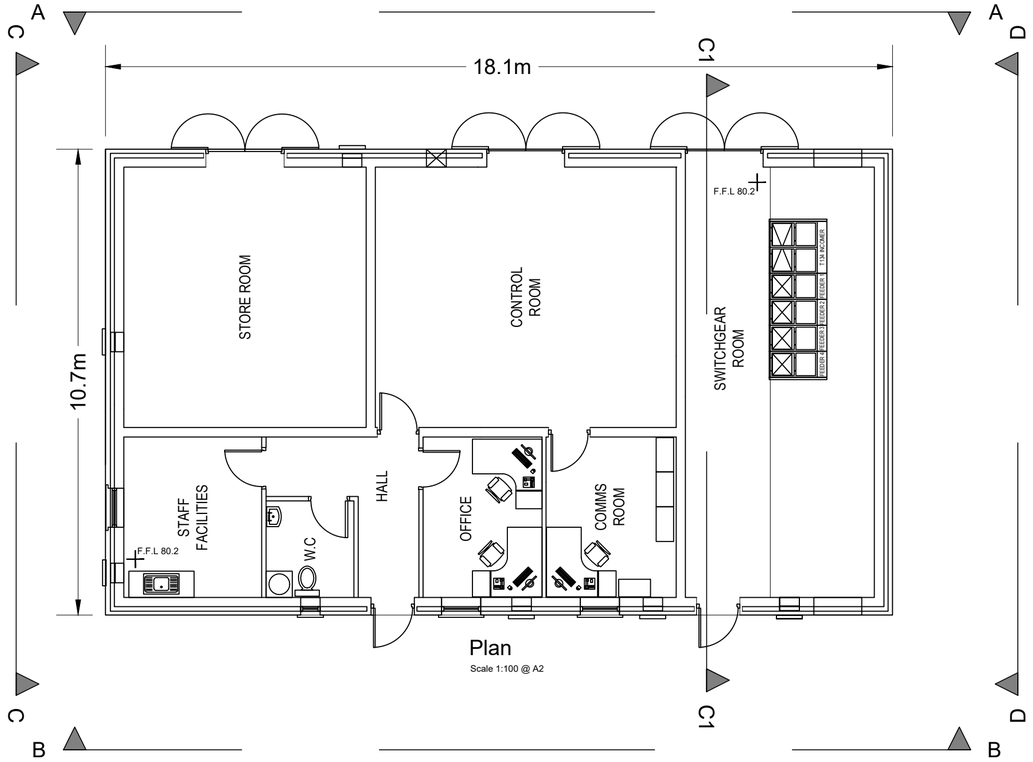
PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
220kV Substation Elevations

PROJECT No.:	DRAWING No.:	SCALE:
240740	**Figure 4-30**	**1:250 @ A1**

DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	**RD**	**05.10.2026**	P01

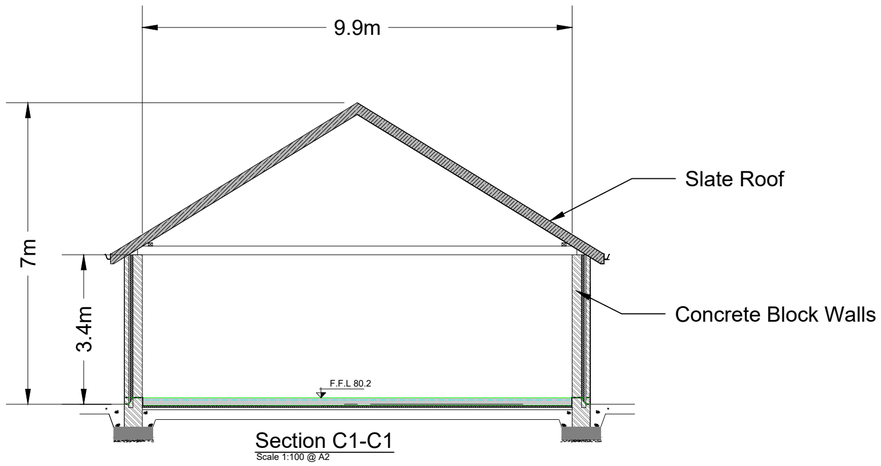
Email: info@www.mkoireland.ie /Website: www.mkoireland.ie



Plan

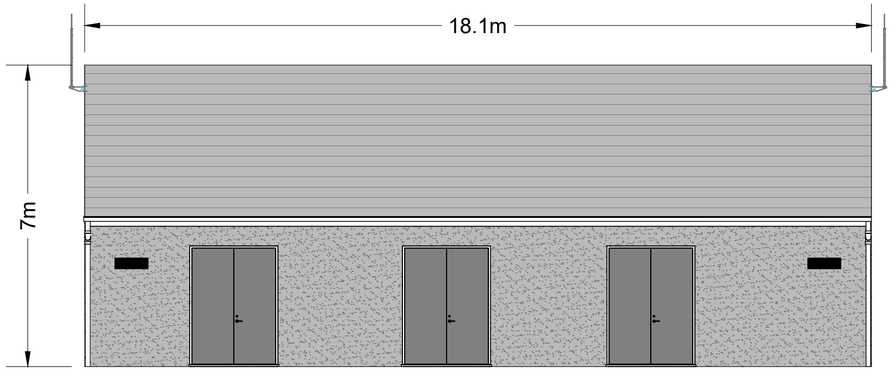
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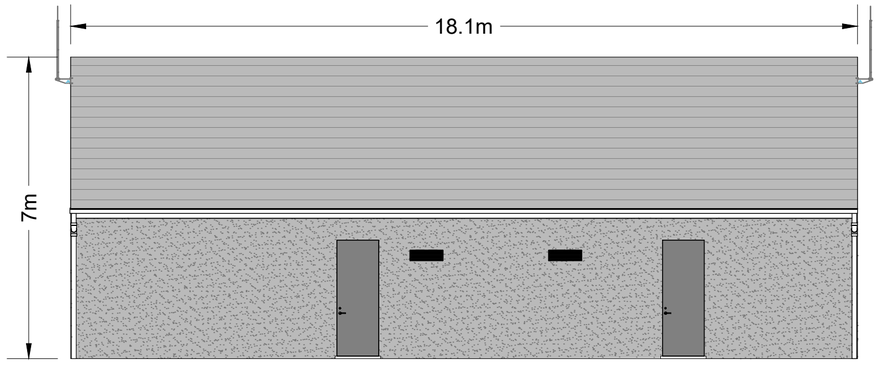
Section C1-C1

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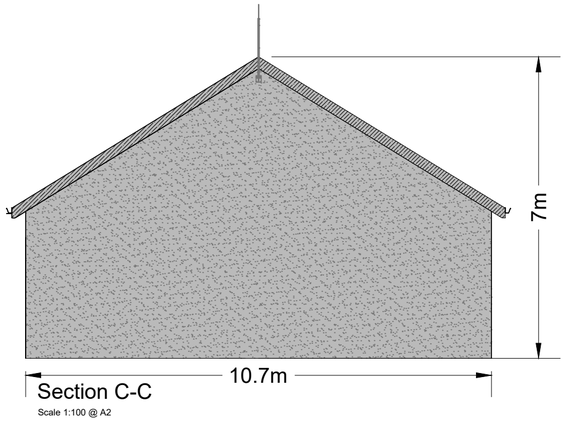
Section A-A

Scale 1:100 @ A2



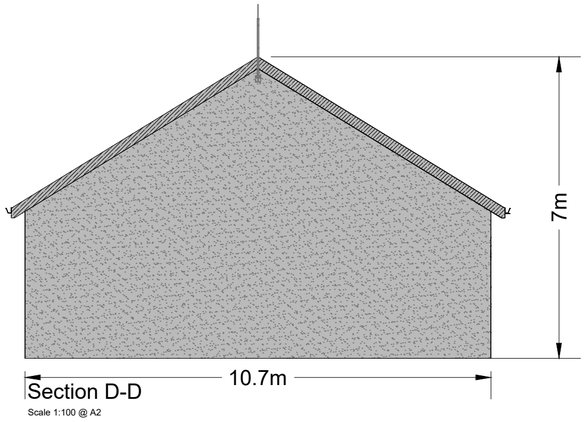
Section B-B

Scale 1:100 @ A2



Section C-C

Scale 1:100 @ A2



Section D-D

Scale 1:100 @ A2

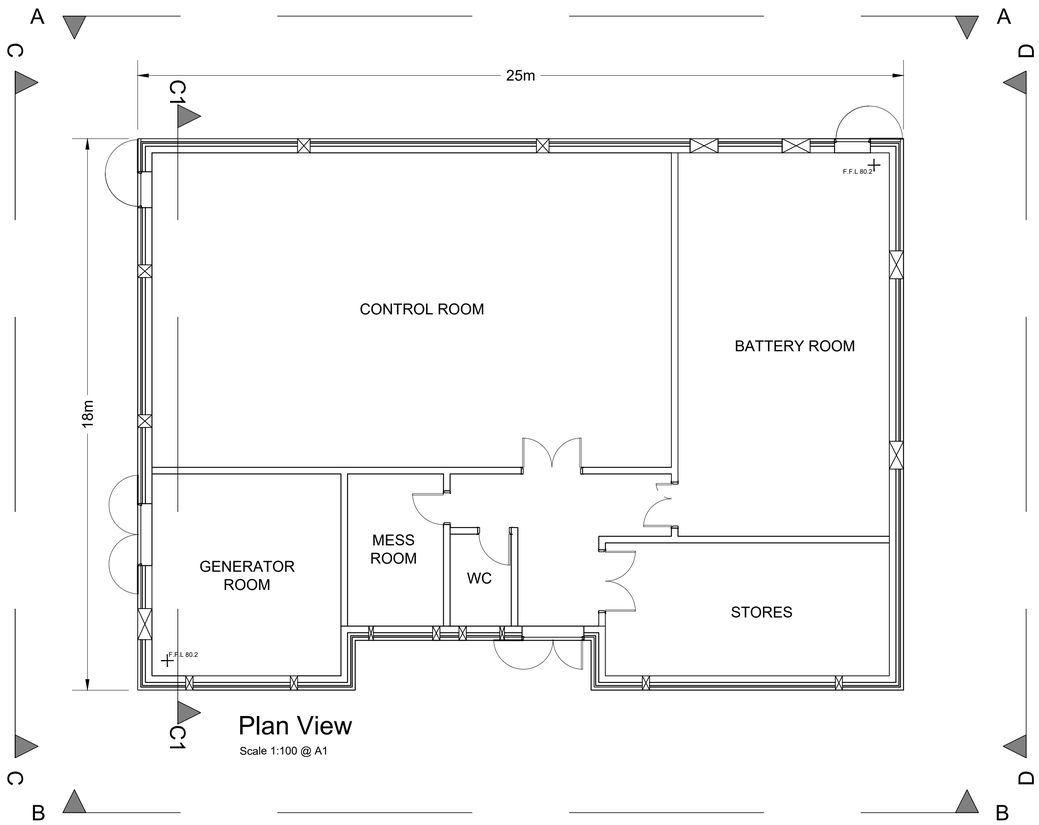
PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
220kV Control Building

PROJECT No.:	DRAWING No.:	SCALE:
240740	**Figure 4-31**	**1:100 @ A2**

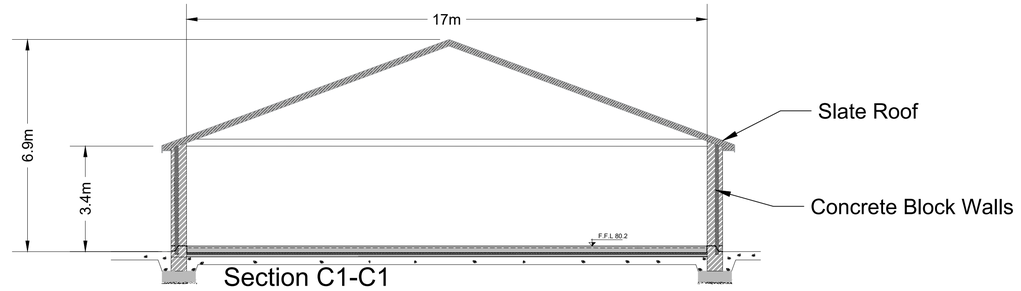
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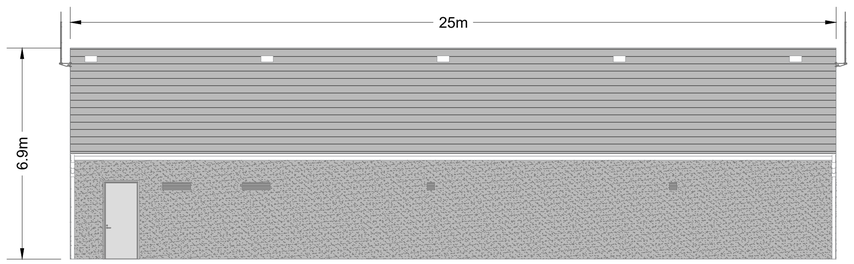
Plan View

Scale 1:100 @ A1



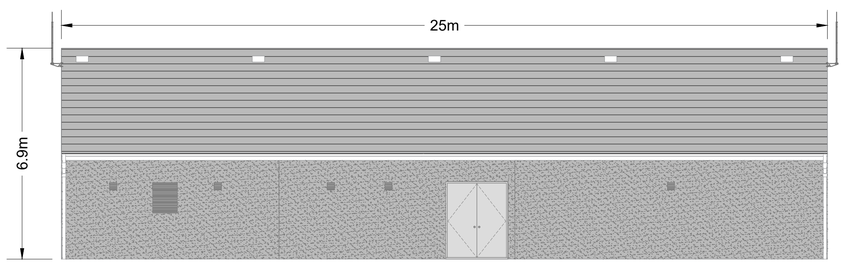
Section C1-C1

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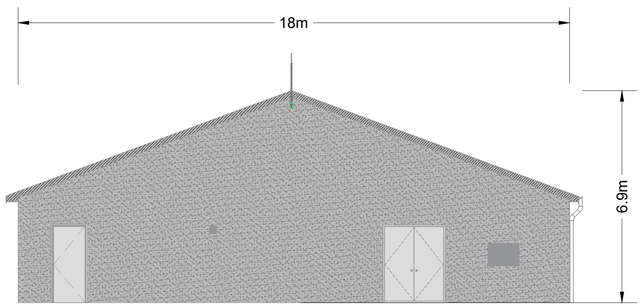
Section A-A

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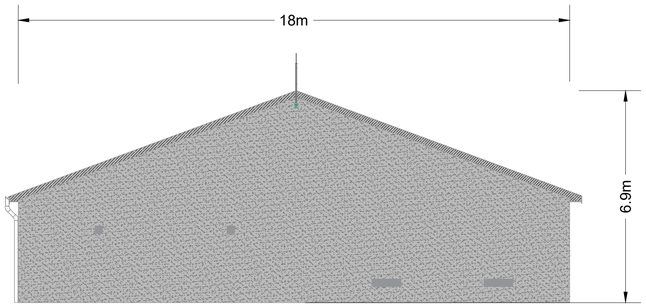
Section B-B

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Section C-C

Scale 1:100 @ A1



Section D-D

Scale 1:100 @ A1

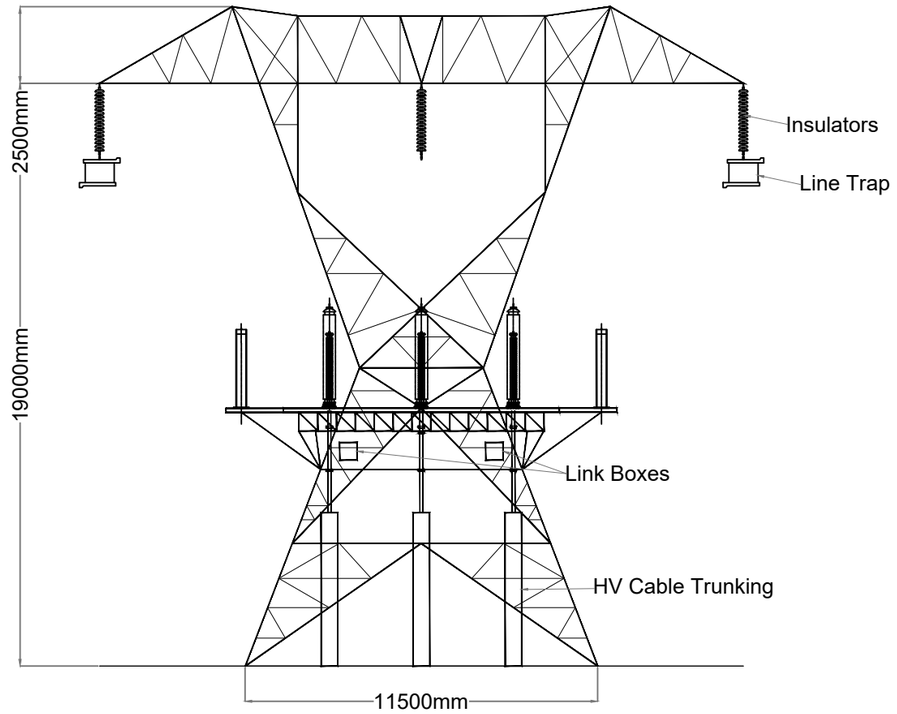
PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

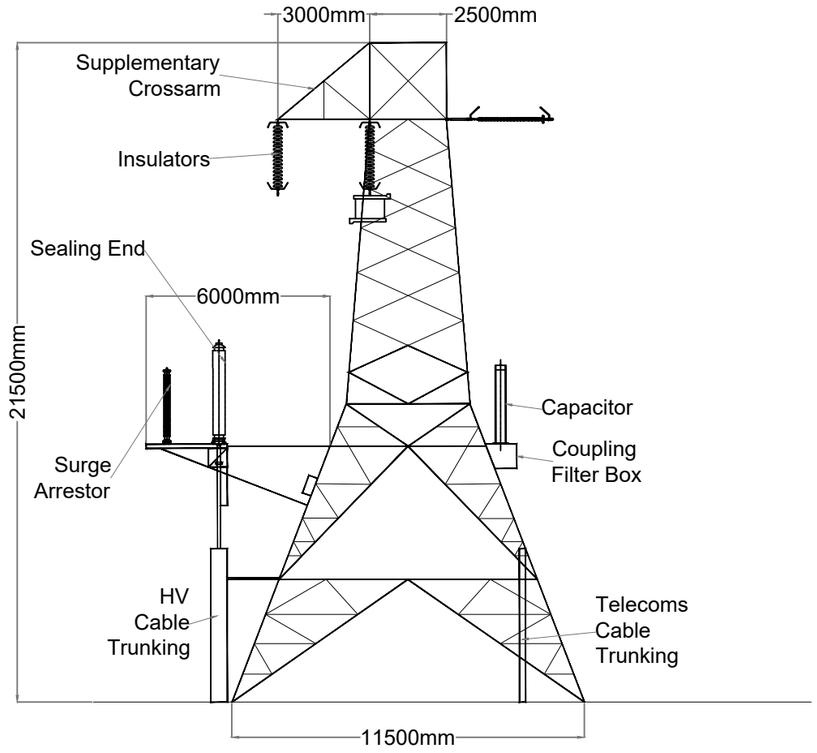
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220kV Eirgrid Building

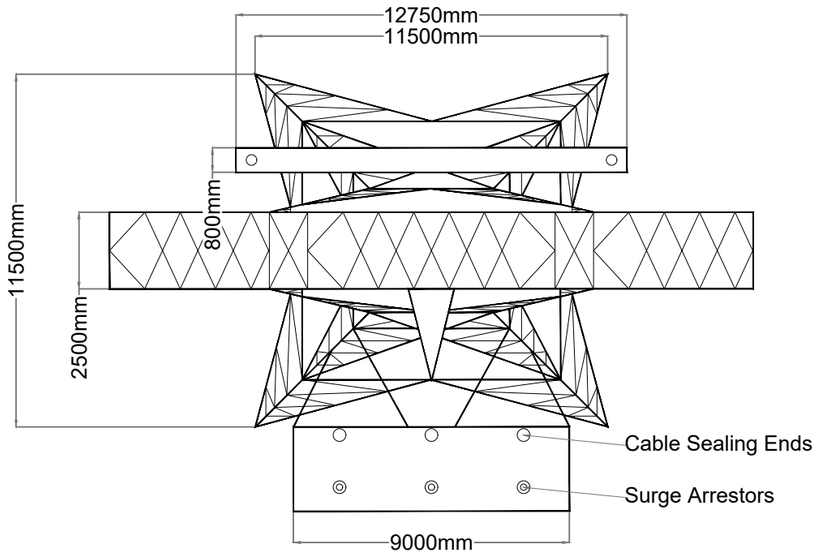
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240740	Figure 4-32	1:100 @ A1

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PROJECT TITLE: **Slievegrine Renewable Energy Development, Co. Waterford**			
DRAWING TITLE: **220kV Tower**			
PROJECT No.: **240740**		DRAWING No.: **Figure 4-33**	SCALE: **5:1 @ A3**
DRAWN BY: **JOB**	CHECKED BY: **RD**	DATE: **05.10.2026**	REVISION.: P01

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4.3.2.3.4 *Site Roads*

To provide access to the Proposed 220kV Loop-in Substation, it is proposed to upgrade approximately 210 metres of existing roads and tracks, and to construct approximately 1315 metres of new access road within the Proposed Grid Connection site. It is considered that the existing and proposed road network will be wide enough that there will be no need to construct passing bays for the construction phase of the Proposed Grid Connection.

Construction of New Roads

As noted above, approximately 1315m of new roads will be constructed in order to facilitate the Proposed Grid Connection. Due to the ground conditions, new access tracks proposed on site are proposed to be founded and located on competent stratum. The make-up of the founded access tracks is a stone thickness of c. 500mm. A cross-section detail of a new excavated road is also shown in Figure 4-13.

The details on the construction methodology for new excavated roads is outlined below in Section 4.8.1.2.1.

Upgrade of Existing Access Roads or Tracks

As noted above, approximately 210m of existing roads and access tracks will be upgraded as part of the Proposed Grid Connection construction phase. The existing tracks onsite were constructed using the excavate and replace construction technique, therefore proposed road widening will be founded on competent stratum. Cross section details of the upgrade of existing roads are shown as Figure 4-12. Details on the construction methodology for the upgrading of existing tracks and roads is outlined below in Section 4.8.1.2.2.

4.3.2.4 Watercourse and Service Crossings

There are 15 no. identified watercourse crossings along the Proposed 110kV Underground Cabling Route, of which 2 no. are EPA/OSI mapped. The construction methodology for the 2 no. EPA/OSI mapped has been designed to eliminate the requirement for in-stream works at these locations. There are no watercourse or service crossings required along the 220kV underground electrical cabling route. The various crossing methodologies to be employed along the 110kV underground electrical cabling route include the following:

- Type A: Crossing using standard trefoil formation (Figure 4-34)
- Type B: Flatbed formation under (Figure 4-35)
- Type C: Flatbed Formation over (Figure 4-36)
- Type D: Horizontal Directional Drilling (Figure 4-37)

A description of the construction methods employed at watercourse crossings are described in Section 4.8.2.8 below. An illustration of the proposed crossing methodology at the 2 no. EPA/OSI mapped crossing locations is included within the detailed site layout drawings in Appendix 4-1. A description of proposed methodologies for the crossing of services along the proposed underground cable route is included in Section 4.8.2.3 below.

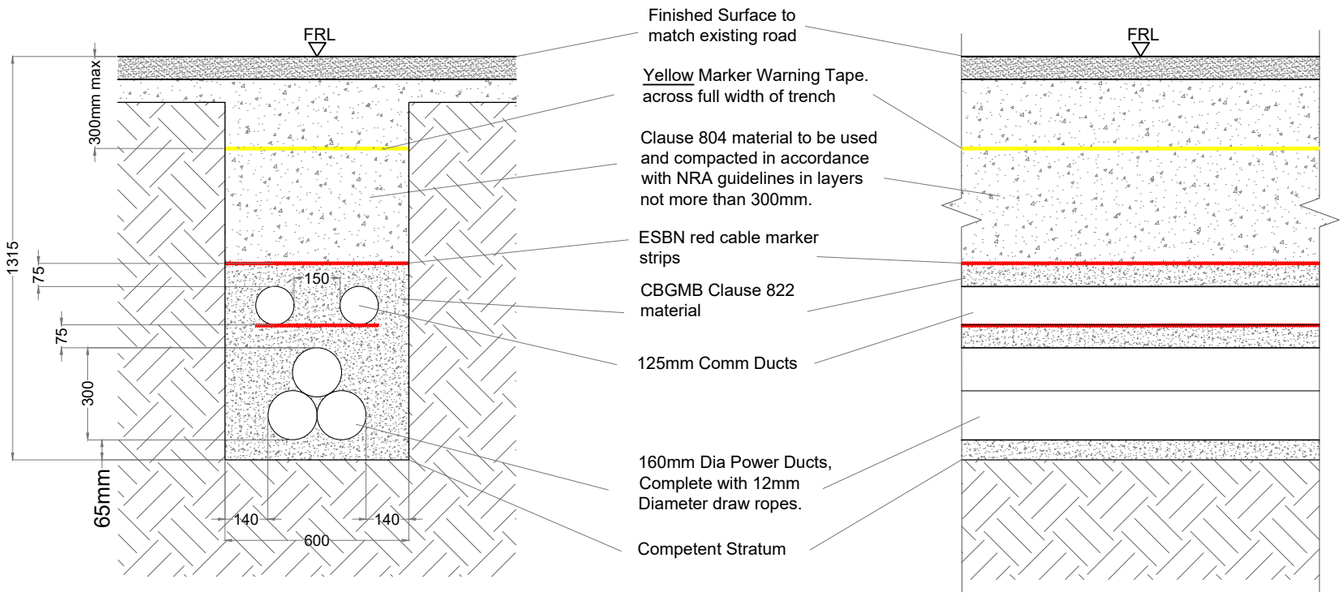
4.3.2.5 Construction Compound

There is 1 no. construction compound proposed as part of the Proposed Grid Connection. A construction compound measuring approximately 2,312m^2 will be located to the south of the Proposed 220kV Loop-in Substation at the approximate coordinates X 613172, Y 589937 (ITM).

The location of the construction compound is shown on the Proposed Grid Connection layout drawing in Figure 4-5, with further detail depicted in Figure 4-28.

The construction compound will consist of a bunded refuelling and containment area for the storage of lubricants, oils and site generators etc, and full retention oil interceptor, waste storage area, temporary site offices, staff facilities, and car-parking areas for staff and visitors. Temporary port-a-loo toilets and 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 permitted waste collector to wastewater treatment plants. There will also be a water supply on site for hygiene purposes, by way of a temporary storage tank. The construction compounds will also include a bunded refuelling and containment area for the storage of oil, lubricants and site generators etc, and full retention oil interceptor.

All construction compound facilities will be removed as part of the post-construction reinstatement works of the Proposed Project. The construction compounds will be let naturally revegetate during the Operational Phase of the Proposed Project.

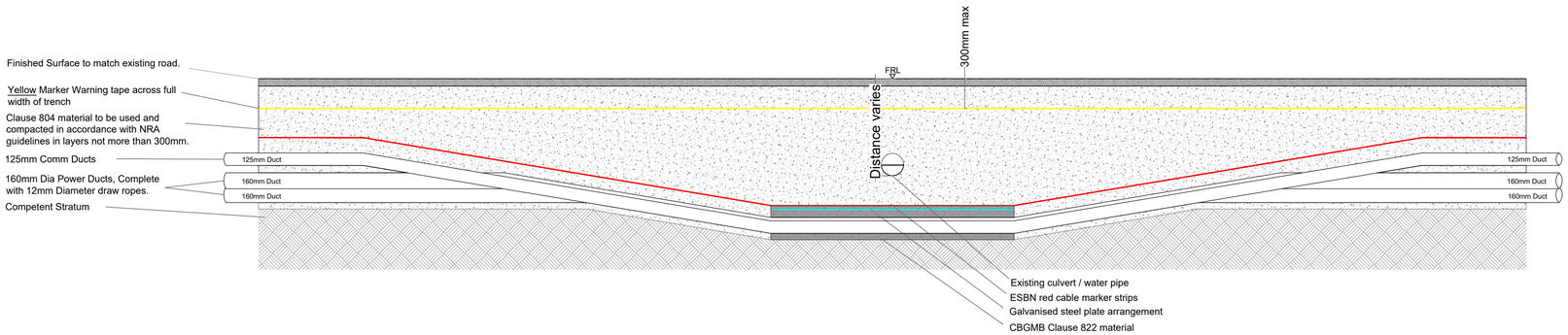


Option A - Standard 110kV Trench Detail in Road

SCALE 1:20

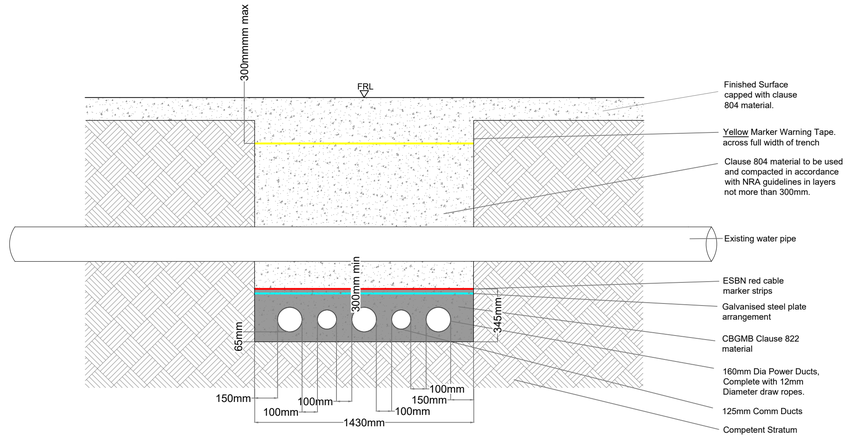
PROJECT TITLE: Slievegrine Renewable Energy Development, Co. Waterford			
DRAWING TITLE: Option A - Standard 110kV Trench Detail in Road			
PROJECT No.: 240740		DRAWING No.: Figure 4-34	SCALE: 1:20 @ A3
DRAWN BY: JOB	CHECKED BY: RD	DATE: 05.10.2026	REVISION.: P01

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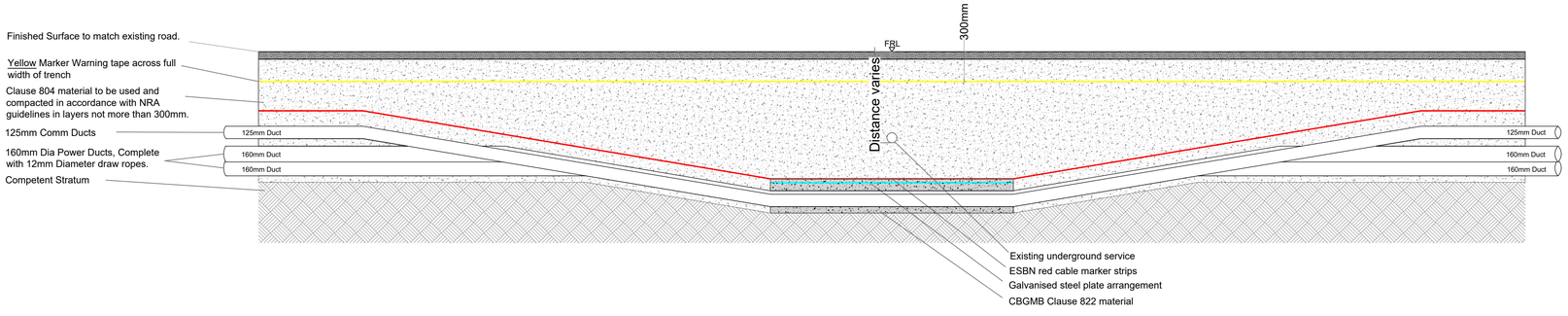
Option B - Flat bed under existing pipe - 110kV

SCALE 1:30



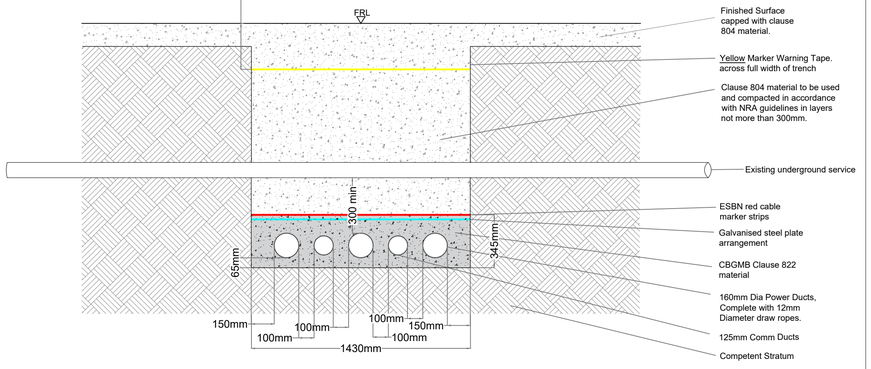
Option B - Flat bed under existing pipe - 110kV

SCALE 1:20



Option B - Flat bed under existing service - 110kV

SCALE 1:30



Option B - Flat bed under existing service - 110kV

SCALE 1:20

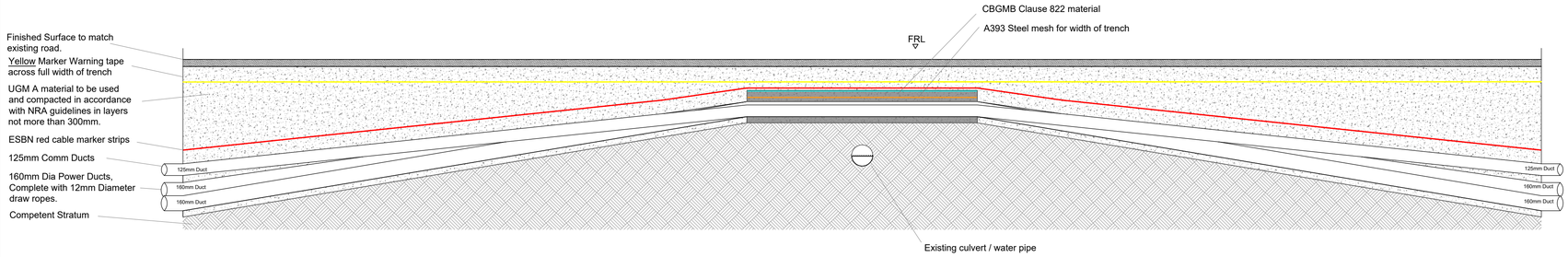
PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
Option B - Flat bed under - 110kV

PROJECT No.:	DRAWING No.:	SCALE:
240740	**Figure 4-35**	**As Shown @ A1**

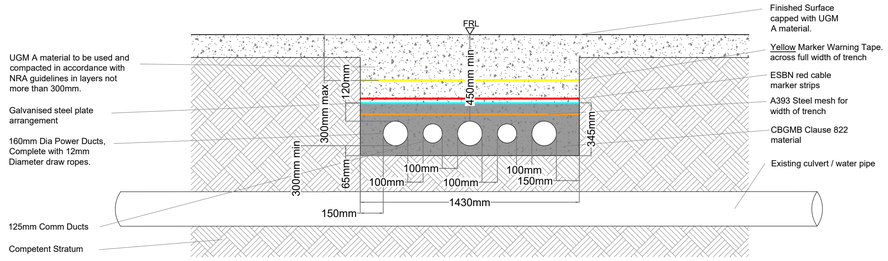
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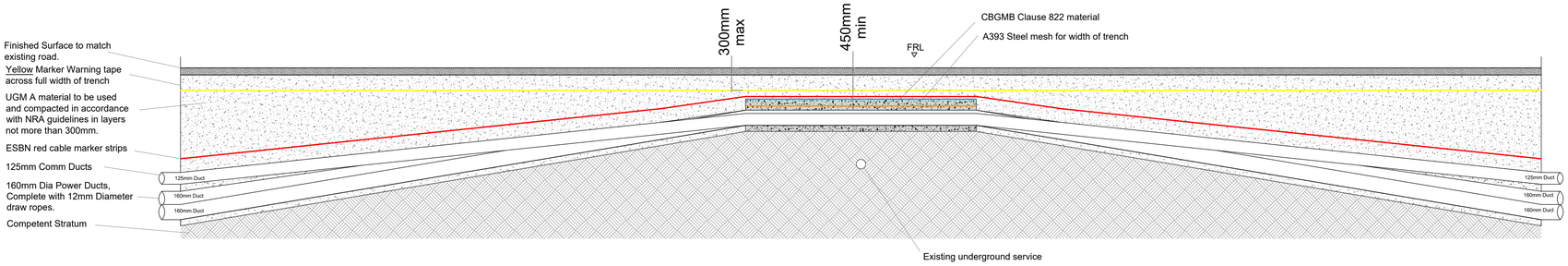
Option C - Flat bed over existing pipe - 110kV

SCALE 1:30



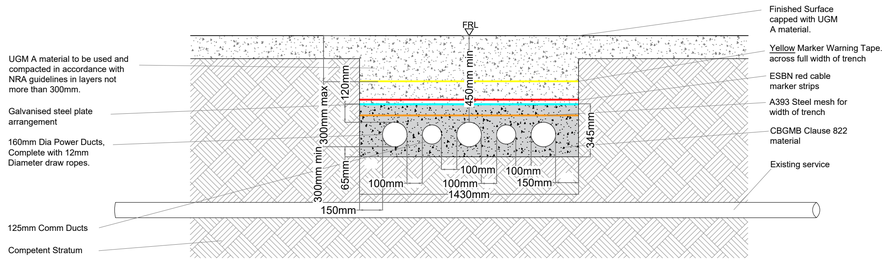
Option C - Flat bed over existing pipe - 110kV

SCALE 1:20



Option C - Flat bed over existing service - 110kV

SCALE 1:30



Option C - Flat bed over existing service - 110kV

SCALE 1:20

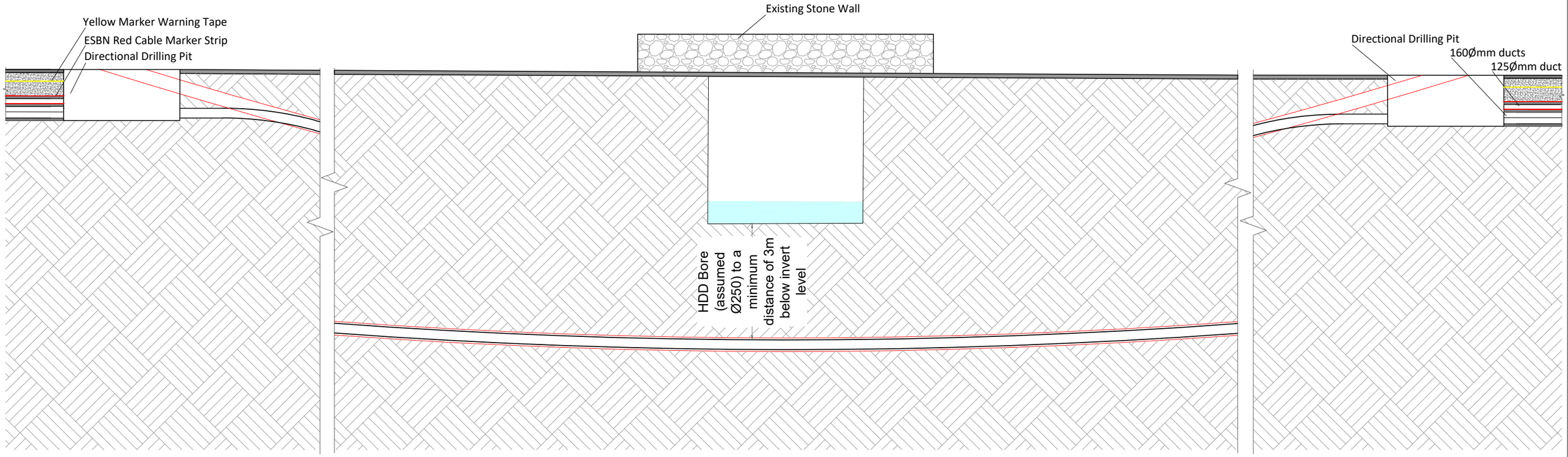
PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
Option C - Flat bed over -110kV

PROJECT No.:	DRAWING No.:	SCALE:
240740	**Figure 4-36**	**As Shown @ A1**

DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	**RD**	**05.10.2026**	P01

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Option D - Horizontal Directional Drill Under Existing Watercourse Crossing

SCALE 1:100



Directional Drilling Rig



Drilling Rig & Launch Pit

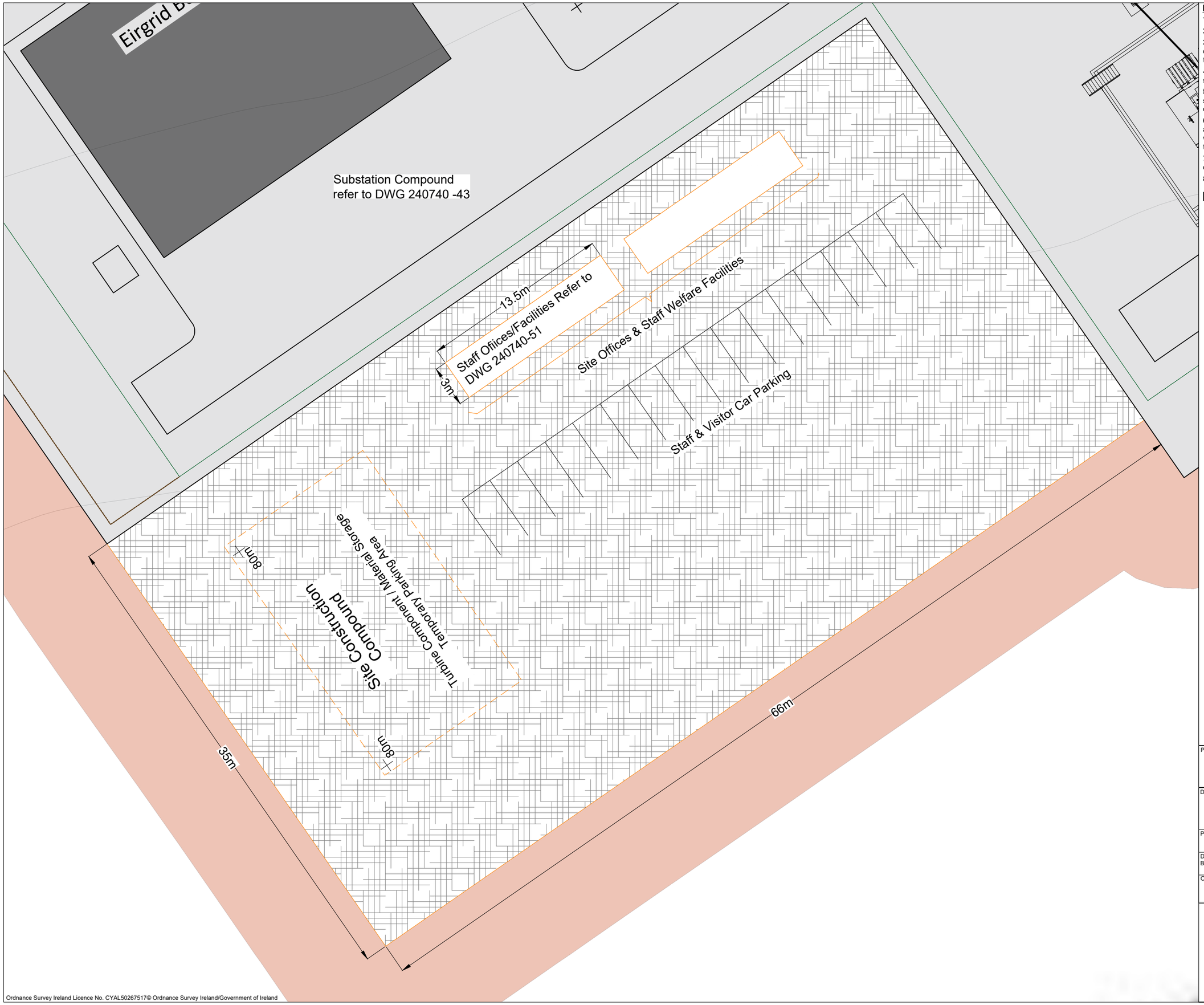
PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
Option D - Horizontal Directional Drill Under Existing Watercourse Crossing

PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-37	1:100 @ A3

DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	RD	05.10.2026	P01

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6. The use of or reliance upon this drawing shall be deemed to be acceptance of these conditions of use unless otherwise agreed in writing, such written agreement to be sought from and issued by the copyright holder to the use or reliance upon this drawing.
7. Layout plans show typical Turbine rotor diameter as per turbine drawing.
8. Final levels may vary depending on local ground conditions.

Drawing Legend

- Cut
- Fill

N

PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
Construction Compound 6

PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-38	1:250 @ A3

DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	AC	05.10.2026	P01

OS SHEET No.:
6068, 6069, 6070, 6113, 6114, 6115, 6159, 6160, 6161, 6206, 6207, 6208

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4.3.3 Proposed Project

4.3.3.1 Tree Felling and Vegetation Removal/Replanting

In line with the Forest Service's published policy on granting felling licences for wind farm developments, areas cleared of forestry for access roads, and any other wind farm-related uses will have to be replaced by replanting at an alternative site or sites. The Forest Service policy requires replacement or replanting on a hectare for hectare basis for the felling carried out as part of the Proposed Project.

The identified 69.27 hectares of conifer plantation (WD4) that will be felled for the Proposed Project will be replaced or replanted on a hectare for hectare basis as a condition of any felling licence that will be issued in respect of the Proposed Project felling. Replanting is a requirement of the Forestry Act and is primarily a matter for the statutory licensing processes that are under the control of the Forest service. The replacement of the felled forestry as part of the Proposed Project may occur on any lands, within the State benefitting from Forest Service Technical Approval[4] for afforestation, should the Proposed Project receive planning permission. Under the Forestry Regulations 2017, all applications for licences for afforestation require the prior written approval (technical approval) of the Minister for Agriculture, Food and the Marine. Before the Minister can grant approval, he/she must first determine if the project is likely to have significant effects on the environment (for EIA purposes) and assess if the development, individually or in combination with other plans or projects is likely to have a significant effect on a European site (for Appropriate Assessment purposes).

It is proposed to plant approximately 3.6ha of native woodland planting on the banks of the River Licky south of T10. This woodland will include a riparian boundary along a tributary of the Licky River, measuring approx. 100m in length. The proposed planting area is located at the southern boundary of the Proposed Wind Farm site, south of the Proposed Turbine T10. This location has been strategically sited in an area characterised by high surface water flows.

Furthermore, over 5.5km of hedgerow enhancement/planting is proposed within the Site in order to offset the 2.69km that is to be removed to facilitate the Proposed Project. Please see Chapter 6: '*Biodiversity*' and Appendix 6-4 Biodiversity Management and Enhancement Plan for details.

The applicant commits to replanting the 69.27 hectares of coniferous forestry, outside the hydrological catchments within which the Site is located. On this basis, it is reasonable to conclude that there will be no cumulative effects associated with the replanting of 69.27 hectares of forestry. Therefore, the forestry replanting is not considered further in the impact assessment chapters of this EIAR. In addition, the applicant commits to not commencing the Proposed Project until both a felling and afforestation licence(s) is in place and, therefore, this ensures the afforested lands are identified, assessed and licenced appropriately by the relevant consenting authority. Please see Figure 4-39 below for detail of felling areas within the Site.

[4] *All proposed forestry developments where the area involved is greater than 0.1 hectare must receive the prior written approval of the Forest Service. The application for approval is known as Pre-Planting Approval – Form 1.*

620000

N

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T15 T16 T17 T18 T19 T20 T21 T22 T23

0 0.65 1.3 km

620000

Map Legend

EIAR Site Boundary

Proposed Project

Proposed Turbine Locations

Felling Areas

Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator

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EIAR Site Boundary - NOT TO SCALE

Drawing Title

Felling Areas

Project Title

Slievegrine Renewable Energy Development

Project No.	Drawing No.	Scale
240740	4-39	1:22,000
Drawn By	Checked By	Date
SOR	NS	01/10/2026

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4.3.3.2 Borrow Pits

It is estimated that approx. 395,800m^3 of stone material will be required to construct the Proposed Project (including a 10% contingency factor). It is intended to obtain the majority of materials for the construction of the Proposed Project from the 5 no. proposed onsite borrow pits (engineer's specified material may be imported onto the Site should sufficient volumes of suitable material not be encountered during the excavation phase of the proposed infrastructure, to come from local licenced quarries). Please see Figure 4-40 to Figure 4-44 for details of the proposed borrow pits. Table 4-7 below details the location and quantities of rock to be extracted from each borrow pit.

Table 4-7 Proposed Borrow Pit Details

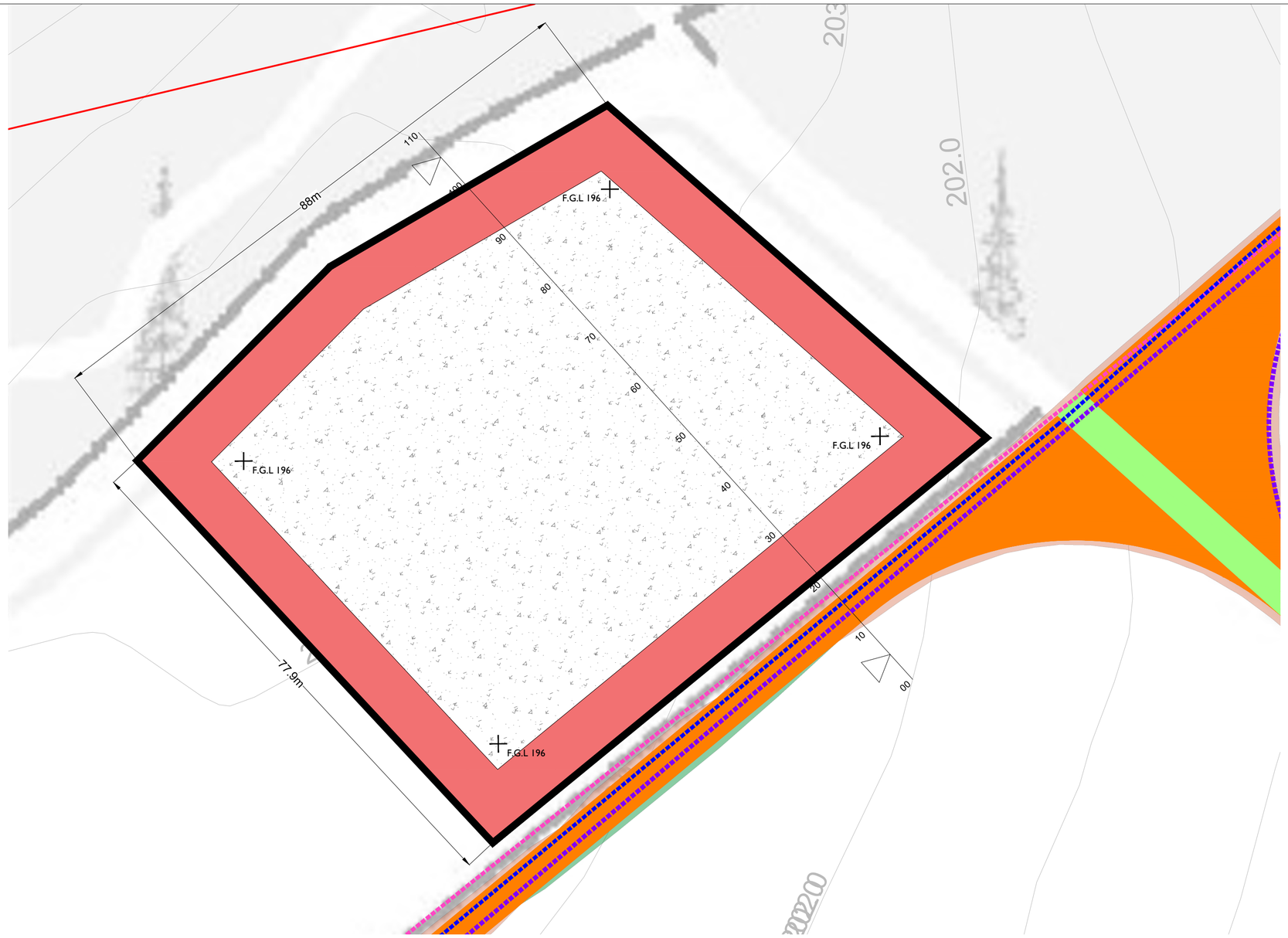
Borrow Pit ID	Location Description	Coordinates (ITM)	Volume of stone to be extracted (m^3)	Area (m^2)	Depth of extraction (m)
BP1	Located adjacent proposed new road between Turbine 22 and 23	615595, 586315	37,500	7,200	8
BP2	Approximately 310m northwest of the Turbine 18	617327, 586760	91,100	16,000	12.8
BP3	Approximately 35m west of the Turbine 13	617673, 587123	60,300	10,000	13.8
BP4	Approximately 35m northwest of the Proposed 110kV Substation	619975, 588332	110,350	15,000	13.4
BP5	Approximately 50m west of Turbine 1	619763, 589585	103,200	15,000	14.6

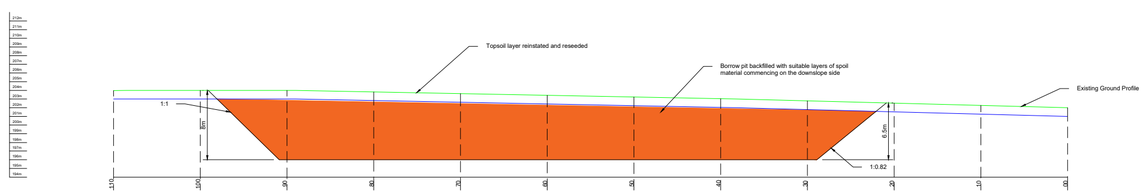
Access to the borrow pits will be via both the proposed new and existing access roads throughout the Proposed Wind Farm site. Please see Figure 4-1 for details. Post-voiding of the proposed borrow pits, the borrow pits will be backfilled with excavated spoil, then reseeded or left to vegetate naturally. A stock-proof fence will be erected after construction materials have been extracted to prevent unauthorised access.

The extraction of material from the borrow pits is a construction phase activity only of the Proposed Project which will be a temporary operation run over a short period of time. Hardcore materials will be extracted from the borrow pits (and some turbine locations, if necessary), principally by means of rock breaking. Some rock breaking will also be required for the construction of the Proposed 110kV Substation and Proposed 220kV Loop-in Substation. Hardcore material extracted at the substation locations will be used for the construction of those compounds. Depending on the hardcore volume, 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 will only be carried out after notifying any potentially sensitive receptors. These two rock extraction methods are discussed below. The processing and crushing of boulders may be required to achieve the grading requirements for use in construction.

The potential noise and vibration impact on sensitive receptors associated with the rock extraction measures, detailed below, are assessed in Chapter 12 of this EIAR. Post-construction, any unsafe areas around the borrow pit areas will be permanently secured and a stock-proof fence will be erected around the borrow pit area to prevent access to this area. Appropriate health and safety signage will also be erected on this fencing and at locations around the fenced area.

The extraction of rock from the borrow pit will be a temporary operation during the construction phase. The topsoil and subsoil will be stripped back and temporarily stockpiled using standard tracked excavators. Two extraction methods have been assessed for breaking out the useful rock below: rock breaking and blasting. Please see Section 4.8.3.1 below for the borrow pit construction methods.





Section View

Borrow Pit 1 Volume Dashboard (m3)	
Overburden Quantities	7200
Bedrock Quantities	37500
Spoil Holding Capacity	37000

N

PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

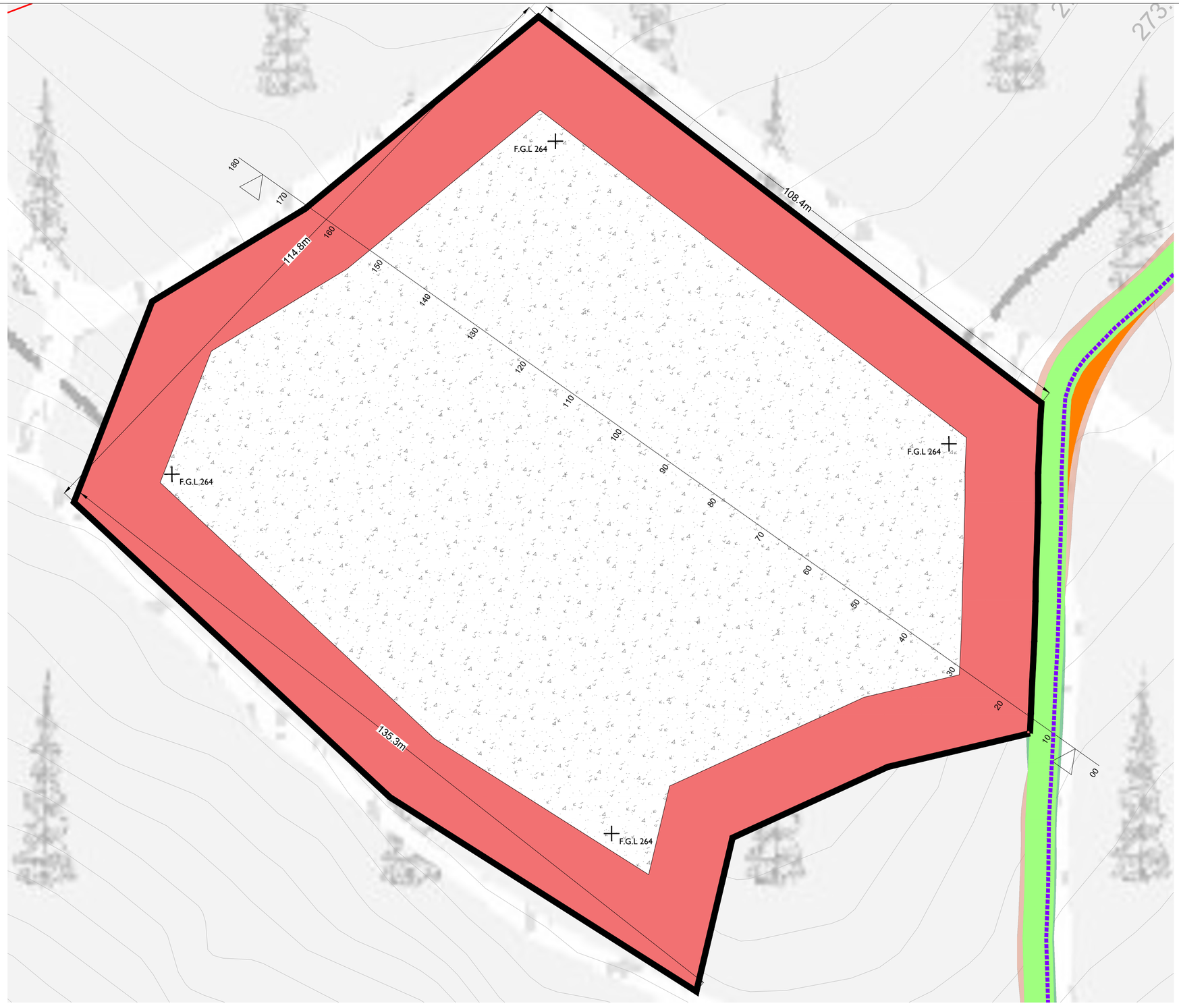
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Borrow Pit 1

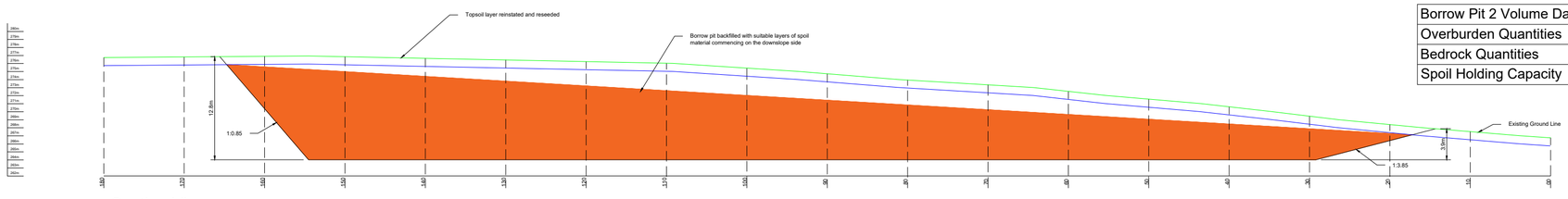
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DRAWN BY: JOB / CHECKED BY: AC	DATE: 05.10.2026	REVISION.: P01

OS SHEET No.: 6068, 6069, 6070, 6113, 6114, 6115, 6159, 6160, 6161, 6206, 6207, 6208

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Section View

Borrow Pit 2 Volume Dashboard (m3)	
Overburden Quantities	16000
Bedrock Quantities	91100
Spoil Holding Capacity	87100

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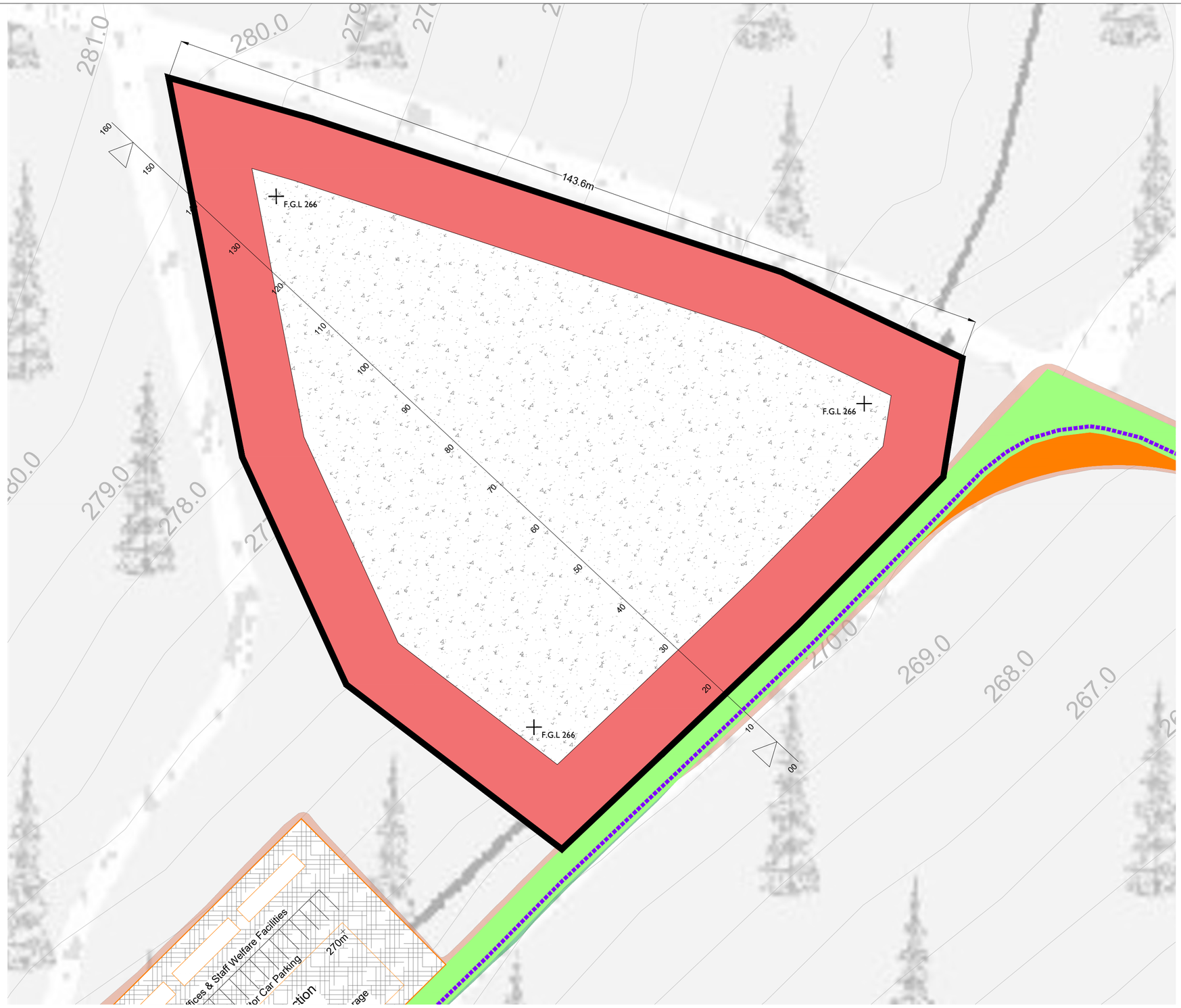
DRAWING TITLE:
Borrow Pit 2

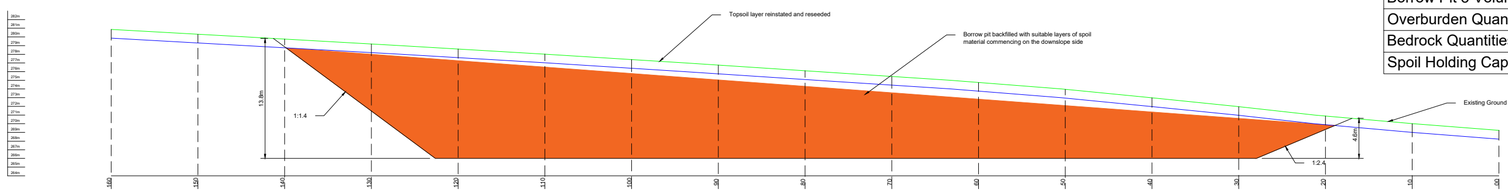
PROJECT No.:	DRAWING No.:	SCALE:
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Section View

Borrow Pit 3 Volume Dashboard (m3)	
Overburden Quantities	10000
Bedrock Quantities	60300
Spoil Holding Capacity	58300

N

PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
Borrow Pit 3

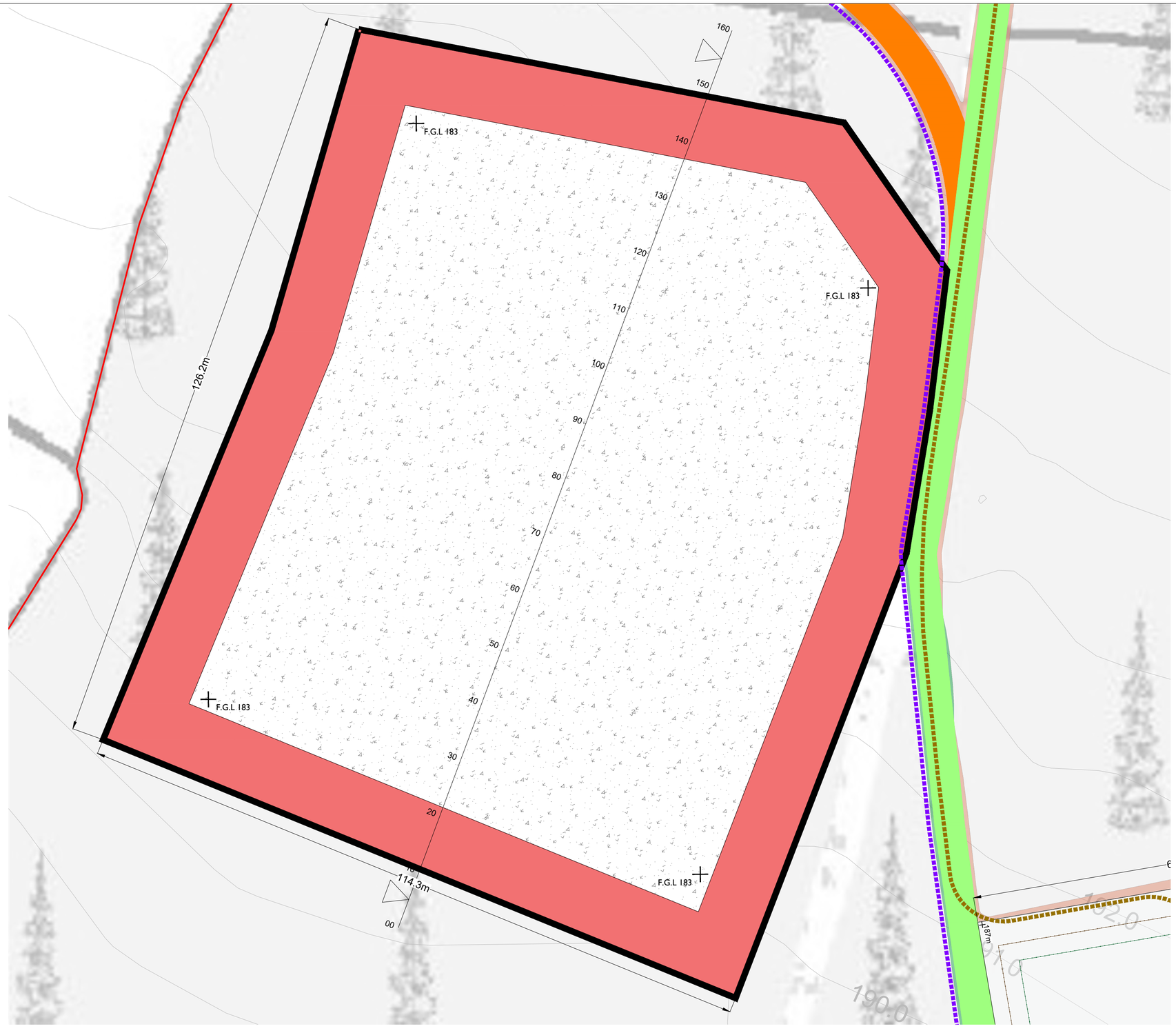
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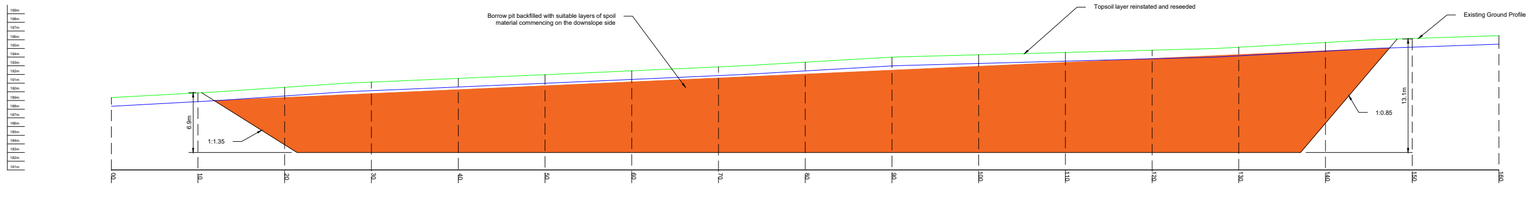
DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	AC	05.10.2026	P01

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Section View

Borrow Pit 4 Volume Dashboard (m3)	
Overburden Quantities	15000
Bedrock Quantities	110350
Spoil Holding Capacity	110450

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PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

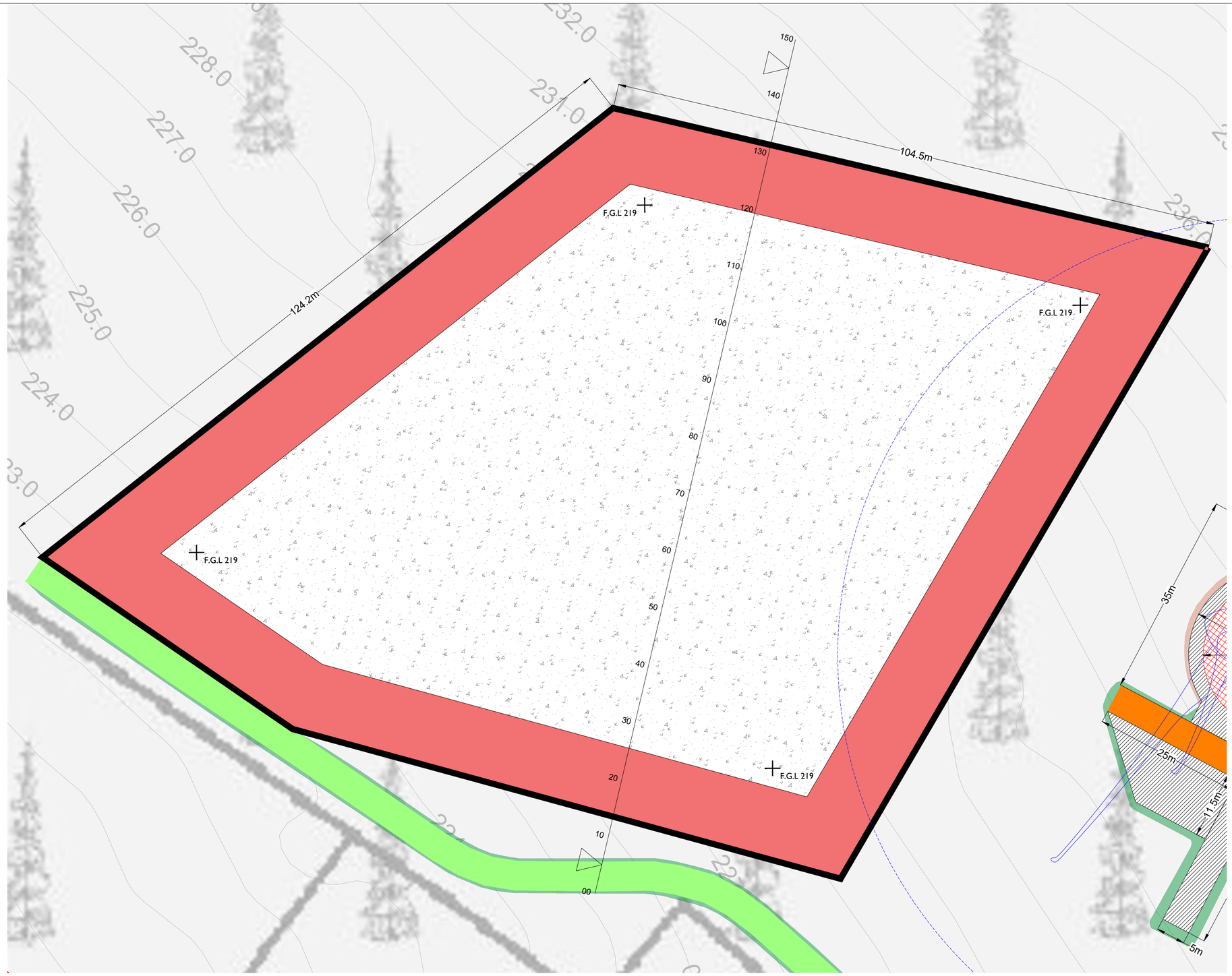
DRAWING TITLE:
Borrow Pit 4

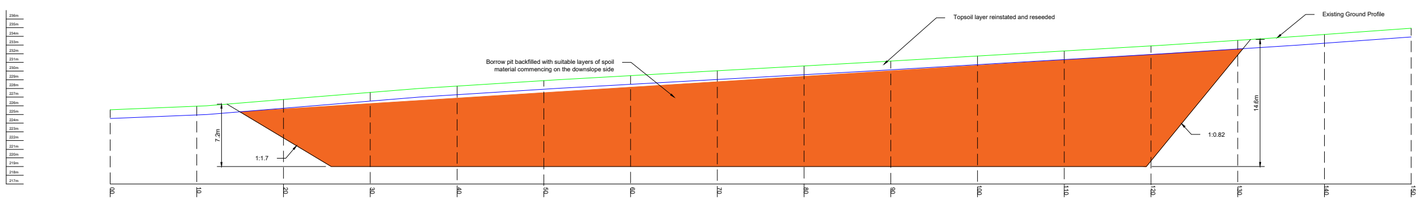
PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-43	1:500 @ A2

DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	AC	05.10.2026	P01

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Section View

Borrow Pit 5 Volume Dashboard (m3)	
Overburden Quantities	15000
Bedrock Quantities	103200
Spoil Holding Capacity	105000

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PROJECT TITLE:
Slievegrine Renewable Energy Development, Co. Waterford

DRAWING TITLE:
Borrow Pit 5

PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-44	1:500 @ A2

DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	AC	05.10.2026	P01

OS SHEET No.: 6068, 6069, 6070, 6113, 6114, 6115, 6159, 6160, 6161, 6206, 6207, 6208

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4.3.3.3 Spoil Management Strategy and Placement of Spoil

It is proposed to manage overburden generated through construction activities for the Proposed Project locally within the Site through the backfilling of the proposed borrow pit voids, as shown in Figure 4-1, with cross section details shown in Figure 4-40 to Figure 4-44. Linear berms will be placed along access roads within the Site and around the Proposed 220kV Loop-in Substation where appropriate for landscaping purposes. The total estimated volume of spoil to be managed following excavations during the construction phase of the Proposed Project is approximately 425,882m^3. Most material arising from the construction of the Proposed Grid Connection underground cabling route will be temporarily stockpiled on Site and stored within the borrow pits within the Proposed Wind Farm, with the rest to be used in landscaping around the Site. There will be no temporary stockpiling of excavated spoil within the stockpile exclusion zone near T10 and T12 and within 50m of any natural watercourses within the Site or within 10m of any drainage features. Please see Figure 4-45 for stockpile exclusion zones within the Proposed Wind Farm site. Please see Section 9.4.3.2 of Chapter 9 for further detail.

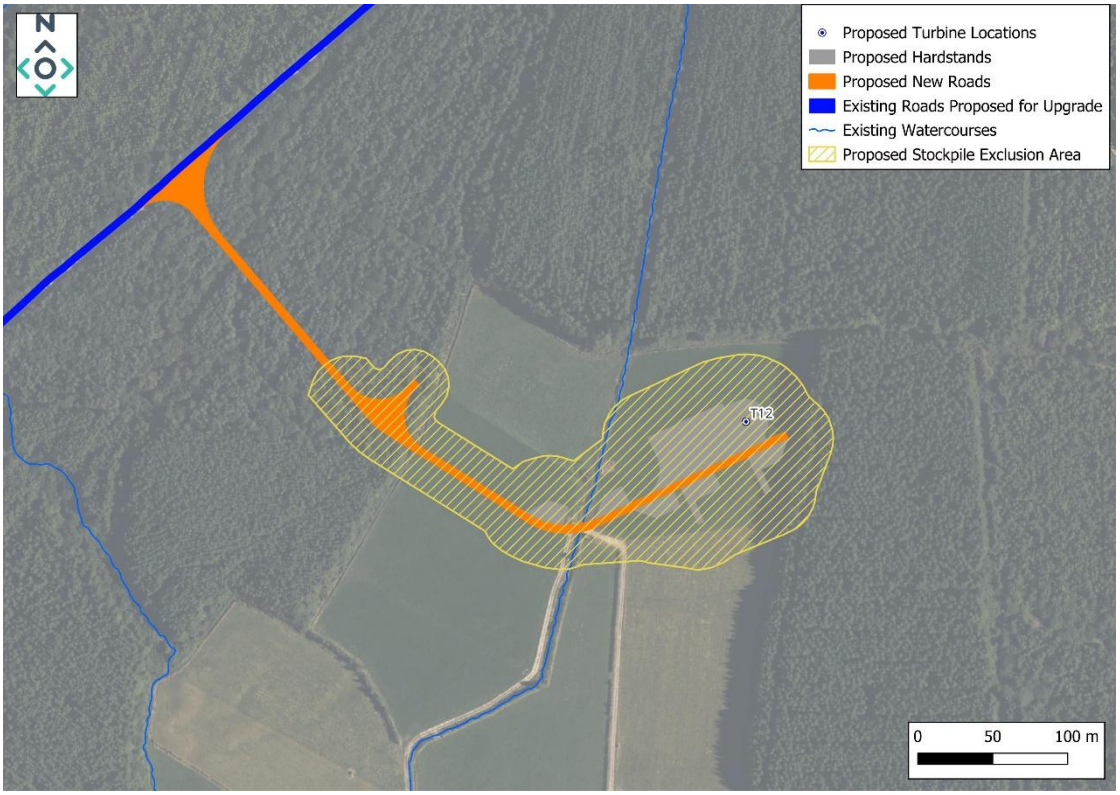


Figure 4-45 Stockpile Exclusion Zones within the Proposed Wind Farm site

The total capacity of the Borrow Pit void is expected to be 395,800m^3 and therefore, in conjunction with the proposed landscaping measures, such as linear berms, there is sufficient capacity to manage the total volume of spoil requiring management for the Proposed Project within the Site.

The construction methodology for the backfilling of void borrow pits with spoil and landscaping using spoil is discussed below in Section 4.8.3.1.

4.3.4 Quantities of Spoil and Crushed Stone

4.3.4.1 Crushed Stone

The quantity of crushed stone required for the construction of the Proposed Project has been calculated, as presented in Table 4-8 below.

Table 4-8 Crushed Stone Requirements

Development Component	Crushed Stone Requirement (m^3) (approx.)
Proposed Wind Farm	
23 no. Turbines and Hardstanding Areas (including foundations)	147,890
Access Roads (including met mast and telecommunications relay mast hardstand)	144,805
Construction Compounds	11,220
Proposed 110kV Substation	9143
Proposed 38kV Underground Cable Works	513
Total	333,571
Proposed Grid Connection underground cabling route	
Proposed 220kV Loop-in Substation and associated construction compound	22,678
Proposed 110kV Underground Cabling Route	3,240
220kV underground electrical cabling trench	324
Total	26,242
Total	359,813
Total (including 10% contingency)	395,800

Note: A contingency factor of 10% has been applied and is included in the crushed stone requirements volumes above to allow for a variation in ground conditions across the Site.

4.3.4.2 Spoil Management

The quantity of spoil generated and requiring management on the Site has been calculated, as presented in Table 4-9 below.

Table 4-9 Spoil Volumes

Development Component	Spoil Volume(m3) (approx.)
Proposed Wind Farm	
23 no. Turbines and Hardstanding Areas (including foundations)	227,930
Access Roads (including met mast and telecommunications relay mast hardstand)	63,387
Construction Compounds	5,610
Proposed 110kV Substation	4571
Proposed 38kV Underground Cable Works	1578
Borrow Pits	99,200
Total	402,277
Proposed Grid Connection	
Proposed 220kV Loop-in Substation and associated construction compound	11,339
Proposed 110kV Underground Cabling Route	11,835
220kV underground electrical cabling trench	430.35
Total	23,605
Total	425,882
Total (including 10% contingency)	468,470

Note: A contingency factor of 10% 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.

It is considered that any spoil generated will be removed and temporarily stockpiled within the Site before being accommodated within the void borrow pits or used for landscaping within the Site. Any road material containing tar will be managed separately.

There will be a requirement to remove some sections of forestry and linear vegetation i.e. treelines and hedgerows to facilitate the Proposed Project infrastructure, however, this will not involve the excavation of tree stumps outside of the infrastructure footprint and as such does not affect the excavation volumes.

4.3.5 Biodiversity Management Plan

4.3.5.1 Hedgerow Enhancement

The vast majority of field boundaries within the Proposed Wind Farm site are delineated by mature (managed and unmanaged) hedgerow and treeline habitats. It is anticipated approximately 2.58km of

hedgerow and treeline habitat will be removed to accommodate the Proposed Project, including turbines and associated bat buffers, wind farm roads and other key infrastructure. The majority of the existing hedgerows in the southern section of the Proposed Wind Farm site are heavily managed and do not support high levels of biodiversity or provide adequate commuting and foraging corridors for local wildlife.

It is proposed to plant 5.5km of new hedgerow within the Site. The proposed hedgerow replanting areas have been strategically chosen to link up areas where bat commuting activity has been recorded during the dedicated baseline surveys undertaken. The proposed new hedgerow includes approximately 1.2km of riparian hedgerow planting proposed alongside existing river corridors, in order to provide further benefits of excluding access to the watercourse by livestock, and by providing an additional vegetative buffer to slow down run-off from adjacent lands to the watercourses in these areas. Please see Figure 4-1 for locations of hedgerow planting.

Species to be used include hawthorn (*Crataegus monogyna)* which will make up approximately 75% of the hedgerow mix. The ideal native hedge is made up of 75% Hawthorn and 25% of at least 4 other species[5], previously recorded on Site. This includes:

- Elder (*Sambucus nigra*)
- Blackthorn (*Prunus spinosa*)
- Grey willow *(Salix cinerea)*
- Rowan (*Sorbus aucuparia*)
- Privet (*Ligustrum vulgare)*

The proposed planting of 5.5km of new hedgerow habitat will improve the ecological value and provide benefits for local biodiversity. Improving hedgerow availability will increase the commuting and foraging habitat available for bats within the Site. Linear features allow bats to navigate across a landscape while providing protection from predators like Owls and Hawks. Predators rely on hunting bats where gaps or open space exist. Bolstering hedgerow and treelines reduce and remove gaps to provide more consistently safe commuting routes for bats. Bats have been shown to avoid crossing a linear feature gap with a distance of 3m. Improving the diversity of the hedgerow and treelines will allow a more diverse and abundant habitat for insect species. Insect species that breed and exist within the tree habitat are an important food source for bats and birds.

4.3.5.2 Native Woodland Planting

The Proposed Wind Farm site borders the Licky River, part of the Blackwater River (Cork/Waterford) SAC, to the south. This SAC supports a range of aquatic QI species and habitats which are highly dependent on the water quality of the river, in particular freshwater pearl mussel (*Margaritifera margaritifera*). In order to enhance the biodiversity value on Site and create an additional riparian buffer to contribute to the protection of the water quality of the Licky River, it is proposed to establish a new native woodland measuring 3.6ha in area. This woodland will include a riparian boundary along a tributary of the Licky River, measuring approx. 100m in length. The proposed planting area is located at the southern boundary of the Proposed Wind Farm site, south of the Proposed Turbine T10 (Figure 3-1 of Appendix 6-4 BMEP). This location has been strategically sited in an area characterised by high surface water flows.

The existing habitat in the proposed woodland planting area is wet grassland (GS4). It is proposed that the woodland to be established will be of a species mix corresponding with a sub type of the *AF- Alder-meadowsweet* woodland type defined in (Cross et al. 2008). Tree species will include a primary species mix of pedunculate oak (*Quercus robur),* alder (*Alnus glutinosa)* and grey willow (*Salix cinerea).* It is likely that the woodland would conform most closely to the 'wet pedunculate oak-ash woodland (WN4) category (Fossitt 2000).

[5] *NBDC. (2018). All Ireland Pollinator Plan How-to-guide: Hedgerows for pollinators. National Biodiversity Data Centre.*

Trees will be of native origin and will be of advanced nursery stock where possible. Additionally, the following measures will be applied when planting trees:

- Mark out the area for planting so it is clear exactly where planting will be established.
- Trees will not be evenly spaced and instead will be spaced out randomly to mimic natural plant spacing. They will be planted at lower planting densities in order to allow natural recolonisation by other native species, particularly shrubs.
- Newly planted trees will need to be protected from poaching by livestock, through the installation of new stockproof fencing which will be at least 2m away from the treeline, and on each side if required.

The management, maintenance and monitoring required to ensure the establishment of the above biodiversity enhancement measures is detailed in Appendix 6-4 Biodiversity Management and Enhancement Plan of this EIAR.

4.3.5.3 Water Quality Protection

Watercourses and tributaries to the River Licky within the Site where poaching was recorded will be fenced off for livestock. Where linear riparian planting is proposed along a watercourse, this will also be fenced off for livestock and access to the watercourse will thereby be restricted also. Fencing will be erected 1.5m from the top bank of the watercourse following the guidance detailed by Farming for Water[6]. The proposed fencing and riparian planting will act as an additional buffer against sediment and nutrient run-off from fields. These measures align with the objectives of the Water Framework Directive, and it is anticipated that these measures will result in added benefits to riparian habitats and fauna within and downstream of the Site. Please see Figure 3-1 of Appendix 6-4 for locations of the proposed fencing.

4.3.5.4 Proposed Nest/Den Box Installation

It is proposed to erect two pine marten den boxes and two red squirrel nest boxes within the Proposed Wind Farm site. The red squirrel boxes will be installed in the vicinity of Proposed Turbines T19 and T21, the pine marten den boxes will be installed to the west of Proposed Turbine T12 and in the vicinity of Proposed Turbine T19. These will be erected immediately post construction (to avoid disturbance to these species during construction). They will be erected along existing mature tree lines within this area and in suitable locations where future tree felling (associated with forestry) will not occur. The following boxes (or similar) should be used:

- Pine marten - https://www.nestbox.co.uk/products/pine-marten-den-box
- Red squirrel - https://connectingtonature.ie/products/squirrel-house-wooden

The proposed number of boxes has been informed by woodland habitat types within the Proposed Wind Farm site and information provided by the Vincent Wildlife Trust (Constructing, erecting, and monitoring Pine Marten Den Boxes[7]).

Please see Appendix 6-4 for further detail.

4.3.5.5 Pollinator Foraging/Nesting Habitats

Berms/embankments will be created around Proposed Project infrastructure with excess excavated soils in areas identified as being suitable by the designer. It is proposed to maximise the potential

[6] *https://farmingforwater.ie/app/uploads/2025/02/Bovine-Exclusion-for-Water-Bodies.pdf*
[7] *https://www.vwt.org.uk/news-media/blog/learning-how-to-install-pine-marten-den-boxes*

biodiversity benefit of these areas, in line with the recommendations in the National Biodiversity Data Series No. 25 *Pollinator-friendly Management of Wind Farms*[8], and in line with the objectives of the All-Ireland Pollinator Plan. New soil berms/embankments will be allowed to revegetate and recolonise naturally, using the native seed bank. No pesticides, herbicides or fertiliser will be used on these berms. Allowing the native seedbank to establish will create foraging habitat for pollinators.

Safe places for bees to nest are crucial to the survival of each species. Adult solitary bees die in autumn, leaving the next generation behind as pupae in nests to emerge as adults the following spring. Adult bumblebees also die in autumn, except for the new queens. These queen bumblebees need to find a safe place to hibernate over winter and emerge the following spring to begin building a colony of their own. Pollinators usually forage within close vicinity of their nest sites. Solitary bees commonly forage within 300m of their nest[8]. Ireland's 62 species of mining solitary bees nest by making tiny burrows in bare earth. Therefore, as well as the above measures providing pollinator foraging habitat within the Site, it will be beneficial to provide nearby nesting habitat.

It is proposed to maintain south-facing embankment slopes of new berms/embankments free of vegetation to provide bare soil for nesting pollinators including solitary bee species. This can be carried out on compacted soils of berms that are stable and free draining. While allowing colonisation of most of the berm with vegetation, south facing slopes will be kept bare by manual removal or scraping back of vegetation when required as identified following the monitoring plan in Section 4 of Appendix 6-4 BMEP. Loose soils are not required in this instance and it is proposed that soil berms are compacted to avoid any sediment run-off.

4.4 Site Activities

4.4.1 Environmental Management

All proposed activities on the Site will be provided for in a Construction and Environmental Management Plan (CEMP). A CEMP has been prepared for the Proposed Project and is included in Appendix 4-3 of this EIAR. Furthermore, a Surface Water Management Plan (SWMP) has been included as Appendix 4-4 of this EIAR and details the mitigation and monitoring measures for the protection of surface water features within the Site. The CEMP sets out the key environmental considerations to be considered by the contractor during construction of the Proposed Project. The CEMP includes details of drainage, spoil management and waste management, and details the mitigation and monitoring measures to be implemented in order to comply with the environmental commitments outlined in the EIAR. The contractor will be contractually obliged to comply with all such measures. In the event planning permission is granted for the Proposed Project, the CEMP will be updated prior to the commencement of the development, to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned and will be submitted to the Planning Authority for approval.

4.4.2 Refuelling

Wherever possible, vehicles will be refuelled off-site, particularly for regular road-going vehicles. On-site refuelling of machinery will be carried out at designated refuelling areas at various locations throughout the Site. Heavy plant and machinery will be refuelled on-site by a fuel truck that will come to the Site as required on a scheduled and organised basis. All refuelling will be carried out outside designated watercourse buffer zones. Only designated trained and competent operatives will be authorised to refuel plant on-site. Mobile measures such as drip trays and fuel absorbent mats will used during refuelling operations as required. All plant and machinery will be equipped with fuel absorbent material and pads to deal with any event of accidental spillage. Please see Appendix 4-3 and 4-4.

[8] *NBDC (2021). Pollinator-friendly management of Wind Farms. All-Ireland Pollinator Plan, Guidelines 12. National Biodiversity Data Centre - https://pollinators.ie/wp-content/uploads/2022/12/Wind-Farm-Pollinator-Guidelines-2022-WEB.pdf*

4.4.3 Concrete Deliveries

Only ready-mixed concrete will be used during the construction phase, with all concrete being delivered from local batching plants in concrete delivery trucks. The use of ready-mixed concrete deliveries will eliminate any potential environmental risks of on-site batching.

Before leaving the Site, washing of the delivery truck will be minimised and restricted to designated wash out areas. Wash out will be restricted to the concrete lorry's chute only. Concrete trucks will be washed out fully at the off-site batching plant, where facilities are already in place.

The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a temporary lined impermeable containment area. The residual liquids and solids will be removed off-site by an appropriately authorised waste collector for disposal at an authorised waste facility. Where temporary lined impermeable containment areas are used, such containment areas are typically lined with an impermeable membrane. Two examples are shown in Plates 4-4 and Plate 4-5 below.



Plate 4-4 Concrete washout area



Plate 4-5 Concrete Wash Out Area

The areas are covered when not in use to prevent rainwater collecting. In periods of dry weather, the areas can be uncovered to allow much of the water to be lost to evaporation. At the end of the concrete pours, any of the remaining liquid contents will be tankered off-site to an appropriately authorised facility as necessary. Any residual solid contents that will have been cleaned down from the chute will have solidified and can be broken up and disposed of along with other construction waste, as noted above, by an appropriately authorised waste collector for disposal at an authorised waste facility.

The risks of pollution arising from concrete deliveries will be further reduced by the following:

- Concrete truck bodies will not be washed out on the Site but will be directed back to their batching plant for washout.
- Site roads will initially be constructed with a subgrade and compacted with the use of a roller to allow concrete delivery trucks access all areas where the concrete will be needed. The final wearing course for the Site roads will not be provided until all bases have been poured. No concrete will be transported around the Site in open trailers or dumpers so as to avoid spillage while in transport. All concrete used in the construction of turbine foundations will be pumped directly into the shuttered formwork from the delivery truck. If this is not practical, the concrete will be pumped from the delivery truck into a hydraulic concrete pump or into the bucket of an excavator, which will transfer the concrete to the location where it is needed.
- The arrangements for concrete deliveries to the Site will be discussed with suppliers before work starts, agreeing routes, prohibiting on-site washout and discussing emergency procedures.
- Clearly visible signage will be placed in prominent locations close to concrete pour areas specifically stating washout of concrete lorries is not permitted at the Site.

4.4.3.1 Concrete Pouring

Due to the volume of concrete required for each turbine foundation, and the requirement for the concrete pours to be continuous, deliveries may be carried out outside normal working hours to limit the traffic impact on other road users, particularly peak period school and work commuter traffic. Such activities are limited to the day of turbine foundation concrete pours, which are normally completed in a single day per turbine. The main concrete pours for turbine foundations will be planned approximately one week in advance.

Specific procedures will be adopted in advance of and during all concrete pours to minimise the risk of pollution. These will include:

- Using weather forecasting to assist in planning large concrete pours and avoiding large pours where prolonged periods of heavy rain is forecast.
- Restricting concrete pumps and machine buckets from slewing over watercourses (including drains and ditches) while placing concrete.
- Ensuring that excavations are sufficiently dewatered before concreting begins and that dewatering continues while concrete sets.
- Ensuring that covers are available, and used, when necessary, for freshly placed concrete to avoid the surface washing away in heavy rain.
- The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a temporary lined impermeable containment area.

4.4.4 Dust Suppression

In periods of extended dry weather, dust suppression may be required within the Site, along haul roads, and public road corridors to prevent dust from becoming a nuisance. If necessary, water will be taken from stilling/settlement ponds in the Site's drainage system and will be pumped into a bowser or water spreader to dampen down the above mentioned areas to prevent the generation of dust. Silty or oily water will not be used for dust suppression, as this would transfer the pollutants to the haul roads and generate polluted runoff or more dust. Water bowser movements will be carefully monitored, as the application of too much water may lead to increased runoff.

4.4.5 Vehicle Washing

Wheels or vehicle underbodies are often washed before leaving sites to prevent the build-up of mud on public (and site) roads. It is not anticipated that vehicle or wheel washing facilities will be required as part of the construction phase of the Proposed Project as site roads will be formed before road-going trucks begin to make regular or frequent deliveries to the site (e.g. with steel or concrete). The Proposed Project roads will be well finished with compacted hardcore, and so the public road-going vehicles will not be travelling over soft or muddy ground where they might pick up mud or dirt.

A road sweeper will be available if any section of the public roads requires cleaning due to construction traffic associated with the Proposed Project.

4.4.6 Waste Management

The CEMP, Appendix 4-3 of this EIAR, provides a waste management plan (WMP) which outlines the best practice procedures during the construction phases of the project. The WMP outlines the methods of waste prevention and minimisation by recycling, recovery and reuse at each stage of construction of the Proposed Project. Disposal of waste will be seen as a last resort. The WMP was produced in line with the EPA's 2021 document '*Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects' 2021*[9].

The Waste Management Act 1996 and its subsequent amendments provide for measures to improve performance in relation to waste management, recycling and recovery. The Act also provides a regulatory framework for meeting higher environmental standards set out by other national and EU legislation.

[9] *EPA 2021 Best practice guidelines for the preparation of resource & waste management plans for construction & demolition projects. Available at: https://www.epa.ie/publications/circular economy/resources/CDWasteGuidelines.pdf*

The Act requires that any waste related activity has to have all necessary licenses and authorisations. It will be the duty of the Waste Manager on the Site to ensure that all contractors hired to remove waste from the Site have valid Waste Collection Permits. It will then be necessary to ensure that the waste is delivered to a licensed or permitted waste facility. The hired waste contractors and subsequent receiving facilities must adhere to the conditions set out in their respective permits/licenses and authorisations.

Prior to the commencement of the development, a Construction Waste Manager will be appointed by the Contractor. The Construction Waste Manager will be in charge of the implementation of the objectives of the plan, ensuring that all hired waste contractors have the necessary permits/licenses and authorisations and that the waste management hierarchy is adhered to. The person nominated must have sufficient authority so that they can ensure everyone working on the development adheres to the management plan.

The WMP will provide systems that will enable all arisings, movements and treatments of construction waste to be recorded. This system will enable the contractor to measure and record the quantity of waste being generated. It will highlight the areas from which most waste occurs and allows the measurement of arisings against performance targets. The WMP can then be adapted with changes that are seen through record keeping.

4.5 Site Access and Transportation

4.5.1 Site Entrances

The location of construction phase and operational phase Site access points are shown in Figure 4-1. A Traffic Management Plan is included in Chapter 15 and Appendix 15-3 of this EIAR. In the event planning permission is granted for the Proposed Project, an updated Traffic Management Plan will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned.

Main Construction and Operational Site Entrance

A general construction entrance for the Proposed Wind Farm will be constructed on the L-2024 in the townland of Pulla. This entrance will be used as the main entrance for construction traffic and turbine components throughout the construction phase. Appropriate sightlines will be established at the proposed Site entrance for the safe egress of traffic during the construction phase. On completion of the construction phase, this Site entrance will be reduced in size and gated for security and will be used as an operational Site entrance.

220kV Loop-in Substation Site Entrances

Junction upgrade works are required on the existing R671/ L-99997 junction to facilitate transformer delivery of the Proposed 220kV Loop-in Substation. Appropriate sightlines will be established for the safe egress of traffic during the construction phase.

Additionally, a new general construction entrance for the Proposed 220kV Loop-in Substation complex will be constructed off of the L99997 local road in the townland of Graigue. Appropriate sightlines will be established at the entrance for the safe egress of traffic during the construction phase. This entrance will be used as the main entrance for construction traffic throughout the construction phase of the Proposed 220kV Loop-In Substation.

On completion of the construction phase, the latter new entrance off the L-99997 will be reduced in size and gated for security and will be used as an operational entrance for inspection and maintenance of the Proposed 220kV Loop-in Substation when required.

Other Site Entrances

Five other site entrances will be established throughout the Site for use throughout all phases of the Proposed Project for general construction vehicles and operational phase monitoring vehicles. All entrances for the Proposed Project are outlined below in Table 4-10.

Table 4-10 Site entrance points

Site Entrance Number	Townland	Road
1 – Main Entrance	Pulla	L-2024
2 – Secondary Entrance	Clashbrack	L-2024
3 – Secondary Entrance	Clashbrack	L-2024

4 – Existing Junction Upgrade	Reamanagh East	L-6085
5 – Existing Junction Upgrade	Drumslig	L-2023
6 – Existing Junction Upgrade	Cloghraun	L-6082
7 – Existing Junction Upgrades	Graigue	R671/ L-99997
8 – Proposed 220kV Loop-in Substation Entrance	Graigue	L-99997

4.5.2 Turbine Component Transport Route

There are a range of ports within the island of Ireland that have proven capability to accept and store large wind turbine components. These ports include Cork, Foynes, Waterford, Galway and Dublin ports. Furthermore, subsequent access to the national motorway network during transportation from these ports has been demonstrated. The facilities within the ports and access to and from the ports is continually being upgraded as part of general improvements. It is on this basis that it is not foreseen that this project will require any material change to the port selected should the project be consented and enter into the construction phase.

For the purpose of this EIAR, the Port of Waterford has been selected and assessed to facilitate turbine delivery to the Site. It is proposed that the large wind turbine components will be delivered from Belview Port (Port of Waterford), Co. Waterford to the Site via the N29 and N25 for approximately 62.8km, exiting at the L2024/N25 Junction in Pulla before heading west along the L2024 for 1.1km before reaching the main site entrance. The proposed turbine delivery route is shown on Figure 4-46. All deliveries of turbine components to the Site will follow this route.

A turbine with the maximum blade length of 79.35 metres has been used in assessing the traffic impact of the Proposed Project. The blade transporter for such a turbine blade would have a total vehicle length of 84.6 metres, including the blade which overhangs the back of the vehicle. The total length of the tower transporter is 59.5 metres with the axles located at the front and rear of the load with no overhang.

The vehicles used to transport the nacelles will be similar to the tower transporter. All other vehicles requiring access to the Site will be smaller than the large turbine component transport vehicles. The turbine delivery vehicles have been modelled in the swept path assessments of identified pinch points along the proposed turbine delivery route, as detailed in Chapter 15: '*Material Assets'* of this EIAR.

4.5.2.1 Delivery Accommodation Works

4.5.2.1.1 *Turbine Delivery Accommodation Works*

Works such as road widening are sometimes required along proposed turbine transport routes to accommodate the large turbine components and associated vehicles seeking to access wind farm sites. The proposed turbine delivery route for the Proposed Project, as shown on Figure 4-46, has been the subject of a route assessment to determine if any works are required along its length. Full details of the assessment are included as part of the traffic impact assessment set out in Section 15.1 of this EIAR and summarised below.

It is noted that a dry run involving a vehicle adapted to replicate the geometry of the extended transport vehicles will be undertaken over the entire turbine delivery route prior to the construction stage of the Proposed Project.

A swept path analysis was undertaken using Autotrack in order to establish whether remedial measures are required at any locations along the route.

To facilitate the transportation of turbine components off the N25 and onto the L-2024, load bearing mats will be placed on a grassy verge along the L-2024 to allow the turbine delivery vehicle to make the turn towards the Site. Please see Figure 4-47 for detail.

4.5.2.1.2 *220kV Transformer Delivery*

To facilitate transformer delivery to the Proposed 220kV Loop-in Substation, some vegetation clearance will be required along the L-99997. In order to minimise the extent of upgrade works on the L-99997, it is proposed that the transformer delivery vehicle will arrive via the R671 from the south and pull past the junction where the towing vehicle would be reconfigured to draw the load back to the access junction without the need to turn the load itself.

4.5.3 Construction Materials Transport Route

Construction materials will be delivered to the Site via selected haul routes that will be determined based on the source of the construction material. Quarries within a 20km range of the Site that could potentially provide stone and concrete are illustrated on Figure 4-48. Traffic movements generated by the Proposed Project are discussed in Section 15.1 of Chapter 15: '*Material Assets*'.

620000
640000
660000
600000
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CLONMEL
Cluain Meala
CARRICK-on-SUIR
Carraig na Siúire
WATERFORD
Port Láirge
TRAMORE
Trá Mhór
DUNGARVAN
Dún Garbhán
CAPPOQUIN
N25
Port of Waterford
Dungarvan
CELTIC SEA
An Mhuir Cheilteach
Helvick Head
Ceann Heilbhic
Mine Head
Mion Ard
0
5
10 km

Map Legend

EIAR Site Boundary

Proposed Turbine Delivery Route

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Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator

N

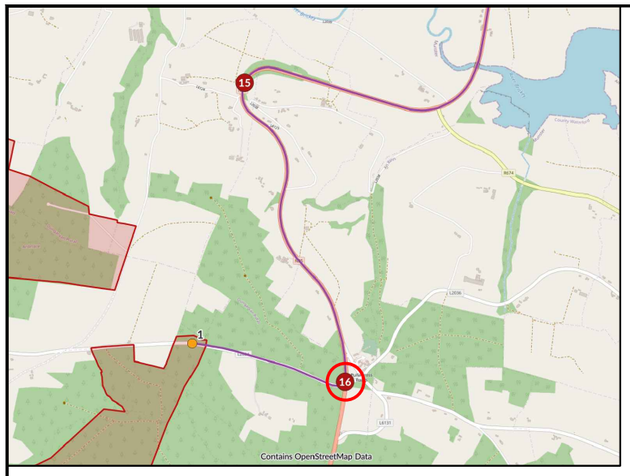
EIAR Site Boundary - NOT TO SCALE

Drawing Title
Proposed Turbine Delivery Route

Project Title
Slievegrine Renewable Energy Development

Project No.	Drawing No.	Scale
240740	4-46	1:170,000
Drawn By	Checked By	Date
SOR	NS	06/10/2026

MKO
Email: info@mkoireland.ie/ Website: www.mkoireland.ie



Oversail of verge

Temporary removal of 3no. road signs and 1no. bollard

Oversail of verge

Oversail of verge

Temporary removal of 1no. electrical transmission column and 2no. road signs

Overrun of roadside verge

Notes:

1. Do not scale from drawing.
2. All dimensions in metres unless otherwise stated.
3. Please note that marked service locations are indicative only and should be confirmed by topographical survey.

N

Key:

- Blade Transporter Vehicle
- Blade Outline
- Over-run envelope of tractor and trailer wheels
- Over-sail envelope being swept by tractor and trailer bed
- Over-sail envelope being swept by blade path

Rev.	Date	Revision details	Drawn	Checked	Approved

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Client: Slievegrine Ltd

Project: Slievegrine Renewable Energy Development
Abnormal Loads Assessment

Title: Vestas V162 Blade (79.35m Length)
Nooteboom Super Wing Carrier
Pinch Point 16
Manual Override Rear Steering Utilised

Drawn	Checked	Approved
TF	ADV	ADV

Original drg. size	Date	Scale
A3	29/09/2026	1:750

Drawing Status	Drawing Number	Rev.
Information	Figure 4-47	-

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600000
620000
640000
600000
580000
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0
5
10 km

Map Legend

EIAR Site Boundary

20km Buffer of Proposed Turbines

Quarries

Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator

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EIAR Site Boundary - NOT TO SCALE

Drawing Title
Quarries within 20km of the Proposed Turbines

Project Title
Slievegrine Renewable Energy Development

Project No.	Drawing No.	Scale
240740	4-48	1:170,000
Drawn By	Checked By	Date
SOR	NS	24/09/2026

Email: info@mkoireland.ie/ Website: www.mkoireland.ie

4.5.3.1 Traffic Management

The need to transport turbine components on the public roads is not an everyday occurrence in the vicinity of the Site. However, the procedures for transporting abnormal size loads on the country's roads are well established. While every operation to transport abnormal loads is different and requires careful consideration and planning, escort vehicles, traffic management plans, drive tests, road marshals and convoy escorts from the Garda Traffic Corps are all measures that are regularly employed to deliver oversized loads from origin to destination. With just under 400 No. wind farms already built and operating in Ireland (Republic and Northern Ireland combined, as per latest available figures on www.windenergyireland.com), transport challenges are something the wind energy industry and specialist transport sector has become particularly adept in finding solutions to.

As an alternative solution for transport of turbine blades, alternative delivery systems are available. For example, delivery vehicles fitted with blade adapters may be used in order to navigate the existing roads along the turbine delivery route. Blade adaptors allow the turbine blade to be transported at a suitable angle in order to navigate tight bends or obstacles along the delivery route. Plate 4-6 below shows an example of a blade adapter.



Plate 4-6 Blade Adaptor Transport System

A detailed Traffic Management Plan (TMP) will be provided specifying details relating to traffic management and included in the Construction Environmental Management Plan (CEMP) prior to the commencement of the construction phase of the Proposed Project. The TMP will be agreed with the local authority and An Garda Síochána prior to construction works commencing on-site. The TMP will include:

- A delivery schedule.
- Details of works or any other minor alteration identified.
- A dry run of the route using vehicles with similar dimensions.

The deliveries of turbine components to the Proposed Wind Farm site may be made in convoys of three to four vehicles at a time, and at night when roads are quietest. Convoys will be accompanied by escorts at the front and rear operating a "stop and go" system. Although the turbine delivery vehicles are large, they will not prevent other road users or emergency vehicles passing, should the need arise. The delivery escort vehicles will ensure the turbine transport is carried out in a safe and efficient manner with minimal delay or inconvenience for other road users.

It is not anticipated that any section of the public road network will be closed during transport of turbines, although there will be some delays to local traffic at pinch points. During these periods it may be necessary to operate local diversions for through traffic. All deliveries comprising abnormally large

loads where required will be made outside the normal peak traffic periods, usually at night, to avoid disruption to work and school-related traffic.

Prior to the Traffic Management Plan being finalised, a full dry run of the transport operation along the potential routes will be completed using vehicles with attachments to simulate the dimensions of the wind turbine transportation vehicles. This dry run will inform the Traffic Management Plan for agreement with the relevant Authorities. All turbine deliveries will be provided for in a Traffic Management Plan which will be finalised in advance of oversized load deliveries, when the exact transport arrangements are known, delivery dates confirmed and escort proposals in place. Such a traffic management plan is typically submitted to the relevant Authorities for agreement in advance of any abnormal loads using the local roads, and will provide for all necessary safety measures, including a convoy and Garda escort as required, off-peak turning/reversing movements and any necessary safety controls.

General construction deliveries and staff will access the Site via one of the 8 site entrances outlined in Table 4-10 above, as described in Section 4.5.1 above. As set out in Chapter 15, Section 15.1 and shown in Figure 15-1a of this EIAR, in order to separate traffic movements travelling to and from the site it is proposed that all traffic accessing the site will travel from east to west along the L2024 and turn left into the site, with all traffic exiting the site turning right out onto the L2024. It is proposed that temporary traffic management measures will be introduced at this location during the construction phase, including signs and the presence of a Flagman on days with high volumes of construction material deliveries.

4.6 Site Drainage

4.6.1 Introduction

The drainage design for the Proposed Project has been prepared by MKO. The drainage design has been prepared based on experience of the project team on other similar projects and the best practice guidance documents referred to in the References section of the EIAR.

The protection of the watercourses within and surrounding the Site, and downstream catchments that they feed is important to establish the most appropriate drainage proposals for the Proposed Project. The drainage design for the Proposed Project has been planned with the intention of having no significant negative impact on the water quality of the Site and its associated rivers, and consequently no impact on downstream catchments and ecological ecosystems. The assessment of potential impacts on hydrology and hydrogeology due to the construction, operation and decommissioning of the Proposed Project is included in Chapter 9: '*Hydrology and Hydrogeology*'.

No routes of any natural drainage features will be altered as part of the Proposed Project. Turbine locations and associated new roadways were designed to avoid natural watercourses with existing roads to be used wherever possible. There will be no direct discharges to any natural watercourses or land drains, with all drainage waters being dispersed as overland flows. All discharges from the proposed works areas will be made over vegetation filters at an appropriate distance from natural watercourses and drains. Buffer zones around the existing natural drainage features have been used to inform the layout of the Proposed Project.

4.6.2 Existing Drainage Features

It is proposed that 4 no. EPA watercourse crossings are required at the Proposed Wind Farm site, these consisting of 1 no. new clear span watercourse crossing, 2 no. bottomless box culverts watercourse crossings and 1 no. flatbed over existing watercourse crossing. 2 no. EPA watercourse crossings are required along the Proposed 110kV Underground Cabling Route, these consisting of flatbed over existing watercourse crossings. Additionally, drain crossings will be required or upgraded for the

Proposed Project. The drains are typically man-made forestry drains which run through coniferous forestry swathes.

There will be no direct discharges to natural watercourses or drains. All discharges from the proposed works areas or from interceptor drains will be made over vegetated ground at an appropriate distance from watercourses. Buffer zones around the existing natural drainage features have informed the layout of the Proposed Project and are indicated on the drainage design drawings.

Where artificial drains are currently in place in the vicinity of proposed works areas, these drains may have to be diverted around the proposed works areas to minimise the amount of water in the vicinity of works areas. Where it may not be possible to divert artificial drains around proposed work areas, the drains will be blocked to ensure sediment laden water from the works areas has no direct route to other watercourses. Where drains have to be blocked, the blocking will only take place after an alternative drainage system to handle the same water has been put in place.

Existing artificial drains in the vicinity of existing Site roads will be maintained in their present location where possible. If it is expected that these artificial drains will receive drainage water from works areas post treatment, check dams will be added (as specified below) to control flows and sediment loads in these existing artificial drains. If road widening or improvement works are necessary along the existing roads, where possible, the works will take place on the opposite side of the road to the drain.

4.6.3 Drainage Design Principles

The key principles of drainage design that will be implemented and adhered to as part of the Proposed Project are as follows:

- Keep clean water clean by intercepting it where possible, upgradient of works areas, and divert it around the works areas for discharge as diffuse overland flow or for rewetting of land.
- Collect potentially silt-laden runoff from works areas via downgradient collector drains and manage via series of avoidance, source, in-line, treatment and outfall controls prior to controlled diffuse release as overland flow or for rewetting of land.
- No direct hydraulic connectivity from construction areas to watercourses or drains connecting to watercourses.
- Buffer zones of 50m around the existing natural drainage features
- No alteration of natural watercourses.
- Maintain the existing hydrology of the Site.
- Blocking of existing manmade drainage as appropriate.
- Daily inspection and recording of surface water management system by on-site Environmental Clerk of Works and immediate remedial measures to be carried out as required and works temporarily ceased if a retained stormwater/sediment load is identified to have the potential to migrate from the Site.

Drainage water from any works areas of the Site will not be directed to any natural watercourses within the Site. Two distinct methods will be employed to manage drainage water within the Site. The first method involves keeping clean water clean by avoiding disturbance to natural drainage features, minimising any works in or around artificial drainage features, and diverting clean surface water flow around excavations and construction areas. The second method involves collecting any drainage waters from works areas within the Site that might carry silt or sediment, to allow attenuation and settlement prior to controlled diffuse release. The drainage design is intended to maximise erosion control, which is more effective than having to control sediment during high rainfall. Such a system also requires less maintenance. The area of exposed ground will be minimised. The drainage measures will prevent runoff from entering the works areas of the Site from adjacent ground, to minimise the volume of sediment-laden water that has to be managed. Discoloured run-off from any construction area will be

isolated from natural clean run-off. A schematic of the proposed site drainage management is presented in Figure 4-49 below.

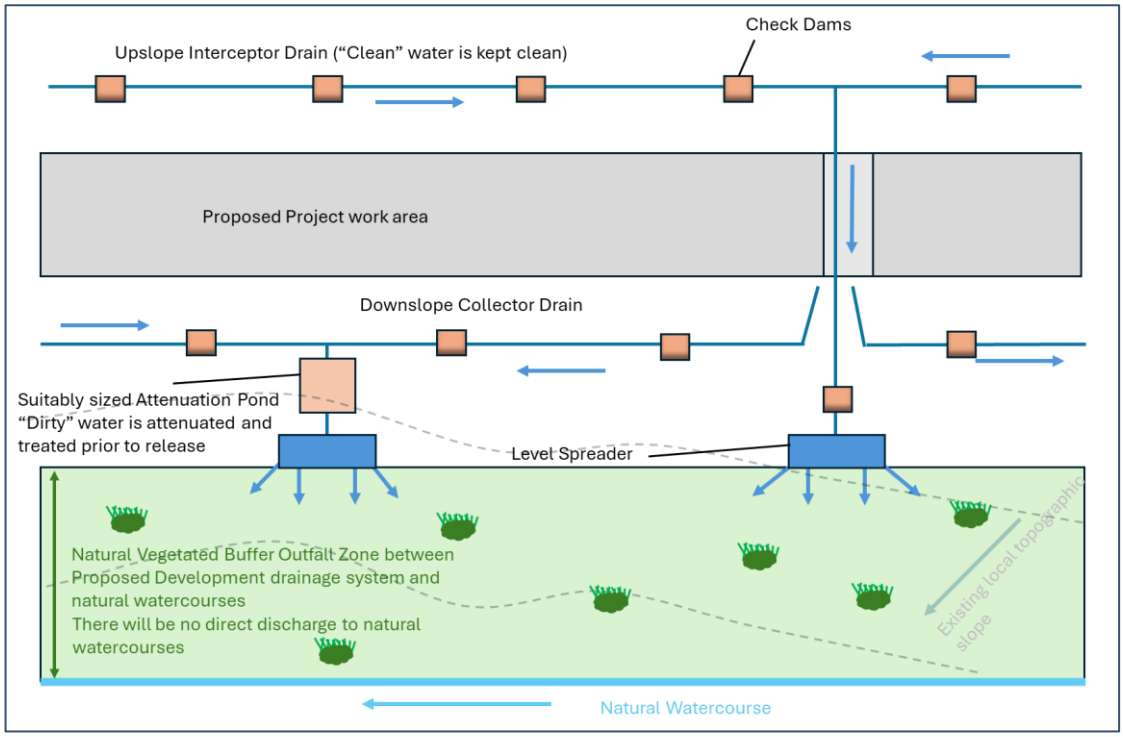


Figure 4-49 Schematic of Proposed Site Drainage Management

4.6.4 Drainage Design

A drainage design for the Proposed Project, incorporating all principles and measures outlined in this drainage design description, has been prepared, and is included in Appendix 4-2 to this EIAR. The drainage design employs the various measures further described below and is cognisant of the following guidance documents:

- Forestry Commission (2011): Forests and Water UK Forestry Standard Guidelines, Fifth Edition. Publ. Forestry Commission, Edinburgh;
- Coillte Forest (2013): Operations and Water Protection Guidelines;
- Forest Services (Draft) Forestry and Freshwater Pearl Mussel Requirements – Site Assessment and Mitigation Measures;
- Forest Service (2000): Forestry and Water Quality Guidelines. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford;
- COFORD (2004): Forest Road Manual – Guidelines for the Design, Construction and Management of Forest Roads;
- Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Watercourses;
- Scottish Natural Heritage, 2019 Good Practice During Wind Farm Construction
- UK Guidance Note 2020 GPP1 - General Guide to Prevention of Pollution (UK Guidance Note);
- UK Guidance Note 2018 GPP5 – Works or Maintenance in or Near Watercourses
- Construction Industry Research and Information Association (CIRIA) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006); and,

- Construction Industry Research and Information Association (CIRIA) 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006.

4.6.4.1 Interceptor Drains

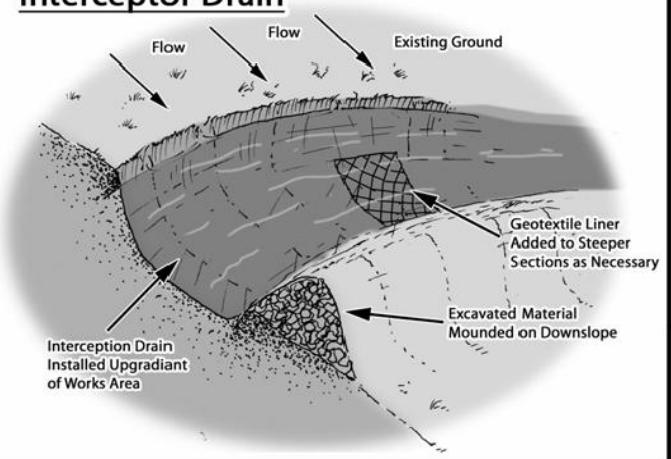
Interceptor drains will be installed upgradient of any works areas to collect surface flow runoff and prevent it reaching excavations and construction areas of the Site where it might otherwise have come into contact with exposed surfaces and picked up silt and sediment. The drains will be used to divert upslope runoff around the works area to a location where it can be redistributed over the ground surface as sheet flow. This will minimise the volume of potentially silty runoff to be managed within the construction area.

The interceptor drains will be installed in advance of any main construction works commencing. The material excavated to make the drain will be compacted on the downslope edge of the drain to form a diversion dike. On completion of the construction phase works, it is envisaged that the majority of the interceptor drains could be removed. At that stage, there will be no open excavations or large areas of exposed ground that are likely to give rise to large volumes of potentially silt-laden run off. Any areas in which works were carried out to construct roads, turbines or hardstands, will have been built up with large grade hardcore, which even when compacted in place, will retain sufficient void space to allow water to infiltrate the subsurface of these constructed areas. It is not anticipated that roadways or other installed Site infrastructure will intercept ground-conveyed surface water runoff to any significant extent that would result in scouring or over-topping or spill over. Where the drains are to be removed, they will be backfilled with the material from the diversion dike. Interceptor drains may have to be retained in certain locations, for example where roadways are to be installed on slopes, to prevent the roadways acting as conduits for water that might infiltrate the roadway sub-base. In these cases, interceptor drains would be maintained in localised areas along the roadway with culverts under the roadway, which would allow the intercepted water to be discharged to vegetation filters downgradient of the roadway. Similarly, in localised hollows where water is likely to be funnelled at greater concentrations than on broader slopes, interceptor drains and culverts may be left in situ following construction. Figure 4-50 below shows an illustrative drawing of an interceptor drain.

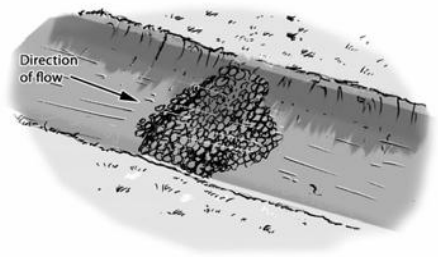
The velocity of flow in the interceptor will be controlled by check dams (discussed further below), which will be installed at regular intervals along the drains to ensure flow in the channel is non-erosive. On steeper sections where erosion risks are greater, a geotextile membrane will be added to the channel. Interceptor drains will be installed horizontally across slopes to run in parallel with the natural contour line of the slope. Intercepted water will travel along the interceptor drains to areas downgradient of works areas, where the drain will terminate at a level spreader (discussed below). Across the entire length of the interceptor drains, the design elevation of the water surface along the route of the drains will not be lower than the design elevation of the water surface in the outlet at the level spreader.

Drainage Design Measures

Interceptor Drain

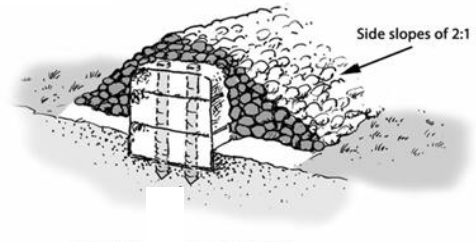


Check Dam (Stone Dam in Drain)

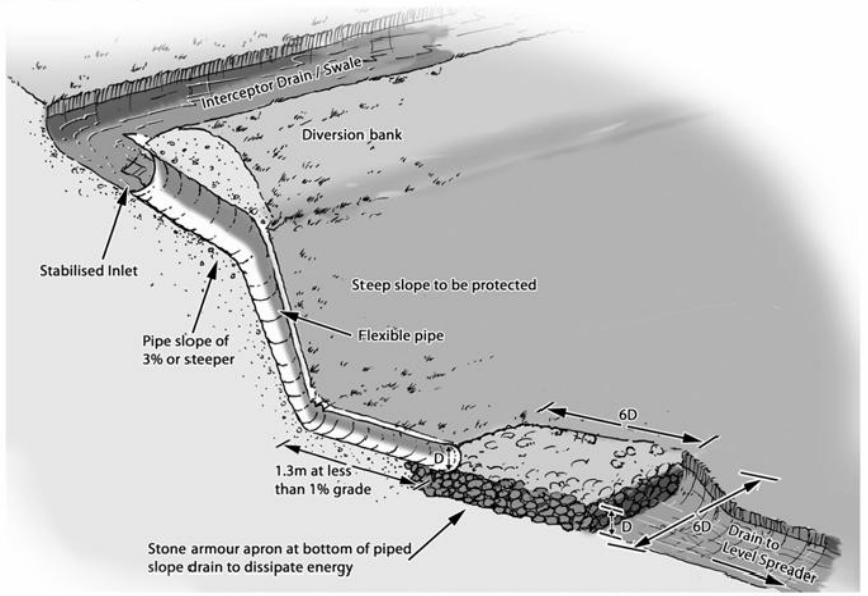


Check Dam

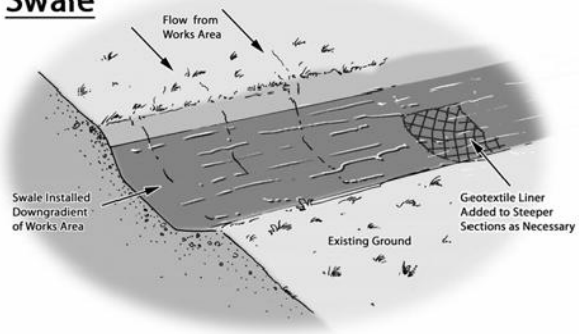
Stone Dam - Cross Section)



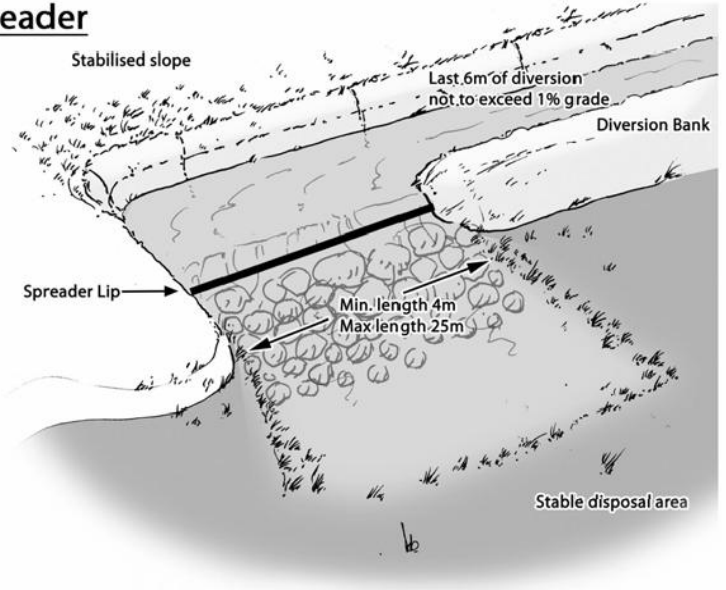
Slope Pipe Drain



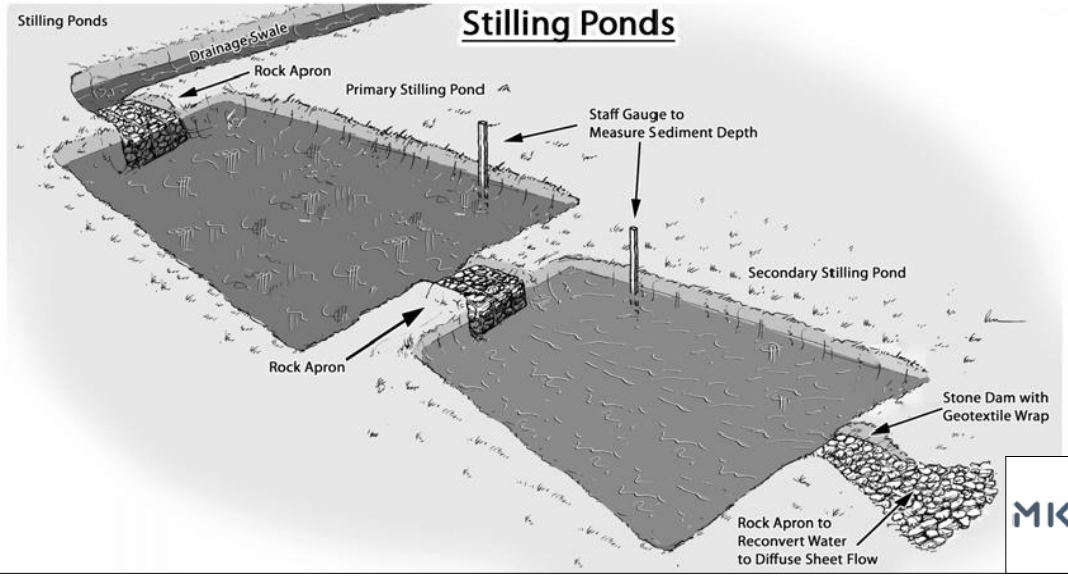
Swale



Level Spreader



Stilling Ponds



MAP TITLE: **Drainage Design Measure Illustrations**		MAP NO.: **Figure 4-50**	SCALE: **NTS**
PROJECT TITLE: **Slievegrine Renewable Energy Development**			DATE: **23.09.2026**
DRAWING BY: **Natalia Stolarska**	CHECKED BY: **Eoin McCarthy**	ISSUE NO.: **240740**	

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4.6.4.2 Swales

Drainage swales are shallow drains that will be used to intercept and collect run off from construction areas of the Site during the construction phase. Drainage swales will remain in place to collect runoff from roads and hardstanding areas of the Proposed Project during the operational phase. A swale is an excavated drainage channel located along the downgradient perimeter of construction areas, used to collect and carry any sediment-laden runoff to a sediment-trapping facility and stabilised outlet. Swales are proven to be most effective when a dike is installed on the downhill side. They are similar in design to interceptor drains and collector drains described above. Figure 4-50 shows an illustrative example of a drainage swale.

Drainage swales will be installed downgradient of any works areas to collect surface flow runoff where it might have come into contact with exposed surfaces and picked up silt and sediment. Swales will intercept the potentially silt-laden water from the excavations and construction areas of the Site and prevent it reaching natural watercourses.

4.6.4.3 Check Dams

The velocity of flow in the interceptor drains and drainage swales, particularly on sloped sections of the channel, will be controlled by check dams, which will be installed at regular intervals along the drains to ensure flow in the swale is non-erosive.

Check dams will restrict flow velocity, minimise channel erosion and promote sedimentation behind the dam. The check dams will be installed as the interceptor drains are being excavated. Check dams may also be installed in some of the existing artificial drainage channels on the Site, downstream of where drainage swales connect in.

The proposed check dams will be made up of stone. Clean 4–6-inch stone will be built up on either side to a maximum height of 600mm over the bottom of the interceptor drain. In smaller channels, a stone check dam will be installed and pressed down into place in the bottom of the drainage swale with the bucket of an excavator. Figure 4-50 shows illustrative examples of check dams.

The check dams will be installed at regular intervals along the interceptor drains to ensure the bottom elevation of the upper check dam is at the same level as the top elevation of the next down-gradient check dam in the drain. The centre of the check dam will be approximately 150mm lower than the edges to allow excess water to overtop the dam in flood conditions rather than cause upstream flooding or scouring around the dams.

Check dams will not be used in any natural watercourses, only artificial drainage channels and interceptor drains. The check dams will be left in place at the end of the construction phase to limit erosive linear flow in the drainage swales during extreme rainfall events.

Check dams are designed to reduce velocity and control erosion and are not specifically designed or intended to trap sediment, although sediment is likely to build up. If necessary, any excess sediment build up behind the dams will be removed. For this reason, check dams will be inspected and maintained regularly to insure adequate performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.

4.6.4.4 Level Spreaders

A level spreader will be constructed at the end of each interceptor drain to convert concentrated flows in the drain, into diffuse sheet flow on areas of vegetated ground. The levels spreaders will be located

downgradient of any proposed works areas in locations where they are not likely to contribute further to water ingress to construction areas of the Site.

The water carried in interceptor drains will not have come in contact with works areas of the Site, and therefore should be free of silt and sediment. The level spreaders will distribute clean drainage water onto vegetated areas where the water will not be reconcentrated into a flow channel immediately below the point of discharge. The discharge point will be on level or only very gently sloping ground rather than on a steep slope so as to prevent erosion. Figure 4-50, above, shows an illustrative example of a level spreader.

The slope in the channel leading into the spreader will be less than or equal to 1%. The slope downgradient of the spreader onto which the water will dissipate will have a grade of less than 6%. The availability of slopes with a grade of 6% or less will determine the locations of level spreaders. If a slope grade of less than 6% is not available in the immediate area downgradient of a works area at the end of a diversion drain, a piped slope drain (discussed below) will be used to transfer the water to a suitable location.

The spreader lip over which the water will spill will be made of a concrete kerb, wooden board, pipe, or other similar piece of material that can create a level edge similar in effect to a weir. The spreader will be level across the top and bottom to prevent channelised flow leaving the spreader or ponding occurring behind the spreader. The top of the spreader lip will be 150mm above the ground behind it. The length of the spreader will be a minimum of four metres and a maximum length of 25 metres, with the actual length of each spreader to be determined by the size of the contributing catchment, slope and ground conditions.

Clean four-inch stone can be placed on the outside of the spreader lip and pressed into the ground mechanically to further dissipate the flow leaving the level spreader over a larger area.

4.6.4.5 Piped Slope Drains

Piped slope drains will be used to convey surface runoff from diversion drains safely down slopes to flat areas without causing erosion. Once the runoff reaches the flat areas it will be reconverted to diffuse sheet flow. Level spreaders will only be established on slopes of less than 6% in grade. Piped slope drains will be used to transfer water away from areas where slopes are too steep to use level spreaders.

The piped slope drains will be semi-rigid corrugated pipes with a stabilised entrance and a rock apron at the outlet to trap sediment and dissipate the energy of the water. The base of drains leading into the top of the piped slope drain will be compacted and concavely formed to channel the water into the corrugated pipe. The entrance at the top of the pipe will be stabilised with sandbags if necessary. The pipe will be anchored in place by staking at approximately 3-4 metre intervals or by weighing down with compacted soil. The bottom of the pipe will be placed on a slope with a grade of less than 1% for a length of 1.5 metres, before outflowing onto a rock apron.

The rock apron at the outlet will consist of 6-inch stone to a depth equal to the diameter of the pipe, a length six times the diameter of the pipe. The width of the rock apron will be three times the diameter of the pipe where the pipe opens onto the apron and will fan out to six times the diameter of the pipe over its length. Figure 4-50 above, shows a diagrammatic example of a piped slope drain and rock apron.

Piped slope drains will only remain in place for the duration of the construction phase of the Proposed Project. On completion of the works, the pipes and rock aprons will be removed, and all channels backfilled with the material that was originally excavated from them.

Piped slope drains will be inspected weekly and following rainfall events. Inlet and outlets will be checked for sediment accumulation and blockages. Stake anchors or fill over the pipe will be checked

for settlement, cracking, and stability. Any seepage holes where pipe emerges from the drain at the top of the pipe will be repaired promptly.

4.6.4.6 Vegetation Filters

Vegetation filters are the existing vegetated areas of land that will be used to accept surface water runoff from upgradient areas. The selection of suitable areas to use as vegetation filters will be determined by the size of the contributing catchment, slope and ground conditions.

Vegetation filters will carry outflow from the level spreaders as overland sheet flow, removing any suspended solids and discharging to the groundwater system by diffuse infiltration.

Vegetation filters will not be used in isolation for waters that are likely to have higher silt loadings. In such cases, silt-bearing water will already have passed through stilling ponds prior to diffuse discharge to the vegetation filters via a level spreader.

4.6.4.7 Stilling Ponds (Settlement Ponds)

Stilling ponds will be used to attenuate runoff from works areas of the Site during the construction phase and will remain in place to handle runoff from roads and hardstanding areas of the Proposed Project during the operational phase. The purpose of the stilling ponds is to intercept runoff potentially laden with sediment and to reduce the amount of sediment leaving the disturbed area by reducing runoff velocity. Reducing runoff velocity will allow larger particles to settle out in the stilling ponds, before the run-off water is redistributed as diffuse sheet flow in filter strips downgradient of any works areas.

Stilling ponds will be excavated/constructed at each required location as two separate ponds in sequence, a primary pond and a secondary pond. The points at which water enters and exits the stilling ponds will be stabilised with rock aprons, which will trap sediment, dissipate the energy of the water flowing through the stilling pond system, and prevent erosion. The primary stilling pond will reduce the velocity of flows to less than 0.5 metres per second to allow settlement of silt to occur. Water will then pass from the primary pond to the secondary pond via another rock apron. The secondary stilling pond will reduce the velocity of flows to less than 0.3 metres per second. Water will flow out of the secondary stilling pond through a stone dam, partially wrapped in geo-textile membrane, which will control flow velocities and trap any sediment that has not settled out. Figure 4-50, above, shows an illustrative example of a stilling pond system.

Water will flow by gravity through the stilling pond system. The stilling ponds will be sized according to the size of the area they will be receiving water from but will be sufficiently large to accommodate peak flows storm events. The stilling ponds will be dimensioned so that the length to width ratio will be greater than 2:1, where the length is the distance between the inlet and the outlet. Where ground conditions allow, stilling ponds will be constructed in a wedge shape, with the inlet located at the narrow end of the wedge. Each stilling pond will be a minimum of 1-1.5 metres in depth. Deeper ponds will be used to minimise the excavation area needed for the required volume.

The embankment that forms the sloped sides of the stilling ponds will be stabilised with vegetated turves, which will have been removed during the excavation of the stilling ponds area. All material excavated during pond construction will be used locally for landscaping and berm construction around these ponds.

Stilling ponds will be located towards the end of swales, close to where the water will be reconverted to diffuse sheet flow. Upon exiting the stilling pond system, water will be immediately reconverted to diffuse flow via a fan-shaped rock apron if there is adequate space and ground conditions allow. Otherwise, a swale will be used to carry water exiting the stilling pond system to a level spreader to reconvert the flow to diffuse sheet flow.

Stilling ponds will be inspected weekly and following rainfall events. Inlet and outlets will be checked for sediment accumulation and anything else that might interfere with flows.

4.6.4.8 Silt Bags

Dewatering silt bags allow the flow of water through them while trapping any silt or sediment suspended in the water. The silt bags provide a passive non-mechanical method of removing any remaining silt contained in the potentially silt-laden water collected from works areas within the Site.

Dewatering silt bags are an additional drainage measure that can be used downgradient of the stilling ponds at the end of the drainage swale channels and will be located, wherever it is deemed appropriate, throughout the Site. The water will flow, via a pipe, from the stilling ponds into the silt bag. The silt bag will allow the water to flow through the geotextile fabric and will trap any of the finer silt and sediment remaining in the water after it has gone through the previous drainage measures. The dewatering silt bags will ensure that there will be no loss of silt into the stream.

The dewatering silt bag that will be used will be approximately 3 metres in width by 4.5 metres (see Plate 4-7 below) in length and will be capable of trapping approximately four tonnes of silt. The dewatering silt bag, when full, will be removed from Site by a waste contractor with the necessary waste collection permit, who will then transport the silt bag to an appropriate, fully licensed waste facility. Silt Bag with water being pumped through.



Plate 4-7 Silt Bag with water being pumped through.

4.6.4.9 Sedimats

Sediment entrapment mats, consisting of coir or jute matting, will be placed at the outlet of the silt bag to provide further treatment of the water outfall from the silt bag. Sedimats will be secured to the ground surface using stakes/pegs. The sedimat will extend to the full width of the outfall to ensure all water passes through this additional treatment measure.

4.6.4.10 Culverts

All new proposed culverts and proposed culvert upgrades will be suitably sized for the expected peak flows in the watercourse.

Some culverts may be installed to manage drainage waters from works areas of the Proposed Project, particularly where the waters have to be taken from one side of an existing roadway to the other for discharge. The size of culverts will be influenced by the depth of the track or road sub-base. In all cases, culverts will be oversized to allow mammals to pass through the culvert.

Culverts will be installed with a minimum internal gradient of 1% (1 in 100). Smaller culverts will have a smooth internal surface. Larger culverts may have corrugated surfaces which will trap silt and

contribute to the stream ecosystem. Depending on the management of water on the downstream side of the culvert, large stone may be used to interrupt the flow of water. This will help dissipate its energy and help prevent problems of erosion. Smaller water crossings will simply consist of an appropriately sized pipe buried in the sub-base of the road at the necessary invert level to ensure ponding or pooling does not occur above or below the culvert and water can continue to flow as necessary.

All culverts will be inspected regularly to ensure they are not blocked by debris, vegetation or any other material that may impede conveyance.

4.6.4.11 Silt Fences

Silt fences will be installed as an additional water protection measure around existing watercourses in certain locations, particularly where works are proposed within the 50-metre buffer zone of a stream, which is inevitable where existing roads in proximity to watercourses are to be upgraded as part of the Proposed Project. These areas include around existing culverts, around the headwaters of watercourses, and the proposed locations are indicated on the drainage design drawings included in Appendix 4-2.

Silt fences will be installed as single, double or a series of triple silt fences, depending on the space available and the anticipated sediment loading. The silt fence designs follow the technical guidance document '*Control of Water Pollution from Linear Construction Projects'* published by Construction Industry Research and Information Association (CIRIA, No. C648, 1996). Up to three silt fences may be deployed in series.

All silt fencing will be formed using Terrastop Premium or equivalent silt fence product.

Silt fences will be inspected regularly to ensure water is continuing to flow through the fabric, and the fence is not coming under strain from water backing up behind it.

4.6.4.12 Oil Interceptor

An oil interceptor is a trap used to filter out oil and other hydrocarbons from surface water runoff. A suitably sized hydrocarbon interceptor will be installed wherever it is intended to store hydrocarbons and oils (i.e., construction compounds and substation compound).

4.6.4.13 Tree Felling Drainage

Tree felling will be required within and around Proposed Project footprint to allow for the construction of the Proposed Turbines , access roads, underground cabling, and the other ancillary infrastructure. The felling will not be undertaken simultaneously with construction groundworks. Keyhole felling to facilitate construction works will take place prior to groundworks commencing. A Harvest Management Plan is included as Appendix 4-5.

During tree felling there is a potential to generate silts and sediments in surface water runoff due to tracking of machinery and disturbance of the ground surface etc, however mitigation is provided in Chapter 9 Hydrology and Hydrogeology with regard surface water quality protection for this activity which is summarised below. Also, prior to the commencement of tree felling for subsequent road construction the following key temporary drainage measures will be installed:

- All existing dry forestry drains that intercept the proposed works area will be temporarily blocked down-gradient of the works using forestry check dams/silt traps;
- Clean water diversion drains will be installed upgradient of the works areas;
- Check dams/silt fence arrangements (silt traps) will be placed in all existing forestry drains that have surface water flows and also along existing forestry roadside drains; and,

- A double silt fence perimeter will be placed down-slope of works areas that are located inside the watercourse 50m buffer zone.

Before the commencement of any felling works, an Environmental Clerk of Works (ECoW) shall be appointed to oversee the keyhole and extraction works. The ECoW shall be experienced and competent (with freshwater pearl mussel experience), and shall have the following functions and operate their record using a Schedule of Works Operation Record (SOWOR), as proposed in the planning application:

- Attend the Site for the setup period when drainage protection works are being installed and be present onsite during the remainder of the forestry keyhole felling works.
- Prior to the commencement of works, review and agreement of the positioning by the Operator of the required Aquatic Buffer Zones (ABZs), silt traps, silt fencing (see below), water crossings and onsite storage facilities for fuel, oil and chemicals (see further below).
- Be responsible for preparing and delivering the Environmental Tool Box Talk (TBT) to all relevant parties involved in site operations, prior to the commencement of the works.
- Conduct daily and weekly inspections of all water protection measures and visually assess their integrity and effectiveness in accordance with Section 3.4 (Monitoring and Recording) and Appendix 3 (Site Monitoring Form (Visual Inspections)) of the Forestry & Freshwater Pearl Mussel Requirements.
- Take representative photographs showing the progress of operation onsite, and the integrity and effectiveness of the water protection measures.
- Collect water samples for analysis by a 3rd party accredited laboratory, adhering to the following requirements:
- Surface water samples shall be collected upstream and downstream of the keyhole felling at suitable sampling locations.
- Sampling shall be taken from the stream / riverbank, with no in-stream access permitted.
- The following minimum analytical suite shall be used: pH, EC, TSS, BOD, Total P, Ortho-P, Total N, and Ammonia.
- Review of operator's records for plant inspections, evidence of contamination and leaks, and drainage checks made after extreme weather conditions.
- Prepare and maintain a contingency plan.
- Suspend work where potential risk to water from siltation and pollution is identified, or where operational methods and mitigation measures are not specified or agreed.
- Prepare and maintain a Water Protection Measure Register. This document is to be updated weekly by the ECoW.

To protect watercourses, the following measures will be adhered to during all keyhole/tree felling activities.

- All relevant measures, best practice methods and requirements set out in Chapter 9 of the EIAR will be adhered to including Forestry & Water Quality Guidelines, Forest Harvesting & the Environment Guidelines and the Forest Protection Guidelines.
- The extent of all necessary tree felling will be identified and demarcated with markings on the ground in advance of any felling commencing.
- All roads and culverts will be inspected prior to any machinery being brought on Site to commence the felling operation. No tracking of vehicles through watercourses will occur. Vehicles will only use existing road infrastructure and established watercourse crossings.

- Existing drains that drain an area to be felled towards surface watercourses will be blocked, and temporary silt traps will be constructed to ensure collection of all silt within felling areas. These temporary silt traps will be cleaned out and backfilled once felling works are complete. This ensures there is no residual collected silt remaining in blocked drains after felling works are completed. No direct discharge of such drains to watercourses will occur from within felling areas.
- New collector drains and sediment traps will be installed during ground preparation to intercept water upgradient of felling areas and divert it away. Collector drains will be excavated at an acute angle to the contour (0.3%-3% gradient), to minimise flow velocities.
- All silt traps will be sited outside of buffer zones and have no direct outflow into the aquatic zone. Machine access will be maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of away from all aquatic zones.
- All new collector drains will taper out before entering the aquatic buffer zone to ensures the discharging water gently fans out over the buffer zone before entering the aquatic zone.
- Machine combinations, such as mechanical harvesters or chainsaw felling will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance.
- Mechanised operations will be suspended during and immediately after heavy rainfall.
- Where brash is required to form brash mats, it is to be laid out at harvesting stage to prevent soil disturbance by machine movement.
- Brash which has not been pushed into the soil may be moved within the Site to facilitate the creation of mats in more demanding locations.
- Felling of trees will be pointed directionally away from watercourses.
- Felling will be planned to minimise the number of machine passes in any one area.
- Extraction routes, and hence brash mats, will be aligned parallel to the ground contours where possible.
- Harvested timber will be stacked in dry areas, and outside any 50-metre watercourse buffer zone. Check dams to be emplaced on the down gradient side of timber storage sites.
- Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but removing of natural debris deflectors will be avoided.

4.6.5 Cable Trench Drainage

Cable trenches are typically constructed in short, controlled sections, thereby minimising the amount of ground disturbed at any one time and minimising the potential for drainage runoff to pick up silt or suspended solids. Each short section of trench is excavated, ducting installed and bedded, and backfilled with the appropriate materials, before work on the next section commences.

To efficiently control drainage runoff from cable trench works areas, excavated material is stored on the up-gradient side of the trench and is temporarily sealed/smoothed over, using the back of the excavator bucket. Should any rainfall cause runoff from the excavated material, the material is therefore collected and contained in the downgradient cable trench. Excess subsoil is removed from the cable trench works area immediately upon excavation, and in the case of the Proposed Project, would be transported for use of backfilling the 5 no. borrow pits or used for landscaping and reinstatement of other areas elsewhere on-site. Along sections of the Proposed 110kV Underground Cabling Route that are further removed from the Proposed Wind Farm site it may be more practical to transport excess excavated material to a nearby licenced facility.

On steeper slopes, silt fences, as detailed in Section 4.6.4.11, above, will be installed temporarily downgradient of the cable trench works area, or on the downhill slope below where excavated material is being temporarily stored to control run-off.

4.6.6 Site Drainage Management

4.6.6.1 Preparative Site Drainage Management

All materials and equipment necessary to implement the drainage measures detailed above, will be brought on-site in phases as they are required during the construction phase. A sufficient number of clean drainage stone, terram, stakes, etc. will be kept on-site at all times to implement the drainage design measures as necessary. The drainage measures detailed in the above will be installed prior to, or at the same time as the works they are intended to drain.

4.6.6.2 Pre-emptive Site Drainage Management

The works programme for the groundworks part of the construction phase of the Proposed Project will also take account of weather forecasts, and predicted rainfall. Large excavations, large movements of overburden or large-scale overburden or soil stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

4.6.6.3 Reactive Site Drainage Management

The final drainage design prepared for the Proposed Project prior to commencement of construction will provide for reactive management of drainage measures. The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat silt-laden water from the works areas, will be monitored continuously by the Environmental Clerk of Works (ECoW) or supervising hydrologist on-site. The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional check dams, interceptor drains or swales as deemed necessary on-site. The drainage design may have to be modified on the ground as necessary, and the modifications will draw on the various features outlined above in whatever combinations are deemed to be most appropriate to situation on the ground as a particular time.

In the event that works are giving rise to siltation of watercourses, the ECoW or supervising hydrologist will stop all works in the immediate area around where the siltation is evident. The source of the siltation will be identified and additional drainage measures such as those outlined above will be installed in advance of works recommencing.

4.6.7 Drainage Maintenance

An inspection and maintenance plan for the drainage system on-site will be prepared in advance of commencement of any works on the Proposed Project. Regular inspections of all installed drainage features will be necessary, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water at parts of the systems where it is not intended. The inspection of the drainage system will be the responsibility of the ECoW or the Project Hydrologist. The drainage inspection and maintenance plan are included in the CEMP in Appendix 4-3 of this EIAR.

If necessary, any excess sediment build up behind check dams will be removed. For this reason, check dams will be inspected and maintained weekly during the construction phase of the Proposed Project to insure adequate performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.

Check dams will also be inspected weekly during the construction phase of the Proposed Project and following rainfall events to ensure the structure of the dam is still effective in controlling flow. Any scouring around the edges of the check dams or overtopping of the dam in normal flow conditions will be rectified by reinforcement of the check dam.

Drainage swales will be regularly inspected for evidence of erosion along the length of the swale. If any evidence of erosion is detected, additional check dams will be installed to limit the velocity of flow in the channel and reduce the likelihood of erosion occurring in the future.

Silt traps will be inspected weekly during the construction phase of the Proposed Project and following rainfall events. Inlet and outlets will be checked for sediment accumulation and anything else that might interfere with flows.

The frequency of drainage system inspections will be reduced following completion of the construction phase of the Proposed Project. The Project Hydrologist will inspect and review the drainage system after construction has been completed to provide guidance on the requirements of an operational phase drainage system.

4.7 Construction Management

4.7.1 Construction Timing

It is estimated that the construction phase of the Proposed Project will take approximately 18-24 months from commencement of civil works to the commissioning of the wind turbines. The commencement of works where the removal of vegetation is required, or where works take place in sensitive breeding habitats will be scheduled to occur outside the bird breeding season (1st of March to 31st of August) to avoid any potentially significant effects on nesting birds. Construction where removal of vegetation is required, or where works take place in sensitive breeding habitats may commence from September to March so that construction activities are ongoing by the time the next bird breeding season comes around and can continue throughout that bird breeding season.

Construction activities will be carried out during normal daytime working hours (i.e., 0700 – 1900hrs Monday to Saturday). However, to ensure that optimal use is made of good weather period or at critical periods within the programme (i.e., concrete pours) or to accommodate delivery of large turbine components along public routes it could be necessary on occasion to work outside of these hours. Any such out of hours working will be notified in advance to the Local Authority.

4.7.2 Construction Sequencing

The The construction phase can be broken down into three main phases, which overlap partially, 1) civil engineering works - 10 months, 2) electrical works including grid connection works - 9-12 months, and 3) turbine erection and commissioning - 8 months. The main task items under each of the three phases are outlined below.

Civil Engineering Works

- Construct new site entrances.
- Construct & Upgrade site roads to construction compounds.
- Clear and hardcore area for temporary site offices. Install same.
- Construct bunded area for oil storage.
- Tree felling and replanting.
- Construct new site roads and open borrow pits.
- Construct hard-standings and crane pads.
- Construct drainage ditches, culverts etc. integral to road construction.

- Excavate for turbine foundations. Place blinding concrete to turbine foundation bases. Fix reinforcing steel and anchorage system for tower section. Construct shuttering. Fix any ducts etc. to be cast in. Pour concrete bases. Cure concrete. Remove shutters after concrete cures.
- Excavate trenches for Site cables, lay cables and backfill. Provide ducts at road crossings.
- Backfill turbine foundations, and landscape with previously stored topsoil.
- Complete site works, reinstate Site.
- Remove temporary site offices. Provide any gates, landscaping, signs etc. which may be required.

Electrical Works

- Clear and hardcore area for temporary site offices. Install same
- Clear and Hardcore area for substations footprint
- Construct bases/plinths for substation buildings.
- Install external electrical equipment at substations.
- Install transformers at compounds.
- Erect stock proof and palisade fencing around substation areas.
- Install internal collector network and communication cabling.
- Construct 110kV and 220kV grid connection cabling.

Turbine and Meteorological Mast Erection

- Commission erection crane(s) and deliver components to turbine hardstands.
- Erect towers, nacelles and blades.
- Complete electrical installation.
- Install meteorological mast.
- Commission and test turbines.
- Complete site works, reinstate site.
- Remove temporary site offices. Provide any gates, landscaping, signs etc. which may be required.

All relevant Site Health & Safety procedures, in accordance with the relevant Health and Safety Legislation and guidance (listed in Section 5.10.2.8.1 of this EIAR), including the preparation of the Health & Safety Plan, erection of the relevant and appropriate signage on site, inductions and toolbox talks will take place prior to and throughout the construction phase of the Proposed Project. Further details of on-site health, safety and welfare are included in Chapter 5 of this EIAR.

The phasing and scheduling of the main construction task items are outlined in Table 4-12 below, where the 1st of January has been selected as an arbitrary start date for construction activities.

Table 4-11 Indicative Construction Schedule

		Year 1				Year 2			
ID	Task Name	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Site Health & Safety								
2	Grid Connection								
3	Site Compounds								
4	Site Roads								
5	Substation & Electrical								
6	Turbine Hardstands								
7	Turbine Foundations								
8	Backfilling & Landscaping								
9	Turbine Delivery & Erection								
10	Substation Commissioning								
11	Turbine Commissioning								

4.7.3 Construction Phase Monitoring and Oversight

The requirement for a CEMP to be prepared in advance of any construction works commencing on any wind farm development site and submitted for agreement to the Planning Authority is now well-established. The procedures for the implementation of the mitigation measures outlined in the CEMP and their completion is audited by way of a CEMP Audit Report.

The CEMP Audit Report will list all mitigation measures prescribed in any of the planning documentation and all conditions attached to the grant of planning permission and allows them to be audited on a systematic and regular basis. The first assessment is a simply Yes/No question, has the mitigation measure been employed on-site or not? Following confirmation that the mitigation measure has been implemented, the adherence to mitigation measures must be the subject of regular review and audit during the full construction stage of the project. If remedial actions are needed to improve the effectiveness of the mitigation measure, then these are notified to the Site staff immediately during the audit site visit, and in writing by way of the circulation of the audit report. Depending on the importance and urgency of rectifying the issue, the construction site manager is given a timeframe by when the remedial works need to be completed.

A CEMP has been prepared for the Proposed Project and is included in Appendix 4-3 of this EIAR. The CEMP includes details of drainage, overburden management, waste management etc, and describes how the above-mentioned Audit Report will function and be presented. In the event planning permission is granted for the Proposed Project, the CEMP will be updated prior to the commencement of the development, to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned and will be submitted to the Planning Authority for written approval.

The on-site construction staff will be responsible for implementing the mitigation measures specified in the EIAR and the CEMP and compiled in the Audit Report. Their implementation will be overseen by the ECoW or supervising hydrogeologists, environmental scientists, ecologists or geotechnical engineers, depending on who is best placed to advise on the implementation. The system of auditing referred to above ensures that the mitigation measures are maintained for the duration of the construction phase, and into the operational phase where necessary.

4.8 Construction Methodologies

This section of the chapter outlines the construction methodologies to be used for the various elements of the Proposed Wind Farm and Proposed Grid Connection. Further details in relation to construction methodologies is included in Section 2 of the CEMP, included as Appendix 4-3 of this EIAR.

4.8.1 Proposed Wind Farm

4.8.1.1 Turbine, Met Mast and Telecommunications Relay Mast Foundations

Each of the turbines to be erected on the Site will have a reinforced concrete base that is installed below the finished ground level. It is anticipated that the turbine foundations will be formed on competent strata (i.e., bedrock or subsoil of sufficient load bearing capacity). As detailed above in Section 4.3.1.13, intrusive site investigations were undertaken across the Proposed Wind Farm site, to provide detail and clarity on the nature and extent of sublayers and bedrock present. This assisted in providing additional information on the most suitable location for turbines and associated infrastructure. A methodology for reinforced concrete foundations and piled foundations is included in Section 2.3.3 of the CEMP, Appendix 4-3 of this EIAR.

Overburden will be stripped off the foundation area to a suitable formation using a 360° excavator and will be temporarily stored for later reuse in backfilling around the turbine foundations and for borrow pit reinstatement. A two-metre-wide working area will be required around each turbine foundation, with the sides of the excavated areas sloped sufficiently to ensure that slippage does not occur. Material excavated to create the working area will be stored locally for later reuse in backfilling and/or landscaping the working area around the turbine foundation. The excavated material will be sealed using the back of the excavator bucket and surrounded by silt fences to ensure sediment-laden run-off does not occur.

The formation material will have to be approved by an engineer as meeting the turbine manufacturer's requirements. If the formation level is reached at a depth greater than the depth of the foundation, the ground level will have to be raised with UGM Type A or similar hardcore material, compacted in 250 millimetres (mm) layers, with sufficient compacted effort (i.e., compacted with seven passes using 12 tonne roller). Drainage measures will be installed to protect the formation by forming an interceptor drain around the perimeter of the base which will be pumped out or outfall out at the lowest point level spreader or settlement pond.

An embankment approximately 600 mm high will be constructed around the perimeter of each turbine foundation base and a fence will be erected to prevent construction traffic from driving into the excavated hole and to demarcate the working area. All necessary health and safety signage will be erected to warn of deep excavations etc. Access to and from excavated bases will be formed by excavating a pedestrian walkway to 1:12 grade.

There will be a minimum of 100 mm of binding concrete laid on the formation material positioned using concrete skip and 360° excavator to protect ground formation and to give a safe working platform.

The anchor cage is delivered to the Site in 2 or more parts depending on the turbine type. A 360° excavator or crane with suitable approved lifting equipment will be used to unload sections of the anchor cage and reinforcing steel. The anchor cage is positioned in the middle of the turbine foundation base and is assembled accordingly. When the anchor cage is in final position it is checked and levelled by using an appropriate instrument. The anchor cage is positioned 250mm – 300mm from formation level by use of adjustable legs. Reinforcement bars are then placed around the anchor cage, first radial bars, then concentric bars, shear bars and finally the superior group of bars. Earthing material is attached during the steel foundation build up. The level of the anchor cage will be checked again prior to the concrete pour and during the concrete pour. As noted in Section 4.3.1.3, the transformer in each turbine is connected to the on-site substation through a network of buried electrical cables which are installed through the centre of the anchor cage.

Formwork to concrete bases will be propped/supported sufficiently to prevent failure. Concrete for foundations will be poured using a concrete pump. Each base will be poured in three stages. Stage 1

will see the concrete being poured and vibrated in the centre of the anchor cage to bring the concrete up to the required level inside the cage. Stage 2 will see the centre of the steel foundation being poured and vibrated to the required level. Stage 3 will see the remaining concrete being poured around the steel foundation to bring it up to the required finished level. After a period of time when the concrete has set sufficiently the top surface of the concrete surface is to be finished with a power float.

Once the base has sufficient curing time it will be backfilled with suitable fill up to existing ground level and finished with the original material that was excavated.

Based on the available trial pit data, is in envisaged that piled foundations will be required at the following turbines:

- T8 – T12
- T14
- T21

The requirement for piling at these turbines will be determined during post consent confirmatory ground investigations. The results of these confirmatory investigations may deem that the gravity foundation methodology is more appropriate. Both foundation methodologies have been fully assessed in the EIAR and NIS.

4.8.1.2 Site Roads and Hardstand Areas

Site roads will be constructed to each turbine base and at each base hard standing will be constructed to the turbine manufacturer's specifications. Tracked excavators will carry out excavation for roads with appropriate equipment attached. The excavations shall follow a logical route working away from the borrow pit locations. A 2-3m wide working area will be required around each hard standing area, with the sides of the excavated areas sloped sufficiently to ensure that slippage does not occur. Material excavated to create the working area will be stored locally for later reuse in backfilling the working area around the turbine foundation. The excavated material will be covered with polythene sheets or sealed with the excavator bucket and surrounded by silt fences to ensure sediment-laden run-off does not occur.

When the formation layer has been reached, stone from the on-site borrow pits shall be placed to form the road foundation. In the event of large clay deposits being encountered in sections of road, a geotextile layer will be required at sub base level. The sub grade will be compacted with the use of a roller. The final wearing course will not be provided until all bases have been poured. This prevents damage to the wearing course due to stone and concrete trucks movements. The road will be upgraded prior to the arrival of the first turbine. All roads will be maintained for the duration of the operation of the Proposed Project.

4.8.1.2.1 *New Site Access Road*

The construction methodology for the 13.5km of proposed new access roads and turbine hardstands for the Proposed Project is outlined as follows. The same construction methodology for the Proposed Wind Farm site roads will be used for the Proposed Grid Connection.

- Establish alignment of the new road from the construction drawings and mark out the centrelines with ranging rods or timber posts;
- All drainage measures prescribed in the detailed drainage design for the Proposed Project will be implemented around the works area;
- The road layout has been designed to avoid crossings of natural watercourses where possible;
- Where existing culverts are to be upgraded or extended, the works will be carried out to follow a method statement to be prepared in consultation with Inland Fisheries Ireland;

- The access tracks will be of single-track design with a width of 5m with localised widening at bends and changes in direction. (depending on the location within the Site)
- All spoil excavated will be managed on-site. It will be temporarily stockpiled within the Site for reuse for landscaping purposes. No spoil will be stockpiled in works areas adjacent to natural watercourses within stockpile exclusion zones as outlined in Figure 4-45.
- The subsoil will be excavated down to a suitable formation layer of competent stratum;
- The road will be constructed using well-graded granular fill (imported or site-won), spread and compacted in layers typically of 200mm and a suitable capping layer to provide a homogeneous running surface. The thickness of layers and amount of compaction required will be subject to detailed design by Project Engineer in consultation with the Construction Manager based on the characteristics of the material and the compaction plant to be used;
- The new access roads will be constructed with a camber to aid drainage of surface water;
- Excavations side slopes shall not generally be greater than 1(V): 2 (H). Design slopes will be informed by the Geotechnical Engineer;
- At bends or steep inclines from the road, reflective snow poles will be erected to warn traffic on dark mornings and evenings that there is a turn in the road or a sharp incline beyond the road.
- Where underground services are to be traversed during the construction of new roads throughout the Proposed Wind Farm site, they will be traversed as per the methodology as outlined above, as it is not anticipated that any existing services will be encountered when excavating the proposed new site access roads due to the nature of the works.

4.8.1.2.2 *Upgrading of Existing Site Access Road*

Approximately 8.9km of the existing roads will require upgrading for the Proposed Project which will comprise widening of the roadway to a total running width of approximately five metres, with wider sections at corners and the laying of a new surface dressing on the existing section of roadway where necessary. The road widening will be undertaken as follows. The same construction methodology for the Proposed Wind Farm site roads will be used for the Proposed Grid Connection.

- If it is considered that the current road formation level is adequate to support required bearing, then no upgrade or widening works will be completed.
- Otherwise, where required, the subsoil in the existing road verge will be excavated down to a suitable formation layer.
- All spoil excavated will be managed on-site. It will be temporarily stockpiled on Site and placed within the onsite borrow pit voids within the Proposed Wind Farm site. Some topsoil may be temporarily stockpiled locally for reuse for landscaping purposes.
- All drainage measures prescribed in the detailed drainage design for the Proposed Project will be implemented around the works area.
- Well-graded granular fill (imported or site-won) will be spread and compacted in layers up to 200mm to provide a homogeneous running surface. The thickness of layers and amount of compaction required will be decided by the Construction Manager based on the characteristics of the material and the compaction plant to be used.
- These layers of granular fill will be brought to the same level as the top of the existing road surface.
- Where required, a layer of geogrid will be installed directly onto the top of the granular fill layer and the existing road surface.

- A layer of finer well graded stone for the running surface will be laid on the geogrid and compacted.
- Upon completion the upgraded roads will be a single-track design with a width of 5m with localised widening at bends and changes in direction (depending on the location within the Site).
- Prior to any works commencing on the upgrade of existing roads, the requirement for additional roadside drainage will be considered by the Project Hydrologist in line with the proposals outlined in the CEMP.

4.8.1.3 33kV Underground Electrical and Communication Cabling

The transformer in each turbine and the met mast is connected to the Proposed 110kV Substation through a network of buried electrical and communication cabling. The ground is trenched using a mechanical excavator. The top layer of soil (or road surface) is removed and saved so that it is replaced on completion. The cables will be bedded with suitable material. The cables will be laid at a depth of approximately 1.2m below ground level; a suitable marking tape is installed between the cabling and the surface (see Plate 4-8 below illustrating an example of a single cable trench and Plate 4-9 for a typical trefoil cable trench view). On completion, the ground will be reinstated. The route of the underground electrical and communication cabling will follow the access tracks as illustrated on the Proposed Wind Farm layout drawings included as Appendix 4-1 of the EIAR. The cabling may be placed on either side of the road footprint, on both sides of the road and/or within the road. The exact configuration of the underground cabling will be set by the requirements of the electrical designers at detailed design stage. Where any underground services are encountered along the internal wind farm IPP cabling route, they will be traversed using one of the methods outlined in Section 4.8.1.2.



Plate 4-8 Typical Single Cable Trench View



Plate 4-9 Typical Trefoil Cable Trench View

4.8.1.4 Construction Compounds

As discussed in Section 4.3.1.6, there are 5 no. proposed construction compounds within the Proposed Wind Farm site. The compounds will be constructed in the same manner as follows:

- The area to be used as the compound will be marked out at the corners using ranging rods or timber posts. Drainage runs and associated settlement ponds will be installed around the perimeter;
- The compound platform will be established using a similar technique as the construction of the Proposed 110kV Substation platform as discussed below in Section 4.8.1.9;

- A layer of geo-grid will be installed where deemed necessary by the designer and compacted layers of well graded granular material will be spread and lightly compacted to provide a hard area for Site offices and storage containers;
- A limited amount of fuel will have to be stored in appropriately bunded containers and a designated area for oil storage will be constructed within the compound.
- Areas within the compound will be constructed as site roads and used as vehicle hardstandings during deliveries and for parking;
- A bunded containment area will be provided within the compound for the storage of lubricants, oils and site generators etc;
- A waste storage area will be provided within the compound;
- The compound will be fenced and secured with locked gates if necessary; and,

4.8.1.5 Watercourse Crossings

To facilitate the construction of the Proposed Wind Farm roads, 4 no. watercourse crossing are required. detail of the EPA mapped watercourse crossing locations within the Proposed Wind Farm site are included in Table 4-6 below.

Table 4-12 Watercourse Crossing Details – Proposed Wind Farm

Crossing No.	*Watercourse Type*	Crossing Type Description	Extent of in-channel works
WC1	Stream	New bottomless box culvert crossing	None. No in-stream works required.
WC2	Stream	New bottomless box culvert crossing	None. No in-stream works required.
WC3	Stream	New clear span crossing	None. No in-stream works required.
WC4	Stream	Flatbed over existing watercourse	None. No in-stream works required.

4.8.1.5.1 Bottomless Box Culvert Crossing

It is proposed to construct a bottomless box culvert crossing at 2 no. locations where new watercourse crossings are required within the Proposed Wind Farm site. The locations of these crossings are shown on the layout drawings included in Appendix 4-1. The bottomless box culvert crossing methodology presented below will ensure that no instream works are necessary. The standard construction methodology for the installation of a bottomless box culvert crossing is as follows:

1. The access road on the approach either side of the watercourse will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of each watercourse crossing.
2. A foundation base will be excavated to rock or competent ground with a mechanical excavator with the foundation formed in-situ using a semi-dry concrete lean mix. The base will be excavated along the stream bank with no instream works required.
3. Access to the opposite side of the watercourse for excavation and foundation installation will require the installation of a temporary pre-cast concrete bridge across the watercourse to provide temporary access for the excavator. Plant and equipment will not be permitted to track across the watercourse.
4. Once the foundation base has been completed, the pre-cast bottomless culvert will be installed using a crane which will be set up on the bank of the watercourse and will be lifted into place from the bank with no contact with the watercourse.
5. Once the crossing is in position stone backfill will be placed and compacted against the structure up to the required level above the foundations.
6. Underground cabling ducting will be contained within the road make-up of the proposed crossing.

The watercourse crossing will be constructed to the specifications of the OPW bridge design guidelines '*Construction, Replacement or Alteration of Bridges and Culverts - A Guide to Applying for Consent under Section 50 of the Arterial Drainage Act, 1945*', and in consultation with Inland Fisheries Ireland. Abutments will be constructed from precast units combined with in-situ foundations, placed within an acceptable backfill material.

Confirmatory inspections of the proposed new watercourse crossing locations will be carried out by the Project Civil/Structural Engineer and the Project Hydrologist prior to the construction of the crossing.

4.8.1.5.2 Clear Span Watercourse Crossings

It is proposed to construct a clear-span watercourse crossing at 1 no. of the 3 no. locations where new watercourse crossings are required within the Proposed Wind Farm site. The locations of these crossings are shown on the layout drawings included in Appendix 4-1 and Appendix 4-2. The clear-span watercourse crossing methodology presented below will ensure that no instream works are necessary. The standard construction methodology for the installation of a clear-span watercourse crossing is as follows:

- The access road on the approach either side of the watercourse will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of each watercourse crossing.
- All drainage measures along the proposed road will be installed in advance of the works.
- A foundation base will be excavated to rock or competent ground with a mechanical excavator with the foundation formed in-situ using a semi-dry concrete lean mix. The base will be excavated along the stream bank with no instream works required.
- Access to the opposite side of the watercourse for excavation and foundation installation will require the installation of a temporary pre-cast concrete or metal

bridge across the watercourse to provide temporary access for the excavator. Plant and equipment will not be permitted to track across the watercourse.
- Once the foundation base has been completed, the pre-cast concrete clear-span structure will be installed using a crane which will be set up on the bank of the watercourse and will be lifted into place from the bank with no contact with the watercourse.
- Once the crossing is in position stone backfill will be placed and compacted against the structure up to the required level above the foundations.
- Underground cabling ducting will be contained within the road make-up of the proposed crossing.

A standard design drawing of a pre-cast concrete, clear span crossing is shown in Figure 4-51.

The watercourse crossing will be constructed to the specifications of the OPW bridge design guidelines 'Construction, Replacement or Alteration of Bridges and Culverts - A Guide to Applying for Consent under Section 50 of the Arterial Drainage Act, 1945', and in consultation with Inland Fisheries Ireland. Abutments will be constructed from precast units combined with in-situ foundations, placed within an acceptable backfill material.

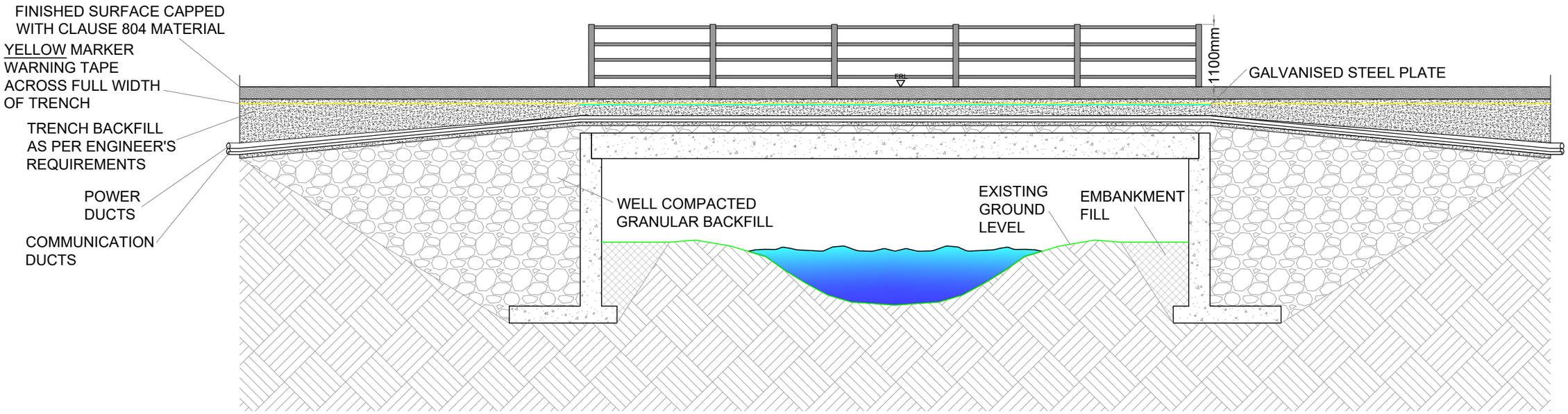
Confirmatory inspections of the proposed new watercourse crossing locations will be carried out by the Project Civil/Structural Engineer and the Project Hydrologist prior to the construction of the crossing.

4.8.1.5.3 *Culvert Crossing*

All new proposed culverts and proposed culvert upgrades at field drain crossings required for the Proposed Wind Farm will be suitably sized for the expected peak flows in the watercourse. Some culverts may be installed to manage drainage waters from works areas of the Proposed Wind Farm, particularly where the waters have to be taken from one side of an existing roadway to the other for discharge. The size of culverts will be influenced by the depth of the track or road sub-base but will have a minimum 900m diameter. In all cases, culverts will be oversized to allow mammals to pass through the culvert.

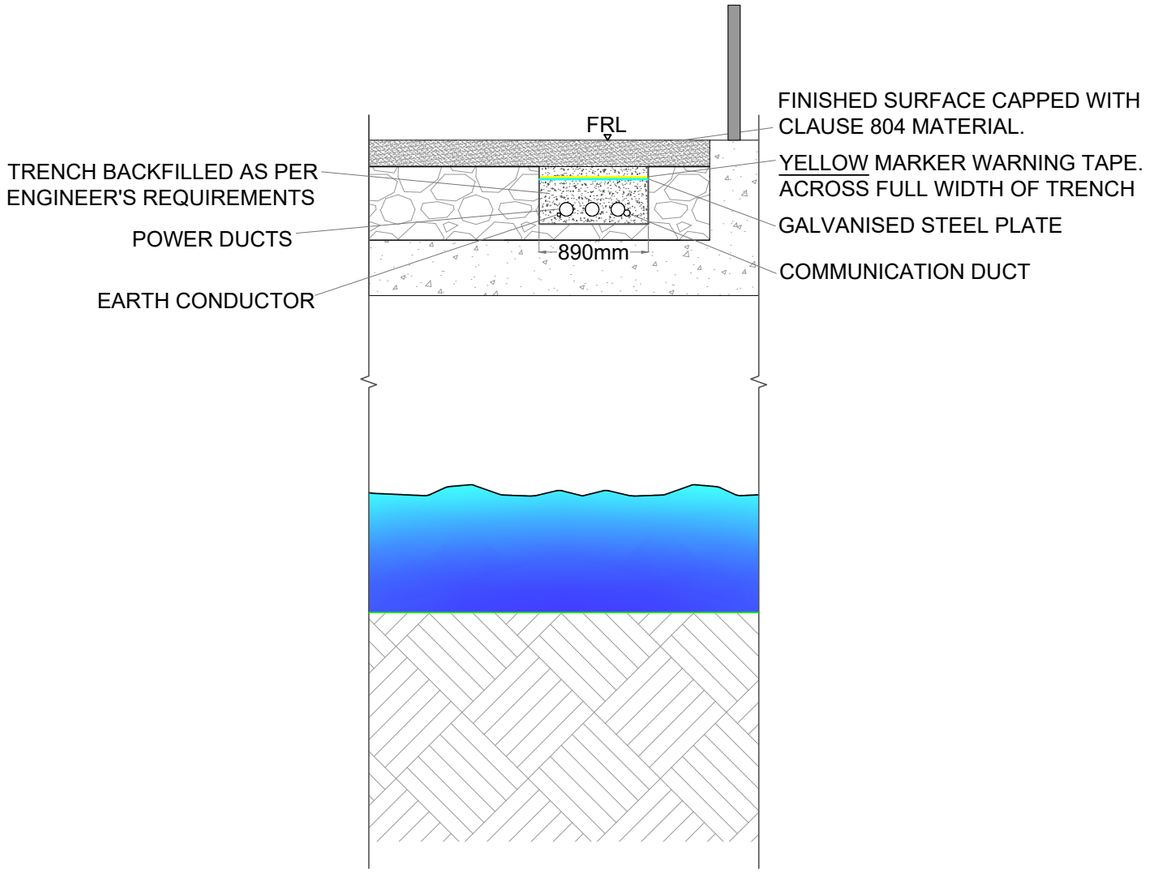
Culverts will be installed with a minimum internal gradient of 1% (1 in 100). Smaller culverts will have a smooth internal surface. Larger culverts may have corrugated surfaces which will trap silt and contribute to the stream ecosystem. Depending on the management of water on the downstream side of the culvert, large stone may be used to interrupt the flow of water. This will help dissipate its energy and help prevent problems of erosion. Smaller water crossings will simply consist of an appropriately sized pipe buried in the sub-base of the road at the necessary invert level to ensure ponding or pooling does not occur above or below the culvert and water can continue to flow as necessary.

All culverts will be inspected regularly to ensure they are not blocked by debris, vegetation or any other material that may impede conveyance. Please see Figure 4-15 for detail.



Clear Span Watercourse Crossing - 33kV - Longitudinal Section

SCALE: 1:75



Clear Span Watercourse Crossing - 33kV - Cross Section

SCALE: 1:50

PROJECT TITLE: **Slievegrine Renewable Energy Development, Co. Waterford**

DRAWING TITLE: **33kV Clear Span Crossing**

PROJECT No.:	DRAWING No.:	SCALE:
240740	Figure 4-51	As Shown @ A3

DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	RD	05.10.2026	P01

Email: info@www.mkoireland.ie /Website: www.mkoireland.ie

4.8.1.6 38kV Underground Electrical Cabling

The 38kV underground electrical cabling works will consist of the installation of ducts in an excavated trench to accommodate electrical cables to facilitate the undergrounding of the 1230m section of the existing Dungarvan-Foxhole OHL. Please see Appendix 4-3 for details.

The 38kV underground electrical cabling will be installed within new proposed access roads using the following methodology:

- Before works commence, updated surveying will take place along the proposed cable route, with all existing culverts and services identified. All relevant bodies i.e., ESBN, Waterford County Council etc. will be contacted and all up to date information for all existing services sought.
- A tracked 360-degree excavator will dig out the proposed trench, typically to a depth of 1.2m, within which the ducts will be laid.
- The cable ducts will be concrete surrounded.
- Trench supports will be installed, or the trench sides will be benched or battered back where appropriate and any ingress of ground water will be removed from the trench using submersible pumps, fitted with appropriate silt filtration systems, to prevent contamination of any watercourse.
- Once the trench has been excavated, a base-layer will be laid and compacted, comprising UGM Type A, or 15 Newton CBM4 concrete as required.
- The ducting will be installed as per specification, with couplers fitted and capped to prevent any dirt etc. entering the duct. In poor ground conditions, the ends of the ducts will be shimmed up from the bed of the trench, to prevent any possible ingress of water dirt. The shims will be removed again once the next length has been connected. Extreme care will be taken to ensure that all duct collars (both ends) are clean and in good condition prior to ducts being joined.
- As the works progress, the as-built location of the ducting will be recorded using a total station or GPS.
- As per the associated base-layer (UGM Type A material or 15 Newton CBM4 concrete) will be installed and compacted as per approved detail, with care not to displace the ducting.
- Spacers will be used to ensure that the correct cover is achieved at both sides of the ducting.
- The remainder of the trench will be backfilled in two compacted layers with approved engineer's specified material.
- Yellow marker warning tape will be installed across the width of the trench, at 300mm depth,
- The finished surface is to be reinstated, as per original specification. Off-road cabling may be finished with granular fill to facilitate access to the trench for any potential maintenance that is required.
- Marker posts will then be placed to denote the location of the underground cabling.

4.8.1.7 38kV End Masts

As outlined in Section 4.3.1.10 it is proposed to reroute a section of the 38kV Dungarvan-Foxhole OHL underground. Two proposed 38kV end masts (lattice type towers) will be located immediately beneath the existing 38kV OHL. Please see Figure 4-1 for location details. The existing 38kV OHL conductor will be terminated at these end masts to facilitate the proposed undergrounding works. The following section outlines the construction methodology for the 2 no. new 38kV end masts:

- The steel lattice tower sites are scanned for underground services such as cables etc.
- A foundation c.6m x 6m is excavated and the formation levels (depths) will be checked by the on-site foreman The excavated material will be temporarily stored

close to the excavation and excess material will be used as berms along the grid access track.

- To aid construction, a concrete pipe is placed into each excavation to allow operatives level the mast at the bottom of the excavation. The frame of the reinforcing bars will be prepared and strapped to a concrete pipe with spacers as required. The reinforcing bars will be lifted into each excavated foundation using the excavator and chains/slings. The base and body section of each tower will then be assembled next to excavation.
- Concrete trucks will pour concrete directly into each excavation in distinct stages.
- A third pour for the leg of the tower 1m x 1m and will be 300mm over ground level.
- Once the main concrete foundation pour is cured after circa five days, metal shuttering is installed to accommodate the placement of concrete around the tower legs. During each pour, the concrete will be vibrated thoroughly using a vibrating poker. Refer to Section 4.4.3 for during concrete delivery details.
- Once the concrete is set after the five days the shuttering is removed.
- The tower foundations will be backfilled one leg at a time with the material already excavated at the location. The backfill will be placed and compacted in layers. All dimensions will be checked following the backfilling process.
- The existing overhead line will be de-energised by ESB so work can commence on the construction of the towers.
- An earth mat consisting of copper or aluminium wire will be laid circa 400mm below ground around the tower. This earth mat is a requirement for the electrical connection of the equipment on the tower structure.
- Once the base section of each tower is completed and the concrete sufficiently cured, it is ready to receive the tower body. Temporary hardstands may be removed and disposed of off site where necessary.
- A hardstand area for the crane will be created by laying geogrid material on the ground surface and overlaying this geogrid with a suitable grade of aggregate.
- A physical barrier (Heras Fence Site Boundary) will be put in place to restrict plant from coming too close to the OHL.
- The towers will be constructed lying flat on the ground beside the recently installed tower base.
- The conductor will be moved off centre using a stay wire and weights to anchor the stay wire to ground.
- The tower section will be lifted into place using the crane and guide ropes.
- The body sections will be bolted into position.

The conductor will be centred over the towers and held in place. Once the conductor is secured at both ends it is then cut and attached onto each tower. The small section of conductor in between the two towers will be removed and utilised as connector wire for the new towers. Please see Figure 4-24 for a detailed drawing of the proposed 38kV end mast.

4.8.1.8 38 kV Joint Bay

The 38kV joint bay will be a pre-cast concrete chamber where lengths of cable will be joined to form one continuous cable. It will be located along the ducting route between the two 38kV end masts. 38kV joint bays are typically 2.5m x 4.5m x 2m pre-cast concrete structures installed below finished ground level.

During construction the joint bay location will be completely fenced off once it has been constructed, it will be backfilled until cables are being installed. Once the cabling is installed the joint bay will be permanently backfilled.

There is 1 no. joint bay proposed along the 38kV undergrounding cabling works. The locations of the joint bay are shown in Appendix 4-1.

The precise siting of the joint Bay within the 38kV underground cabling route corridor assessed is subject to approval by ESB/EirGrid.

4.8.1.9 Proposed 110kV Substation and Control Buildings

A detailed drawing of the Proposed 110kV Substation is shown in Figure 4-25 and 4-26. The Proposed 110kV Substation will be constructed using the following methodology:

- The area of the Proposed 110kV Substation will be marked out using ranging rods or wooden posts and the soil and overburden stripped and temporarily stockpiled for later use in landscaping. Any excess material will be temporarily stockpiled and stored within the void borrow pits in the Proposed Wind Farm site.
- 2 no. control buildings will be built within the Proposed 110kV Substation compound.
- The foundations will be excavated down to the level indicated by the designer and appropriately shuttered reinforced concrete will be laid over it. An anti-bleeding admixture will be included in the concrete mix.
- The block work walls will be built up from the footings to DPC level and the floor slab constructed, having first located any ducts or trenches required by the follow on mechanical and electrical contractors.
- The block work will then be raised to wall plate level and the gables & internal partition walls formed. Scaffold will be erected around the outside of the building for this operation.
- The roof slabs will be lifted into position using an adequately sized mobile crane.
- The timber roof trusses will then be lifted into position using a telescopic load all or mobile crane depending on-site conditions. The roof trusses will then be felted, battened, tiled and sealed against the weather.
- The transformer, electrical equipment, and storage container plinths will be excavated down to the level indicated by the designer and appropriately shuttered reinforced concrete will be laid over it. An anti-bleeding admixture will be included in the concrete mix.
- Lightning poles will be erected at appropriate locations adjacent to the substation. All lightning poles will be appropriately earthed.
- The electrical equipment will be installed and commissioned.
- Perimeter fencing will be erected.
- The construction and components of the Proposed 110kV Substation will be built to EirGrid specifications.

4.8.2 Proposed Grid Connection

4.8.2.1 Site Preparations

Prior to beginning construction work the contractor will scan the proposed route with a cable avoidance tool (CAT), carry out visual inspection of the area and may carryout out further below ground surveys if deemed necessary. If any previously unidentified services are discovered the site engineer will inform the design of the issues and possibly recommend a solution that works with the new constraints.

In some instances, it may be necessary to relocate existing underground services such as water mains or existing cables. In advance of any construction activity, the contractor will undertake additional surveys of the proposed route to confirm the presence or otherwise of any services. If found to be present, the relevant service provider will be consulted with in order to determine the requirement for specific excavation or relocation methods and to schedule a suitable time to carry out works.

If existing low voltage underground cables are found be present, a trench will be excavated, and new ducting and cabling will be installed along the new alignment and connected to the network on either end. The trench will be backfilled with suitable material to the required specification. Warning strip and marking tape will be laid at various depths over the cables as required. Marker posts and plates will be installed at surface level to identify the new alignment of the underground cable, the underground cables will then be re-energised.

In the event that water mains are encountered the water supply will be turned off by the utility so work can commence on diverting the service. The section of existing pipe will be removed and will be replaced with a new pipe along the new alignment of the service. The works will be carried out in accordance with the utility standards.

4.8.2.2 Trenching and Ducting

The proposed cables (33kV, 38kV, 110kV and 220kV) will be installed in a series of ducts in an excavated trench. Trenching will be achieved using a mechanical excavator. The top layer of soil or road surfacing will be removed and stockpiled separately for reuse. Material stockpiles should be stored at least 15 m back from drains and watercourses on level ground with a silt fence inserted at the base to prevent runoff.

The trench base will be graded and smoothed once the required depth and width is achieved. A layer of bedding material will be placed and compacted to the required specification on the trench floor prior to laying the ducts in trefoil formation.

The ducting surrounds will be carefully backfilled and compacted in accordance with the required specification. Cable protection strips will be placed on compacted material directly above the ducting. A secure cap will be placed at the end of each duct to prevent the ingress of dirt or water.

Ground water and surface water accumulating in the base of trenches will not be pumped directly to roadside drains or watercourses unless it is clean and free from solids. Contaminated water will be either treated onsite prior to discharge or tankered offsite to a suitably licensed disposal facility.

For concrete and asphalt/bitumen road sections, surfaces will be permanently reinstatement in accordance with the specification and to the approval of the local authority and/or private landowners, unless otherwise agreed with local authorities. All trench works carried out in public roadways will be carried out in accordance with *'Guidelines for Opening, Backfilling and Reinstatement of trenches in Public Roads'* and any other conditions imposed by the relevant road authority.

For unsurfaced/grass sections, trenches will be backfilled with suitable excavated material to ground level leaving at least 100 mm topsoil or match existing level at the top to allow for seeding or replace turves as per the specification of the local authority or landowner.

Ducting will be cleaned and tested in accordance with the specification by pulling through a brush and mandrel. A draw rope will be installed in each duct in preparation for cable installation at a later date.

4.8.2.3 Proposed 110kV Underground Cabling Route

The Proposed 110kV Underground Cabling Route works will consist of the installation of ducts in an excavated trench to accommodate electrical and fibre communications cables to facilitate a connection between the Proposed 110kV Substation and the Proposed 220kV Loop-in Substation. Please see Appendix 4-1 for details.

The underground electrical cabling will be laid beneath the surface of the existing farm access road to be upgraded and the public roads using the following methodology:

- Before works commence, updated surveying will take place along the proposed cable route, with all existing culverts and services identified. All relevant bodies i.e., ESBN, Waterford County Council etc. will be contacted and all up to date information for all existing services sought.
- When the cable is located on public roads, a traffic management plan will be prepared prior to any works commencing. A road opening licence will be obtained where required and all plant operators and general operatives will be inducted and informed as to the location of any services.
- A tracked 360-degree excavator will then proceed to dig out the proposed trench, typically to a depth of 1.2m, within which the ducts will be laid.
- The cable ducts will be concrete surrounded where they pass under the public road and under drains or culverts.
- Trench supports will be installed, or the trench sides will be benched or battered back where appropriate and any ingress of ground water will be removed from the trench using submersible pumps, fitted with appropriate silt filtration systems, to prevent contamination of any watercourse.
- Once the trench has been excavated, a base-layer will be laid and compacted, comprising UGM Type A, or 15 Newton CBM4 concrete as required.
- The ducting will be installed as per specification, with couplers fitted and capped to prevent any dirt etc. entering the duct. In poor ground conditions, the ends of the ducts will be shimmed up from the bed of the trench, to prevent any possible ingress of water dirt. The shims will be removed again once the next length has been connected. Extreme care will be taken to ensure that all duct collars (both ends) are clean and in good condition prior to ducts being joined.
- As the works progress, the as-built location of the ducting will be recorded using a total station or GPS.
- As per the associated base-layer (UGM Type A material or 15 Newton CBM4 concrete) will be installed and compacted as per approved detail, with care not to displace the ducting.
- Spacers will be used to ensure that the correct cover is achieved at both sides of the ducting.
- The remainder of the trench will be backfilled in two compacted layers with approved engineer's specified material.
- Yellow marker warning tape will be installed across the width of the trench, at 300mm depth,
- The finished surface is to be reinstated, as per original specification. Off-road cabling may be finished with granular fill to facilitate access to the trench for any potential maintenance that is required during the operational phase of the Proposed Project.

- Marker posts will then be placed at regular intervals (generally at joint bays and any change in direction) to denote the location of the underground cabling.

4.8.2.4 110 kV Joint Bays

110kV joint bays are typically pre-cast concrete chambers where lengths of cable will be joined to form one continuous cable. They will be located at various points along the ducting route generally between 600 to 800 metres intervals or as otherwise required by ESB/EirGrid and electrical requirements. Joint Bays are typically 2.5m x 6m x 2m pre-cast concrete structures installed below finished ground level.

Where possible, joint bays will be located in areas where there is a natural widening/wide grass margin on the road in order to accommodate easier construction, cable installation and create less traffic congestion. Joint Bays will be located in the non-wheel bearing strip of roadways, however given the narrow profile of local roads this may not always be possible. During construction the joint bay locations will be completely fenced off once they have been constructed, they will be backfilled until cables are being installed. Once the cabling is installed the joint bays will be permanently backfilled with the existing surface re-instated and there will be no discernible evidence of the joint bay on the ground.

In association with joint bays, Communication Chambers are required at every joint bay location to facilitate jointing of the communication cabling. Earth Sheath Link Chambers are also required approximately every second joint bay along the cable route. Earth Sheath Links are used for earthing and bonding cable sheaths of underground electrical cabling, installed in a flat formation, so that the circulating currents and induced voltages are eliminated or reduced. Earth Sheath Link Chambers and Communication Chambers are located in proximity to Joint Bays. Earth Sheath Link Chambers and Communication Chambers will be pre-cast concrete structures with a steel access cover at finished surface level. The locations of the joint bays and chambers are shown on the Grid Connection Infrastructure drawings in Appendix 4-1.

The precise siting of all Joint Bays, Earth Sheath Link Chambers and Communication Chambers within the Proposed Grid Connection site assessed is subject to approval by ESB/EirGrid.

4.8.2.5 Proposed 220kV Loop-in Substation and Control Buildings

A detailed drawing of the Proposed 220kV Loop-in Substation is shown in Figure 4-29 and 4-30. The Proposed 220kV Loop-in Substation will be constructed largely using the same methodology as the Proposed 110kV Substation (see Section 4.8.1.9 above), however with some key differences as follows:

- The 220kV Air-Insulated Substation (AIS) building will be in a compound of approximately 170m by 152m, surrounded by a 2.6m-high palisade fence with a total area c. 23,211m^2
- The substation drainage will be marked by a qualified engineer.
- A drainage system shall be installed around the compound area.
- Topsoil and subsoil shall be removed from the footprint of the compound using an excavator.
- A layer of geotextile material shall be laid over the footprint of the compound.
- Using an excavator, a base of UGM Type A material shall be laid followed by a 6F2 layer which will provide a finished surface. UGM Type A material is a specific type of material used in road construction and sub-base layers consisted of crushed stone, crushed concrete, or a mixture of both, 6F2 material is a granular fill material consisting of crushed concrete, crushed brick, or reclaimed construction aggregate.
- Each layer will be compacted using a vibrating roller.
- Earthing cable will be laid underground around the vicinity of the substation for connection to various electrical components during the electrical fit-out phase.

- Lightning protection masts with an approximate height of 18m shall be installed to provide lightning protection to the substation compound
- The 2 no. new steel masts are required to connect the 220kV overhead lines into the Proposed 220kV Loop-in Substation – these will be constructed in line with the methodology outlined in Section 4.8.2.6 below.
- The electrical equipment will be installed and commissioned.
- Perimeter fencing will be erected.

4.8.2.6 220kV Underground Electrical Cabling

The 220kV underground electrical cabling works will consist of the installation of ducts in an excavated trench to accommodate electrical and fibre communications cables to facilitate a connection between the Proposed 220kV Substation and the proposed 220kV end masts. Please see Appendix 4-1 for details.

The 220kV underground electrical cabling will be installed within new proposed access roads using the following methodology:

- Before works commence, updated surveying will take place along the proposed cable route, with all existing culverts and services identified. All relevant bodies i.e., ESBN, Waterford City and County Council etc. will be contacted and all up to date information for all existing services sought.
- A tracked 360-degree excavator will dig out the proposed trench, typically to a depth of 1.4m, within which the ducts will be laid.
- The cable ducts will be concrete surrounded.
- Trench supports will be installed, or the trench sides will be benched or battered back where appropriate and any ingress of ground water will be removed from the trench using submersible pumps, fitted with appropriate silt filtration systems, to prevent contamination of any watercourse.
- Once the trench has been excavated, a base-layer will be laid and compacted, comprising UGM Type A, or 15 Newton CBM4 concrete as required.
- The ducting will be installed as per specification, with couplers fitted and capped to prevent any dirt etc. entering the duct. In poor ground conditions, the ends of the ducts will be shimmed up from the bed of the trench, to prevent any possible ingress of water dirt. The shims will be removed again once the next length has been connected. Extreme care will be taken to ensure that all duct collars (both ends) are clean and in good condition prior to ducts being joined.
- As the works progress, the as-built location of the ducting will be recorded using a total station or GPS.
- As per the associated base-layer (UGM Type A material or 15 Newton CBM4 concrete) will be installed and compacted as per approved detail, with care not to displace the ducting.
- Spacers will be used to ensure that the correct cover is achieved at both sides of the ducting.
- The remainder of the trench will be backfilled in two compacted layers with approved engineer's specified material.
- Yellow marker warning tape will be installed across the width of the trench, at 300mm depth,
- The finished surface is to be reinstated, as per original specification. Off-road cabling may be finished with granular fill to facilitate access to the trench for any potential maintenance that is required.
- Marker posts will then be placed to denote the location of the underground cabling.

4.8.2.7 220kV End Masts

It is proposed to connect the Proposed 220kV Loop-in Substation to the existing 220kV Knockraha-Cullenagh OHL. Two proposed 220kV end masts (lattice type towers) will be located immediately beneath the existing 220kV OHL. Please see Figure 4-1 for location details. The existing 220kV OHL conductor will be terminated at these end masts to facilitate a new OHL loop connection following the proposed 220kV underground electrical cabling route leading from the proposed 220kV end masts to the Proposed 220kV Loop-in Substation. The following section outlines the construction methodology for the new loop in tower structures which will be constructed underneath the existing 220kV OHL:

- The Steel lattice tower sites are scanned for underground services such as cables etc.
- A foundation c.5.7m x 5.7m is excavated and the formation levels (depths) will be checked by the on-site foreman The excavated material will be temporarily stored close to the excavation and excess material will be used as berms along the grid access track.
- To aid construction, a concrete pipe is placed into each excavation to allow operatives level the mast at the bottom of the excavation. The frame of the reinforcing bars will be prepared and strapped to a concrete pipe with spacers as required. The reinforcing bars will be lifted into each excavated foundation using the excavator and chains/slings. The base and body section of each tower will then be assembled next to excavation.
- Concrete trucks will pour concrete directly into each excavation in distinct stages.
- A third pour for the leg of the tower 1m x 1m and will be 300mm over ground level.
- Once the main concrete foundation pour is cured after circa five days, metal shuttering is installed to accommodate the placement of concrete around the tower legs. During each pour, the concrete will be vibrated thoroughly using a vibrating poker. Refer to Section 4.4.3 for during concrete delivery details.
- Once the concrete is set after the five days the shuttering is removed.
- The tower foundations will be backfilled one leg at a time with the material already excavated at the location. The backfill will be placed and compacted in layers. All dimensions will be checked following the backfilling process.
- The existing overhead line will be de-energised by ESB so work can commence on the construction of the towers.
- An earth mat consisting of copper or aluminium wire will be laid circa 400mm below ground around the tower. This earth mat is a requirement for the electrical connection of the equipment on the tower structure.
- Once the base section of each tower is completed and the concrete sufficiently cured, it is ready to receive the tower body. Temporary hardstands may be removed and disposed of off site where necessary.
- A hardstand area for the crane will be created by laying geogrid material on the ground surface and overlaying this geogrid with a suitable grade of aggregate.
- A physical barrier (Heras Fence Site Boundary) will be put in place to restrict plant from coming too close to the OHL.
- The towers will be constructed lying flat on the ground beside the recently installed tower base.
- The conductor will be moved off centre using a stay wire and weights to anchor the stay wire to ground.
- The tower section will be lifted into place using the crane and guide ropes.
- The body sections will be bolted into position.
- The conductor will be centred over the towers and held in place. Once the conductor is secured at both ends it is then cut and attached onto each tower. The small section of conductor in between the two towers will be removed and utilised as connector wire for the new towers. Please see Plate 4-11 for an example of a constructed tower.



Plate 4-10 Example of a Completed End Mast TowerExisting Underground Services

Any underground services encountered along the Proposed 110kV Underground Cabling Route will be surveyed for level and the ducting will pass over the service provided adequate cover is available. A minimum clearance of 300 mm will be required between the bottom of the ducts and the service in question. If the clearance cannot be achieved the ducting will pass under the service and again 300 mm clearance between the top of the communications duct and bottom of the service will be achieved. In deeper excavations an additional layer of marker tape will be installed between the communications duct and top-level yellow marker tape. If the required separation distances cannot be achieved then a number of alternative options are available such as using steel plates laid across the width of the trench and using 35N concrete surrounding the proposed ducting, with marker tape on the side of the trench. Back fill around any utility services will be with dead sand/pea shingle where appropriate.

4.8.2.8 Watercourse/Service Crossings on the Proposed 110kV Underground Cabling Route

A total of 15 no. existing watercourse crossings will be traversed along the Proposed 110kV Underground Cabling Route, of which 2 no. are EPA/OSI mapped. The locations of the watercourse crossings are shown on the detailed layout drawings in Appendix 4-1 and details of each crossing method are shown in Figures 4-32 to 4-35. The watercourse crossing methodologies for the provision of the Proposed 110kV Underground Cabling Route component of the Proposed Project at these locations is set out below with the most appropriated option being selected for each crossing. Instream works are not required at any watercourse crossing along the Proposed 110kV Underground Cabling Route.

The 2 no. EPA mapped watercourse crossings will utilise flatbed over methodology as per Figure 4-36. See Table 4-13 below for further detail, The remaining 13 no. crossings will utilise methodologies A – D, subject to pre-commencement surveys.

Should an alternative methodology option listed below be required for individual crossings during the construction process this will be agreed with the relevant authorities including Waterford City and County Council prior to works commencing.

4.8.2.8.1 *Crossing Using Standard Trefoil Formation Over – Option A*

Watercourses will not be directly impacted upon since no instream works or bridge/culvert alterations are proposed. Where adequate cover exists above a bridge/culvert or where a new bottomless box culvert or clear-span structure has been installed at a sufficient depth, the standard ESB approved trefoil arrangement will be used where the cable ducts pass over a culvert without any contact with the existing culvert or water course. The cable trench will pass over the culvert in a standard trench.

4.8.2.8.2 *Flatbed Formation Under– Option B*

Where cable ducts are to be installed under an existing watercourse or service crossing where sufficient cover cannot be achieved by installing the ducts in a trefoil arrangement, the ducts will be laid in a much shallower trench, the depth of which will be determined by the location of the top of the obstacle or the depth of excavatable material under it. The ducts will be laid in this trench in a flatbed formation under the existing watercourse/ service and will be encased in 6mm thick steel galvanized plate with a 35N concrete surround as per ESB Networks specification.

4.8.2.8.3 *Flatbed Formation over– Option C*

Where cable ducts are to be installed over a watercourse or service crossing where sufficient cover cannot be achieved by installing the ducts in a trefoil arrangement, the ducts will be laid in a much shallower trench the depth of which will be determined by the location of the top of the obstacle or the depth of excavatable material over it. The ducts will be laid in this trench in a flatbed formation over the existing culvert and will be encased in 6mm thick steel galvanized plate with a 35N concrete surround as per ESB Networks specification.

Where a bridge/culvert or service has insufficient cover depth to fully accommodate the required trench, the ducts can be laid in a flatbed formation partially within the existing road surface. Where this option is to be employed, the ducts will also be encased in steel with a concrete surround as per ESB Networks specifications. In order to achieve cover over these ducts and restore the carriageway of the road, it may be necessary to raise the pavement level locally to fully cover the ducts. The increased road level will be achieved by overlaying the existing pavement with a new wearing course as required. Any addition of a new pavement will be tied back into the existing road pavement at grade. After the crossing over the culvert has been achieved, the ducts will resume to the trefoil arrangement within a standard trench.

4.8.2.8.4 *Horizontal Directional Drilling – Option D*

The horizontal directional drilling method of duct installation is carried out using Vermeer D36 X 50 Directional Drill (approximately 22 tonnes), or similar plant. The launch and reception pits will be approximately 2.5mm wide, 2.5m long and 2.0m deep. The pits will be excavated with a suitably sized excavator. The drilling rig will be securely anchored to the ground by means of anchor pins which will be attached to the front of the machine. The drill head will then be secured to the first drill rod and the operator will commence to drill into the launch pit to a suitable angle which will enable him to obtain the depths and pitch required to the line and level of the required profile. Drilling of the pilot bore will continue with the addition of 3.0m long drill rods, mechanically loaded and connected into position.

During the drilling process, a mixture of a natural, inert and fully biodegradable drilling fluid such as Clear Bore™ and water is pumped through the centre of the drill rods to the reamer head and is forced in to void and enables the annulus which has been created to support the surrounding subsoil and thus prevent collapse of the reamed length. Depending on the prevalent ground conditions, it may be necessary to repeat the drilling process by incrementally increasing the size of the reamers. When the reamer enters the launch pit, it is removed from the drill rods which are then passed back up the bore to the reception pit and the next size reamer is attached to the drill rods and the process is repeated until the required bore with the allowable tolerance is achieved.

The use of a natural, inert and biodegradable drilling fluid such as Clear Bore™ is intended to negate any adverse impacts arising from the use of other, traditional polymer-based drilling fluids and will be used sparingly as part of the drilling operations. It will be appropriately stored prior to use and deployed in the required amounts to avoid surplus. Should any excess drilling fluid accumulate in the reception or drilling pits, it will be contained and removed from the site in the same manner as other subsoil materials associated with the drilling process to a licensed recovery facility.

Backfilling of launch & reception pits will be conducted in accordance with the normal specification for backfilling excavated trenches. Sufficient controls and monitoring, as listed below, will be put in place during drilling to prevent frack-out, such as the installation of casing at entry points where reduced cover and bearing pressure exits.

- The area around the Clear Bore™ batching, pumping and recycling plants shall be bunded using terram and sandbags in order to contain any spillages;
- One or more lines of silt fences shall be placed between the works area and adjacent rivers and streams on both banks;
- Accidental spillage of fluids shall be cleaned up immediately and transported off site for disposal at a licensed facility; and,
- Adequately sized skips will be used for temporary storage of drilling arisings during directional drilling works. This will ensure containment of drilling arisings and drilling flush

Table 4-13 Watercourse Crossing Details - Proposed Grid Connection

Crossing No.	Watercourse Type	Width of Channel (m)	Cover from Road Level to Top of Culvert (m)	Crossing Type Description	Watercourse Crossing Type	Extent of in-channel works
WC 03	River	1	1	Flatbed Formation Over	C	None. No in-stream works required.
WC 10	Stone Arch Bridge	1	1.3	Flatbed Formation Over	C	None. No in-stream works required.

4.8.2.9 Construction Compound

The construction compound adjacent to the Proposed 220kV Loop-in Substation will be constructed as outlined above in Section 4.8.1.4.

4.8.2.10 Site Roads and Hardstand Areas

The new site access roads, upgrades to existing roads and hardstand areas at the Proposed Grid Connection site will be constructed as outlined above in Section 4.8.1.2.

4.8.3 Proposed Project

4.8.3.1 Borrow Pits

The estimated volume to be extracted from the borrow pits for the construction of the Proposed Project is up to approximately 395,800 m^3(with a 10% contingency factor). This figure presented is the anticipated maximum volumes; however, the actual volumes to be removed from the borrow pit will be confirmed at the time of construction and following detailed pre-construction site investigation works. It is intended to obtain the majority of materials for the construction of the Proposed Project from the 5 no. proposed onsite borrow pits (engineer's specified material may be imported onto the Site should sufficient volumes of suitable material not be encountered during the excavation phase of the proposed infrastructure, to be sourced from local, licenced quarries).

The borrow pits will be excavated and backfilled as follows:

- The area to be used for the borrow pit will be marked out at the corners using ranging rods or timber posts. Drainage runs, and associated settlement ponds will be installed around the perimeter;
- The initial borrow pit excavation will involve removal of soil to the top of bedrock. These materials will be stored temporarily in selected temporary stock pile areas or used for landscaping throughout the Site;
- All drainage measures prescribed in the detailed drainage design for the Proposed Project will be implemented around the works area;
- The bedrock material will be extracted by breaking and blasting (Section 4.8.3.1.1 and 4.8.3.1.2 below) from the borrow pit and stockpiled or used as required;
- The use of material won from the borrow pit will be sequential with new road construction or turbine foundation formations;
- Temporary stockpiling of aggregates will be required to accommodate the cut and fill operations within the borrow pit, and the progression of access roads and turbine excavations;
- As the borrow pit excavation progress and become deeper, surface water and groundwater ingress will be removed via pumping to settlement ponds, and re-distribution locally across natural vegetated areas. Where required, additional specialist water treatment measures will be employed to ensure no deterioration in downstream water quality occurs;
- The use of temporary access ramps and long reach excavators during the placement of the excavated spoil will be required.
- The surface of the placed spoil will be shaped to allow efficient run-off of surface water from the placed arising towards the perimeter of the borrow pit.
- An interceptor drain will also be installed around the perimeter of the borrow pit. This drain will divert any surface water away from the borrow pit and hence prevent water from ponding and lodging during construction and also when reinstated.

- Temporary control of groundwater within the borrow pits will be required and measures will be determined as part of the ground investigation programme. A temporary pump and suitable outfall locations will be required during construction.
- Settlement ponds have been designed at the lower side/outfall location of the borrow pits.
- Supervision by the Project Geotechnical Engineer is required for the development of the borrow pits.

Two extraction methods have been assessed for breaking out the useful rock below: rock breaking and blasting.

4.8.3.1.1 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. In areas where stronger rock is encountered and cannot be removed by means of excavating then a rock breaking methodology may be used. Rock breaking equipment comprises a large hydraulic 360-degree excavator with a rock breaker attachment. 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. A smaller rock breaker, in the 30-40 tonne size range, then breaks the rocks down to a size that can then be fed into a crusher.

The extracted, broken rock is 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 within the borrow pit, away from the immediate area of the crusher, until it is required elsewhere within the Site.

4.8.3.1.2 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. A drilling rig will drill the necessary number of boreholes required for a single blast in approximately 3 to 4 days. The locations, depth and number of boreholes are determined by the blast engineer. This is a specialist role fulfilled by the blasting contractor.

The blast engineer will arrange for the necessary quantity of explosive to be brought to site to undertake a single blast. The management of explosives on-site and the actual blasting operation will be agreed in advance with and supervised by An Gardaí Siochána. The blast engineer sets the explosives in place in the boreholes, sets the charges, and fires the blast. All residents within 2km of the blast site will be informed at least 24 hours prior to blasting taking place.

A properly designed blast should generate rock of a size that can be loaded directly into a mobile crusher, using the same wheeled loader outlined above. The same method is used for processing the rock generated from a blast, as would be used to process rock generated by rock breaking. Generally, the drilling rig will recommence drilling blast holes for the next blast as soon as one blast is finished. The potential impacts and control measures associated with noise and vibration from this extraction method are assessed in Chapter 12: '*Noise and Vibration*'. Any blasting will be carried out in accordance with the *Guidance on the Safe Use of Explosives in Quarries* (Safety and Health

Commission for the Mining and Other Extractive Industries, 2002)[10] and the British Standard BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Noise*[11].

4.8.3.2 Spoil Management Practices

The following recommendations and best practice guidelines for the placement of spoil for use in landscaping will be adhered to during the construction of the Proposed Project:

- The landscaping areas will be developed in a phased approach, with the spoil being removed and temporarily stockpiled within a defined area while the borrow pit is being extracted. The stockpiled spoil will be deposited into the void borrow pit upon completion of extraction activities and the exercise will continue within the void until it cannot accommodate any further spoil.
- Stockpiles of excavated spoil will not be placed within the stockpile exclusion areas, as outlined in Figure 4-45.
- The material will be backfilled into the void borrow pits and landscaping areas and will be spread evenly across the area.
- Stockpiles will be compacted to reduce air voids and reduce the migration paths for infiltration by precipitation. This will reduce the amount of potentially silt laden surface water run-off from these areas.
- Where practical, 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.
- Inspections of the temporary stockpiles, reinstated borrow pits and landscaping areas will be made by a Geotechnical Engineer through regular monitoring of the works. The appointed contractor will review work practices at these areas when periods of heavy rainfall are expected so as to prevent excessive dirty water runoff from being generated.
- An interceptor drain will be installed upslope of the filled borrow pit areas to divert any surface water away from these areas where necessary.
- The surface of the deposited spoil will be profiled to a gradient to be agreed with the Geotechnical Engineer and vegetated or allowed to vegetate naturally as indicated by the Project Ecologist.
- All the above-mentioned general guidelines and requirements will be confirmed by the Geotechnical Engineer prior to construction.

4.9 Community Gain Proposal

4.9.1 Background

The Proposed Wind Farm has the potential to have significant benefits for the local economy, by means of job creation, landowner payments and commercial rate payments. An important part of a renewable energy development, which Slievegrine Ltd has been at the forefront of developing, is its Community Benefit Package. The concept of directing benefits from wind farms to the local community is promoted by the National Economic and Social Council (NESC) and Wind Energy Ireland (WEI) among others. While it may be simpler and easier to put a total fund aside for a wider community area, Slievegrine Ltd. is endeavouring to develop new ways to direct increased gain towards the local community with particular focus on those living closest to the Proposed Wind Farm.

[10] https://www.hsa.ie/eng/Publications_and_Forms/Publications/Mines_and_Quarries/Guidance%20on%20the%20Safe%20Use%20of%20Explosives%20in%20Quarries.pdf
[11] https://www.thenbs.com/PublicationIndex/documents/details?Pub=BSI&DocID=305965

The applicant company has given careful consideration to the issue of community gain arising from the Proposed Wind Farm, if permitted and constructed. Community gain from significant development proposals, including wind farms, whilst a relatively recent approach, is now a common consideration for developers and, indeed, planning authorities. This approach recognises that, with any significant wind farm proposal, the locality in which the Proposed Wind Farm is situated is making a significant contribution towards helping achieve national renewable energy and climate change targets, and the local community should derive some benefit from accommodating such a development in their locality.

Community gain proposals can take a number of forms, generally depending on the nature and location of the Proposed Wind Farm and the nature and make-up of the local community. The nature of the community gain proposal will be subject to discussions with and input from the local community. In some instances, funds are paid by the developer, either annually or as a one-off payment, to a community fund that is administered as agreed by the community. These funds may then be used for a variety of projects, such as environmental improvements, local amenities and facilities, voluntary and sporting groups and clubs, educational projects and energy efficiency improvement works and direct payments could be made to nearby households.

A Community Report is included as Appendix 2-2 of this EIAR, which sets out further detail on the proposals for the Community Benefit Fund.

4.9.2 Renewable Energy Support Scheme

The Renewable Electricity Support Scheme (RESS) is a Government of Ireland initiative that provides support to renewable electricity projects in Ireland. RESS is a pivotal component of the Programme for Government and the Climate Action Plan 2021, 2023, 2024 and 2025 and is a major step in achieving Ireland's target of at least 80% renewable electricity by 2030. One of the key objectives of RESS is to provide an Enabling Framework for Community Participation through the provision of pathways and supports for communities to participate in renewable energy projects.

The current RESS 5 Terms and Conditions[12], published by the Department of Climate, Energy and Environment in February 2026, make some high-level provisions for how this type of benefit fund will work. Any project which wants to avail of RESS must abide by these broad principles. These include the following:

1. *in respect of Onshore Wind RESS 5 Projects, €1,000 shall be paid annually to each household located within a distance of a 1-kilometre radius from the Onshore Wind RESS 5 Project. Household refers to the owner or tenant who had the property as his/her primary residence at the time the RESS 5 Project achieved Commercial Operation, including proposed homes within the relevant distances on sites which have full planning permission for a residential property before the RESS 5 Project achieved Commercial Operation. The 1-kilometre distance specified is measured from the base of the nearest turbine of the RESS 5 Project to the nearest part of the structure of the household, the location of which is identified in the An Post's GeoDirectory;*
2. *in respect of Onshore Wind RESS 5 Projects, households located outside a distance of 1 kilometre from the RESS 5 Project but within a distance of 2 kilometres from such RESS 5 Project shall receive an annual payment of an amount lower than €1,000. The amount of this payment shall decrease progressively as the distance from the RESS 5 Project increases, ensuring a proportional allocation based on proximity. The specific values and methodology shall be determined in accordance with requirements established in the Rulebook for Community Benefit Funds under RESS. Household refers to the owner or tenant who had the property as his/her primary residence at the time the RESS 5 Project achieved Commercial Operation, including proposed homes within the relevant distances on sites which have full planning permission for a*

[12] *https://assets.gov.ie/static/documents/RESS_5_Terms_and_Conditions.pdf*

residential property before the RESS 5 Project achieved Commercial Operation. The distance specified is from the base of the nearest turbine to the nearest part of the structure of the occupied residence, the location of which is identified in the An Post's GeoDirectory (the payments provided for in this limb (b), together with those provided for in limb (a), being "Direct Household Payments");

3. *a minimum of 40% of the funds shall be paid to initiatives successful in the annual application process, as proposed by clubs and societies and similar notfor-profit community enterprises whose primary focus or aim is the promotion of 76 initiatives towards the delivery of the UN Sustainable Development Goals (available online at https://gov.ie/sdgs.This application process shall either be opened annually or at intervals between two and five years subject to the conditions set out in Section 4.4.2(9)(d) of the Rulebook for Community Benefit Funds under RESS; and*
4. *a maximum of 10% of the total contributions to the Community Benefit Fund over the entire period in which the RESS 5 Project is required to maintain the Community Benefit Fund may be spent on administration. However, for the first year following the establishment of the Community Benefit Fund, a maximum of 20% of the annual Community Benefit Fund contribution may be spent on administration without prejudice to the overall maximum of 10% over the entire period in which the RESS 5 Project is required to maintain the Community Benefit Fund. This is to ensure successful outcomes and good governance of the Community Benefit Fund. The Generator may supplement this spend on administration from its own funds should it be deemed necessary to do so.*

4.9.3 Community Benefit Fund

Based on the current RESS 5 T&Cs it is expected that for each megawatt hour (MWh) of electricity produced by the wind farm, the Proposed Wind Farm will contribute €2 into a community fund for the first 15 years of operation of the Proposed Project. If this commitment is changed in upcoming Government Policy, the fund would be adjusted accordingly.

The Community Benefit Fund belongs to the local community. The premise of the fund is that it should be used to bring about significant, positive change in the local area. To make this happen, the first task will be to form a benefit fund development working group that clearly represents both the close neighbours to the project as well as nearby communities. This group will then work on designing the governance and structure of a community entity that would administer the Community Benefit Fund.

The types of projects and initiatives that could be supported by such a Community Benefit Fund could include youth, sport and community facilities, schools, educational and training initiatives, and wider amenity, heritage, and environmental projects.

Should the Proposed Project be developed under the current RESS T&C's, it would attract a community contribution in the region of €890,000/year for the local community (estimated based on an average energy yield as calculated in Section 4.3.1.1.7) over the first 15 years of operation of the Proposed Project. The value of this fund would be directly proportional to the electricity generated by the Proposed Wind Farm. Under the current RESS 5 T&Cs, the following is the recommended breakdown of the fund:

- **Direct Payments –** to those living closest to the wind farm. A minimum €1,000 payment per annum for houses within 1km of the Proposed Project. Further payments to those living within 1-2km of the Proposed Project will be made using the remaining fund with Direct Payments capped at 50%.
- **Energy Efficiency –** A minimum of 40% of the fund would be available for the development of energy initiatives to benefit people living in the local area. This is to be provided to not-for profit community enterprises.

- **Administration Costs** – A maximum of 10% of this fund to be made available for the administration and governance costs of the fund.
- **Support for Local Groups** – Any remaining funds would be available for local groups, clubs and not-for-profit organisations that provide services in the local area. This would include services for the elderly, local community buildings, and the development of sporting facilities such as all-weather playing pitches etc.

Should the Proposed Project not be developed under RESS, the Applicant is committing that for each megawatt hour (MWh) of electricity produced by the wind farm, the project will contribute €1 into a community fund for the entire operational life of the Proposed Project. This would equate to an estimated annual fund of approximately €445,000 (using the same formula as mentioned above), which across the 35-year operational lifespan would result in funding of over €15.5 million to the local community which is a substantial contribution. The number and size of grant allocations will be decided by a Community Fund liaison committee with various groups and projects benefiting to varying degrees depending on their funding requirement. Please see Appendix 2-2 'Community Engagement Report' for details.

4.10 Operation

The Proposed Turbines are expected to have a lifespan of approximately 35 years. As part of the planning application for the Proposed Project, permission is being sought for a 35-year operation period for the Proposed Turbines, commencing from the date of full operational commissioning of the Proposed Turbines . During the operational period, on a day-to-day basis the wind turbines will operate automatically, responding by means of meteorological equipment and control systems to changes in wind speed and direction.

The Proposed Turbines will be connected together and data relayed from the Proposed Turbines to a central control unit at the Proposed 110kV Substation which will facilitate off-site remote monitoring of the Proposed Wind Farm. Each Proposed Turbine will be monitored off-site by the appointed Operations and Maintenance contractor (typically the wind turbine manufacturer) and a wind farm operations management company. The monitoring of turbine output, performance, wind speeds, and responses to any key alarms will be monitored off-site by both parties 24-hours per day. Regular on-site visual inspections will also be carried out by the wind farm operations management company.

4.10.1 Maintenance

Each turbine will be subject to a routine maintenance programme involving several checks and changing of consumables, including oil changes. The meteorological mast will be subject to a routine maintenance programme involving several checks and changing of instrumentation when required. 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. Maintenance of the site roads will involve filling potholes and maintaining road edge markers. Drainage maintenance will typically involve cleaning of drainage ditches when required to prevent water backing up.

The Proposed 110kV Substation and Proposed 220kV Loop-in Substation will also require periodic maintenance. Both substations would be operational 24 hours per day, 7 days a week throughout the year. Substations can be operated remotely and manually. Supervisory operational and monitoring activities will be carried out remotely using a SCADA system, with the aid of computers connected via a telephone modem link. The following maintenance procedures will also be adhered.

- Periodic service and maintenance works which include some vehicle movement.
- For operational and inspection purposes, substation access is required.
- Servicing of the substation equipment will be carried out in accordance with the manufacturer's specifications, which would be expected to entail the following:

- Six-month service – three-week visit
- Annual service – six-week visit
- Weekly visits as required.

Occasional technical problems may require maintenance visits by technical staff. During the six-month and annual service visits, some waste (lubricating and cooling oils, packaging from spare parts or equipment, unused paint, etc.) will arise. This will be recorded and removed from the site and reused, recycled or disposed of in accordance with the relevant legislation in an authorised facility.

It is estimated that 1-2 daily visits will be made to the Site for authorised persons and vehicles to undertake minor routine maintenance and inspection, if and when required. Although the level of activity required for the maintenance of the both the Proposed Wind Farm and Proposed Grid Connection infrastructure is minimal, the impacts associated with traffic volumes for this period are assessed in Chapter 15: '*Material Assets*'.

4.10.2 Monitoring

Section 8 of the CEMP sets out a programme of monitoring required for the operational phase of the project. The CEMP should be consulted for detailed information on the monitoring requirements during the operational phase, however a summary of the key information is provided below:

- Monthly water sampling and laboratory analysis will be undertaken for the first six months during the operational phase.
- The drainage system will be monitored in the operational phase until such a time that all areas that have been reinstated become re-vegetated and the natural drainage regime has been restored.
- Post-construction bird monitoring will be carried out in accordance with the Bird Monitoring Plan provided in Appendix 7-7.
- Post-construction bat monitoring will be carried out in accordance with the Bat Report recommendations in Appendix 6-2.
- Post-construction linear habitat restoration monitoring following the main growing season (i.e., in September) in a given year for the first three years of growth.
- Monitoring for shadow flicker at properties within the Study Area as outlined in Chapter 5.
- Post turbine commissioning noise monitoring will be commenced within 6 months of commissioning the wind farm.

4.11 Decommissioning

The Proposed Turbines are expected to have a lifespan of approximately 35 years. Following the end of their useful life, the equipment may be replaced with a new technology, subject to planning permission being obtained, or the Proposed Wind Farm will be decommissioned fully.

Upon decommissioning, the Proposed Turbines, the meteorological mast and the telecommunications relay mast will be disassembled in reverse order to how they were erected. The Proposed Turbines will be disassembled with a similar model of crane that was used for their erection. All above ground turbine and mast components would be separated and removed off-site for recycling. Turbine and mast foundations would remain underground and would be covered with earth and allowed to revegetate. Leaving the 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 temporary environment nuisances such as noise, dust and/or vibration. Site roadways will be used during the operational phase by farm machinery and will provide a useful means of extracting the commercial forestry crop which exists on at the Site and therefore will be retained post decommissioning to facilitate these activities.

The 33kV underground electrical cabling connecting the Proposed Turbines to the Proposed 110kV Substation will be removed from the cable ducts. The cabling will be pulled from the cable ducts using a mechanical winch which will extract the cable and re-roll it on to a cable drum. This will be undertaken at the original cable jointing pits which will be excavated using a mechanical excavator and will be fully re-instated once the cables are removed. The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance. The cable materials will be transferred to a suitable recycling or recovery facility.

The Proposed 110kV Substation and associated Proposed 110kV Underground Cabling Route along with the Proposed 220kV Loop-in Substation and associated 220kV underground electrical cabling and 220kV end masts, will remain in place as they will form part of the National Grid under the ownership and control of the ESBN and EirGrid.

A Decommissioning Plan has been prepared (Appendix 4-6). The Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will agree with the competent authority at that time. The potential for effects during the decommissioning phase of the Proposed Wind Farm has been fully assessed in the EIAR.

As noted in the Scottish Natural Heritage report (SNH) *Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms* (SNH, 2013) reinstatement proposals for a wind farm are made approximately 30 years in advance, so within the lifespan of the Proposed 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".*