# Environmental Impact Assessment Report (EIAR)

## Seskin Wind Farm, Co. Carlow

### Chapter 4 – Description of the Proposed Project

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# 4. DESCRIPTION OF THE PROPOSED PROJECT

## 4.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) describes the Proposed Project and all its component parts. Two separate planning applications, relating to the Proposed Project, will be made to Carlow County Council and to Kilkenny County Council. This chapter also describes elements of the overall project which are not subject to this planning application but are assessed in this EIAR. Construction methodologies for the main infrastructural components of the development are also included in this chapter (or its associated appendices) of the EIAR.

The Proposed Project will consist of the provision of the following:

i. *The construction of 7 no. wind turbines with the following parameters (all within Co. Carlow):*
   a. *Total tip height range of 179.5m – 180m,*
   b. *Rotor diameter range of 149m – 155m,*
   c. *Hub height range of 102.5m to 105m,*
ii. *Construction of associated foundations, hardstand and assembly areas (all within Co. Carlow);*
iii. *All associated wind farm underground electrical and communications cabling connecting the turbines and meteorological mast to the proposed onsite electrical substation including road crossing at L30372, Co. Carlow (all within Co. Carlow);*
iv. *Construction of 1 no. permanent 38kV electrical substation compound including a single-story control building with welfare facilities, all associated electrical plant and equipment, security fencing, entrance on to the access track, all associated underground cabling, wastewater holding tank and all ancillary works in the townland of Seskinrea, Co. Carlow (all within Co. Carlow);*
v. *A permanent Battery Energy Storage System within the electrical substation compound in the townland of Seskinrea, Co. Carlow (all within Co. Carlow);*
vi. *All works (within County Carlow) associated with the connection of the proposed wind farm to the national electricity grid, via underground 38kV electrical cabling predominantly within the public road corridor from the proposed onsite electrical substation in the townland of Seskinrea, Co. Carlow to the existing 110kV Kilkenny substation (all within Co. Carlow);*
vii. *Provision of 2 no. joint bays, communication chambers and earth sheath links along the underground electrical cabling route (all within Co. Carlow);*
viii. *Reinstatement of the road and track surfaces above the cabling trench along existing roads and tracks (all within Co. Carlow);*
ix. *1 no. meteorological mast of c. 36.5m in height, and associated foundation and hard-standing area in the townland of Ridge, Co. Carlow (all within Co. Carlow);*
x. *The permanent upgrade of 1 no. existing site entrance off L3037 for the provision of construction and operational access (all within Co. Carlow);*
xi. *The provision of 1 no. new permanent site entrance and the upgrade of 1 no. existing site entrance off the L30372 (all within Co. Carlow);*
xii. *Upgrade of existing tracks/ roads and provision of new site access roads, 2 no. clear span bridge crossings, junctions and hardstand areas (all within Co. Carlow);*
xiii. *2 no. temporary construction compounds with temporary offices and staff facilities in the townland of Ridge and Seskinrea, Co Carlow (all within Co. Carlow);*
xiv. *Carriageway strengthening works at 'Black Bridge' on the L1835 / L3037 (Protected Structure: Kilkenny RPS Ref. D84) (within Co. Carlow and Co. Kilkenny);*
xv. *Peat and Spoil Management (all within Co. Carlow);*

xvi. *Tree Felling to accommodate the construction and operation of the proposed development (all within Co. Carlow);*
xvii. *Operational stage site signage; and*
xviii. *All ancillary apparatus and site development works above and below ground, including soft and hard landscaping and drainage infrastructure (all within Co. Carlow).*
xix. *All works (within county Kilkenny) associated with the connection of the proposed Seskin Wind Farm to the national electricity grid, via underground 38kV electrical cabling within the public road corridor to the existing Kilkenny 110kV substation (all within Co. Kilkenny);*
xx. *Provision of 16 no. joint bays, communication chambers and earth sheath links along the underground electrical cabling route (all within Co. Kilkenny);;*
xxi. *Reinstatement of the road and track surfaces above cabling trench along existing roads and tracks (all within Co. Kilkenny);;*
xxii. *Carriageway strengthening works at 'Black Bridge' on the L1835 / L3037 (Protected Structure RPS Ref. D84) (within Co. Carlow and Co. Kilkenny);*
xxiii. *A new temporary access road off the N78 to the L30372 in the townlands of Cloneen, Co. Kilkenny to facilitate the delivery of turbine components and other abnormal loads (all within Co. Kilkenny);;*
xxiv. *All ancillary apparatus and site development works above and below ground (all within Co. Kilkenny).*

The applicant is seeking a ten-year planning permission for development.

The Proposed Project includes for an onsite 38kV electricity substation and the Proposed Grid Connection Route, connecting the onsite substation to the national electricity grid via the existing Kilkenny 110kV electricity substation located in the townland of Scart, Co. Kilkenny. The Proposed Grid Connection Route will be located within the public road corridor or existing tracks for its entire length. The total length of the Proposed Grid Connection Route is approximately 20.1km, of which 2km is located within Co. Carlow and 18.1km is located within Co. Kilkenny.

All elements of the Proposed Project are provided in the list above, and described in this chapter, have been assessed as part of this EIAR.

## 4.2 Proposed Project Location

The Proposed Wind Farm is located approximately 3.1 km northwest of the village of Oldleighlin, Co. Carlow, 5km northwest of Leighlinbridge, Co. Carlow, and 9.9 kilometres southeast of Castlecomer, Co. Kilkenny. The Proposed Wind Farm site is located in an upland settling and is dominated by coniferous forestry plantations with some heath and agricultural lands. Current land-use on the Proposed Wind Farm comprises coniferous forestry and agriculture, and the site is served by a number of existing public, forestry and agricultural roads and tracks. The nearest Natura 2000 site to the Proposed Wind Farm, i.e., Special Area of Conservation (SAC) or Special Protection Area (SPA) is the River Barrow and River Nore SAC, and is located approximately 1.3km downstream of the Proposed Wind Farm and is hydrologically linked to it via watercourses which drain the site. Elevations within the Proposed Wind Farm site range from ~230mOD (metres above Ordnance Datum) in the west to ~271m in the northeast.

The Proposed Grid Connection Route includes for underground 38kV cabling from the proposed onsite 38kV substation, in the townland of Seskinrea, Co. Carlow, to the existing Kilkenny 110kV substation in the townland of Scart, Co. Kilkenny. The Proposed Grid Connection Route to Kilkenny, measuring approximately 20.1 km in length, is primarily located within the public road corridor. Current land-use along the Proposed Grid Connection Route comprises of public road corridor, public open space, pastures, coniferous forestry and land principally used by agriculture with significant areas of natural vegetation. The Proposed Grid Connection Route runs adjacent to the River Barrow and River Nore SAC within the public road corridor.

The Proposed Project location is described in detail in Chapters 1-16 of the EIAR.

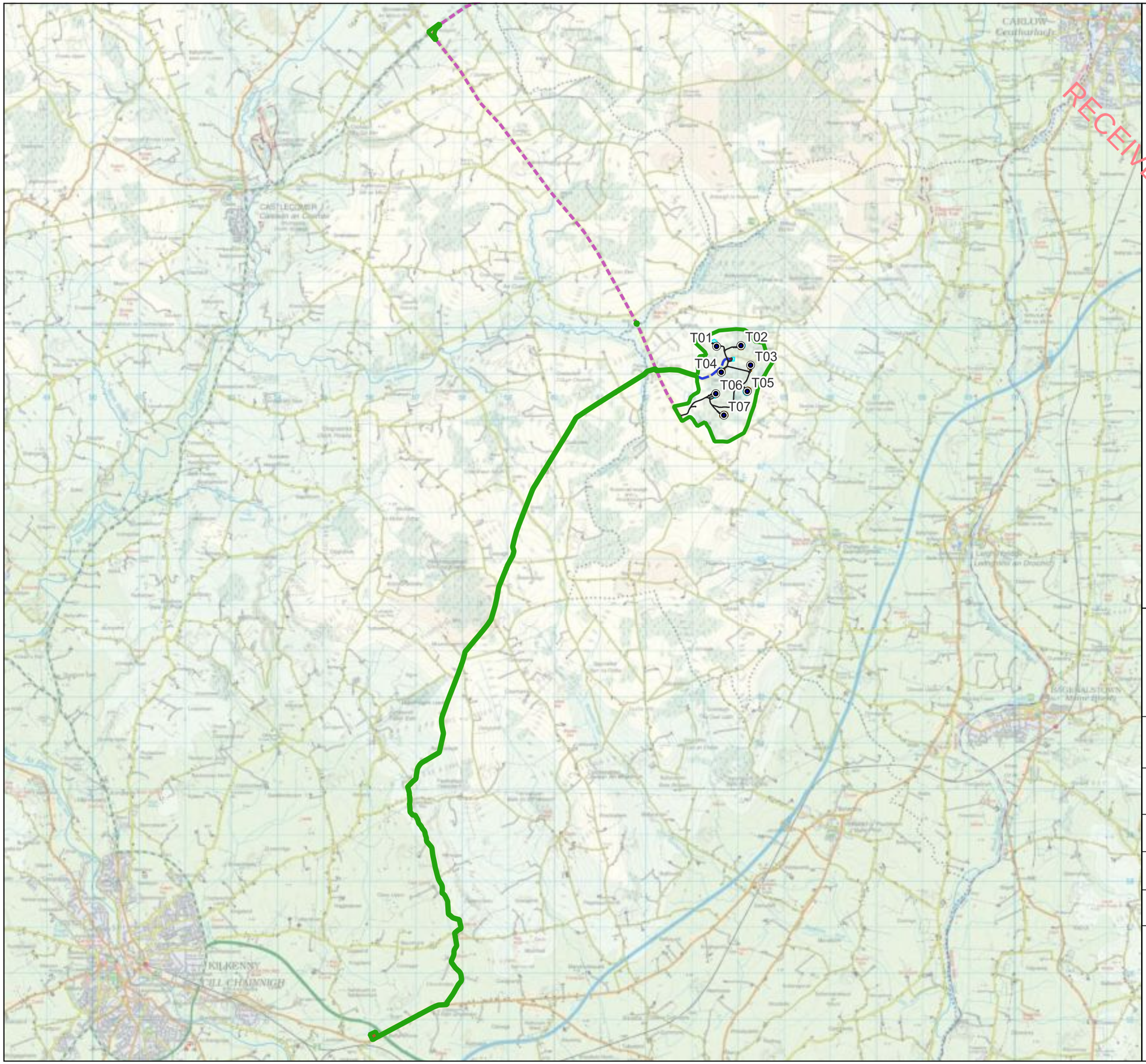


## 4.3 Proposed Project Layout

The overall layout of the Proposed Project is shown on Figure 4-1, this incluldes the Proposed Wind Farm site and the Proposed Grid Connection Route

The layout of the Proposed Project has been designed to minimise potential environmental effects, while at the same time maximising the energy yield of the wind resource passing over the site. Constraint studies, as described in Section 3.2.6 and 3.2.7 of Chapter 3 of this EIAR, have been carried out to ensure that turbines and all ancillary infrastructure are located in the most appropriate areas of the site and makes use of the existing tracks within the site where appropriate, thereby minimise the extent of proposed new roads required. Similarly, as described in Section 3.2.8 of this EIAR, a route selection constraints study was undertaken to ensure that the most appropriate route for the Proposed Grid Connection Route was selected. The Proposed Wind Farm site layout is shown in Figure 4-2. The Proposed Grid Connection Route layout is shown in Figure 4-3

The overall layout of the Proposed Project is shown on Figure 4-1. This drawing shows the proposed locations of the wind turbines, onsite 38kV electricity substation and battery storage compound, grid connection underground electrical cabling route, peat and spoil management areas, temporary construction compounds, internal roads layout, the turbine delivery route temporary link road and the main site entrance. Detailed site layout drawings of the Proposed Project are included in Appendix 4-1 to this EIAR.






## Map Legend

- EIAR Site Boundary
- Proposed Turbine Layout
- Proposed Turbine Foundations
- Proposed Turbine Hardstands
- Proposed Upgrades to Existing Roads
- Proposed New Roads
- Proposed Met Mast
- Proposed Grid Connection Route
- Proposed Onsite 38kV Substation and Battery Storage Compound
- Proposed Junction Accomodation Areas
- Proposed Peat Repository Areas
- Proposed Spoil Repository Areas
- Proposed Temporary Construction Compounds
- Proposed Turbine Delivery Route
- Kilkenny 110kV Substation



Drawing Title
Proposed Project Layout

Project Title
Seskin Wind Farm, Co. Carlow

| Drawn By | Checked By |
|---|---|
| BT | EC |
| Project No. 220246 | Drawing No. Figure 4-1 |
| Scale 1:80,000 | Date 2024-04-29 |

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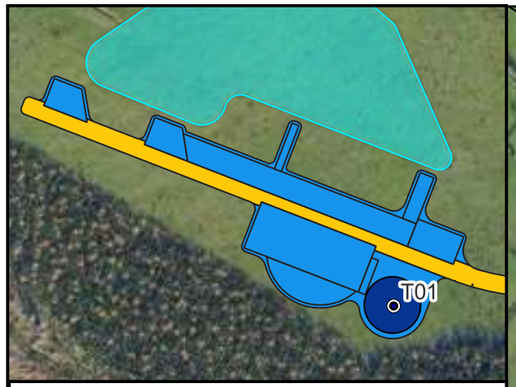


1:2500 scale of Turbine, Hardstand and Foundation






1:2500 scale of Met Mast Location



## Map Legend

- EIAR Site Boundary
- Proposed Turbine Layout
- Proposed Turbine Foundation
- Proposed Turbine Hardstands
- Proposed New Roads
- Proposed Upgrades to Existing Roads
- Proposed Met Mast
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- Proposed Onsite 38kV Substation and Battery Storage Compound
- Proposed Junction Accomodation Areas
- Proposed Peat Repository Areas
- Proposed Spoil Repository Areas
- Proposed Temporary Construction Compounds
- Proposed Turbine Delivery Route



Drawing Title
Proposed Wind Farm Layout

Project Title
Seskin Wind Farm, Co. Carlow

| Drawn By | Checked By |
|---|---|
| BT | EC |
| Project No. 220246 | Drawing No. Figure 4-2 |
| Scale 1:10,000 | Date 2024-04-29 |

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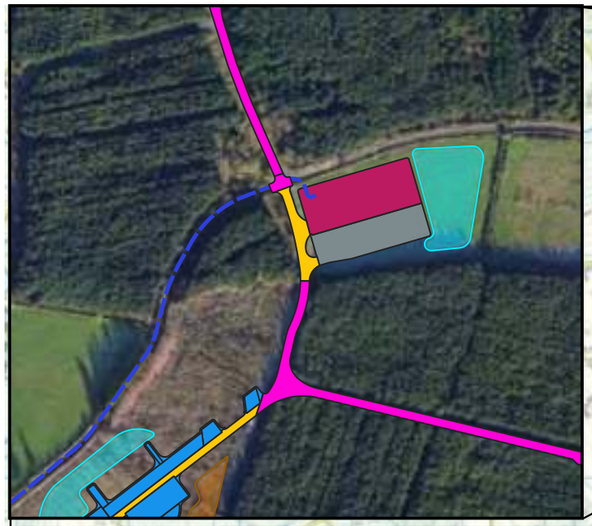






## Map Legend

- County Boundaries
- EIAR Site Boundary
- Proposed Grid Connection Route
- Proposed Onsite 38kV Substation and Battery Storage Compound
- Proposed Temporary Construction Compounds
- Kilkenny 110kV Substation





Drawing Title
Proposed Grid Connection

Project Title
Seskin Wind Farm, Co. Carlow

| Drawn By | Checked By |
|---|---|
| CJ | EC |
| Project No. 220246 | Drawing No. Figure 4-3 |
| Scale 1:55,000 | Date 2024-05-02 |

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# 4.4 Proposed Project Components

This section of the EIAR describes the components of the Proposed Project. Further details regarding Access and Transportation (Section 4.5), Site Drainage (Section 4.6), and Construction Methodologies (Section 4.8) are provided subsequently in this chapter.

## 4.4.1 Proposed Wind Farm

### 4.4.1.1 Wind Turbines

#### 4.4.1.1.1 *Turbine Locations*

The proposed wind turbine layout has been optimised using wind farm design software (WindPro) to maximise the energy yield from the Proposed Project site, while maintaining sufficient distances between the proposed turbines so as to ensure turbulence and wake effects do not compromise turbine performance, and maintain the minimum setbacks from neighbouring properties set out in the DoEHLG 2006 Guidelines and Draft 2019 Guidelines. The Grid Reference coordinates of the proposed turbine locations are listed in Table 4-1 below.

The final Top of Foundation Level of the turbine foundations will be determined by the actual ground conditions at each proposed turbine location and may differ but not materially from those levels listed in Table 4-1. Also, in accordance with the '*Wind Energy Development Guidelines for Planning Authorities'* (Department of the Environment, Heritage and Local Government (DOEHLG), 2006) micro-siting of the turbine positions may be required within the criteria set out in the guidelines.

*Table 4-1 Proposed Wind Turbine Locations and Elevations*

| Turbine | ITM Coordinates | | Top of Foundation Elevation (m OD) |
|---|---|---|---|
| | X (ITM) | Y (ITM) | |
| T1 | 663467 | 669637 | 252 |
| T2 | 663996 | 669653 | 269 |
| T3 | 664205 | 669229 | 260 |
| T4 | 663569 | 669075 | 252 |
| T5 | 664134 | 668661 | 254 |
| T6 | 663450 | 668611 | 242 |
| T7 | 663626 | 668143 | 252 |

### 4.4.1.2 Turbine Type

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

- Foundation unit
- Tower

- Nacelle (turbine housing)
- Rotor


*Plate 4-1 Wind turbine components*

The proposed wind turbines to be installed on the site will have the following dimensions:

- Turbine Tip Height – Maximum height 180 metres, Minimum height 179.5 metres
- Hub Height – Maximum height 105 metres, Minimum height 102.5 metres
- Rotor Diameter - Maximum diameter 155 metres, Minimum diameter 149 metres.

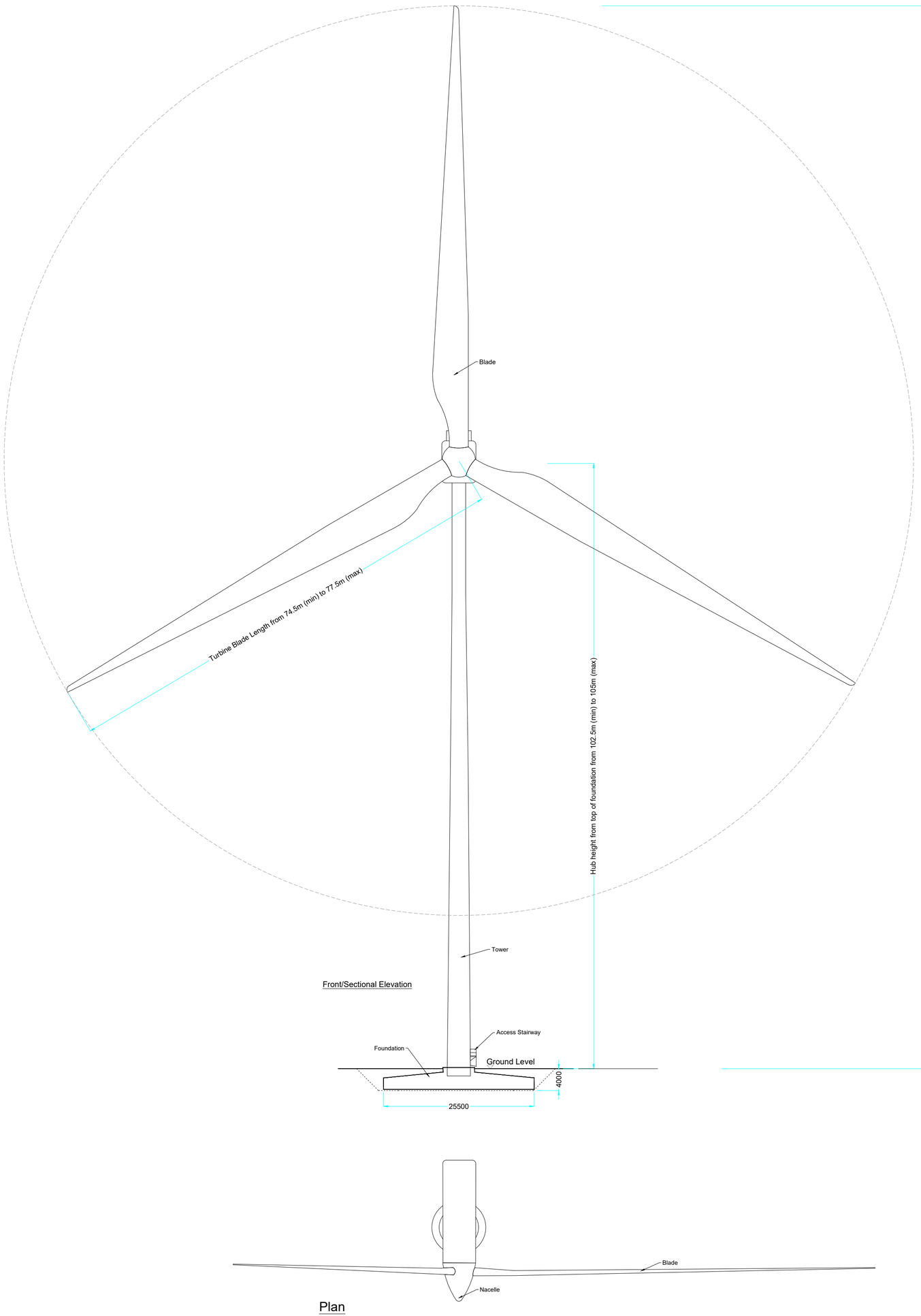
Modern wind turbines from the main turbine manufacturers have evolved to share a common appearance and other major characteristics, with only minor cosmetic differences differentiating one from another. The wind turbines that will be installed on the Proposed Wind Farm site will be conventional three-blade turbines, that will be geared to ensure the rotors of all turbines rotate in the same direction at all times.

As detailed in Section 1.7.3, for the purposes of this EIAR and in compliance with the Opinion issued by Carlow County Council and further detailed in Chapter 2, Section 2.8.2.2, various types and sizes of wind turbines, within the proposed ranges outlined above, have been selected for the purpose of assessing the likely environmental effects of the turbines throughout this EIAR. This allows for a robust assessment of the likely environmental effects of wind turbines within the proposed dimensional range. Turbine design parameters have a bearing on the assessment of shadow flicker, noise, visual impact, traffic and transport and ecology (specifically birds), as addressed elsewhere in this EIAR.

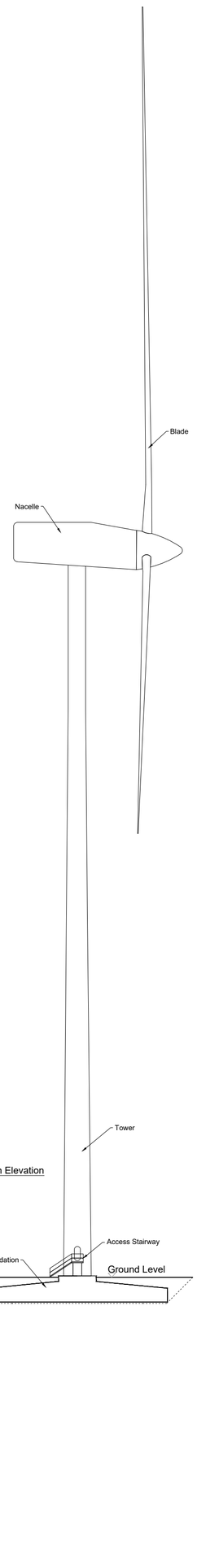
It should also be noted that the assessment of the development footprint of the Proposed Project site, within this EIAR, is based on the maximum potential footprint for all of the infrastructural elements. This precautionary approach is taken as the assessment of the maximum development footprint will, in the absence of mitigation measures, give rise to the greatest potential for significant effects. Should the development footprint be less than the maximum, this in itself will further mitigate the assessed effects.

A drawing of the proposed wind turbine is shown in Figure 4-4. Figure 4-4 also shows the turbine base layout, including turbine foundation, hard standing area, assembly area, access road and surrounding works area.

The individual components of a geared wind turbine nacelle and hub are shown in Figure 4-5 below.




Front/Sectional Elevation




Side/Section Elevation




Plan

Figure 4-4

| | | | |
|---|---|---|---|
| PROJECT TITLE: **EDF Seskin Wind Farm Co. Carlow / Co. Kilkenny** | | | |
| DRAWING TITLE: **Wind Turbine Elevations & Plan Range** | | | |
| PROJECT No.: **220246** | | DRAWING No.: **220246 - 11** | SCALE: **1:500 @ A1** |
| DRAWN BY: **GO** | CHECKED BY: **JW** | DATE: **03.05.2024** | REVISION.: P01 |

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

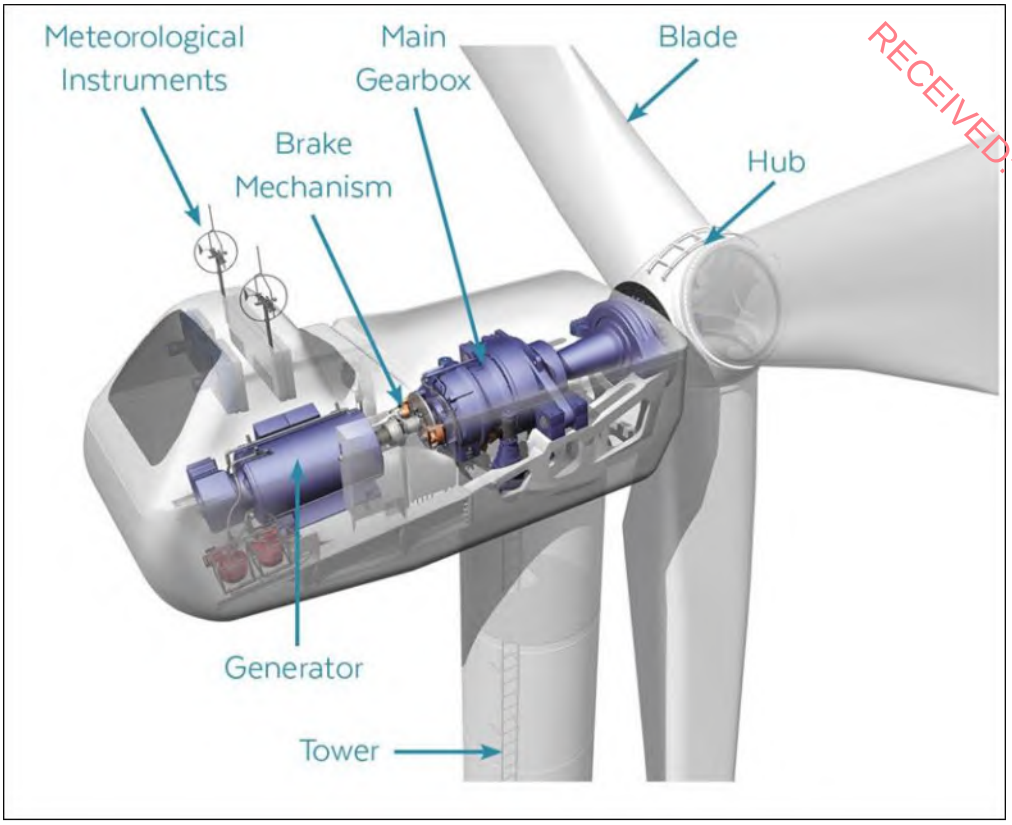





*Figure 4-5 Turbine nacelle and-5 hub components*

### 4.4.1.3 Turbine Foundations

Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground level. The size of the foundation will be dictated by the turbine manufacturer, and the final turbine selection will be the subject of a competitive tender process. Different turbine manufacturers use circular turbine foundations with some variation, depending on the requirements of the final turbine supplier, however, a foundation area large enough to accommodate modern turbine models has been assessed in this EIAR adopting a precautionary approach. The turbine foundation transmits any load on the wind turbine into the ground. The maximum horizontal and vertical extent of the turbine foundation will be 23.5m and 4m respectively, which has been assessed in the EIAR and is shown in Figure 4-6.

After the foundation level of each turbine has been formed using piling methods or on competent strata (i.e., bedrock or subsoil of sufficient load bearing capacity), the “Anchor Cage” (anchors the first section of the turbine tower to the foundation) 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 below).



*Plate 4-2 Turbine 'Anchor Cage' and finished turbine base*

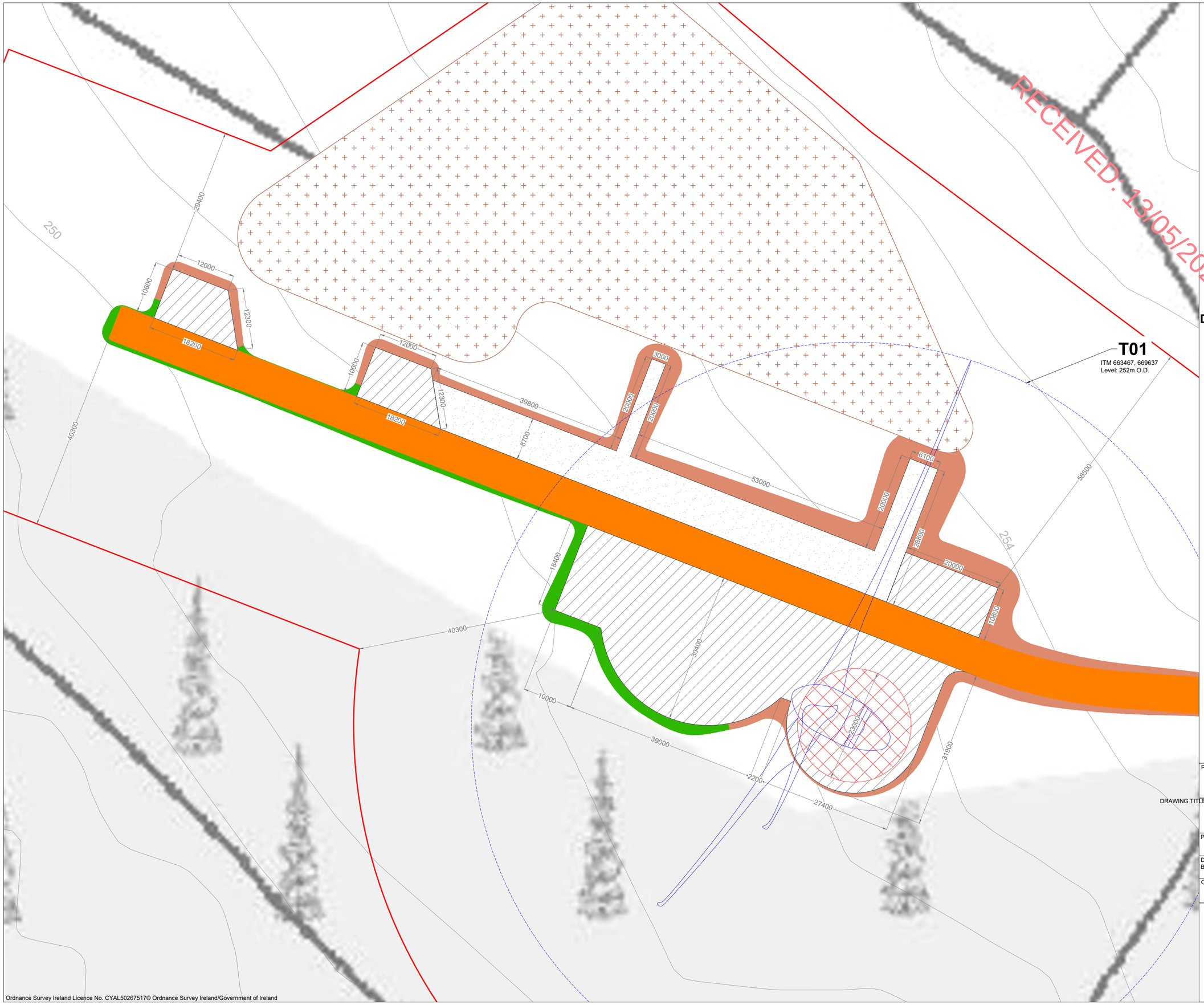
### 4.4.1.4 Hard Standing Areas

Hard standing areas consisting of levelled and compacted hardcore are required around each turbine base. These will 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. The hardstands also allow for the offloading and storage of turbine components, and generally provide a safe, level working area around each turbine position. The hard-standing areas are extended to cover the turbine foundations, once completed, by placing crushed stone over the foundation. The arrangement and positioning of hard standing areas are dictated by turbine suppliers. Figure 4-7 shows a turbine base layout (Turbine No. 1), including turbine foundation, hard standing area, assembly area, access road and surrounding works area.

The proposed hard standing areas for each individual turbine are shown as part of the detailed layout drawings included in Appendix 4-1 and using the precautionary principle, represent the maximum sizes required.

### 4.4.1.5 Assembly Area

Levelled assembly areas will be located on either side of the hard-standing area as shown on Figure 4-7. These assembly areas are required for offloading turbine blades, tower sections and hub from trucks until such time as they are ready to be lifted into position by cranes and to assist the main crane during turbine assembly. The extent of the area required for the assembly areas is shown on Figure 4-7 and the detailed drawing in Appendix 4-1.






**Project Design Drawing Notes**

1. Drawings issued are for planning application purposes only.
2. Drawings not to be used for construction/contract conditions.
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4. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.
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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

- Proposed Road
- Cut
- Fill
- Soft Levelled Area
- Hardstand/ Turbine Assembly Areas
- Turbine Foundation
- Turbine Sweep Area
- Spoil Repository Areas
- Planning Application Boundary (Carlow County Council)

N

PROJECT TITLE:
**EDF Seskin Wind Farm Co. Carlow / Co. Kilkenny**

DRAWING TITLE:
**Typical Turbine Hardstanding Area**

| PROJECT No.: | DRAWING No.: | SCALE: |
|---|---|---|
| 220246 | Figure 4-6 | 1:500 @ A2 |

| DRAWN BY: | CHECKED BY: | DATE: | REVISION.: |
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| GO | N/A | 29.04.2024 | D01 |

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#### 4.4.1.6 Power Output

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 power outputs depending on the capacity of the electrical generator installed in the turbine nacelle. The exact power rating of the installed turbine will be designed to match the wind regime on the Proposed Project site and will be determined by the selected manufacturer.

For the purposes of this EIAR, a rated output of 6.6MW has been chosen to calculate the power output of the proposed 7-turbine renewable energy development, which would result in an estimated installed capacity of 46.2MW.

Assuming an installed capacity of 46.2MW, the Proposed Project therefore has the potential to produce up to 129,507 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 32% is applied here[1].

C = ..... Rated output of the wind turbines: 46.2MW

The 129,507 MWh of electricity produced by the Proposed Project would be sufficient to supply approximately 30,835 Irish households with electricity per year, based on the average Irish household using 4.2 MWh of electricity[2] (this latest figure is available from the March 2017 CER Review of Typical Consumption Figures Decision Paper).

The 2022 Census of Ireland Summary Results recorded a total of 22,238 occupied households in Co. Carlow. Per annum, based on a capacity factor of 32%, the Proposed Project would therefore produce sufficient electricity for the equivalent of over 100% of all households in Co. Carlow.

With regards to the modern turbine range of 4 – 7MW, the resulting electricity produced would range from 78,489MWh to 137,356MWh per annum. The lower end of this range (78,489MWh) would be sufficient to supply approximately 18,688 Irish households with electricity per year, based on the average Irish household using 4.2MWh of electricity. The higher end of this range (137,356MWh) would be sufficient to supply approximately 32,704 Irish households with electricity per year, based on the average Irish household using 4.2MWh of electricity. Based on the 2022 Census of Ireland results for Co. Carlow, the output range would produce sufficient electricity for the equivalent of 84% and 100% respectively.

## 4.4.2 Site Roads

### 4.4.2.1 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

[1] *Eirgrid, 2022 Enduring Connection Policy 2.2 Constraints Report for Area H2 Solar and Wind* ECP-2-2-Solar-and-Wind-Constraints-Report-Area-H2-v1.0.pdf (eirgridgroup.com)
[2] *March 2017 CER (CRU) Review of Typical Consumption Figures Decision Paper* https://www.cru.ie/document_group/review-of-typical-consumption-figures-decision-paper/

constructed. The road construction design, as per the *Peat and Spoil Management Plan* in Appendix 4-2 which was produced by AFRY, has taken into account the following key factors:

1. *Buildability Considerations;*
2. *Serviceability requirements for construction and wind turbine delivery and maintenance vehicles*
3. *Minimisation of excavation arisings;*
4. *The requirement to minimise disruption to peat hydrology;*



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 2.8 kilometres of existing site roads and tracks, and to construct approximately 2.7 kilometres of new access road on the Proposed Wind Farm site. It is proposed to construct passing bays along the proposed access road network.

## Construction of New Excavated Roads – Type A

The general construction methodology for upgrading of existing sections of access roads or tracks, as presented in AFRY's *Peat & Spoil Management Plan* in Appendix 4-2 of this EIAR, is summarised below.

1. *All the access tracks across the site will be constructed to solid sub-formation. For excavations in peat and spoil, side slopes shall be not greater than 1 (v): 2 or 3 (h). This slope inclination should be reviewed during construction, as appropriate.*
2. *Where areas of weaker peat are encountered then slacker slopes will be required.*
3. *New excavated roads constructed through excavation and the removal of organic material and soft subsoil to achieve a suitable formation level.*
4. *A layer of geogrid or geotextile material will be laid at the formation level to separate the road building material from the subsoil.*
5. *A minimum of 450mm of granular fill material, such as Class 6F2 stone, will then be placed and compacted in layers, as specified by the detailed designer.*
6. *The road will then be finished with a 150mm layer of capping material, such as Cl. 804.*
7. *The finished road width will have a running width of 5m, with wider sections on bends and passing bays.*
8. *Access road construction will be to the line and level requirements as per design/planning conditions.*

Sections of New Excavated Roads – Type A are shown in Figure 4-7.

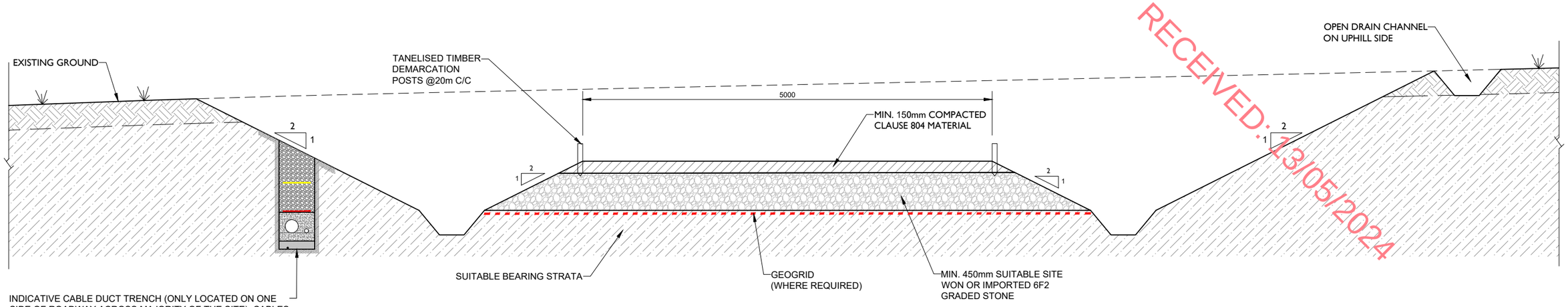
## Upgrade of Existing Access Roads or Tracks – Type B

For the construction of the Proposed Wind Farm, it is proposed to utilise 2.8km of existing roads, 2.2km of which are forestry tracks, accounting for 51% of the roads required to access the site. During the site survey conducted by AFRY, it was observed that the existing forestry tracks are in relatively good condition.

The general construction methodology for upgrading of existing sections of access roads or tracks, as presented in AFRY's *Peat & Spoil Management Plan* in Appendix 4-2 of this EIAR, is summarised below.

1. *All the access tracks across the site will be constructed to solid sub-formation. For excavations in peat and spoil, side slopes shall be not greater than 1 (v): 2 or 3 (h). This slope inclination should be reviewed during construction, as appropriate.*
2. *Where areas of weaker peat are encountered then slacker slopes will be required.*
3. *Upgrading of these existing tracks will involve both widening and resurfacing works, and will typically take place on both sides of the road. However, in areas of steeper slopes, widening of existing tracks will take place on the upslope side of the road.*
4. *The existing roads will be widened through excavation and the removal of organic material and soft subsoil to achieve a suitable formation level.*
5. *The new section of the road will be constructed by placing a minimum of 450mm of granular fill material, such as Class 6F2 stone, and compacting it in layers on top of a layer of geogrid or geotextile, depending on site conditions and as specified by the detailed designer.*
6. *This road construction will be similar in build up to the construction of the Type A - New Excavated Road. The increased road width and the existing road surface, where necessary, will be capped with a 150mm layer of Clause 804 similar material.*
7. *The finished road width will have a running width of 5m, with wider sections on bends and passing bays.*
8. *Access road construction will be to the line and level requirements as per design/planning conditions.*

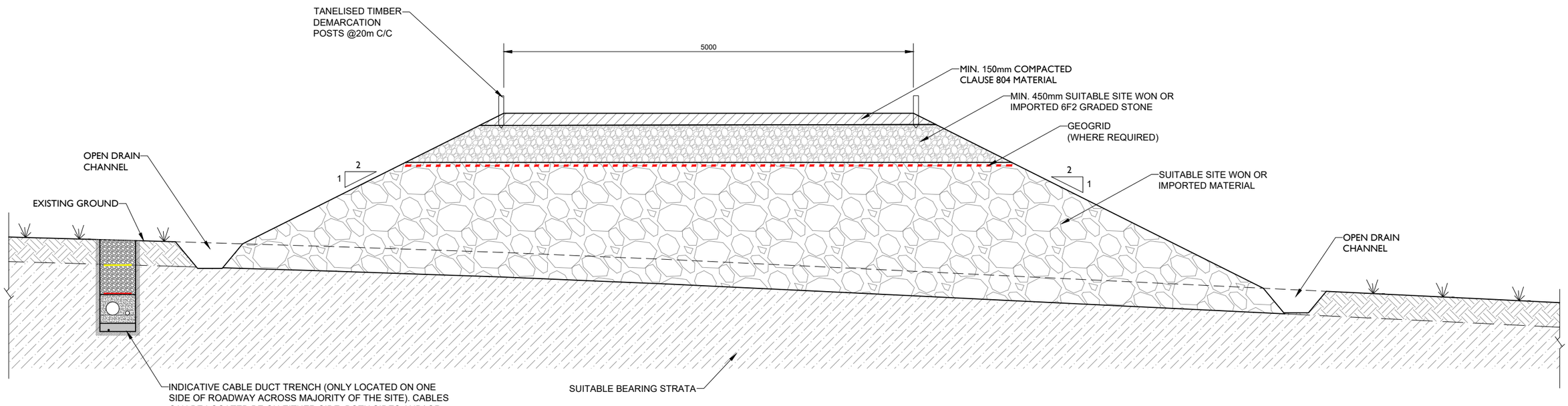
Sections of Upgrade of Existing Roads – Type B are shown in Figure 4-8.




## TYPE 'A' - NEW EXCAVATE & REPLACE ACCESS ROAD SECTION

(SHOWN IN CUT SCENARIO)

Scale 1:50




## TYPE 'A' - NEW EXCAVATE & REPLACE ACCESS ROAD SECTION

(SHOWN IN FILL SCENARIO)

Scale 1:50

NOTES

| REV | DATE | DRAWN BY | CHECKED BY | DETAILS |
|---|---|---|---|---|
| B | 15/01/2024 | M.B. | L.P. | GENERAL REVISION |
| A | 07/12/2023 | M.B. | L.P. | FIRST ISSUE |

ENGINEER

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Tel. +353 (0) 1 845 5031

CLIENT

PROJECT: SESKIN WIND FARM
CO. CARLOW

TITLE: ACCESS ROAD TYPE 'A'
CROSS SECTIONS

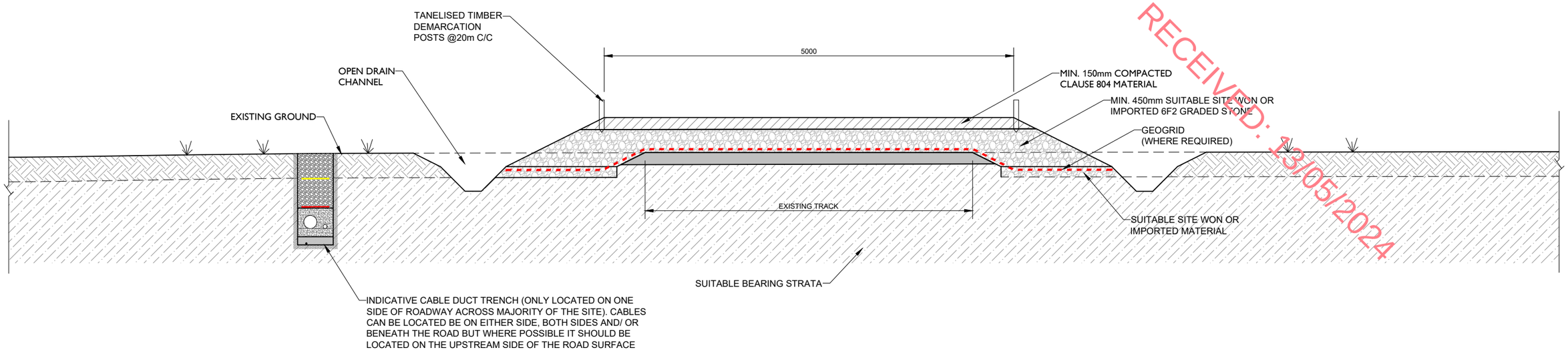
REVISION: B

| DRAWN BY | DATE | PAPER SIZE | SCALE |
|---|---|---|---|
| M. BROWNE | 07/12/2023 | A3 | 1:50 |

| CHECKED AND APPROVED | DATE | STATUS |
|---|---|---|
| L. POWER | 07/12/2023 | FINAL |

DRAWING NUMBER: Figure 4-7

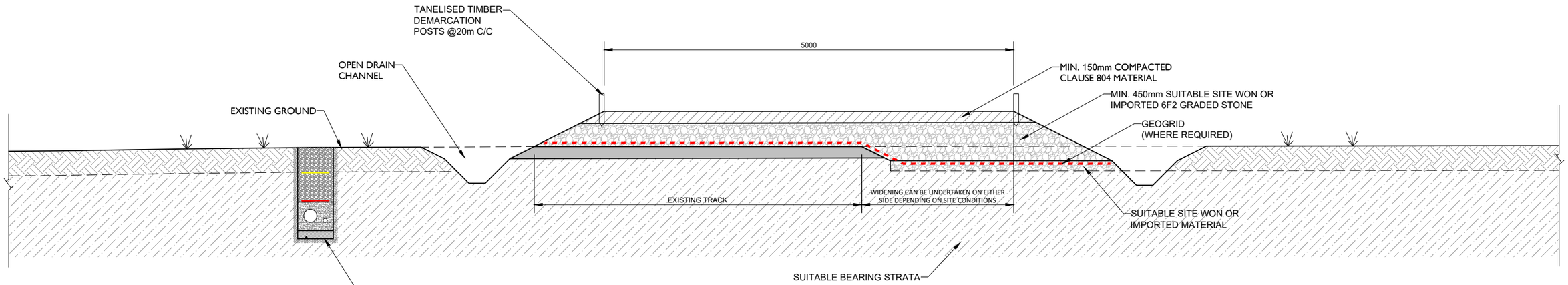
Plotted - 14/02/2024 09:42:32
Z:\Projects\Ireland\Seskin SESK\Drawings\0010 Typical Road And Hardstand Details\SESK-D010.1 Typical Access Road Details




## TYPE 'B' - UPGRADE OF EXISTING EXCAVATED ACCESS ROAD

(WIDENING ON BOTH SIDES)

Scale 1:50




## TYPE 'B' - UPGRADE OF EXISTING EXCAVATED ACCESS ROAD

(WIDENING ON ONE SIDE)

Scale 1:50

NOTES

| REV | DATE | DRAWN BY | CHECKED BY | DETAILS |
|---|---|---|---|---|
| B | 15/01/2024 | M.B. | L.P. | GENERAL REVISION |
| A | 07/12/2023 | M.B. | L.P. | FIRST ISSUE |

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CLIENT

PROJECT: SESKIN WIND FARM
CO. CARLOW

TITLE: ACCESS ROAD TYPE 'B'
CROSS SECTIONS

REVISION: B

| | | | |
|---|---|---|---|
| DRAWN BY: M. BROWNE | DATE: 07/12/2023 | PAPER SIZE: A3 | SCALE: 1:50 |
| CHECKED AND APPROVED: L. POWER | DATE: 07/12/2023 | STATUS: FINAL | |

DRAWING NUMBER: Figure 4-8

Plotted : 14/02/2024 09:43:20
Z:\Projects\Ireland\Seskin SESK\Drawings\dd\10 Typical Road And Hardstand Details\SESK DD10.1 Typical Access Road Details

### 4.4.3 Site Underground Electrical (20kV or 33kV) and Communications Cabling

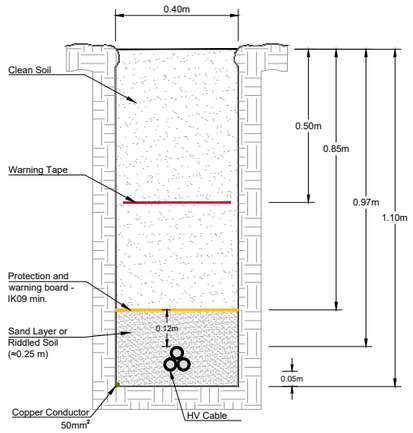
Each turbine will be connected to the on-site electricity substation via underground 20kV or 33kV (kilovolt) electricity cabling. Fibre-optic cables will also connect each wind turbine and the met mast to the onsite substation. The electricity and fibre-optic cabling connecting to the onsite substation compound will be run in cable ducts in the road or direct buried alongside the internal tracks approximately 0.9 metres beneath ground level to the top of the cable. The route of the cable will follow the access track to each turbine location and are illustrated on the site layout drawings included as Appendix 4-1, the exact number and configuration of cable may vary within the cabling trench. Figure 4-9 below shows two variations of a typical 33kV cable trench, one for off-road trenches and one for on-road trenches. 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.

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 Project site should sufficient volumes of suitable material not be encountered during the excavation phase of the proposed infrastructure.

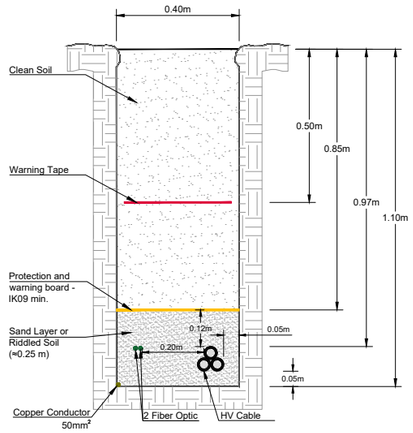
### 4.4.4 Meteorological Mast

One meteorological (met) mast is proposed as part of the Proposed Wind Farm site. The met mast will be equipped with wind monitoring equipment at various heights. The proposed met mast will be located at X 663011, Y 668327 (ITM) as shown on the Proposed Wind Farm layout drawing in Figure 4-2. The mast will be a free-standing slender lattice structure 36.5 metres in height. The mast will be constructed on a hard-standing area sufficiently large to accommodate the equipment that will be used to erect the mast. The proposed meteorological mast is shown in Figure 4-10.

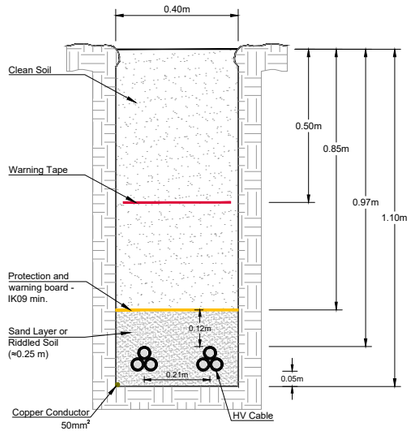
HV1
1 HV Circuit



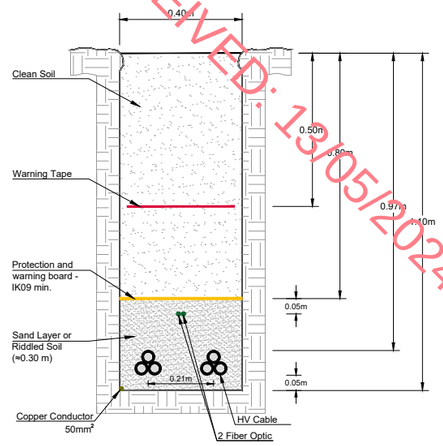

HV 1.1
1 HV Circuit + FO Cables




HV 2
2 HV Circuits

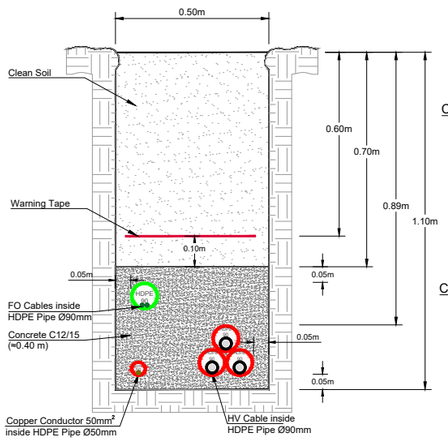



HV 2.1
2 HV Circuits + FO Cables

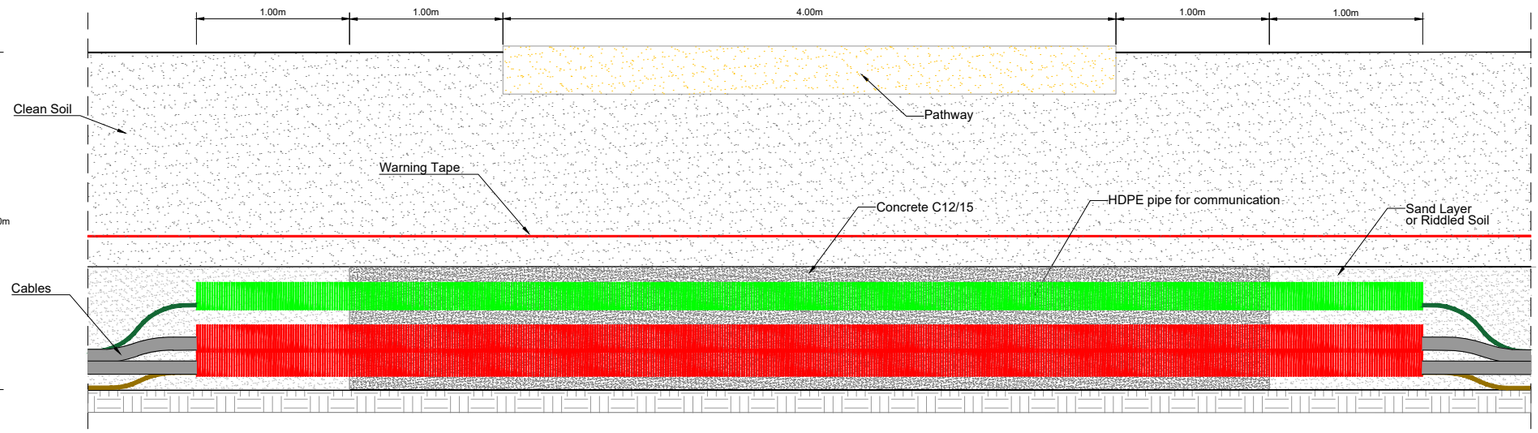



# TRACK CROSSING

HV 1C
Below Track Crossing
1 HV Circuit + FO Cables

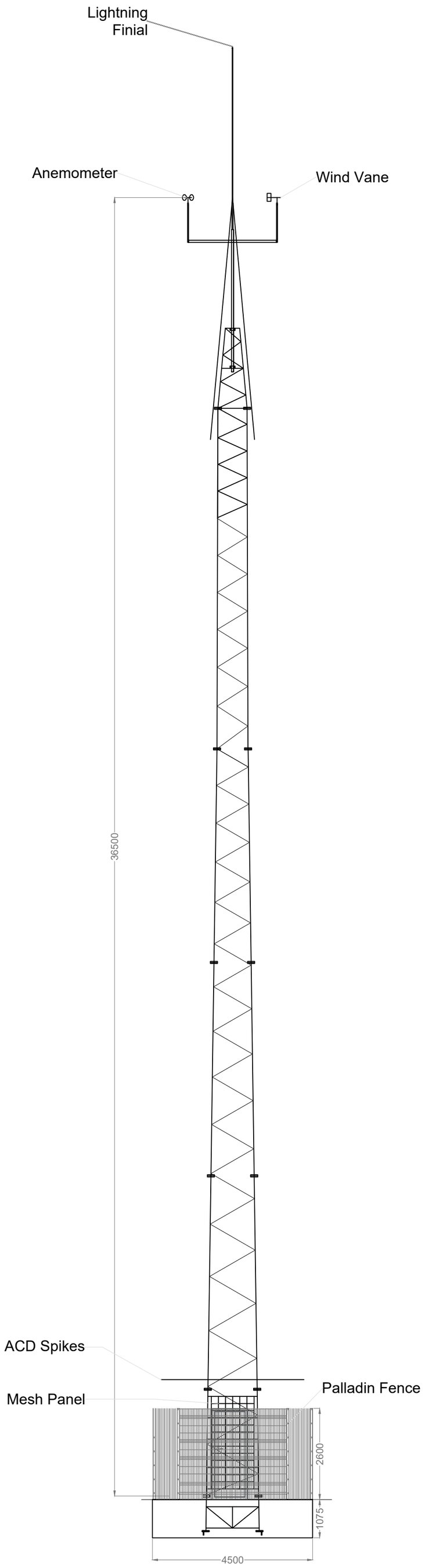



TRACK CROSSING Lateral View



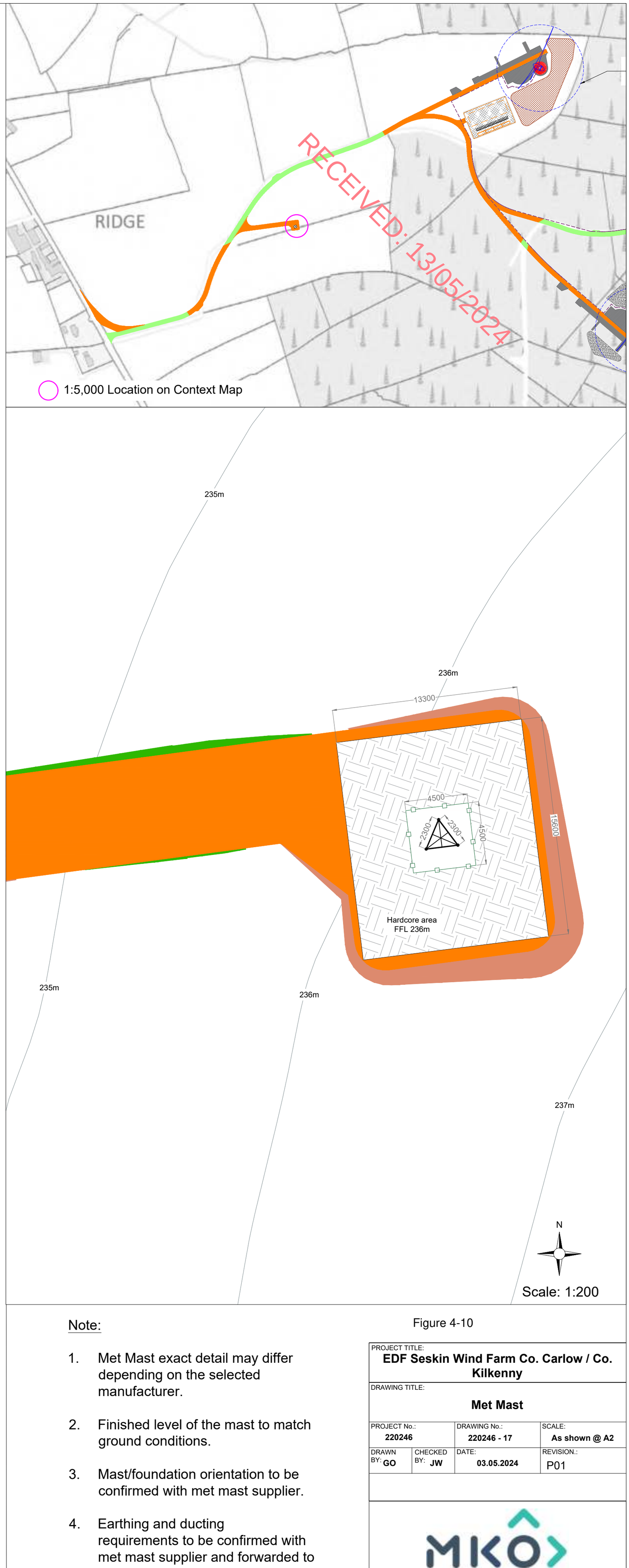

| VERSION | PURPOSE | DRAWN | VERIFIED | APPROVED | DATE |
|---|---|---|---|---|---|
| 00 | Initial version. | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **PROJECT:** | | **DRAWING DESIGNATION:** Internal Cable Cross Sections *ISSUED BY: COE* | | | |
| **SITE:** | | | | | |
| **CLIENT:** | EDF Renewables Ireland | **DRAWING CODE:** | EX_HV_309_00 | | |
| **PROJECT Nº:** | **STAGE:** | **SERVICE:** | Electrical | **SCALE:** 1:20 | **FORMAT:** A3 |




Mast Elevation

Scale: 1:100




Scale: 1:200

Figure 4-10

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:
**EDF Seskin Wind Farm Co. Carlow / Co. Kilkenny**

DRAWING TITLE:
**Met Mast**

| PROJECT No.: | DRAWING No.: | SCALE: |
|---|---|---|
| **220246** | **220246 - 17** | **As shown @ A2** |

| DRAWN BY: | CHECKED BY: | DATE: | REVISION.: |
|---|---|---|---|
| **GO** | **JW** | **03.05.2024** | P01 |

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## 4.4.5 Temporary Construction Compounds



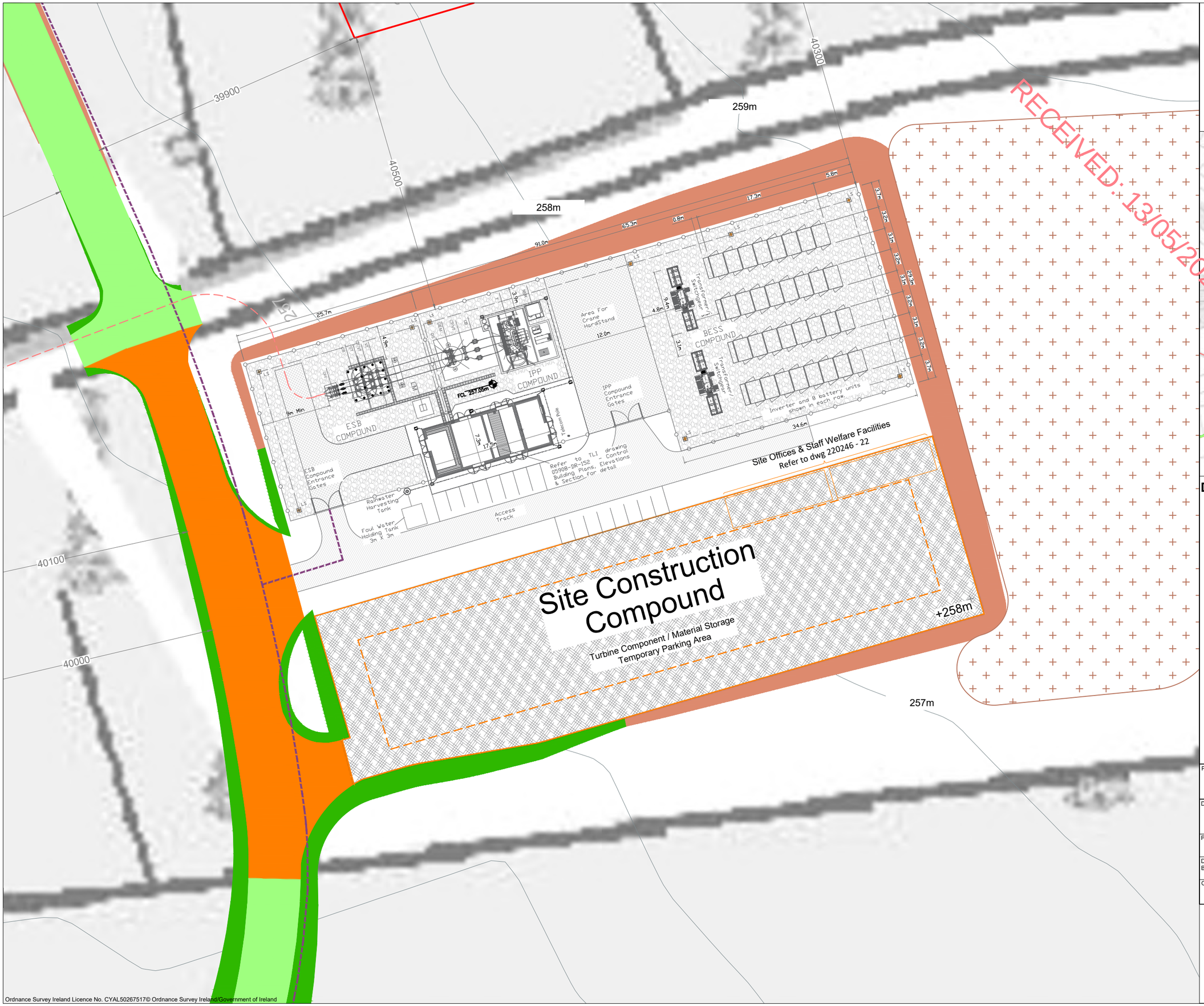
Two temporary construction compounds will be located within the Proposed Wind Farm site. The primary construction compound will be located adjacent to Turbine No. 6 and measures approximately 4,320 square meters in area. The secondary construction compound will be located adjacent to the onsite substation and measures approximately 2,600 square meters in area.

The locations of the proposed construction compounds are shown on the Proposed Wind Farm site layout drawing in Figure 4-2. The layouts of the construction compounds are shown on Figure 4-11 and Figure 4-12.

The temporary construction compounds 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. The construction compounds will consist of temporary site offices, staff facilities, construction materials storage and car-parking areas for staff and visitors. Turbine components will be brought directly to the proposed turbine locations following their delivery to the site.

Temporary toilets, located within staff portacabins, 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 a permitted waste collector to wastewater treatment plants.

Once the Proposed Wind Farm has been commissioned, both compounds will be removed. These areas will be reinstated with previously excavated peat and spoil, and either be reseeded or left to revegetate naturally.








**Project Design Drawing Notes**

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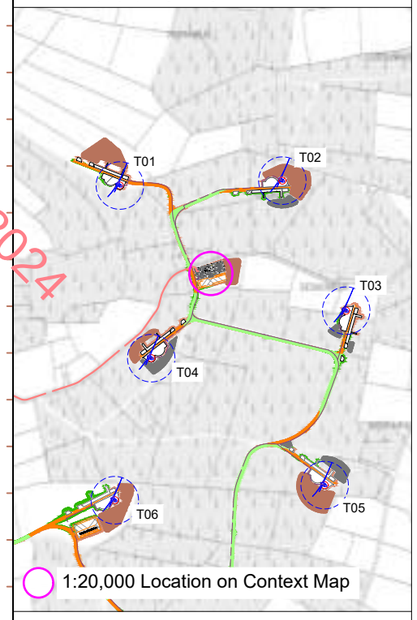
7. Layout plans show typical Turbine rotor diameter as per turbine drawing.
8. Final levels may vary depending on local ground conditions.




## Drawing Legend

- Existing Road to be Upgraded
- Proposed Road
- Cut
- Fill
- Spoil Repository Areas
- 38kV Underground Grid Connection Cabling Route
- Planning Application Boundary (Carlow County Council)
- Internal Electrical Cabling Trench

N

Figure 4-11

PROJECT TITLE:
**EDF Seskin Wind Farm Co. Carlow / Co. Kilkenny**

DRAWING TITLE:
**Temporary Construction Compound 01**

| PROJECT No.: | DRAWING No.: | SCALE: |
|---|---|---|
| 220246 | 220246 - 15 | 1:500 @ A3 |

| DRAWN BY: | CHECKED BY: | DATE: | REVISION.: |
|---|---|---|---|
| GO | JW | 13.05.2024 | P01 |

OS SHEET No.: 4352, 4353, 4354, 4355, 4410, 4411, 4412, 4413, 4468, 4469, 4470, 4471, 4527, 4528, 4529, 4530, 4587, 4588, 4589, 4590, 4646, 4647, 4648, 4649, 4706, 4707, 4708, 4709, 4767, 4768, 4769, 4770

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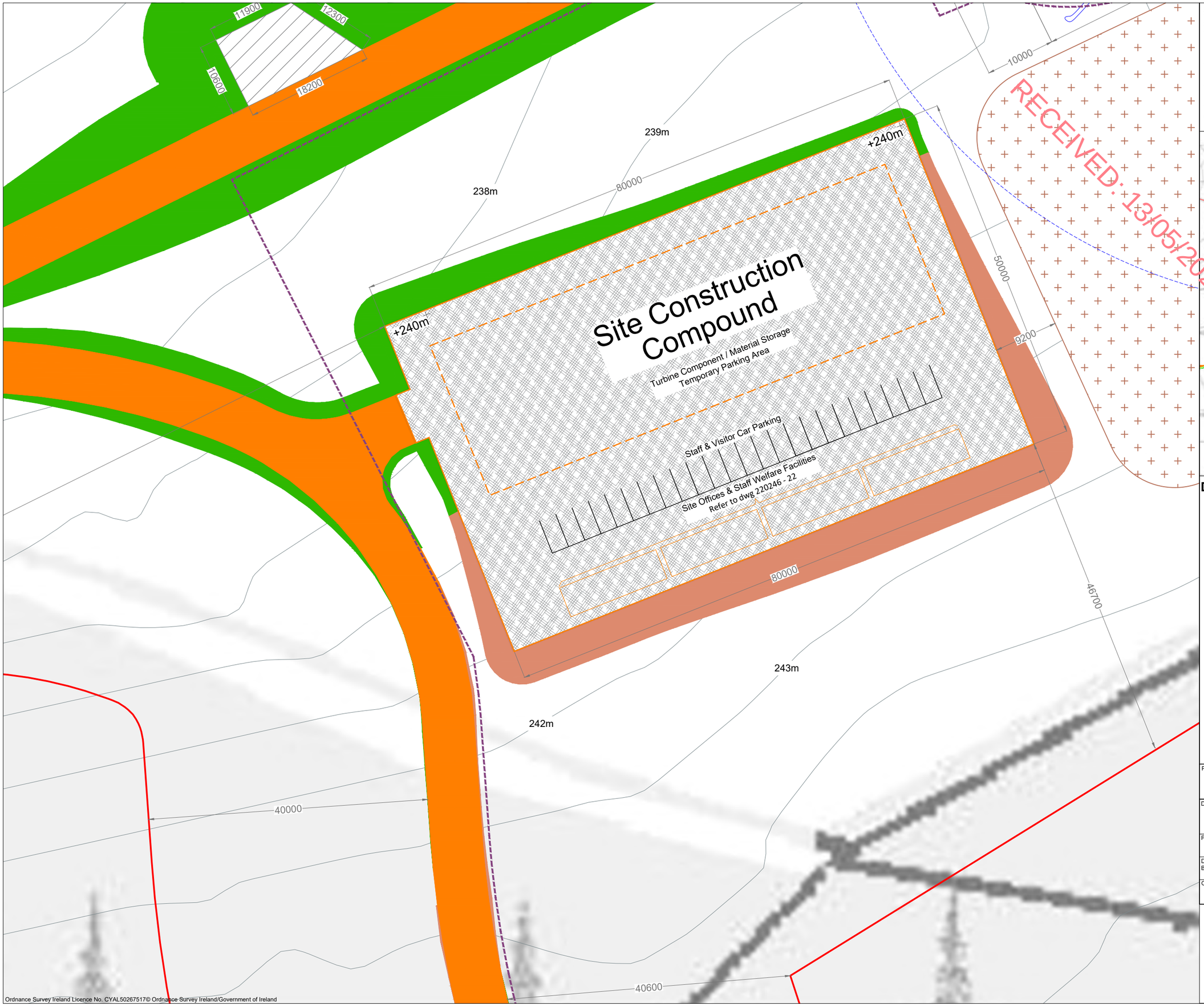




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7. Layout plans show typical Turbine rotor diameter as per turbine drawing.
8. Final levels may vary depending on local ground conditions.


1:20,000 Location on Context Map

## Drawing Legend

- Proposed Road
- Cut
- Fill
- Spoil Repository Areas
- Hardstand/ Turbine Assembly Areas
- Turbine Sweep Area
- Planning Application Boundary (Carlow County Council)
- Internal Electrical Cabling Trench

N

Figure 4-12

PROJECT TITLE:
**EDF Seskin Wind Farm Co. Carlow / Co. Kilkenny**

DRAWING TITLE:
**Temporary Construction Compound 02**

| PROJECT No.: | DRAWING No.: | SCALE: |
|---|---|---|
| 220246 | 220246 - 16 | 1:500 @ A3 |

| DRAWN BY: | CHECKED BY: | DATE: | REVISION.: |
|---|---|---|---|
| GO | JW | 13.05.2024 | P01 |

OS SHEET No.:
4352, 4353, 4354, 4355, 4410, 4411, 4412, 4413, 4468, 4469, 4470, 4471, 4527, 4528, 4529, 4530, 4587, 4588, 4589, 4590, 4646, 4647, 4648, 4649, 4706, 4707, 4708, 4709, 4767, 4768, 4769, 4770

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

## 4.4.6 Proposed Grid Connection Route

### 4.4.6.1 Onsite 38kV Substation

It is proposed to construct a 38kV electricity substation within the Proposed Wind Farm site, as shown in Figure 4-1, Figure 4-2 and Figure 4-3. The proposed onsite 38kV substation is located within agricultural land and will be accessed via the internal Proposed Wind Farm site road network.

The footprint of the proposed onsite 38kVsubstation compound measures approximately 2,350 square metres in area and will include 1 no. control buildings and the electrical substation components necessary to consolidate the electrical energy generated by each wind turbine and export that electricity from the onsite 38kV substation to the national grid. The layouts, drainage detail, and elevations of the proposed onsite 38kV substation are shown on Figure 4-13a, Figure 13-b and Figure 4-14. The construction and exact layout of electrical equipment in the onsite 38kV substation will be to ESB Networks/ or ESB Networks specifications.

Further details regarding the connection between the onsite 38kV substation and the national electricity grid are provided in Section 4.4.6.5 below.

The onsite 38kV substation compound will include steel palisade fencing (approximately 2.5 metre high or as otherwise required by ESB), and internal fences will also segregate different areas within the main substation. The onsite substation will remain in place as it will be under the ownership and control of the ESB Networks and/or EirGrid, and will form a permanent part of the national electricity grid.

### 4.4.6.2 Wind Farm Control Building

The wind farm control building will be located within the substation compound and will measure 17.5 metres by 7.3 metres and six metres in height. This wind farm control building includes for both the Independent Power Provider (IPP) Control Building and the ESB Control Building. Layout, drainage detail and elevation drawings of the control building are included in Figure 4-15 and Figure 4-16. The wind farm control building will include staff welfare facilities for the staff that will work on the Proposed Project site during the operational phase of the project. Toilet facilities will be installed with a low-flush cistern and low-flow wash basin. Due to the specific nature of the Proposed Project, there will be a very small water requirement for occasional toilet flushing and hand washing and therefore the water requirement of the Proposed Project does not necessitate a potable source. It is proposed to either harvest rainwater from the roofs of the buildings or, alternatively, install a groundwater well adjacent to the 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 measuring approximately 9 square metres in area, and approximately 2m in depth, with a holding capacity of 10,000 litres, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. The location of the wastewater tank is shown in Figure 4-13a and the details of the substation drainage is shown in Figure 4-13b.

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 Bord Pleanála as an acceptable proposal.

The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. 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 electricity substation that will be monitored remotely 24 hours a day, 7 days per week. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007(as amended), will be employed to transport wastewater away from the Proposed Project site.



#### 4.4.6.3 Battery Storage

A battery-based energy storage system (BESS) will adjoin the 38kV onsite substation, and is located within the substation compound. The BESS primarily consists of 4 no. steel containers assembled in rows within the BESS compound at the site.

Prior to installing the steel containers, clearance of the site area, levelling off the ground surface and creation of a hard stand will be undertaken. These containers and the adjacent infrastructure house the batteries, inverters, transformers, fire suppression equipment and associated electrical components. The containers will be mounted onto concrete plinth foundations. The containers shall be spaced to allow airflow around the containers, feeding their climate control systems.

In addition to the modular steel containers, other components of the development include:

- A grid transformer within the electrical compound;
- Above ground cable junction boxes/ cabling cabinets and cable racks/steel trunking facilitating the necessary electrical connections between containers;
- Underground ducting and cabling;
- A security fence around the perimeter of the compound;
- Communications equipment; and,
- Lightning protection poles.

The battery storage compound will operate continuously, linked to the on-site substation. It will be monitored in tandem with the overall development and there will be sporadic maintenance visits as required. The battery energy storage system will remain in place.

The BESS layout and elevations is shown in Figure 4-13a and Figure 4-14.

ISO A1 594mm x 841mm

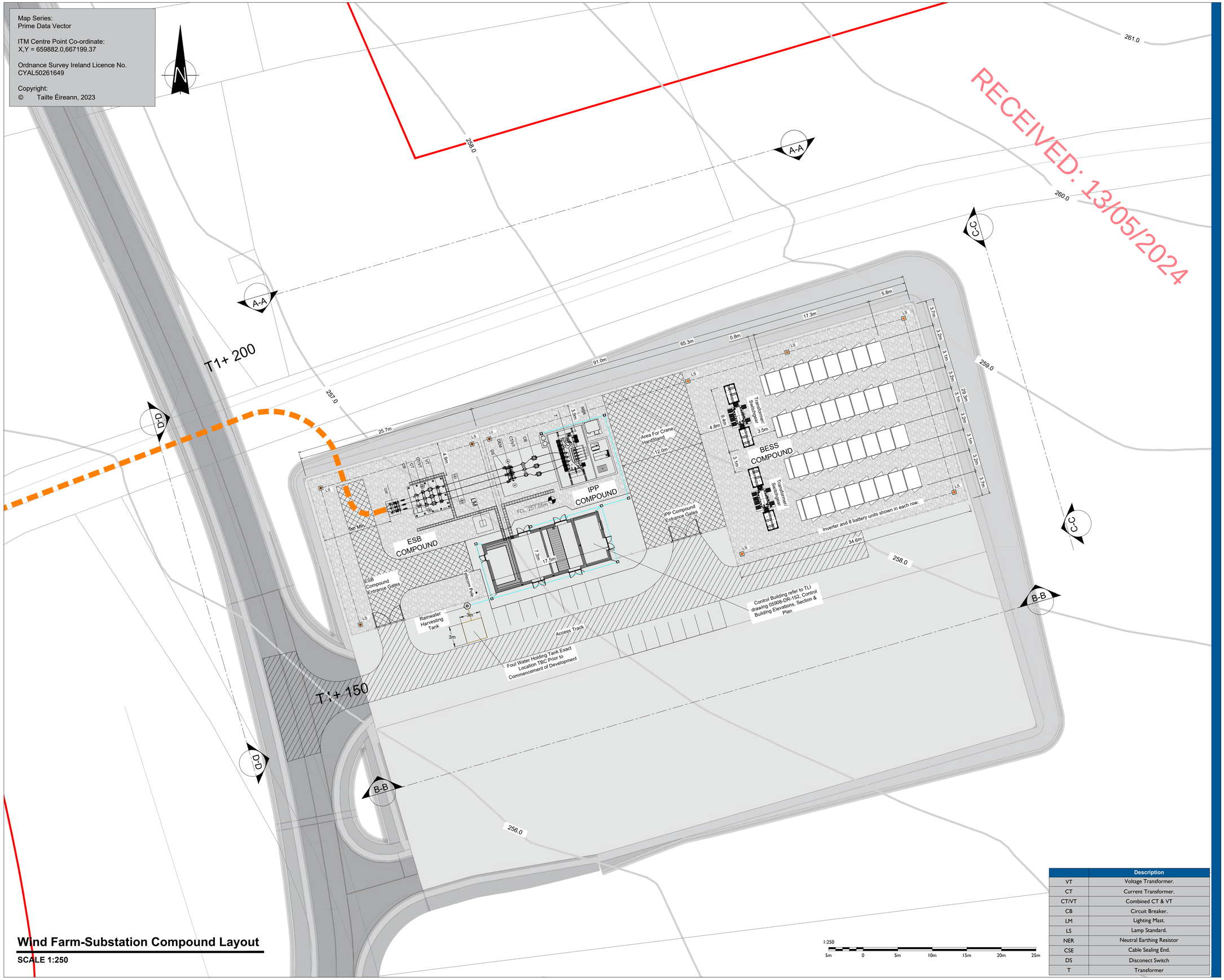
Map Series:
Prime Data Vector

ITM Centre Point Co-ordinate:
X,Y = 659882.0,667199.37

Ordnance Survey Ireland Licence No.
CYAL50261649








## Wind Farm-Substation Compound Layout

**SCALE 1:250**

1:250
5m 0 5m 10m 15m 20m 25m

| | Description |
|---|---|
| VT | Voltage Transformer. |
| CT | Current Transformer. |
| CT/VT | Combined CT & VT |
| CB | Circuit Breaker. |
| LM | Lighting Mast. |
| LS | Lamp Standard. |
| NER | Neutral Earthing Resistor |
| CSE | Cable Sealing End. |
| DS | Disconect Switch |
| T | Transformer |

Project Management Initials: Designer: JC Checked: JVDP Approved: DB

tli GROUP

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Tel: 00353 66 7135710

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Basepoint Business Centre
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Hampshire,
RG24 8UP, UK
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PROJECT

Seskin Wind Farm

38kV Grid Connection

CLIENT

edf renewables

CONSULTANTS

MKO

NOTES: -

- Configuration of substation equipment and infrastructure is subject to detailed design and ESB design approval.
- The proposed substation layout should be used for planning purposes only.
- This drawing is to be read in conjunction with relevant drawings, specifications and reports.
- Dimensions are in millimeters, unless noted otherwise.
- Drawings are not to be scaled use figured dimensions only.

LEGEND: -

- Surface water drainage shown thus
- Planning Application Boundary
- Lamp Standard shown thus
- Proposed Levels shown thus (Planning) FCL 54.60
- Proposed UGC Route
- Contours 14.0
- Access track
- Wind farm access track

**ISSUE/REVISION**

| I/R | DATE | DESCRIPTION |
|---|---|---|
| P11 | 13.05.24 | Issued for Planning |
| P10 | 29.04.24 | Issued for Planning |
| P9 | 22.04.24 | Issued for Planning |
| P8 | 26.01.24 | Issued for Planning |
| P7 | 01.12.23 | Issued for Planning |
| P6 | 25.10.23 | Issued for Planning |
| P5 | 20.10.23 | Issued for Planning |
| P4 | 11.10.23 | Issued for Planning |

PROJECT NUMBER

05-908

SHEET TITLE

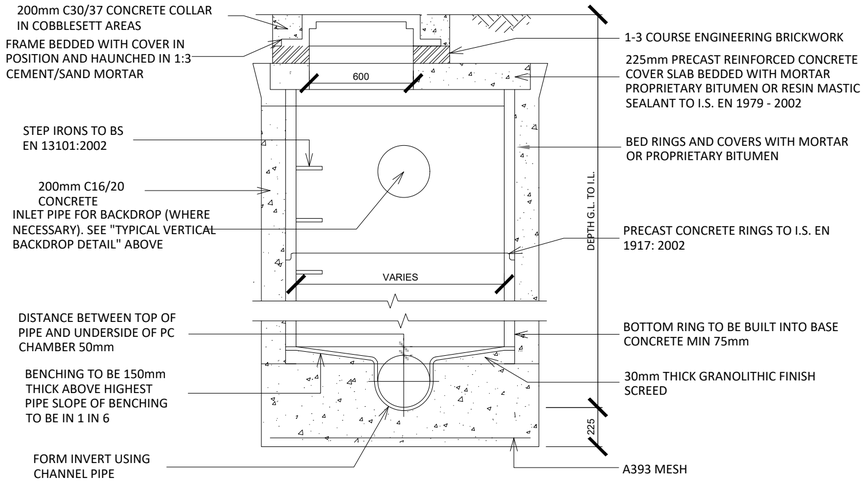
38kV Substation Compound Layout

SHEET NUMBER

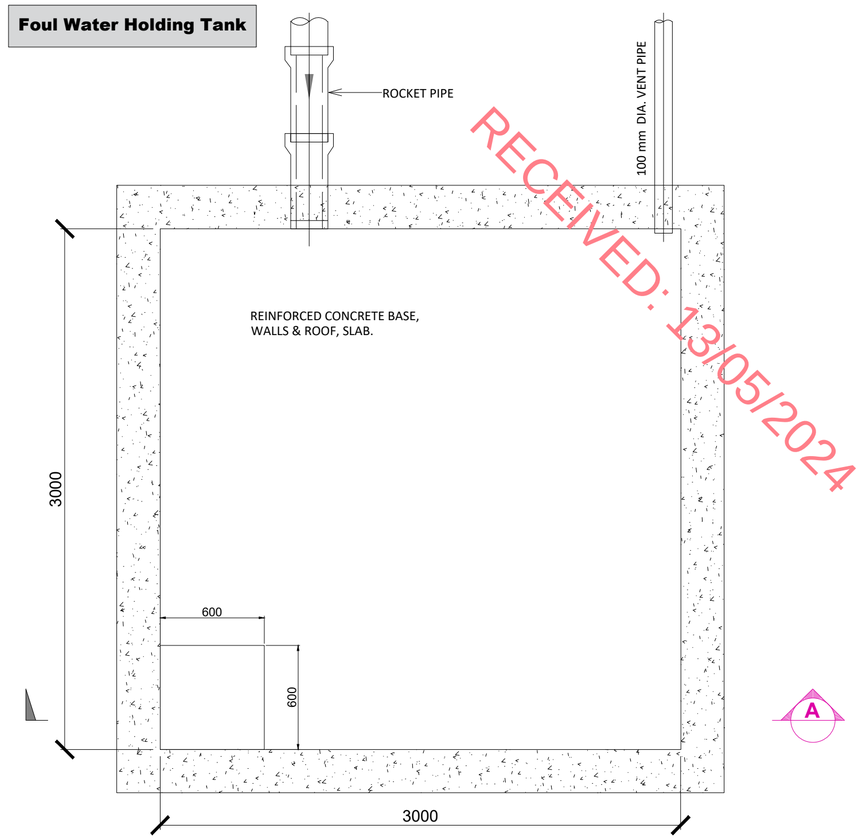
05908-DR-150

ISO A2 420mm x 594mm

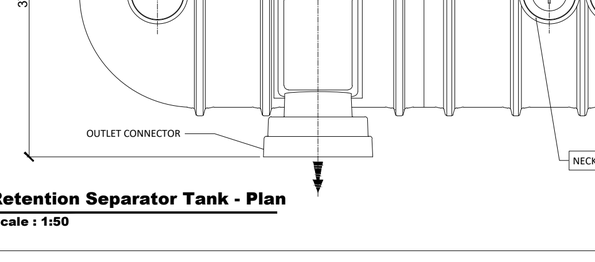
## Manhole




## Foul Water Holding Tank

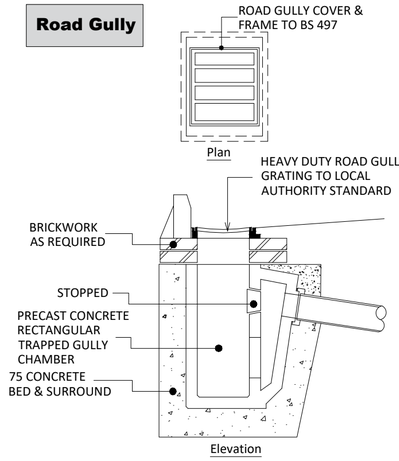



**Foul Water Holding Tank - Plan**
**Scale : 1:25**




**Rainwater Downpipe Detail - Elevation**
**Scale : 1:25**

## Road Gully



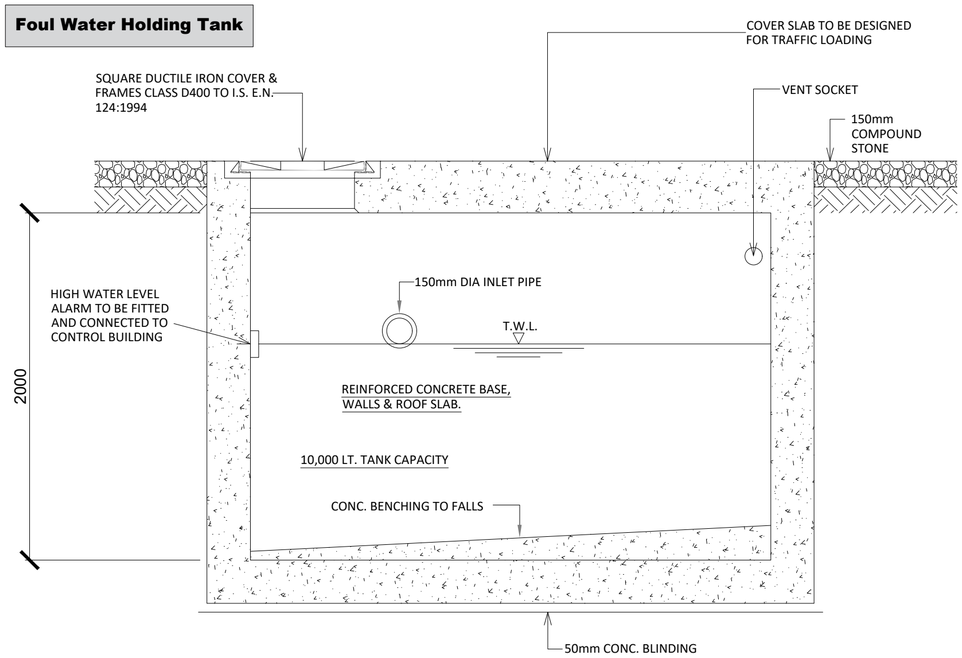

**Road Gully Detail**
**Scale : 1:25**

## Retention Seperator Tank




**Retention Separator Tank - Plan**
**Scale : 1:50**

## Foul Water Holding Tank




**Foul Water Holding Tank - Elevation**
**Scale : 1:25**



Project Management Initials: Designer: POS Checked: DB Approved: RG

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PROJECT

Seskin Wind Farm
38kV Grid Connection

CLIENT

EDF renewables

CONSULTANTS

MKO

NOTES: -

- This drawing is to be read in conjuction with relevant drawings, specifications and reports
- Dimensions are in millimetres, unless noted otherwise
- Drawings are not to be scaled use figured dimensions only

LEGEND: -

Figure 4-14

ISSUE/REVISION

| I/R | DATE | DESCRIPTION |
|---|---|---|
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| | | |
| | | |
| | | |
| P1 | 26.05.23 | Issued for Planning |

PROJECT NUMBER

05-661

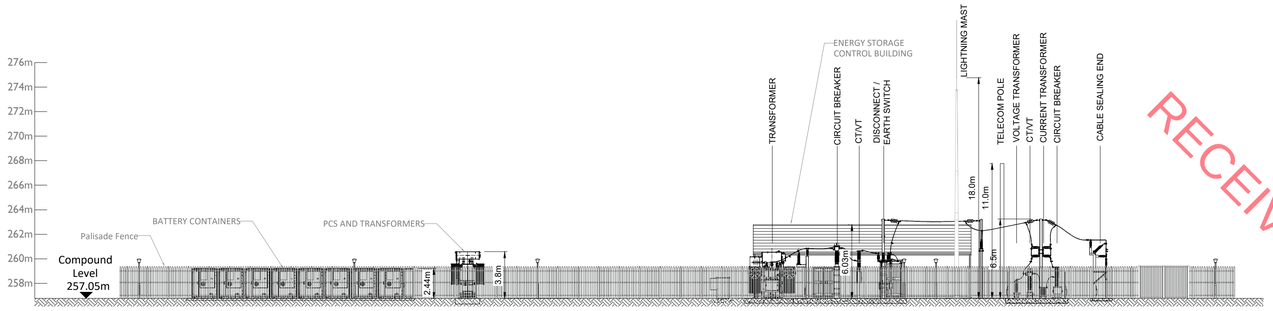
SHEET TITLE

Substation Compound drainage, Rentention seperator tank, Foul water holding tank details

SHEET NUMBER

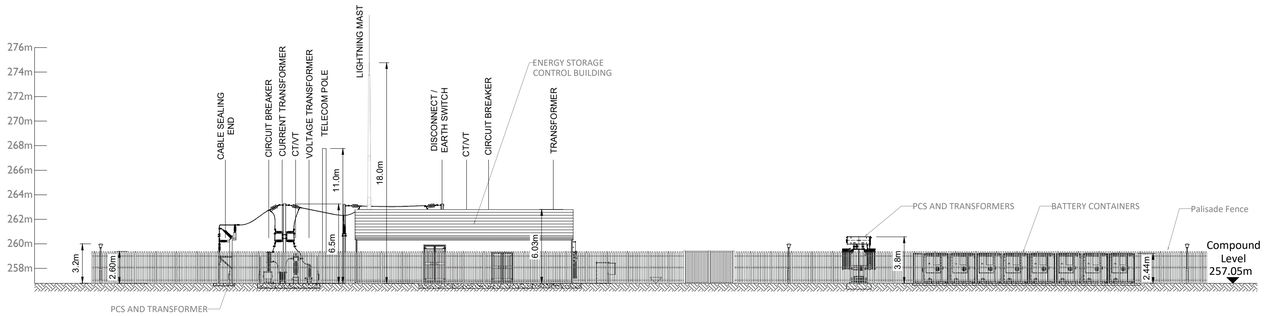
05908-DR-154

ISO A1 594mm x 841mm



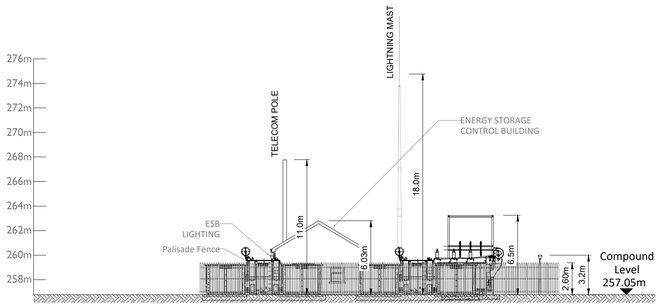

## North Elevation A-A

**SCALE 1:250**



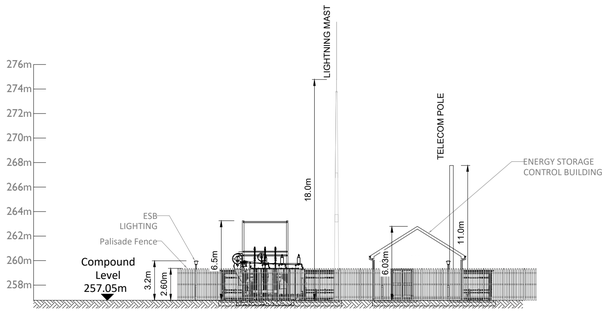

## South Elevation B-B

**SCALE 1:250**




## East Elevation C-C

**SCALE 1:250**




## West Elevation D-D

**SCALE 1:250**

Project Management Initials: Designer: JC Checked: JVDP Approved: DB



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PROJECT

Seskin Wind Farm

38kV Grid Connection

CLIENT

EDF renewables

CONSULTANTS

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NOTES: -

- Configuration of substation equipment and infrastructure is subject to detailed design and ESB design approval.
- The proposed substation layout should be used for planning purposes only.
- This drawing is to be read in conjunction with relevant drawings, specifications and reports.
- Dimensions are in millimeters, unless noted otherwise.
- Drawings are not to be scaled use figured dimensions only.

LEGEND: -

Figure 4-15

**ISSUE/REVISION**

| | | |
|---|---|---|
| | | |
| P6 | 22.04.24 | Issued for Planning |
| P5 | 26.01.24 | Issued for Planning |
| P4 | 11.10.23 | Issued for Planning |
| P3 | 09.10.23 | Issued for Planning |
| P2 | 14.07.23 | Issued for Planning |
| P1 | 26.05.23 | Issued for Planning |
| I/R | DATE | DESCRIPTION |

PROJECT NUMBER

05-908

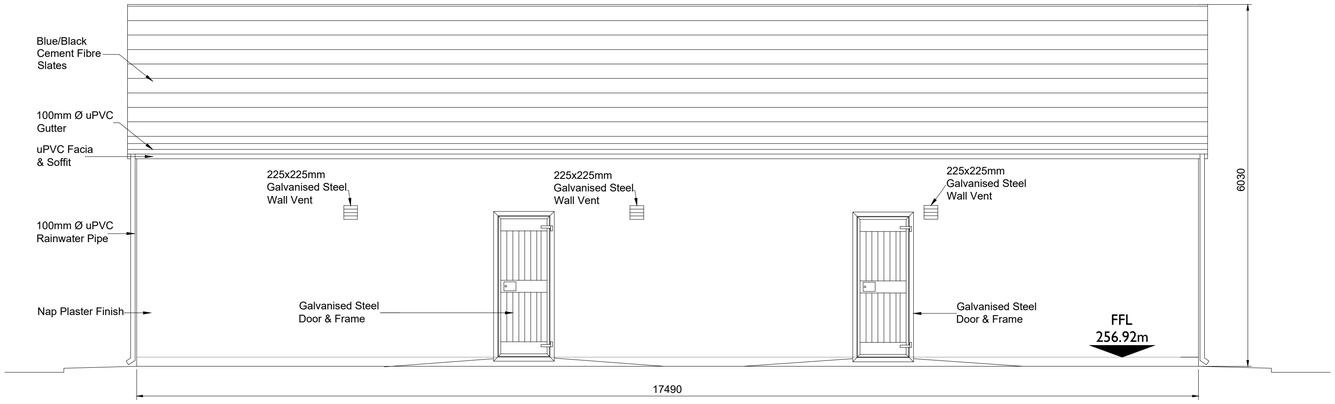
SHEET TITLE

38kV Substation Compound Elevations

SHEET NUMBER

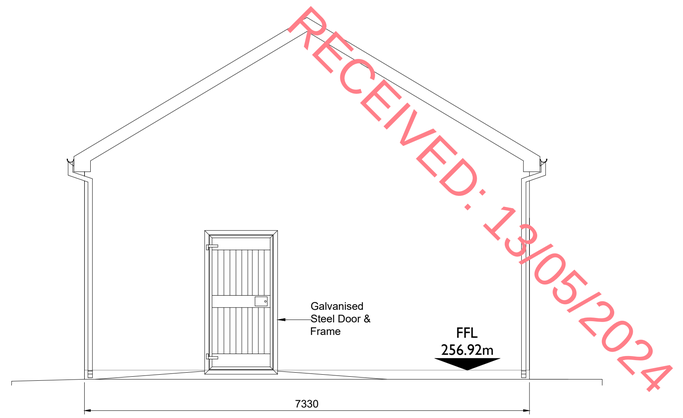
05908-DR-151

ISO A1 594mm x 841mm



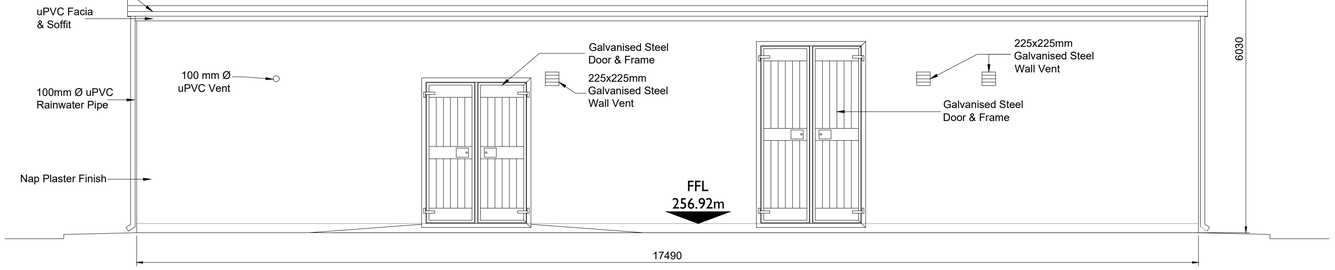

**Front Elevation (Section A-A)**

SCALE 1:50



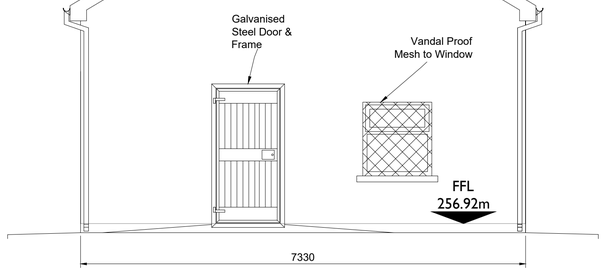

**Side Elevation (Section C-C)**

SCALE 1:50




**Rear Elevation (Section B-B)**

SCALE 1:50




**Side Elevation (Section D-D)**

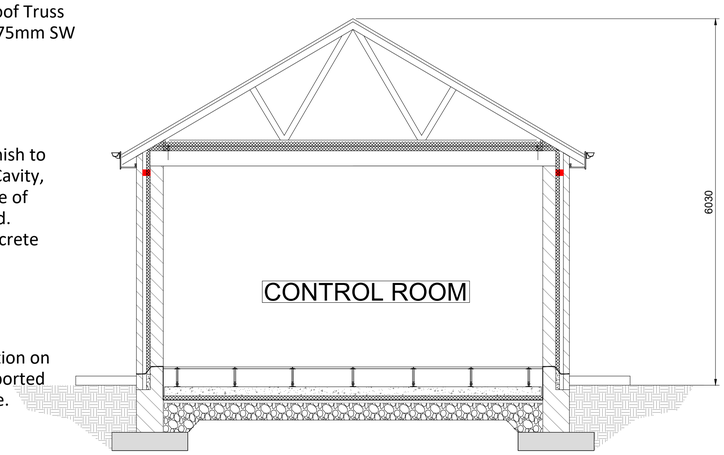
SCALE 1:50

Roof Construction:
Roof on,
treated SW Roof Battens on,
selected Breather Membrane on
selected SW Prefabricated Roof Truss
system fixed to treated 100x75mm SW
Wallplate.
Plasterboard internal ceiling.

Cavity Wall:
Flat Sand / Cement Plaster finish to
100mm Outer Leaf, 100mm Cavity,
215mm Inner Leaf. Inside face of
inner leaf to remain fair-faced.
Cavity wall supported on concrete
strip foundation.

Floor:
Raised Access Floor on
150mm Reinforced Concrete
Floor Slab on Selected Insulation on
DPC on Sand Blinding all supported
off Well Compacted Hardcore.

NOTE : Control Building surfaces need to be non - combustible




**Sectional View**

SCALE 1:50



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PROJECT

Seskin Wind Farm

38kV Grid Connection

CLIENT

EDF renewables

CONSULTANTS

MKO

NOTES: -

- Substation building is subject to detailed design and ESB design approval and should be used for planning purposes only.
- The proposed substation layout should be used for planning purposes only.
- This drawing is to be read in conjunction with relevant drawings, specifications and reports.
- Dimensions are in millimeters, unless noted otherwise.
- Drawings are not to be scaled use figured dimensions only.

LEGEND: -

Proposed Levels Shown thus (Elevation and Sections) FFL 30.15m

Figure 4-16

ISSUE/REVISION

| | | |
|---|---|---|
| P1 | 26.05.23 | Issued for Planning |
| I/R | DATE | DESCRIPTION |

PROJECT NUMBER

05-908

SHEET TITLE

38kV Substation Building Elevations

SHEET NUMBER

05908-DR-152

Project Management Initials: Designer: JC Checked: JVDP Approved: DB

### 4.4.6.5 Underground Grid Connection Electrical Cabling Route

A 38kV connection between the Proposed Wind Farm and the national electricity grid will be necessary to export electricity from the Proposed Wind Farm. It is proposed to construct an onsite 38kV substation within the Proposed Wind Farm site and to connect from here via a 38kV Proposed Grid Connection Route to the existing 110kV Kilkenny substation, in the townland of Scart near Kilkenny, Co. Kilkenny. The Proposed Grid Connection Route is approximately 20.1km in length to the Kilkenny 110kV substation. The total length of the Proposed Grid Connection Route located in Co. Carlow measures approximately 2km, 1.8km of which is located within the public road corridor, and 0.2km of which is located within private lands originating from the onsite 38kV substation before meeting the local public road in the townland of Seskinrea. The total length of the Proposed Grid Connection Route located in Co. Kilkenny measures approximately 18.1km and is entirely located within the public road corridor.

#### Co. Kilkenny

The Proposed Grid Connection Route will originate at the Kilkenny 110kV substation compound and run north onto the R712 regional road for approximately 1.8km. The route then turns left and continues onto the L6657 local road for approximately 3.8km, before joining the L2627 local road for the remaining 12.5km where is meets the L30371 local road in Co. Carlow. A planning application will be made to Kilkenny County Council in respect of this 18.1km section of the Proposed Grid Connection Route which is located in the county. It should be noted that any electrical works required within the Kilkenny substation in order to facilitate the connection to the Proposed Wind Farm will occur within the existing substation compound and, therefore, will not lead to any additional environmental effects.

#### Co. Carlow

The Proposed Grid Connection Route will continue along the L30371 for approximately 0.3km before turning right onto the L3037 for 0.05km. The Proposed Grid Connection Route will then turn left onto the L30372 for approximately 1.8km before entering the proposed onsite 38kV substation in the townland of Seskinrea. The total length of the Proposed Grid Connection Route located in Co. Carlow measures approximately 2km.

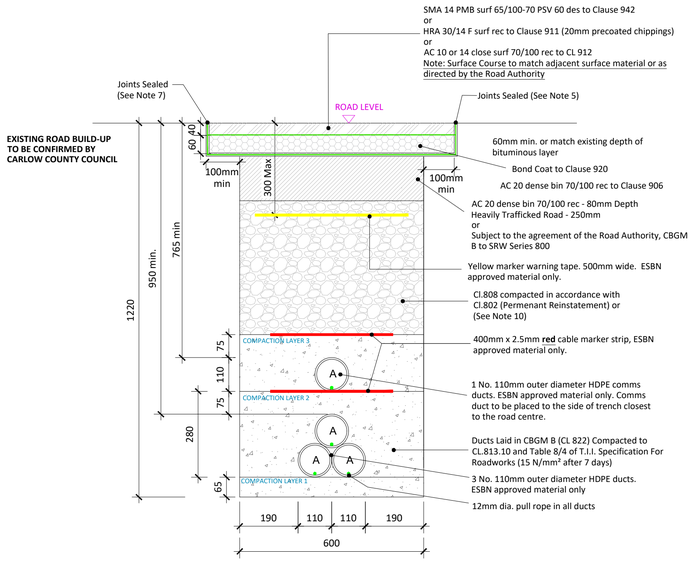
The Proposed Grid Connection Route is shown in Figure 4-1 and Figure 4-3, and a cross section of the grid connection cabling trench is shown in Figure 4-18. The detailed alignment of the Proposed Grid Connection Route is shown in Appendix 4-1. Further details in relation to the Proposed Grid Connection Route for the Proposed Project are outlined in Section 4.8.5 below.

The Proposed Grid Connection Route will remain in place as it will be under the ownership and control of the ESB and EirGrid,and will form a permanent part of the national electricity grid.

ISO A1 594mm x 841mm

# Permanent Reinstatement

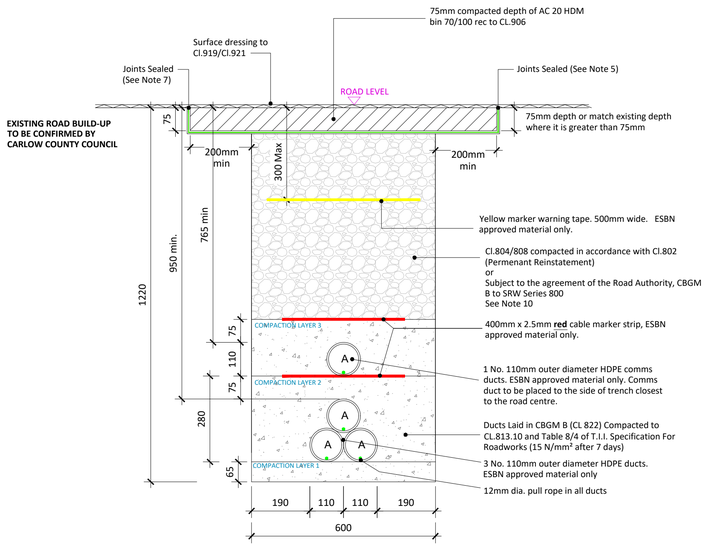
Reinstatement details based on Guidelines for Managing Openings in Public Roads - SD4




## Typical Section Through Permanent Reinstatement of Longitudinal Opening in Roadway

**SCALE 1:10**

Reinstatement details based on Guidelines for Managing Openings in Public Roads - SD5




## Typical Section Through Permanent Reinstatement of Longitudinal Opening in Dressed Rural Unbound Roadway

**SCALE 1:10**

**ALL REINSTATEMENT WORKS ARE TO BE IN ACCORDANCE WITH LOCAL AREA ENGINEERS REQUIREMENTS AND GUIDELINES FOR MANAGING OPENINGS IN PUBLIC ROADS**

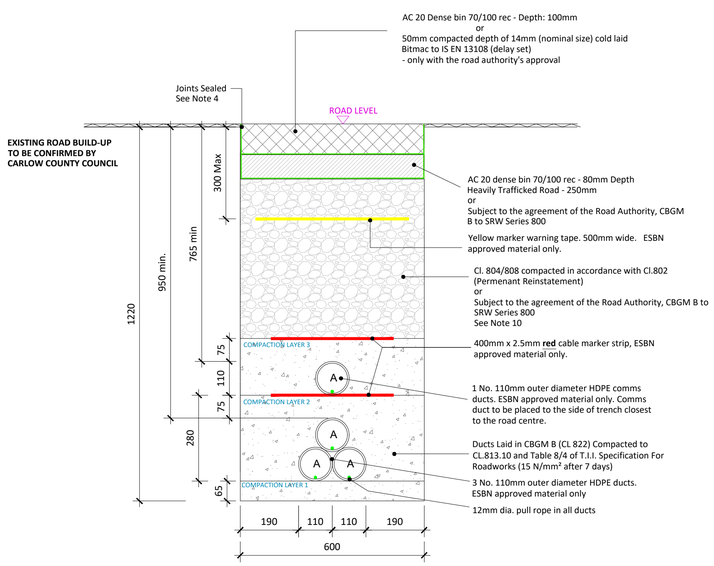
Note:

1. Refer to Guidelines for managing Openings in Public Roads (Purple Book - April 2017), Chapter 6 'Specifications' for guidance on Duct type / colour and Marker Tape type / colour.
2. All bound edges shall be saw cut to expose the full vertical thickness of each layer prior to excavation. All edges shall be essentially straight, smooth and vertical.
3. Where a temporary surface has been used, material shall be planed out to the depth specified in this drawing. The new permanent surface shall be machined laid and mechanically compacted with a vibrating roller.
4. Where the trimmed edge of excavation is within 400mm* of a joint / cover, ironwork or other reinstatement, this trimmed edge shall be extended to include same and the area of reinstatement shall be extended accordingly (* increase to 800mm where this is pre-existing practice).
5. Any damaged area adjacent to the opening and resulting from the excavation operation shall be included within the area to be reinstated.
6. Clause 808 or Cement Bound Granular Material surface to be sprayed per clause 920 prior to application of Asphalt Concrete Layer.
7. Joint sealer shall be a hot 50 pen bitumen binder or cold thixtropic bitumen 50 -70 pen to be applied to all vertical cuts in accordance with B.S.594987 prior to application of bituminous materials.
8. For roads without asphalt concrete surface (e.g. may be Cl.804 with double surface dressing), the road authority may as its discretion permit the temporary reinstatement surface of asphalt concrete to be regulated in lieu of excavation and reinstatement; and subsequently surface dressed.
9. On highly trafficked roads services must have a minimum cover of 750mm.
10. Where required by the Road authority the trench may be reinstated with a Cement Bound Granular Material.



# Temporary Reinstatement

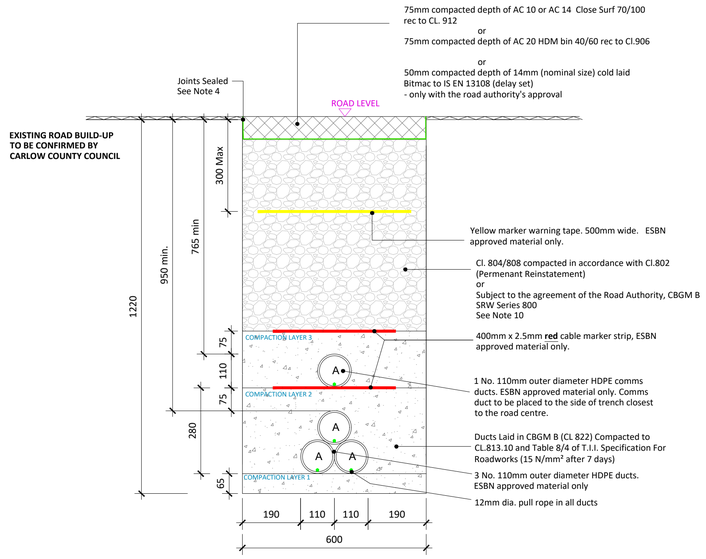
Reinstatement details based on Guidelines for Managing Openings in Public Roads - SD1




## Typical Section Through Temporary Reinstatement of Longitudinal Opening in Roadway

**SCALE 1:10**

Reinstatement details based on Guidelines for Managing Openings in Public Roads - SD2




## Typical Section Through Temporary Reinstatement of Longitudinal Opening in Dressed Rural Unbound Roadway

**SCALE 1:10**

**ALL REINSTATEMENT WORKS ARE TO BE IN ACCORDANCE WITH LOCAL AREA ENGINEERS REQUIREMENTS AND GUIDELINES FOR MANAGING OPENINGS IN PUBLIC ROADS**

Note:

1. Refer to 'Guidelines for managing Openings in Public Roads (Purple Book - April 2017)', Chapter 6 'Specifications' for guidance on Duct type / colour and Marker Tape type / colour.
2. All bound edges shall be saw cut to expose the full vertical thickness of each layer prior to excavation. All edges shall be essentially straight, smooth and vertical.
3. Clause 808 surface to be sprayed per clause 920 prior to application of Asphalt Concrete Layer.
4. Joint sealer shall be a hot 50 pen bitumen binder or cold thixotropic bitumen 50-70 pen to be applied to all vertical cuts in accordance with B.S. 594987 prior to application of bituminous materials.
5. Licence holder must maintain temporary reinstatement to a safe and acceptable standard.
6. Any damaged area adjacent to the opening and resulting from the excavation operation shall be included within the area to be reinstated.
7. Temporary Road Surface warning signs must be used in accordance with the Traffic Signs Manual (Chaper 8 - Temporary Traffic Measures and Signs for Roadworks).
8. Refer to detail Permanent Reinstatement of Road for advice on permanent reinstatement - all permanent reinstatement shall be carried out when adequate settlement has occurred as determined by the Road Authority.

Project Management Initials: Designer: JC Checked: JVDP Approved: DB

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PROJECT

Seskin Wind Farm
38kV Grid Connection

CLIENT

EDF renewables

CONSULTANTS

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NOTES: -

- This design is subject to ESB approval and should not be used for construction.
- This drawing is to be read in conjunction with relevant drawings, specifications and reports.
- Dimensions are in millimeters, unless noted otherwise. Drawings are not to be scaled use figured dimensions only.
- Existing road build up and reinstatement requirements to be confirmed with Carlow County Co.

LEGEND: -

Figure 4-17

ISSUE/REVISION

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| | | |
| P1 | 14.07.23 | Issued for Planning |
| I/R | DATE | DESCRIPTION |

PROJECT NUMBER

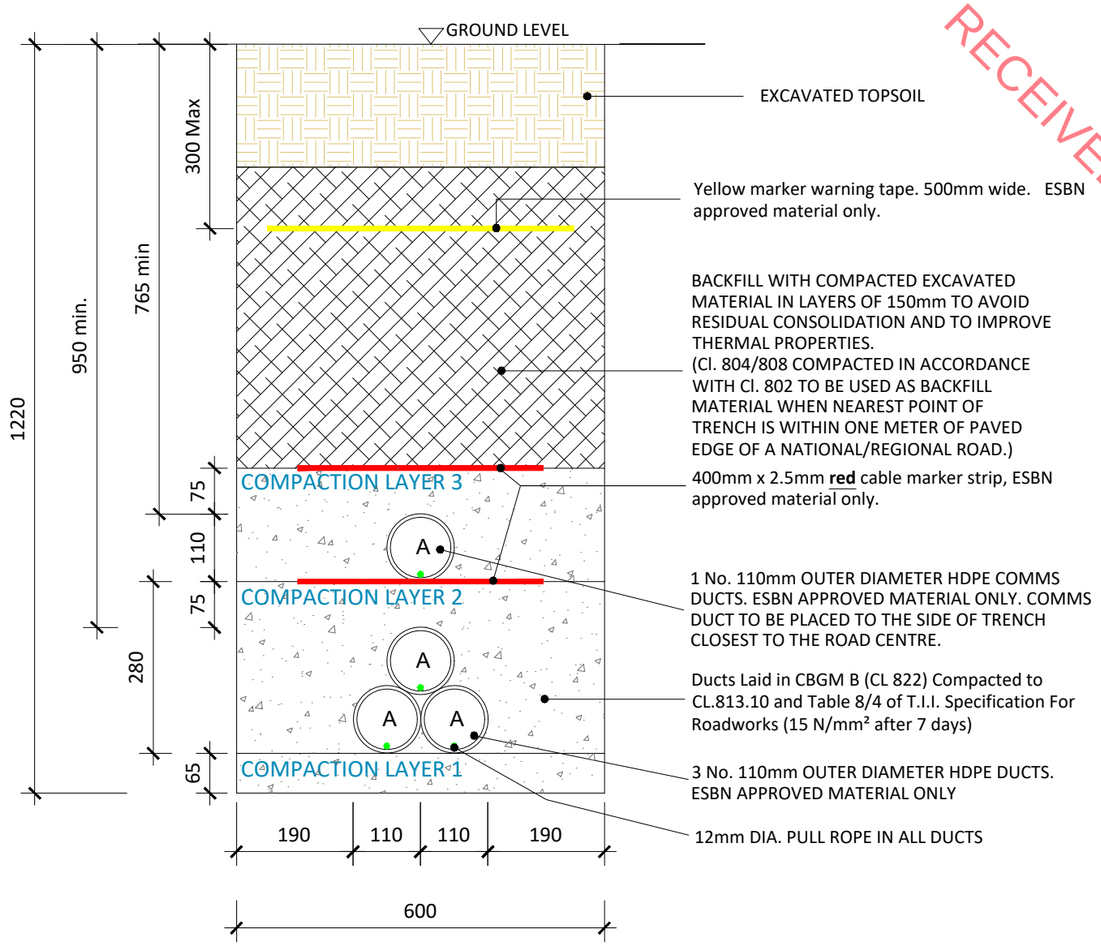
05-908

SHEET TITLE

Ducting Through
Regional / Local Roadways

SHEET NUMBER

05908-DR-120




A =110mm:Outer diameter HDPE ESB Approved Duct, SDR=17.6;

# Typical Section Through Off Road / Grassland

**SCALE 1:10**

Note:
- This design is subject to ESB approval and should not be used for Planning purposes only.
- This drawing is to be read in conjunction with relevant drawings, specifications and reports
- Dimensions are in millimeters, unless noted otherwise
- Drawings are not to be scaled use figured dimensions only

**ALL REINSTATEMENT WORKS ARE TO BE IN ACCORDANCE WITH LANDOWNERS/CARLOW Co.Co REQUIREMENTS**

Figure 4-18

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CLIENT
EDF renewables

PROJECT
Seskin Wind Farm
38kV Grid Connection

PROJECT NUMBER
05-908

SHEET NUMBER
05908-DR-121

SHEET TITLE
Ducting through Off Road / Grassland Section

DRAWING STATUS
For Planning

ISSUE/REVISION

| I/R | DATE | DESCRIPTION |
|---|---|---|
| | | |
| | | |
| | | |
| P1 | 14.07.23 | Issued For Planning |

## 4.4.7 Peat and Spoil Management Plan

### 4.4.7.1 Quantities

The construction of the Proposed Project will require the excavation of peat and spoil. The quantities of peat and spoil, requiring management on the Proposed Wind Farm site has been calculated, as presented in Table 4-2 below. The quantities were calculated by AFRY as part of the *Peat and Spoil Management Plan* included as Appendix 4-2 of this EIAR.

*Table 4-2 Spoil Volumes requiring management*

| Development Component | Area (m2) (approx.) | Peat Volume (m3) (approx.) | Spoil Volume (m3) (approx.) |
|---|---|---|---|
| **7 no. Turbines and Hardstanding Areas** | 25.5m diameter excavation footprint for turbine foundation (23.5m turbine diameter plus 1m working area all around) with 50m x 25m plus 15m x 3m hardstand areas | 17,178 | 18,521 |
| **Access Roads** | Assumed 5m running surface with 6.8m wide development footprint | 3,240 | 12,075 |
| **Meteorological Mast** | Area 25m x 15m | 0 | 288 |
| **Temporary Construction Compounds** | Areas 80m x 50m and 90m x 25m | 1,800 | 1,725 |
| **Onsite 38kV Substation and Battery Storage Compound** | Area 90m x 40m | 120 | 1,495 |
| **Total Peat and Spoil to be managed** | | **22,338** | **34,104** |
| | | **56,442** | |

**Note:** A contingency factor of 15% has been applied and is included in the excavated spoil volumes, and a bulking factor of 20% has been used for excavated peat volumes to allow for expected increase in volume upon excavation and to allow for a variation in ground conditions across the site.

Tree felling is proposed at various locations across the site; however, this will not involve the excavation of tree stumps, outside of the footprint of the Proposed Wind Farm site, and as such does not affect the excavation volumes. Where tree stumps are removed along proposed access roads, the excavation volume has been included in the above table.

### 4.4.7.2 Peat and Spoil Management Areas



It is proposed to manage any excess overburden generated through construction activities within the Proposed Project site, in 8 no. peat deposition areas and 6 no. spoil deposition areas, as shown in Figure 4-2, in linear berms along access roads where appropriate, and landscaping around turbine bases. A detailed breakdown of the capacity of the peat and spoil management areas within the Proposed Project site is shown in Table 4-3 and Tabe 4-4 below, and is further detailed in the Peat and Spoil Management Plan (Appendix 4-2).

*Table 4-3 Peat Management Areas*

| Location | Peat Volume ($m^3$) | Comment |
|---|---|---|
| Peat Repository Areas | 23,360 | 1m in height across clear felled areas around turbine and hardstands, where slopes are relatively shallow (<5 degrees) |
| Peat sidecasting | 1,000 | 0.5m in height along access roads within clear felled areas, where slopes are relatively shallow (<5 degrees) |
| Landscaping | 340 | It is estimated that approximately 340$m^3$ of peat will be required for landscaping purposes at each of the 7no. turbine locations. |
| **Total Volume** | **24,700** | |

*Table 4-4 Spoil Management Areas*

| Location | Spoil Volume ($m^3$) | Comment |
|---|---|---|
| Spoil Repository Areas | 36,845 | 1m in height across clear felled areas around turbine and hardstands, where slopes are relatively shallow (<5 degrees) |
| Reuse of material around excavated turbine base and for ballast | 4,000 | 0.5m in height along access roads within clear felled areas, where slopes are relatively shallow (<5 degrees) |
| **Total Volume** | **40,845** | |

As identified in Tables 4-2 to Table 4-4, the total volume of peat requiring management on site is estimated at 22,338$m^3$. This material will be excavated and deposited in the peat management areas, with a total capacity volume of 24,700$m^3$, around turbine bases and hardstands in peat repository areas, sidecast along access roads with gentle gradients, and landscaping. The total volume of spoil requiring management on site is estimated at 34,104$m^3$. This material will be excavated and deposited in the spoil management areas, with a total capacity volume of 40,845$m^3$, around turbine bases and hardstands in spoil repository areas, for ballast and landscaping. As such, there is enough capacity in the peat and spoil management areas within the Proposed Wind Farm site, for the total volumes of peat and spoil requiring management for the Proposed Wind Farm as detailed in Table 4-2 above.

The following, outlined in the Peat and Spoil Management Plan in Appendix 4-2, particular recommendations/best practice guidelines for the placement of peat and spoil with respect to specific aspects of the wind farm will be considered and taken into account during construction.

### Temporary Management

To manage the material arisings effectively, the following points outline specific guidelines and practices for their temporary management and handling on-site:

- For the temporary management of peat and excess spoil around the turbine base and hardstand, these materials must be stored separately in distinct stockpiles.
- Only the amount of material necessary for landscaping and deposition around the turbine and hardstand locations shall be stockpiled locally at turbine hardstands. Any surplus material would be promptly transported to the proposed deposition areas shown on Figure 4-1.
- Before stockpiling the glacial till spoil, the deposition area would be stripped of topsoil/peat which would be removed and placed in a suitable area to prevent the mixing of materials and facilitate reuse during restoration work.
- Peat can be stored on top of existing and undisturbed peat. The suitability of the underlying peat and the topography will be reviewed by a geotechnical engineer at the construction stage, and this will determine the height of peat that may be stored.
- Glacial till will not be placed on top of peat or topsoil; instead, it will be deposited only on other glacial till material.
- In order to prevent erosion and surface water contamination, silt fencing can be utilised to secure these stockpiles, where necessary.
- The excavated unsuitable material will not be spread over any existing heath, bog, or grassed areas.
- Following the reinstatement of the turbine bases and hardstands, all temporarily stockpiled material not required will be removed and transported to the proposed peat and spoil management areas.
- The proposed locations for the temporary stockpiling of peat and spoil will be confirmed by the geotechnical engineer at detailed design stage.

## 4.4.8 Spoil Repository Areas

Spoil will be managed locally within the Proposed Wind Farm site, in dedicated spoil repository areas as shown on Figure 4-1. The Proposed Wind Farm includes for the provision of spoil repository areas around turbine bases and hardstands within clear felled areas, sidecasting along access roads, and landscaping. The spoil repository areas are located adjacent to the hardstand and foundation of Turbines No 1,2 4, 5, and 6, and adjacent to the onsite 38kV substation. The placement of spoil within the spoil repository areas will be undertaken as follows:

- Spoil repository areas have been identified at locations where the topography (slope angle <5°), peat depth, resulting stability assessment (Factor of Safety of >1.3 for 1.5m peat surcharge) and other environmental constraints (including 50m buffer from all watercourses) have allowed. These areas are designated for permanently placing up to 1.5m of non-peat spoil material.
- Where possible, the surface of the placed spoil will be shaped to allow efficient runoff of surface water from the spoil placement areas.
- Prior to the use of any spoil deposition area, an interceptor drain will first be excavated upslope in order to intercept existing overland flows and divert them around the deposition areas prior to discharge via a buffer zone on the downslope side
- Silting ponds will be required at the lower side/outfall location of the repository areas.
- Any point source drainage from disposal areas will empty into a series of silt control measures designed in accordance with the surface water management plan.
- Water will free drain to the sump of the pit from where it will be discharged utilising a 6” pump discharging to a settlement pond constructed for this purpose.

The Contractor shall make every reasonable effort to promote growth in the spoil repository areas following the placement of spoil and completion of construction stage activities. Upper acrotelm layers

shall be placed on the surface the right way up to promote vegetation growth. This growth will aid in stabilising the placed spoil material and help in preventing it from becoming saturated following heavy periods of rain.



### 4.4.9 Peat Repository Areas

Peat will be managed locally within the Proposed Wind Farm site, in dedicated peat repository areas as shown on Figure 4-1. The Proposed Wind Farm includes for the provision of peat deposition areas around turbine bases and hardstands within clear felled areas, peat sidecasting along access roads, and landscaping. The peat repository areas are located adjacent to the hardstand and foundation of Turbines No 2, 3, 4, 5 and 7.

The placement of peat within the peat repository areas will be undertaken as follows:

- Peat around the turbine bases and hardstands will be deposited to a maximum height of 1m in areas of gentle slopes (less than 5 degrees).
- Prior to the stripping of peat overburden over the peat repository areas around turbines, an interceptor drain will first be excavated upslope in order to intercept existing overland flows and divert them around the deposition areas prior to discharge via a buffer zone on the downslope side.
- Any subsoil material underlying the peat will be excavated and stockpiled separately from the peat. The stockpile will be sealed, and a perimeter drain installed to intercept any run-off so that it can be discharged through an appropriately designed silt trap.
- The shallow peat overburden will then be stripped and temporarily stockpiled; vegetated side upwards where possible, adjacent to the repository areas in order for it to be re-used in its reinstatement on completion.
- If peat turves are proposed to be utilised in the restoration process, the peat repository areas will need to be completed and restored in a continuous cycle so as to minimise the length of time the peat turves are stored and to allow the vegetation to be re-established as quickly as possible.
- Any point source drainage from disposal areas will empty into a series of silt control measures designed in accordance with the surface water management plan.
- Water build-up within deposition areas will not be permitted. Water will free drain to the sump of the pit from where it will be discharged utilising a 6” pump discharging to a settlement pond constructed for this purpose. Permanent design features are proposed to allow drainage function correctly over the deposition areas.

The Contractor shall make every reasonable effort to promote growth in the peat repository areas following the placement of peat and completion of construction stage activities. Upper acrotelm layers shall be placed on the surface the right way up to promote vegetation growth. This growth will aid in stabilising the placed peat material and help in preventing it from becoming saturated following heavy periods of rain.

The plan view of the peat and spoil repository areas within the Proposed Wind Farm site are shown in Figure 4-19a, along with a peat repository cross section included as Figure 4-19b, and a spoil repository cross section included as Figure 4-19c.



**Map Legend**

- EIAR Site Boundary
- Proposed Wind Farm Footprint
- Proposed Peat Repository Areas
- Proposed Spoil Repository Areas



Drawing Title
Proposed Peat and Spoil Management

Project Title
Seskin Wind Farm, Co. Carlow

| Drawn By | Checked By |
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| BT | EC |
| Project No. 220246 | Drawing No. Figure 4-19 |
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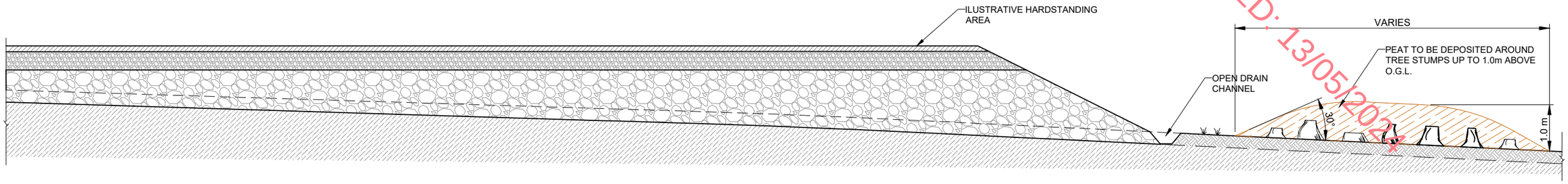


ILLUSTRATIVE PEAT REPOSITORY IN TREE FELLED AREA

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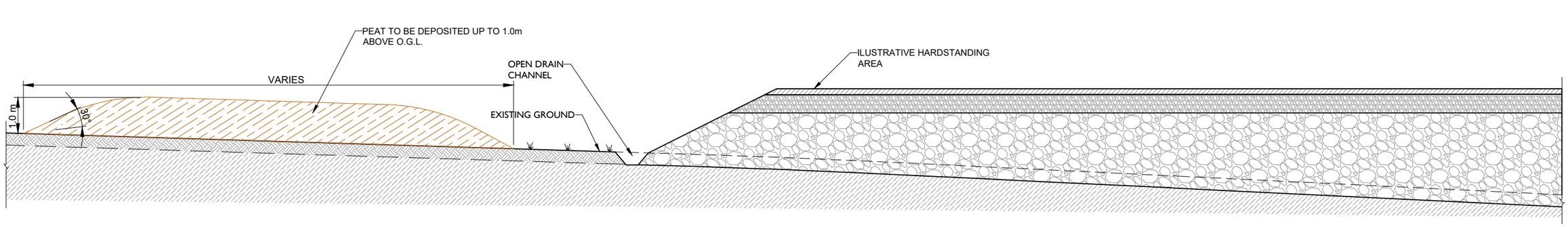


ILLUSTRATIVE PEAT REPOSITORY AREA

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TITLE
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CROSS SECTIONS

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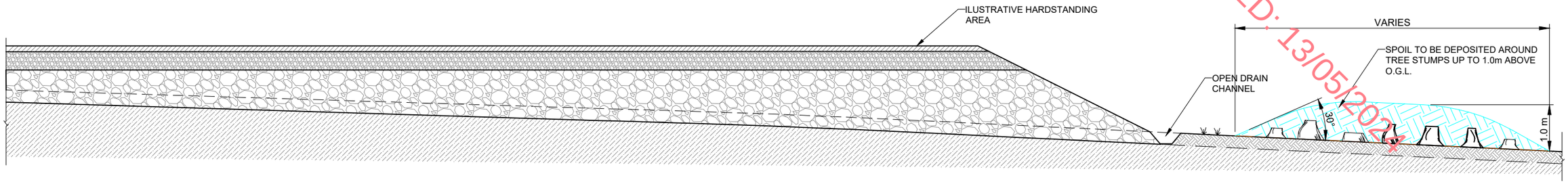


ILLUSTRATIVE PEAT REPOSITORY IN TREE FELLED AREA

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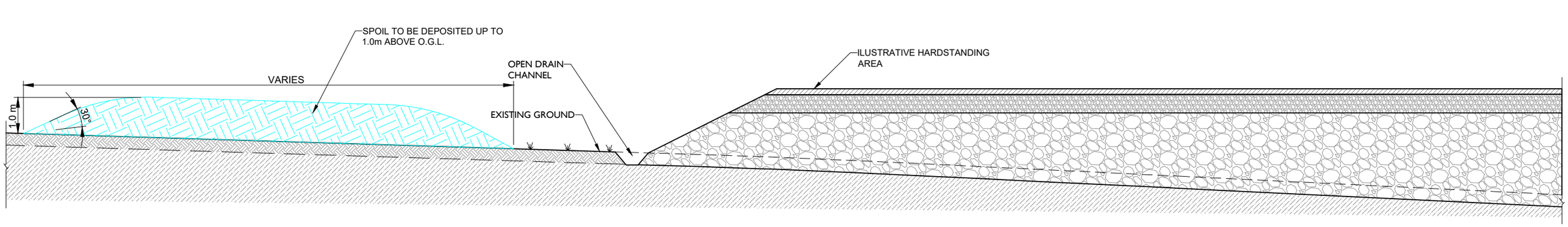


ILLUSTRATIVE PEAT REPOSITORY AREA

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CO. CARLOW/ CO. KILKENNY

TITLE

SPOIL REPOSITORY AREA
CROSS SECTIONS

REVISION

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Figure 4-19c

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## 4.4.10 Tree Felling and Replanting

### 4.4.10.1 Tree Felling

As part of the Proposed Wind Farm, tree felling will be required within and around development footprint to allow for the construction of the turbine bases, access roads underground cabling, and other ancillary infrastructure.

Further details on tree felling required within and around development footprint on the Proposed Wind Farm site is detailed in Chapter 6 of this EIAR.

A total of 19 hectares of forestry will be permanently felled within and around the Proposed Wind Farm along with existing treeline boundaries as detailed in Chapter 6, Section 6.5.1.7. Figure 4-20 shows the extent of the commercial forestry to be permanently felled as part of the Proposed Project

The commercial forestry felling activities required as part of the Proposed Project will be the subject of a Limited Felling Licence (LFL) application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm developments. The policy requires that a copy of the planning permission for the Proposed Project be submitted with the felling licence application; therefore, the felling licence cannot be applied for until such time as planning permission is obtained for the Proposed Project.

### 4.4.10.2 Forestry 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 footprint of the infrastructure developments.

The estimated 19 hectares that will be permanently felled for the footprint of the Proposed Project infrastructure 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. 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 19 hectares of forestry can occur anywhere in the State subject to licence. The replacement of forestry, felled as part of the Proposed Project, may occur on any lands, within the state, benefitting from Forest Service Technical Approval[3] 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 Habitats purposes).

Further details in relation to forestry replanting are included in Section 2.9.2.3 of Chapter 2 and Appendix 2-3 of this EIAR.

[3] *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.*

## Map Legend

- EIAR Site Boundary
- Proposed Turbine Layout
- Proposed Wind Farm Footprint
- Commercial Forestry Felling Area





Drawing Title
Proposed Commercial Forestry to be Felled

Project Title
Seskin Wind Farm, Co. Carlow

| Drawn By | Checked By |
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| BT | EC |
| Project No. 220246 | Drawing No. Figure 4-20 |
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## 4.4.11 Green Infrastructure Plan

A Green Infrastructure Plan has been prepared for the Proposed Project and is included in Appendix 4-3 of this EIAR. This plan identifies, in a layout drawing, the Proposed Wind Farm layout and the relevant biodiversity, hydrological and landscape features of the Proposed Project that are detailed in the EIAR. These various measures are further detailed in Chapter 6: Biodiversity, Chapter 9: Water, and Chapter 14: Landscape & Visual, and are further detailed below.

A Biodiversity Management and Enhancement Plan (BMEP) has been prepared for the Proposed Project and is included as Appendix 6-4 of this EIAR. This plan has been developed to offset the loss of habitats identified within the Proposed Wind Farm site, and further enhance the biodiversity of the site and its environs. These enhancement measures have also been considered in the landscape & visual assessment which is included at Chapter 14: Landscape & Visual, of this EIAR, with particular reference to Section 14.7.3.2.2. Similarly, the drainage design for the Proposed Project has been prepared by Hydro Environmental Services Ltd. (HES) and is included in Appendix 9-1 of this EIAR.

## 4.4.12 Site Activities

### 4.4.12.1 Environmental Management

All proposed activities on the Proposed Project site will be provided for in an environmental management plan. A Construction and Environmental Management Plan (CEMP) has been prepared for the Proposed Project and is included in Appendix 4-4 of this EIAR.

The CEMP includes details of drainage, peat and spoil management and waste management, and clearly outlines the mitigation measures and monitoring proposals that are required to be adhered to in order to comply with the environmental commitments outlined in the EIAR. 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.

Wherever possible, vehicles will be refuelled off-site. This will be the case for regular, road-going vehicles. However, for construction machinery that will be based on-site continuously, a limited amount of fuel will have to be stored on site in appropriately bunded containers.

On-site refuelling of machinery will be carried out at dedicated refuelling locations using a mobile double skinned fuel bowser. The fuel bowser, a double-axle custom-built refuelling trailer will be re-filled off site and will be towed around the Proposed Project site by a 4x4 jeep to where machinery is located. It is not practical for all vehicles to travel back to a single refuelling point, given the size of the cranes, excavators, etc. that will be used during the construction of the Proposed Project. The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use.

Only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays, spill kits and fuel absorbent mats will be available if necessary, during all refuelling operations.

### 4.4.12.2 Concrete Deliveries

Only ready-mixed concrete will be used during the construction phase, with all concrete being delivered from local batching plants in sealed concrete delivery trucks. Quarries that could potentially provide stone and ready-mix concrete for the Proposed Project are detailed below in Section 4.4.2.

The use of ready-mixed concrete deliveries will eliminate any potential environmental risks of on-site batching. When concrete is delivered to site, only the chute of the delivery truck will be cleaned, using the smallest volume of water necessary, before leaving the site. Concrete trucks will be washed out fully at the 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. Where temporary lined impermeable containment areas are used, such containment areas are typically built using straw bales and lined with an impermeable membrane. Two examples are shown in Plate 4-3 below.

The areas are generally 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. Any 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.

*Plate 4-3 Concrete washout area*

Alternatively, a Siltbuster-type concrete wash unit or equivalent (https://www.siltbuster.co.uk/sb_prod/siltbuster-roadside-concrete-washout-rcw/) may be used. This type of Siltbuster unit catches the solid concrete and filters and holds wash liquid for pH adjustment and further solids separation. The residual liquids and solids can be disposed of off-site at an appropriate waste facility.

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

- Concrete trucks 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 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 bases 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 on the site.

### 4.4.12.3 Concrete Pouring

Due to the volume of concrete required for each turbine foundation, and the requirement for the concrete pours to be continuous, deliveries are often carried out outside normal working hours in order 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 complete in a single day per turbine. The main pours will be planned days or weeks in advance.

Special procedures will be adopted in advance of and during all concrete pours to minimise the risk of pollution. These may 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 while placing concrete.
- Ensuring that excavations are sufficiently dewatered before concreting begins and that dewatering continues while concrete sets.
- Ensuring that covers are available 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, or a Siltbuster-type concrete wash unit (https://www.siltbuster.co.uk/sb_prod/siltbuster-roadside-concrete-washout-rcw/) or equivalent.
- Disposing of surplus concrete after completion of a pour in agreed suitable locations away from any watercourse or sensitive habitats.

### 4.4.12.4 Dust Suppression

In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. If necessary, water will be taken from stilling/settlement ponds in the Proposed Project site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and temporary construction compounds to prevent the generation of dust. Silty or oily water will not be used for dust suppression, because 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.

### 4.4.12.5 Vehicle Washing

Wheels or vehicle underbodies are often washed before leaving sites to prevent the build-up of mud on public (and site) roads. A wheel wash facility will be provided and a layout of the same is shown in Figure 4-21. The site 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.

### 4.4.12.6 Waste Management

The CEMP, Appendix 4-4 of this EIAR, provides a waste management plan (WMP) which outlines the best practice procedures during the construction phase of the Proposed Project, and the expected waste types that will arise. The WMP has been produced in line with the following guidance *'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition*

*Projects'* (EPA, 2021)[4]. 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 a last resort. The WMP has been prepared to outline the main objectives that are to be adhered to for the preparation of a more detailed WMP to be completed prior to the construction phase of the Proposed Project. The WMP will be in place throughout the construction and decommissioning phase of the Proposed Project and will be in line with all relevant legislation detailed in Section 3.9.1 in Appendix 4-4.



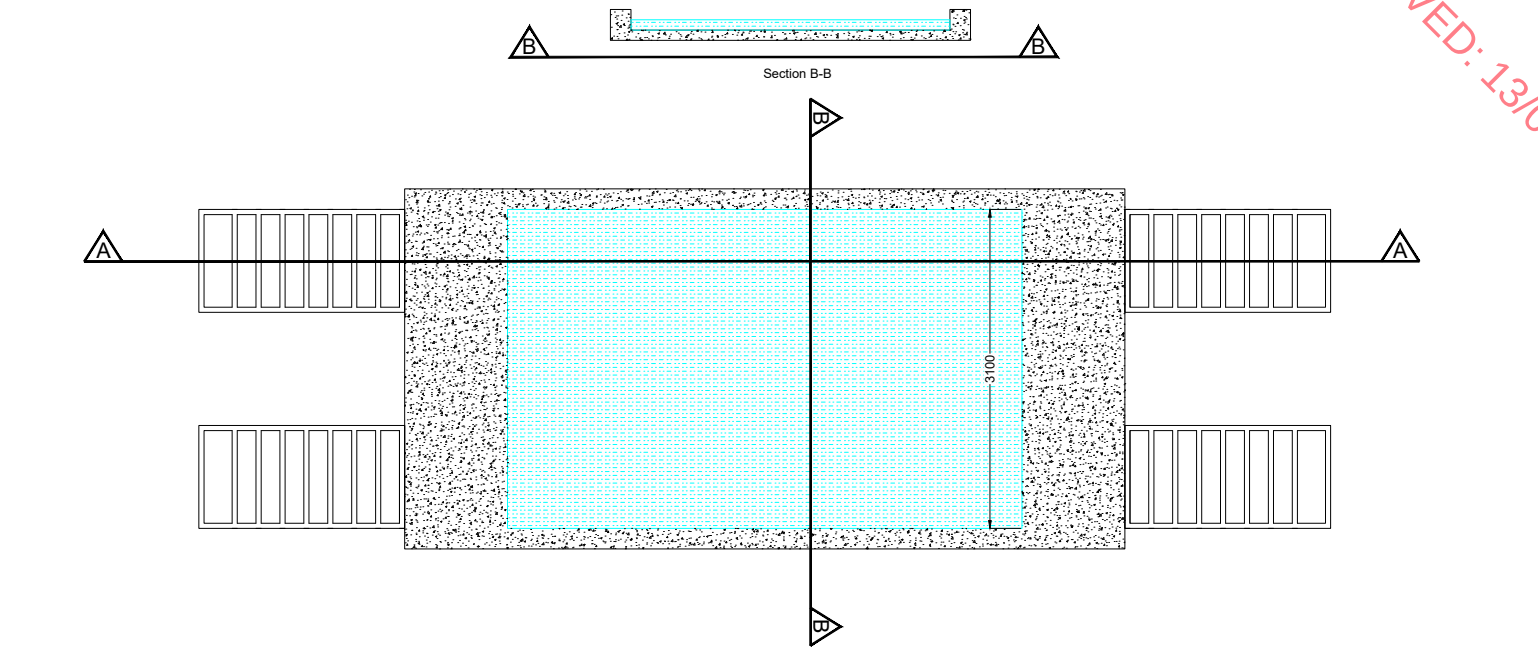
The Waste Management Act 1996 and its subsequent amendments provide for measures to improve performance in relation to waste management, recycling and recovery. The Act also provides a regulatory framework for meeting higher environmental standards set out by other national and EU legislation.

The Act requires that any waste related activity must have all necessary licenses and authorisations. It will be the duty of the Waste Manager on the Proposed Project site to ensure that all contractors hired to remove waste from the site have valid Waste Collection Permits 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 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 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. The system will describe the waste types expected to be produced during the project and identify the waste management action proposed (please refer to Section 3.9.3 and 3.9.4 in Appendix 4-4). Estimates of the quantities to be produced will be inserted into a detailed waste management spreadsheet and the data will be updated as the work progresses, and information is available and performance against the estimates will be monitored. 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] *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*

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| DRAWING TITLE: **Wheel Wash Detail** | | | |
| PROJECT No.: **220246** | | DRAWING No.: **Fig. 4-21** | SCALE: **1:50 @ A3** |
| DRAWN BY: **GO** | CHECKED BY: **N/A** | DATE: **18.04.2024** | REVISION.: D01 |

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# 4.5 Access and Transportation

## 4.5.1 Site Entrances

It is proposed to access the Proposed Wind Farm site during both the construction and operational phase via an existing agricultural site entrance off the L3037 local road along the western boundary of the Proposed Wind Farm site in the townland of Ridge, and is shown in Figure 4-22a. This entrance will be widened to facilitate the delivery of the construction materials and turbine components. The Proposed Wind Farm site entrance was subject to Autotrack assessment to identify the turning area required, as described in Section 15.1 of the Traffic and Transport Assessment. Appropriate sightlines will be established to the north and south of the proposed site entrance for the safe access and egress of traffic. The proposed works will result in a permanent upgrade of this existing site access from the L3037 local road, which will also form the main site entrance to the Proposed Wind Farm during the operational phase.

From the main site entrance, construction traffic will access Turbine No. 1 and Turbine No. 2 at the northernmost section of the Proposed Wind Farm site via two access junctions at the same location on the L30372 local road; one is an existing access junction on the northern side of the L30372 local road and the other is a proposed access junction on the southern side of the L30372. These two access junctions are located where the Proposed Wind Farm internal site road network interacts with the L30372 local road, and are shown in Figure 4-22b. At this location, these junctions will provide access to the northernmost section of the site (Turbine No. 1 and Turbine No. 2) during the construction and operational stages of the Proposed Wind Farm. in the unlikely event of the delivery of a replacement turbine component or other abnormal load required for the operational maintenance of the wind farm.

During the operational phase, it is proposed to access the onsite 38kV substation via the proposed new site entrance on the L30372 local road. Similarly, it is proposed to access Turbine No. 1 and Turbine No. 2 for routine operational maintenance via the upgraded existing site entrance on the L30372 local road. These junctions will be closed off using a steel barrier or stock proof fencing and will be used and appropriate sightlines will be established to the east and west of the proposed site entrances for the safe egress of traffic.

These access and egress points are shown on the site layout drawings in Appendix 4-1. These junctions are described in detail in Chapter 15, Section 15.1.6.4 of this EIAR. The location of Proposed Wind Farm site access is shown in Figure 4-22a and Figure 4-22b. A Traffic Management Plan (TMP) is included as Appendix 15-2 of this EIAR. In the event planning permission is granted for the Proposed Project, the final Traffic Management Plan will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned.

## 4.5.2 Deliveries of Stone and Ready-Mix Concrete from Quarries

In order to facilitate the construction of the Proposed Project, all crushed stone, hardcore materials and ready-mix concrete that will be required during the construction phase will be sourced from local, appropriately authorised quarries. For the purposes of assessment within the EIAR, an existing, authorised quarry, located 6.8km to the east of the Proposed Wind Farm site has been selected and is shown in Figure 4-23.

The proposed route for HGVs originates from Kilcarrig Quarries Ltd. in the townland of Powerstown and travels south on the R448 for approximately 4.3km before turning east onto the L3037 for 6.8km before entering the townland of Ridge. The vehicles will turn east off the L3037 where they will enter the site entrance of the Proposed Wind Farm.

Due to the nature of the Proposed Grid Connection Route, the proposed works will be transient in nature along the public road network in which the Proposed Grid Connection Route is proposed. As such, deliveries of construction materials will utilise the surrounding road network along the Proposed Grid Connection Route as it moves along the public road network in which it's proposed.

It is also envisaged that general construction traffic (including materials and staff) will travel to the site via the public road network to the main entrance of the site.

Deliveries of stone and ready-mix concrete for use in construction of the Proposed Project, are discussed in further detail in Chapter 15 of this EIAR.



## 4.5.3 Turbine Component Delivery Route

It is envisaged that large wind turbine components will be delivered to the Proposed Wind Farm site, from Waterford Port, via the N29, N25, N9, M9, N78 and L1834/L1835/L3037. The proposed turbine transport route from Waterford Port to the Proposed Wind Farm site is shown on Figure 4-24.

From Waterford Port in Waterford City, the turbines will be transported northwest via the N29, N25, N9, and the M9 out of Waterford. The turbines will travel 96km north along the M9 before exiting onto the N78. The turbines will travel east along the N78 for approximately 11km before passing through the town of Athy, Co. Kildare. After exiting Athy, the turbines will turn south and continue along the N78 for a further 22km before exiting onto the L1834. After approximately 2km on the L1834, the turbines will continue straight onto the L1835 for approximately 5km, before entering the townland of Ridge in Co. Carlow onto the L3037. The turbines will continue straight on the L3037 for approximately 2km before turning left into the Proposed Wind Farm site entrance.

### 4.5.3.1 Turbine Delivery Route Accommodation Areas

Road and junction widening are sometimes required along proposed turbine transport routes to accommodate the large vehicles used to transport turbine components to proposed project sites. The proposed transport route for the Proposed Project 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 15.1.8 of this EIAR and summarised below. There are sections on the route where the vertical alignment may require specialist transport vehicles. These sections will be further considered by the appointed transport company following turbine procurement process. Accommodation works will be required at various locations on the national and regional road network between the port of arrival in Waterford and the Proposed Wind Farm site. These will be limited to temporary measures including temporary local road widening, overruns of roundabout island and temporary relocation of some signs and street furniture.

The locations of the accommodation areas are shown in Figure 4-24.

#### Location 1 – Port of Waterford to the M9

The preliminary swept path analysis was undertaken for the section of the turbine delivery route in Waterford city between Waterford Harbour and the M9 motorway. These locations are as follows:

- Exit at the Port of Waterford
- N29/R711 roundabout
- N29/N25 roundabout
- N25/R680 roundabout
- N25/N9 roundabout
- N9/M9 roundabout

A swept path analysis was undertaken using Autotrack for the blade and tower transporter vehicles, and while minor temporary alterations will be required to the existing streetscape, roundabout island, traffic lights and street furniture during the delivery of the large plant, the assessment indicates that the large turbine delivery vehicles will be accommodated at these locations.



### Location 2 – M9 Junction 3 left slip / N78 Roundabout

The preliminary swept path analysis indicates that minor temporary alterations will be required to the existing streetscape and roundabout island during the delivery of the abnormally sized loads.

### Location 3 - N78/R418 Roundabout

The preliminary swept path analysis indicates that minor temporary alterations will be required to the existing streetscape, roadside vegetation and roundabout island during the delivery of the abnormally sized loads.

### Location 4 – N78 Right Bend in Crettyard

The preliminary swept path analysis indicates that minor temporary alterations will be required to the existing streetscape, and roadside vegetation during the delivery of the abnormally sized loads.

### Location 5 – N78/ L1834 Junction

The preliminary swept path analysis indicates that a temporary one-way road is required in the field east of the N78/L1834 junction in order to accommodate wind turbine vehicles in the townland of Cloneen. It is noted that the standard road markings and visibility splays are not required at the access off the N78, or the exit onto the L1834, as the temporary access road will only be used for the transportation of abnormally sized loads, which will be delivered with a Garda escort and transient traffic management vehicles operated by the haulage company. This road will not be available for any other traffic and will be closed off and opened only for the delivery of the abnormally sized loads.

Upon the completion of the construction phase, the temporary road will be covered with a layer of topsoil and reseeded and will only be used again in the unlikely event that an oversized delivery was required for wind turbine maintenance purposes. The boundary of this field and the public road corridor, at either end of the temporary road will be reinstated to its current condition.

This accommodation area is shown in Figure 4-25. The temporary link road along the N78/L1834 junction is part of the planning application being made to the Kilkenny County Council and is assessed as part of this EIAR.

### Location 6 – Black Bridge on the L1835/L3037

A preliminary structural assessment on the Black Bridge, located on the L1835 and L3037, has been conducted by Jennings O'Donovan & Partners Limited which is included as Appendix 4-5 of this EIAR, '*Bridge Crossing Structural Assessment Report*'. The findings of the report indicate that there will be permanent carriageway strengthening works required at the Black Bridge, which crosses the River Dinn at the Kilkenny and Carlow County boundary on L1835 and L3037. The upgrade works include for provision of a 175mm thick reinforcing concrete slab on the road carriageway/bridge deck, over the existing road surface. The proposals also involve raising the parapet walls from c. 1200mm to 1250mm, and road surface dressing all of which are shown in Figure 4-26, and further detailed in Section 4.7.9 below.

The carriageway strengthening works on the Black Bridge forms part of the planning application being made to Carlow County Council and Kilkenny County Council, and is assessed as part of this EIAR.

### Location 7 - Access Junction A on the L-3037 (Main Site Entrance)

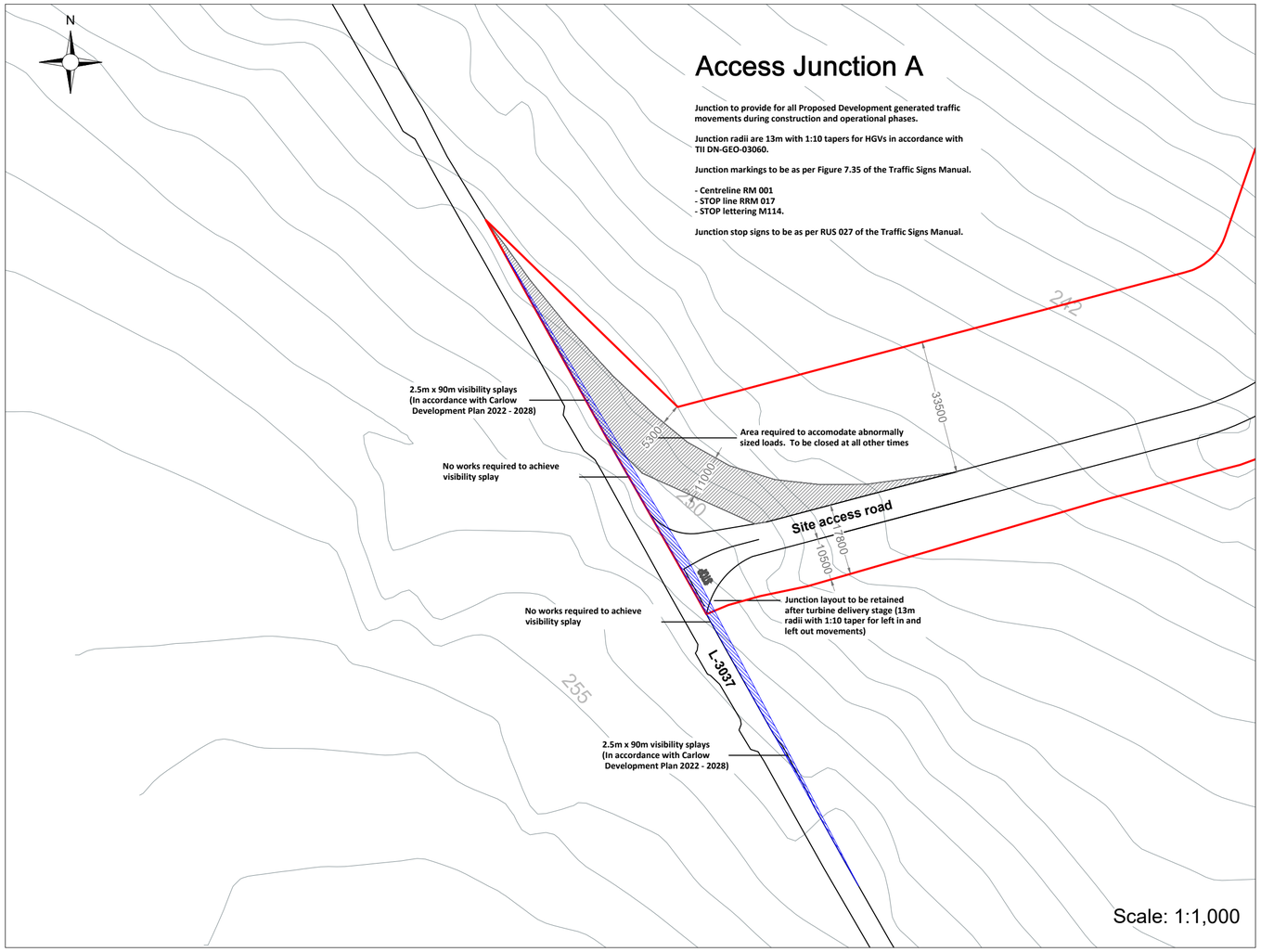
Upgrades to an existing junction will provide access to the Proposed Wind Farm site from the L-3037 for all vehicle types. The proposed junction on the L-3037 will provide access to the Proposed Wind Farm for all traffic during the construction phase, including abnormally sized loads, standard HGV deliveries and construction staff, and is shown in Figure 4-22a above. When the Proposed Project is operational, the junction will provide for all maintenance trips.

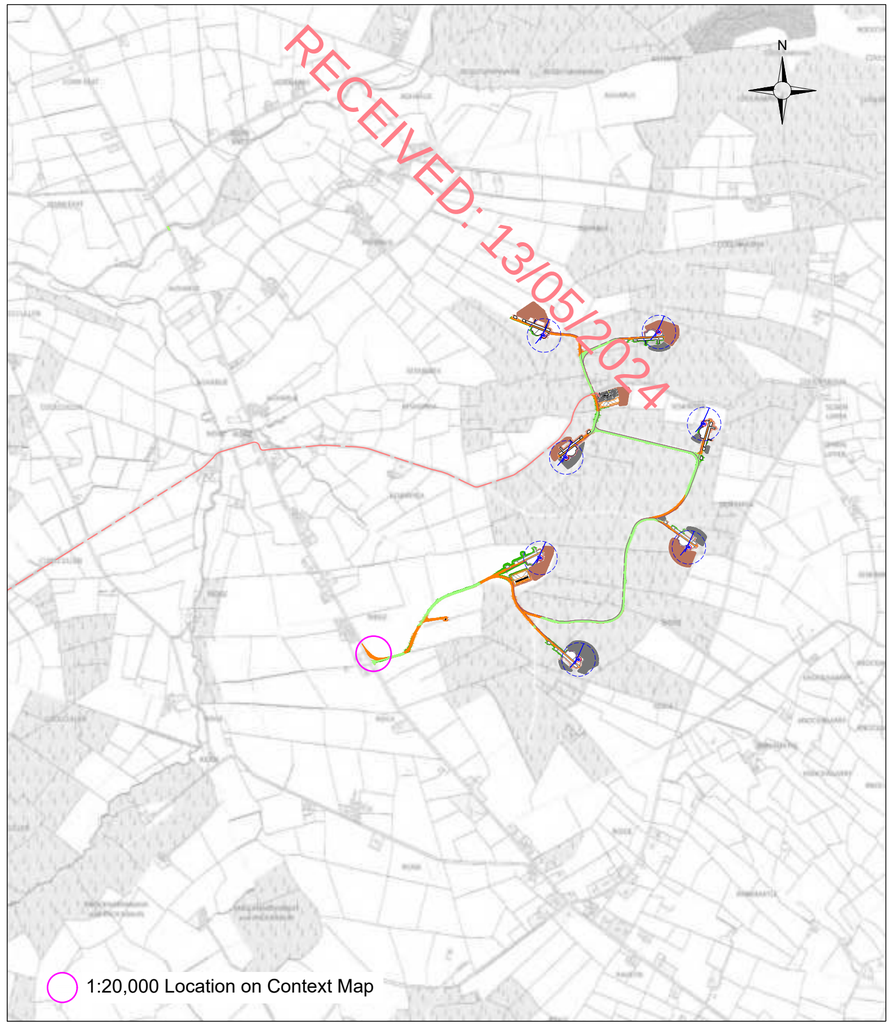
The junction design also includes a temporary run-over area required to accommodate the abnormally sized loads. The Autotrack assessments undertaken for the blade and tower extended artics are further detailed in Section 15.1.9 in Chapter 15 of this EIAR and show that the turning requirements of both vehicles will be accommodated within the confines of the land available.

### Location 8 –Access Junction B - Proposed crossing and access junctions on the L-30372

It is proposed to provide a crossroads type junction on the L-30372 to serve as a crossing point for all construction traffic crossing from the southern part of the Proposed Wind Farm (Turbines 3 to 7) to the northern section (to Turbines 1 and 2), and is shown in Figure 4-22b above..

During the construction phase the junction will provide for construction vehicles and abnormal loads crossing the L-30372 only. The Autotrack assessment detailed in Section 15.1.9 demonstrate that the proposed junction will accommodate the blade and tower extended artics crossing the L-30372.





**Drawing Legend**

- Existing Road Edge
- Planning Application Boundary (Carlow County Council)
- Transport Runover Area
- Sight Line

Figure 4-22a

| | | | |
|---|---|---|---|
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| DRAWING TITLE: **Proposed Access Junction A** | | | |
| PROJECT No.: **220246** | | DRAWING No.: **220246 - 24** | SCALE: **As shown @ A2** |
| DRAWN BY: **GO** | CHECKED BY: **JW** | DATE: **03.05.2024** | REVISION.: P01 |

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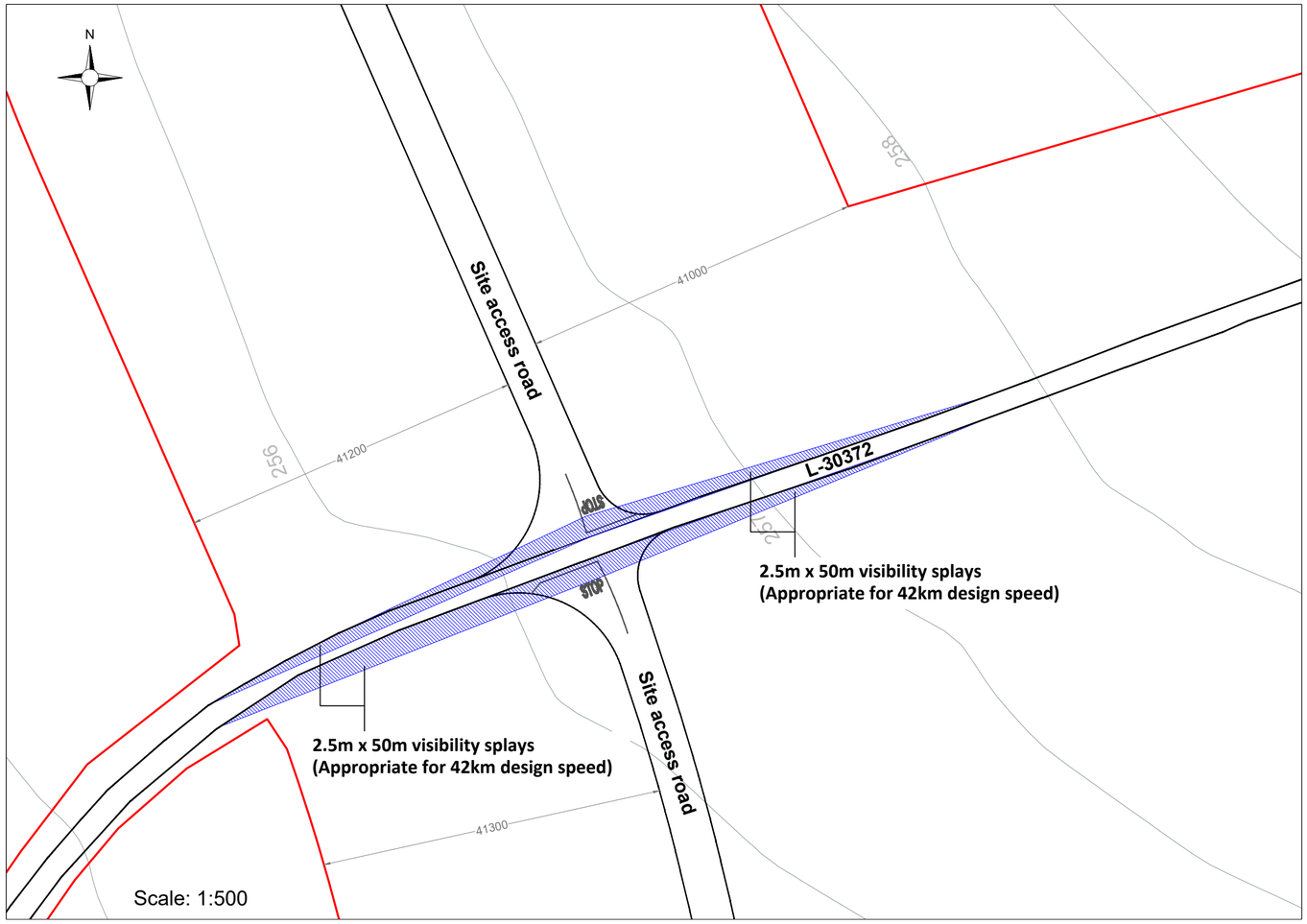


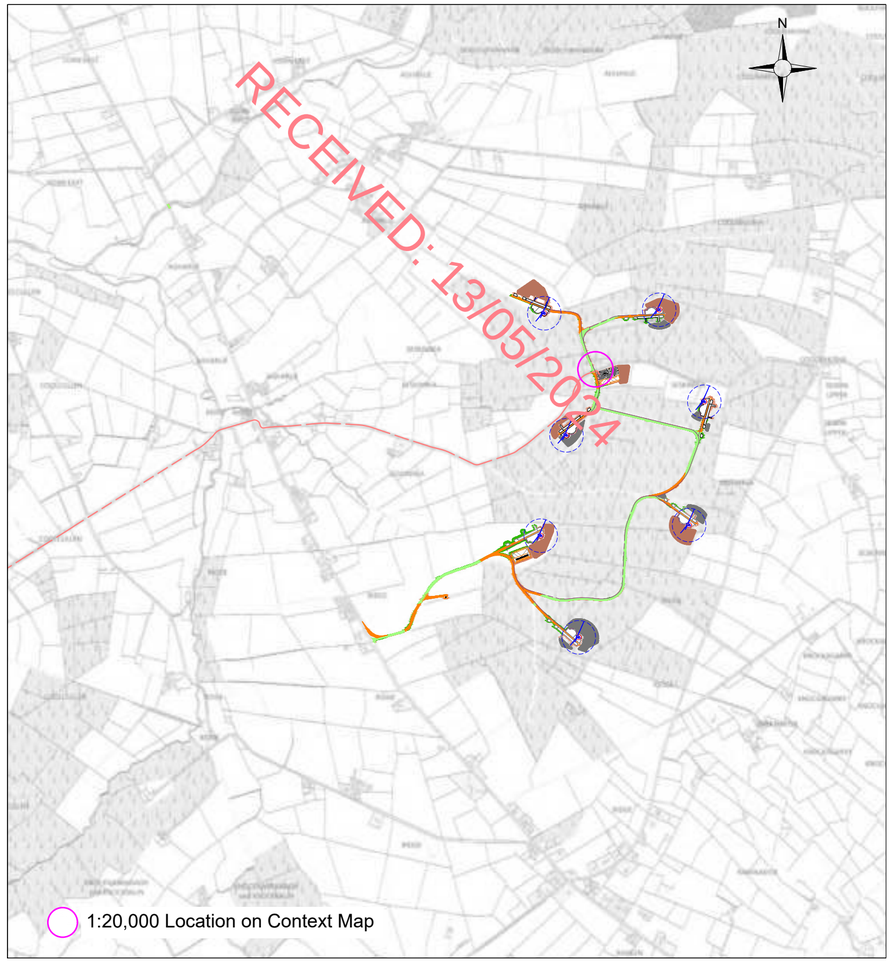



# Access Junction B

**Junction to provide for traffic generated by the Proposed Development crossing the L-30372 during the construction phase and car and lgv trips turning off the L-30372 during the operational phase.**

**Junction radii are 13m for HGVs in accordance with TII DN-GEO-03060.**

**Junction markings to be as per Figure 7.35 of the Traffic Signs Manual.**

**- Centreline RM 001**
**- STOP line RRM 017**
**- STOP lettering M114.**

**Junction stop signs to be as per RUS 027 of the Traffic Signs Manual.**

**Drawing Legend**

- Existing Road Edge
- Planning Application Boundary (Carlow County Council)
- Sight Line

Figure 4-22b

| | | | |
|---|---|---|---|
| PROJECT TITLE: **EDF Seskin Wind Farm Co. Carlow / Co. Kilkenny** | | | |
| DRAWING TITLE: **Proposed Access Junction B** | | | |
| PROJECT No.: **220246** | | DRAWING No.: **220246 - 25** | SCALE: **As shown @ A2** |
| DRAWN BY: **GO** | CHECKED BY: **JW** | DATE: **03.05.2024** | REVISION.: P01 |

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## Map Legend

- EIAR Site Boundary
- Kilcarrig Quarry
- Proposed Delivery Route of Stone and Ready-mix Concrete - Town Roads
- Proposed Delivery Route of Stone and Ready-mix Concrete - Local Roads
- Proposed Delivery Route of Stone and Ready-mix Concrete - Regional Roads



Drawing Title
Proposed Delivery Route of Stone and Ready-mix Concrete

Project Title
Seskin Wind Farm, Co. Carlow

| Drawn By | Checked By |
|---|---|
| CJ | EC |
| Project No. 220246 | Drawing No. Figure 4-23 |
| Scale 1:35,000 | Date 2024-05-02 |

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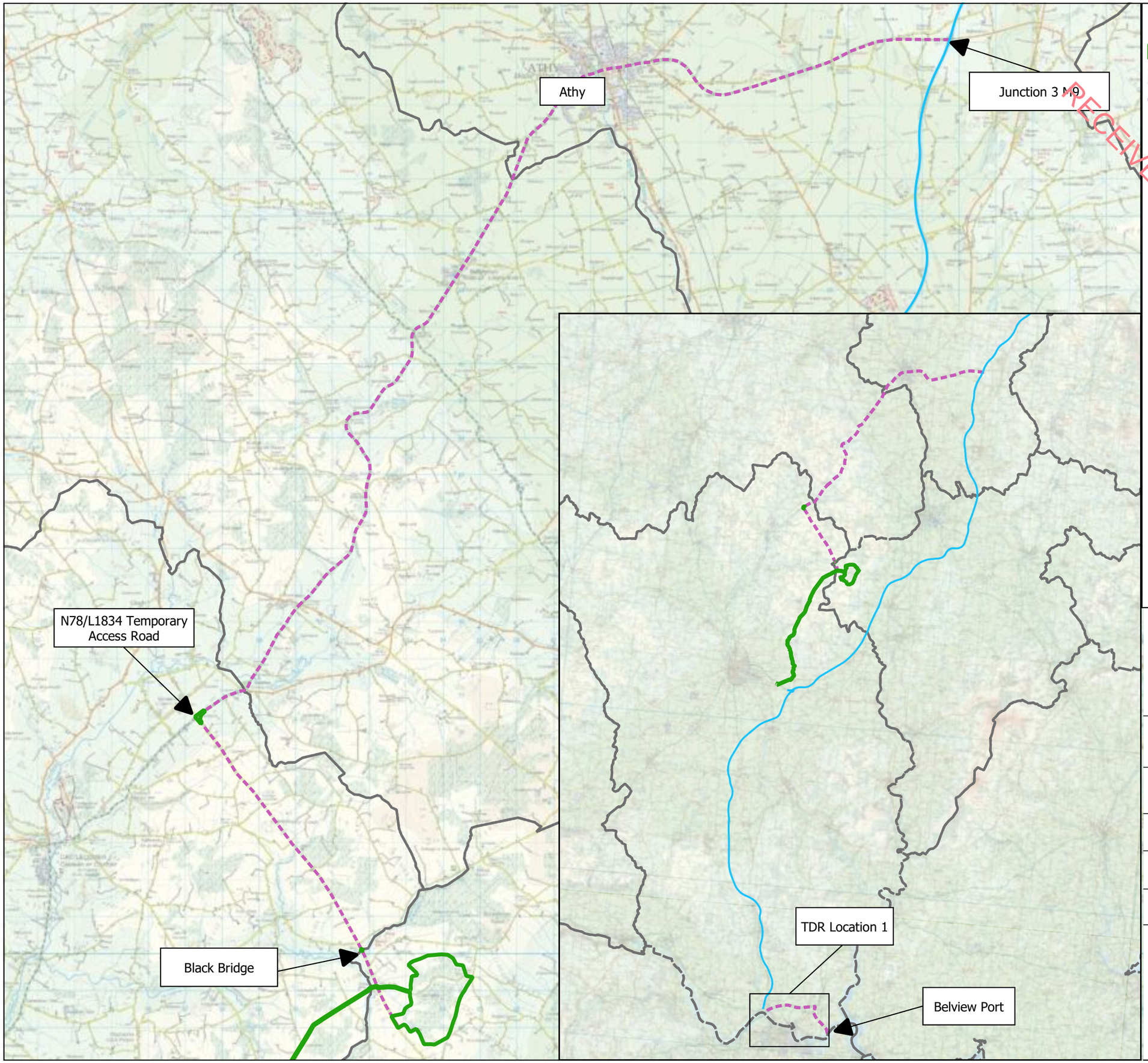


## Map Legend

- EIAR Site Boundary
- County Boundaries
- Proposed Turbine Delivery Route
- M9 Motorway





| | |
|---|---|
| Drawing Title: Proposed Turbine Delivery Route | |
| Project Title: Seskin Wind Farm, Co. Carlow | |
| Drawn By: BT | Checked By: EC |
| Project No.: 220246 | Drawing No.: Figure 4-24a |
| Scale: 1:100,000 | Date: 2024-05-03 |

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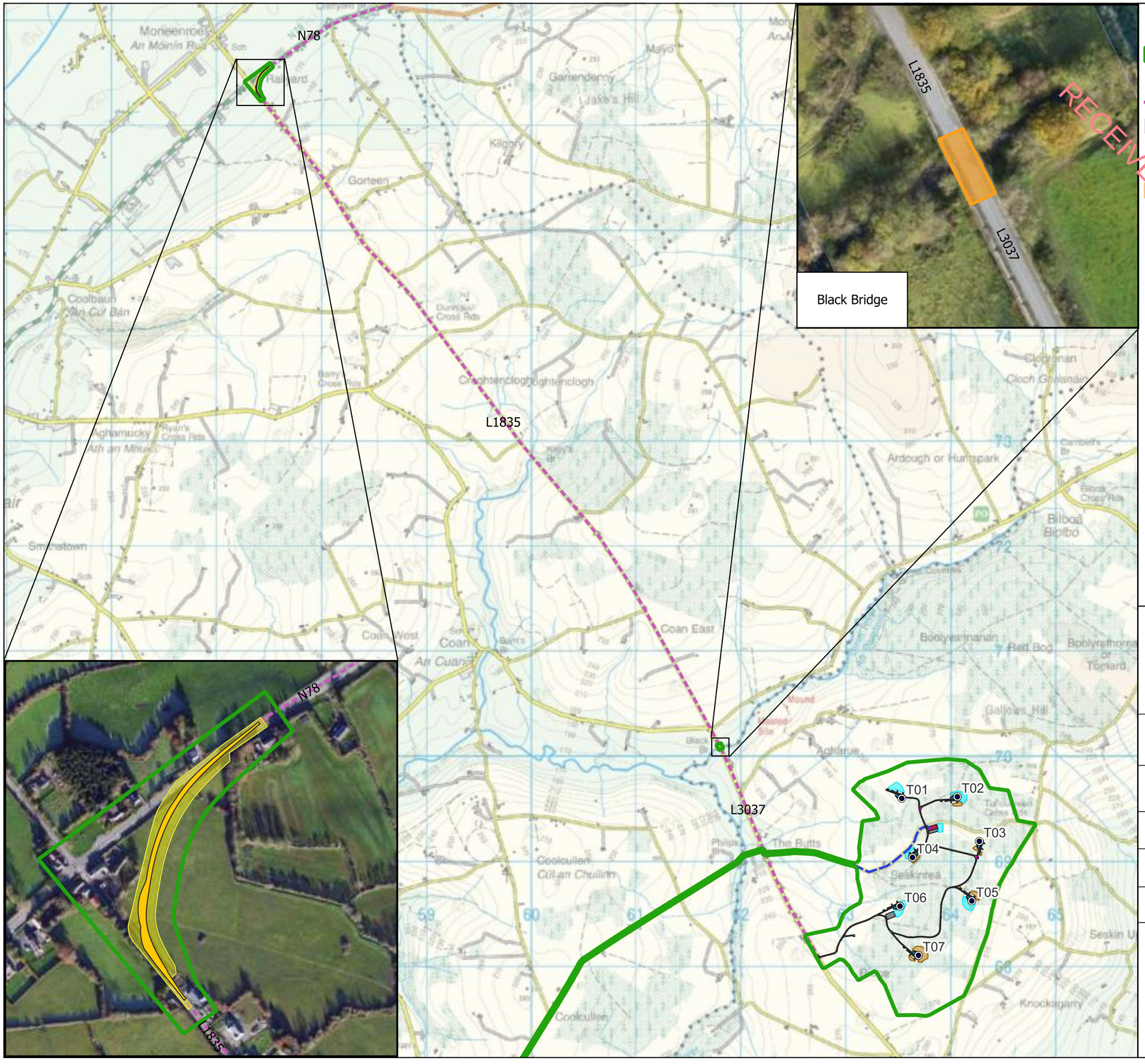





## Map Legend

- EIAR Site Boundary
- Proposed Turbine Layout
- Proposed Turbine Delivery Route
- Proposed New Road (N78/L1835 Temporary Link Road)
- Proposed Temporary Link Road Works Area
- Proposed Upgrades to Black Bridge





Drawing Title
Turbine Transport Route Accommodation Areas

Project Title
Seskin Wind Farm, Co. Carlow

| Drawn By | Checked By |
|---|---|
| CJ | EC |
| Project No. 220246 | Drawing No. Figure 4-24b |
| Scale 1:35,000 | Date 2024-04-18 |

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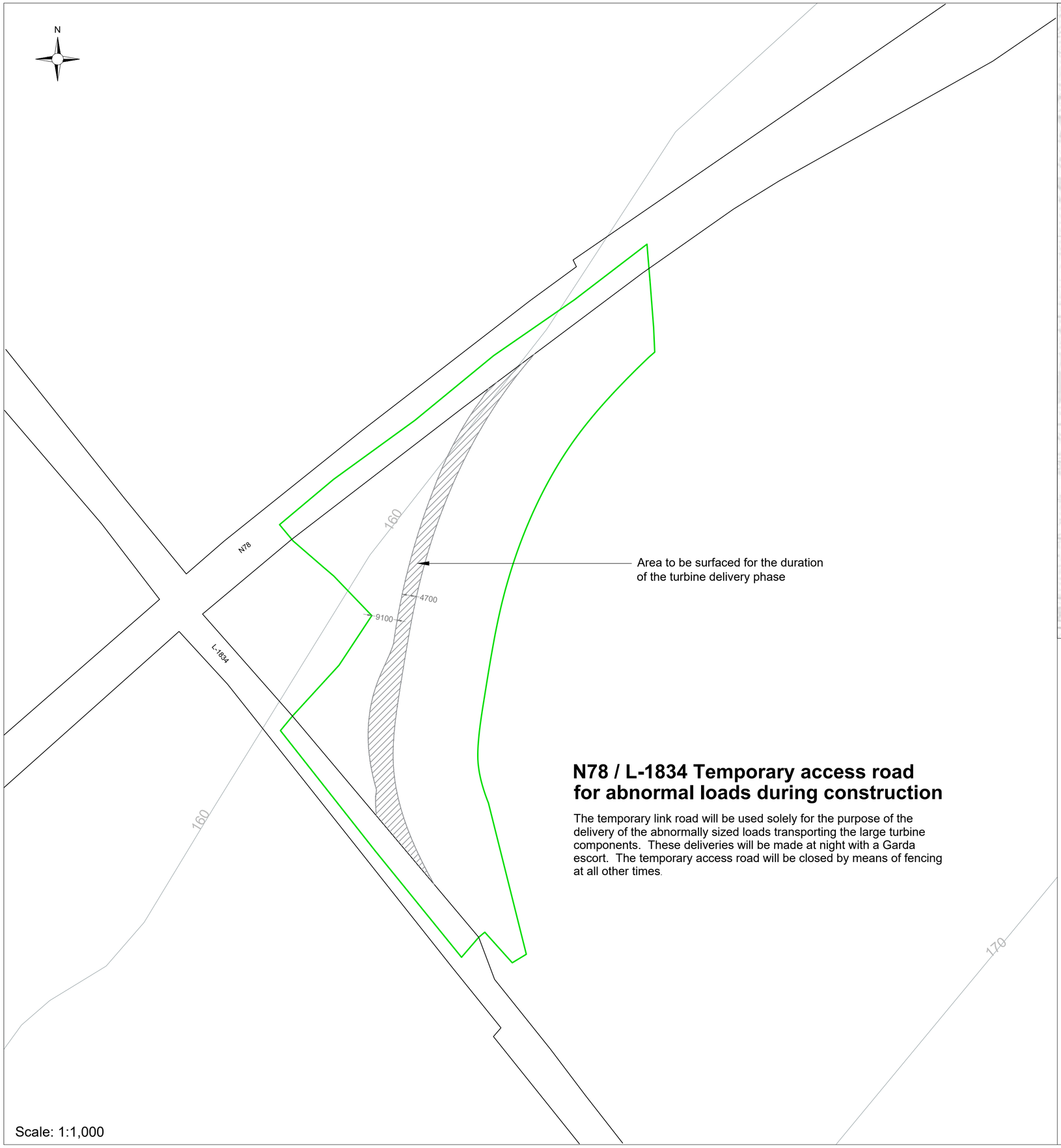
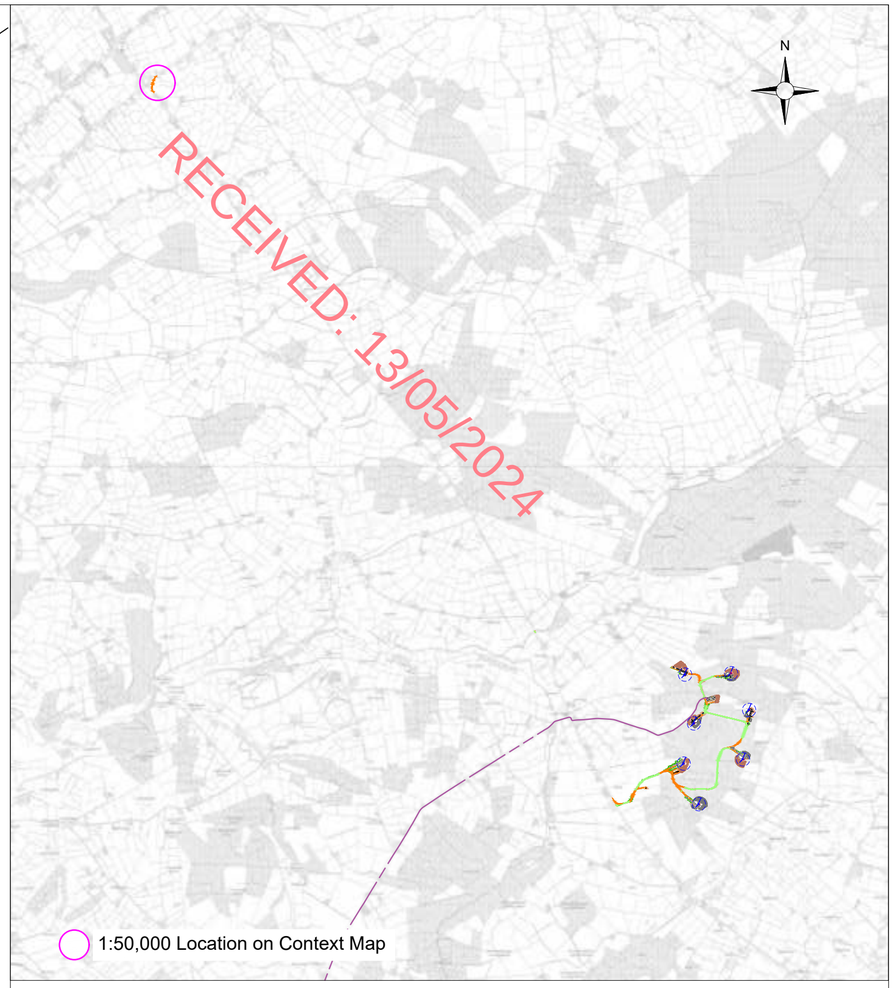



# N78 / L-1834 Temporary access road for abnormal loads during construction

The temporary link road will be used solely for the purpose of the delivery of the abnormally sized loads transporting the large turbine components. These deliveries will be made at night with a Garda escort. The temporary access road will be closed by means of fencing at all other times.

Scale: 1:1,000






**Drawing Legend**

- Existing Road Edge
- Planning Application Boundary (Kilkenny County Council)
- Transport Runover Area

Figure 4-25

| | | | |
|---|---|---|---|
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| DRAWING TITLE: **Temporary Access Road** | | | |
| PROJECT No.: **220246** | | DRAWING No.: **220246 - 23** | SCALE: **As shown @ A2** |
| DRAWN BY: **GO** | CHECKED BY: **N/A** | DATE: **30.04.2024** | REVISION.: D01 |

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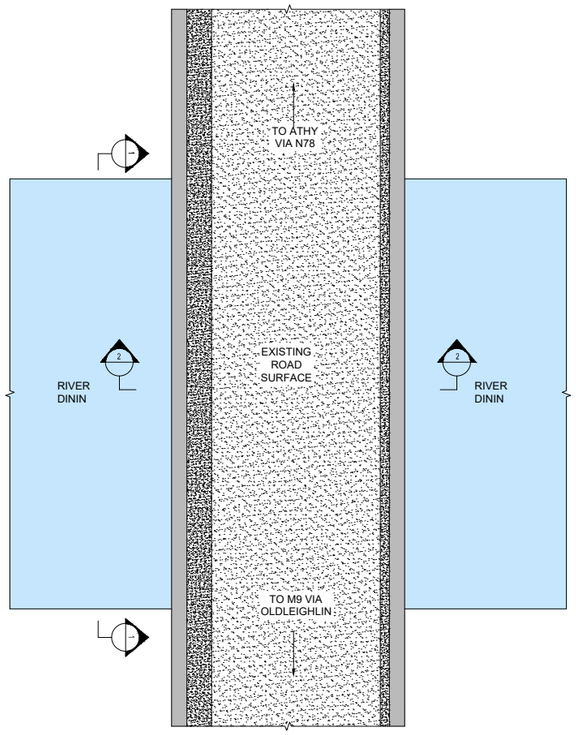
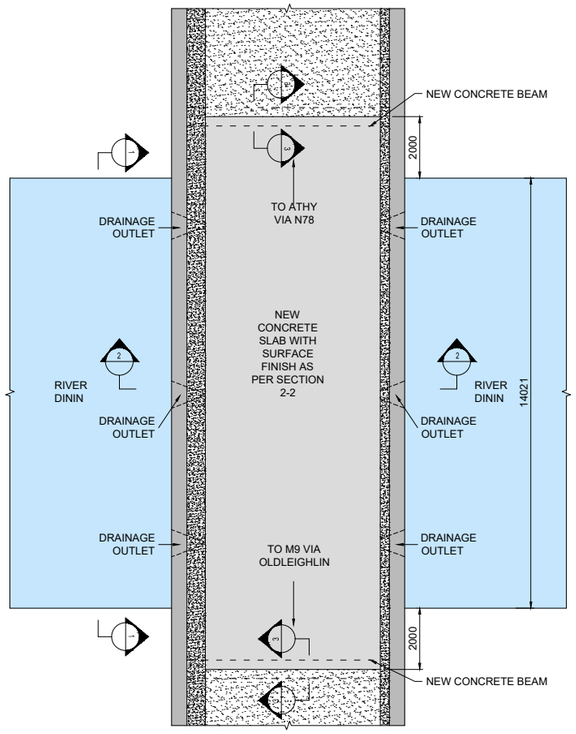
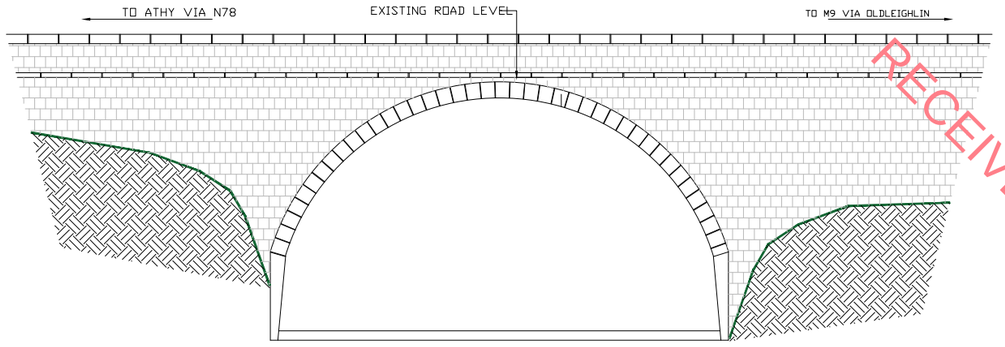


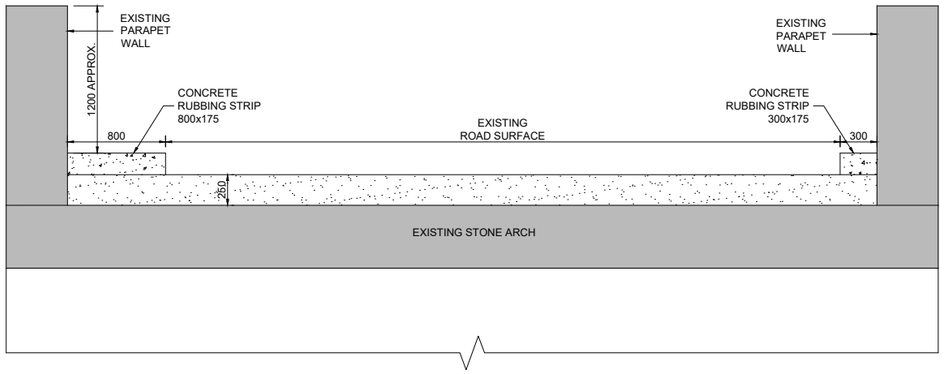

BRIDGE PLAN (EXISTING)
SCALE 1:100



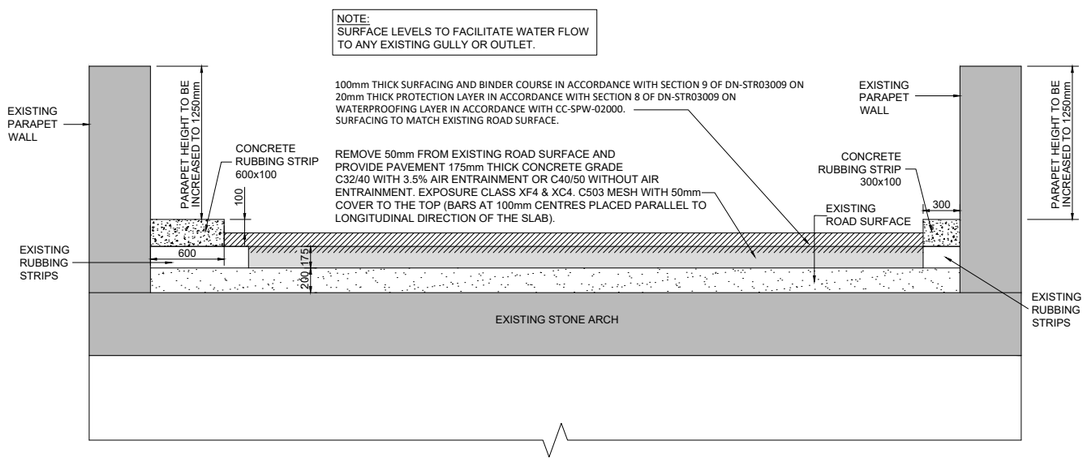

BRIDGE PLAN (PROPOSED)
SCALE 1:100



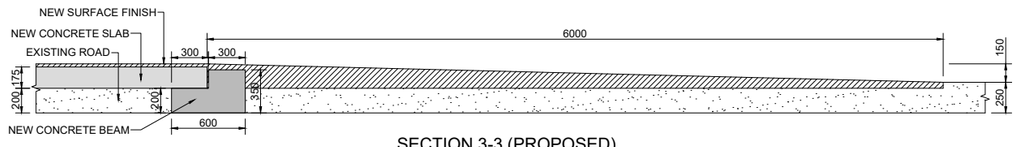

SECTION 1-1
SCALE 1:100




SECTION 2-2 (EXISTING)
SCALE 1:25




SECTION 2-2 (PROPOSED)
SCALE 1:25




SECTION 3-3 (PROPOSED)
SCALE 1:25

RECEIVED: 13/05/2024

| rev. | modifications | by | date |
|---|---|---|---|
| | | | |

Client
EDF RENEWABLES
IRELAND LIMITED

Project
SESKIN WIND FARM

Stage
PLANNING

Title
BLACK BRIDGE - PROPOSED
MODIFICATION DETAILS

Scales
AS SHOWN

| Surveyed | Prepared By | Checked | Date |
|---|---|---|---|
| | NO | JMCE | DEC 2023 |

JENNINGS O'DONOVAN & PARTNERS LIMITED
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Web. www.jodireland.com

| Job No. | Drawing No. | Revision |
|---|---|---|
| 7159 | Fig. 4-26 | |

## 4.5.4 Traffic Management



A turbine with the maximum blade length of 77.5 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 83.5 metres, including the blade which overhangs the back of the vehicle. The total length of the tower transporter is 49.5 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 Proposed Wind Farm site will be smaller than the design test vehicles. The turbine delivery vehicles have been modelled accurately in the Autotrack assessments for the Proposed Wind Farm site access junctions, as detailed in Section 15.1.9 of this EIAR.

The need to transport turbine components on the public roads is not an everyday occurrence in the vicinity of the site of the Proposed Project. 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 4-4 below shows an example of a blade adapter.

*Plate 4-4 Blade adaptor transport system*

A detailed traffic management plan has been prepared as part of the traffic impact assessment set out in Chapter 15 of this EIAR. 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 (TMP) 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.

#### 4.5.4.1 Traffic Management of Other Construction Materials

Aside from the delivery of the large turbine components and other abnormal loads, the construction of the Proposed Project will require the delivery of a large volume of other construction materials (including all crushed stone and cement required) mainly by HGVs, and construction works along the Proposed Grid Connection Route. A detailed TMP has been prepared as part of the traffic and transport impact assessment and is included as Appendix 15-2 of this EIAR. The purpose of the TMP is to set out the various traffic management measures that will be implemented during the construction stage of the Proposed Project. The successful completion of the Proposed Project will require significant coordination and planning and a comprehensive set of mitigation measures will be put in place before and during the construction phase of the Proposed Project in order to minimise the effects of the additional traffic generated on the surrounding road network.

All traffic management measures that are to be implemented during the construction phase of the Proposed Project will be agreed with Carlow County Council and Kilkenny County Council, and the Roads and Traffic Sections will be consulted throughout the construction phase.

## 4.6 Community Gain Proposal

### 4.6.1 Background

The Proposed Project has the potential to have significant benefits for the local economy, by means of job creation, landowner payments and commercial rate payments. 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, EDF Renewables is endeavouring to develop new ways to direct increased gain towards the local community with particular focus on those living closest to the Proposed Project site.

The applicant company has given careful consideration to the issue of community gain arising from the Proposed Project, 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 proposals, 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 Project 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.



## 4.6.2 Renewable Energy Support Scheme

The Renewable Energy Support Scheme (RESS) Terms and Conditions, published by the Department of Communications, Climate Action and Environment in February 2020, 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. *A minimum of €1,000 shall be paid to each household located within a distance of a 1-kilometre radius from the Project;*
2. *A minimum of 40% of the funds shall be paid to not-for-profit community enterprises whose primary focus or aim is the promotion of initiatives towards the delivery of the UN Sustainable Development Goals, in particular Goals 4, 7, 11 and 13, including education, energy efficiency, sustainable energy and climate action initiatives;*
3. *A maximum of 10% of the funds may be spent on administration. This is to ensure successful outcomes and good governance of the Community Benefit Fund.*
4. *The balance of the funds shall be spent on initiatives successful in the annual application process, as proposed by clubs and societies and similar not-for-profit entities, and in respect of Onshore Wind RESS 1 Projects, on "near neighbour payments" for households located outside a distance of 1 kilometre from the Project but within a distance of 2 kilometres from such Project.*

## 4.6.3 Community Benefit Fund

Should the project qualify for the Renewable Electricity Supply Scheme (RESS), it is expected that for each megawatt hour (MWh) of electricity produced by the wind farm, the Proposed Project will contribute €2 into a community fund for the first 15 years of operation of the Proposed Wind Farm. If this commitment is changed in upcoming Government Policy, the fund would be adjusted accordingly.

The value of this fund would be directly proportional to the electricity generated by the wind farm. Under the current T&Cs of RESS, the fund value would be expected to be in the region of €240,000 per year.

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 proposal could include youth, sport and community facilities, schools, educational and training initiatives, and wider heritage, and environmental projects. Initial local suggestions for use of the fund included grants for local schools, the construction of footpaths and footpath improvement works, water-mains connections for residents who relied on river water, local enterprise schemes, riparian planting of native species, energy retrofitting of houses and contributions to electrical bills.

The number and size of grant allocations will be decided by a Community Fund liaison committee with various groups and project benefiting to varying degrees depending on their funding requirement.

# 4.7 Site Drainage

## 4.7.1 Introduction

The drainage design for the Proposed Project has been prepared by Hydro Environmental Services Ltd. (HES). The drainage design has been prepared based on experience of the project team of other wind farm sites, and the number of best practice guidance documents referred to in the Bibliography section of the EIAR.

The protection of the watercourses within and surrounding the site of the Proposed Project, and downstream catchments that they feed is of utmost importance in considering the most appropriate drainage proposals for the site of the Proposed Project.

The Proposed Wind Farm's drainage design has therefore been proposed specifically with the intention of having no negative impact on the water quality of the site and its associated rivers and lakes, and consequently no impact on downstream catchments and ecological ecosystems. No routes of any natural drainage features will be altered as part of the Proposed Project and turbine locations and associated new roadways were originally selected to avoid natural watercourses, and existing roads are to be used wherever possible. There will be no direct discharges to any natural watercourses, 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. Buffer zones around the existing natural drainage features have been used to inform the layout of the Proposed Wind Farm.

## 4.7.2 Existing Drainage Features

The routes of any natural drainage features will not be altered as part of the Proposed Project. Turbine locations have been selected to avoid natural watercourses. It is proposed that 2 no. new watercourse crossing will be required to facilitate the renewable energy development infrastructure, one of which will include for the removal of an existing degraded culvert.

There will be no direct discharges to natural watercourses. All discharges from the proposed works areas or from interceptor drains will be made over vegetated ground at an appropriate distance from natural watercourse and lakes. Buffer zones around the existing natural drainage features have informed the layout of the Proposed Wind Farm 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 Proposed Wind Farm 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, 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.

## 4.7.3 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:

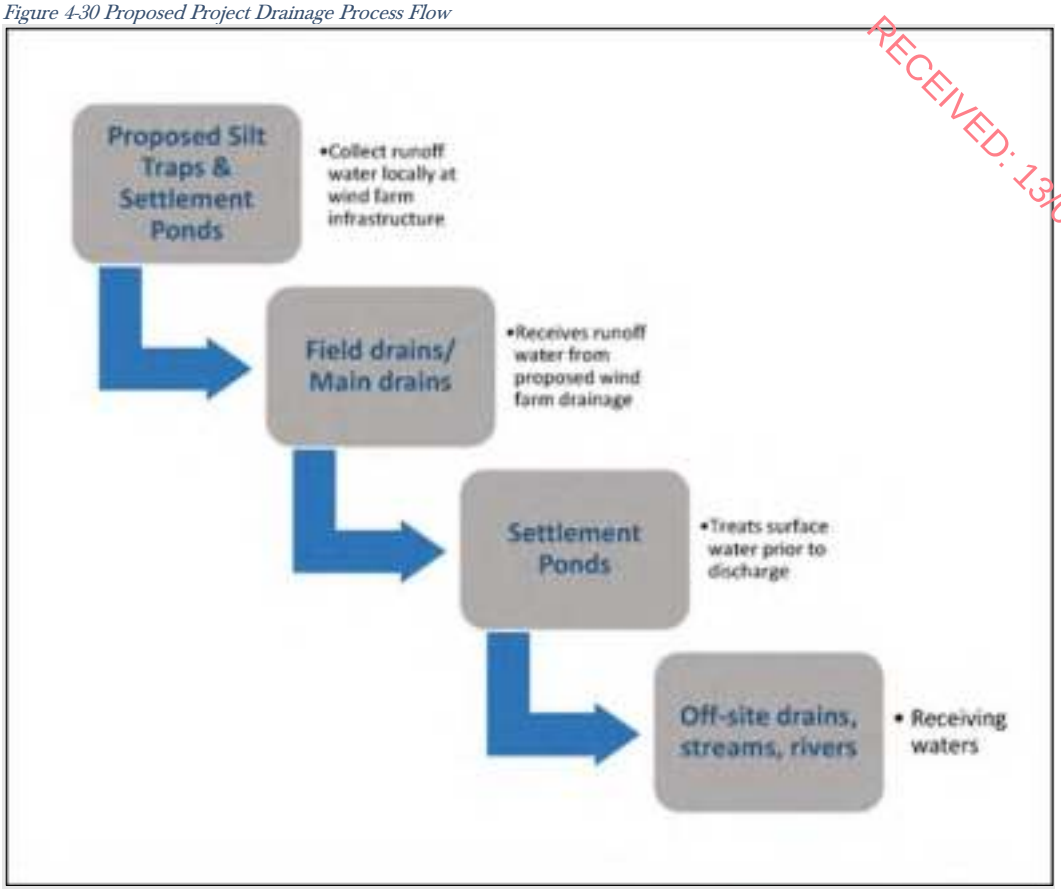
- Keep clean water clean by intercepting it where possible, upgradient of works areas, and divert it around the works areas for discharge as diffuse overland flow or for rewetting of land.
- Collect potentially silt-laden runoff from works areas via downgradient collector drains and manage via series 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.
- Where possible, maintain 50-metre watercourse buffer zones for the wind turbines.
- 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 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.
- Use of silt buster if required.

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 Proposed Wind Farm 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 line drawing of the proposed drainage design is presented in Figure 4-27 below.

*Figure 4-30 Proposed Project Drainage Process Flow*






## 4.7.4 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 9-1 to this EIAR. The drainage design employs the various measures further described below and is cognisant of the following guidance documents:

- Forestry Commission (2004): Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh;
- Coillte (2009): Forest Operations & 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;
- Forest Service, (2000): Code of Best Forest Practice – Ireland. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford;
- COFORD (2004): Forest Road Manual – Guidelines for the Design, Construction and Management of Forest Roads;
- MacCulloch (2006): Guidelines for risk management of peat slips on the construction of low volume low cost roads over peat (Frank MacCulloch Forestry Civil Engineering Forestry Commission, Scotland);
- National Roads Authority (2005): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Wind Farm Development Guidelines for Planning Authorities (September 1996);
- Eastern Regional Fisheries Board: Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites;

- Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Watercourses;
- Good Practice During Wind Farm Construction (Scottish Natural Heritage, 2010);
- PPG1 - General Guide to Prevention of Pollution (UK Guidance Note);
- PPG5 – Works or Maintenance in or Near Watercourses (UK Guidance Note);
- CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006); and,
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006.

#### 4.7.4.1 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, turbine bases 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 of 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 4-28 below shows an illustrative drawing of an interceptor drain.

The velocity of flow in the interceptor will be controlled by check dams (see Section 4.7.4.3 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 (see Section 4.7.4.4 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.

#### 4.7.4.2 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 Wind Farm 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 4-28 below, 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.

Drainage swales will be installed in advance of any main construction works commencing. The material excavated to make the swale will be compacted on the downslope edge of the drain to form a diversion dike.

#### 4.7.4.3 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 straw bales or stone, or a combination of both depending on the size of the drainage swale it is being installed in. Where straw bales are to be used, they will be secured to the bottom of the drainage swale with stakes. Clean 4–6-inch stone will be built up on either side and over the straw bale 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 4-28, below, shows illustrative examples of check dams.

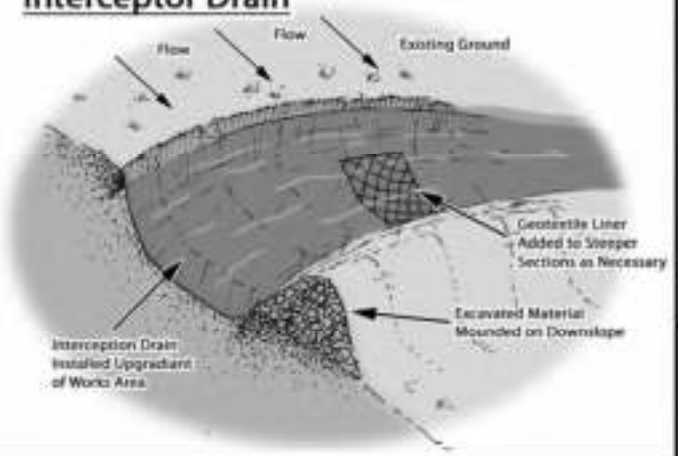
The check dams will be installed at regular intervals along the interceptor drains to ensure the bottom elevation of the upper check dam is at the same level as the top elevation of the next down-gradient check dam in the drain. The centre of the check dam will be approximately 150mm lower than the edges 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.

# Drainage Design Measures

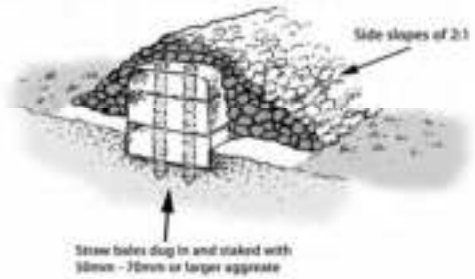
## Interceptor Drain



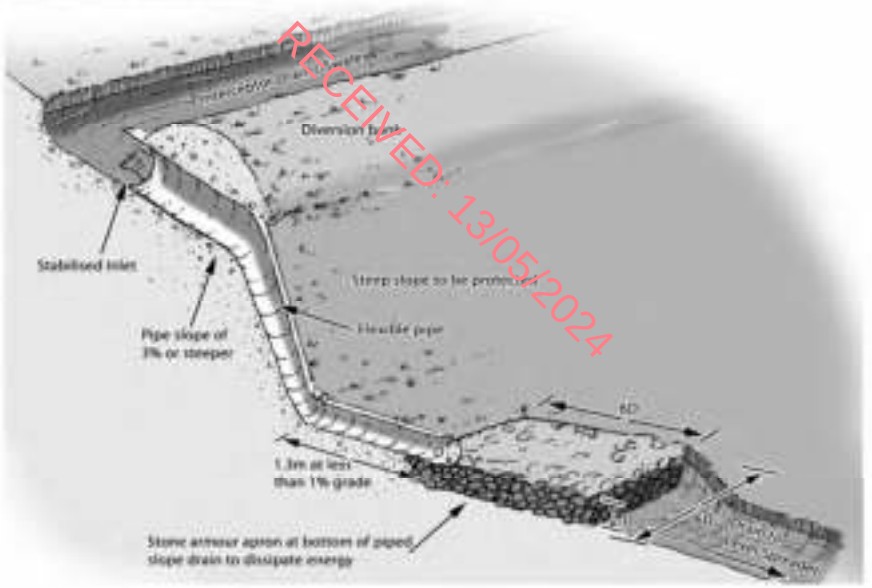

## Check Dam (Stone Dam in Drain)

## Check Dam

(Straw Bale & Stone Dam - Cross Section)

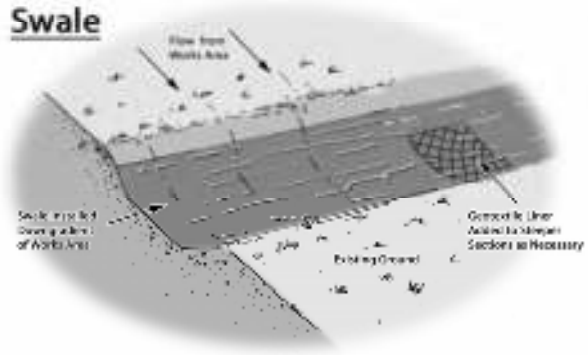



## Slope Pipe Drain

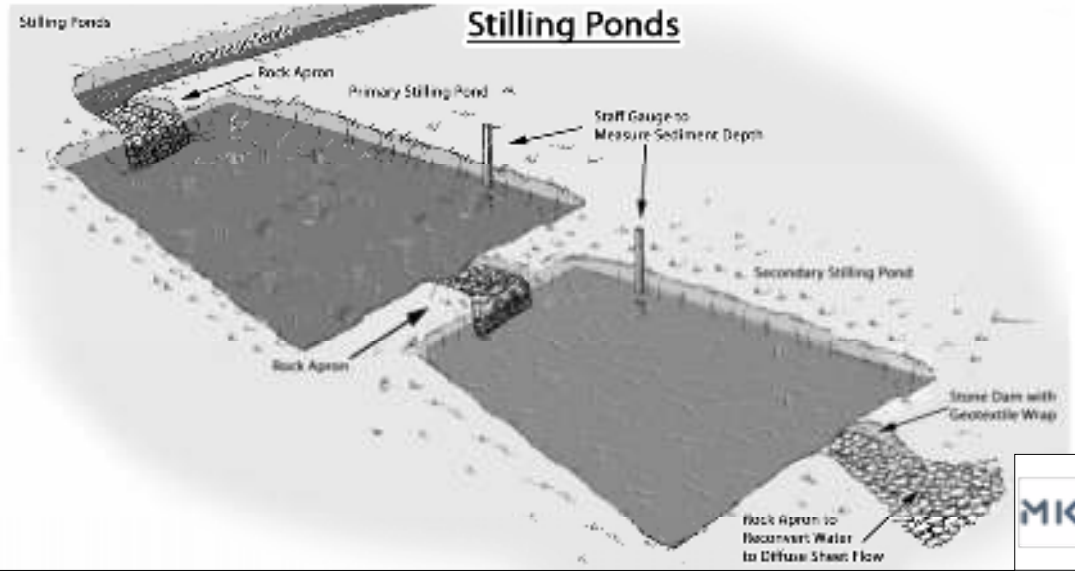




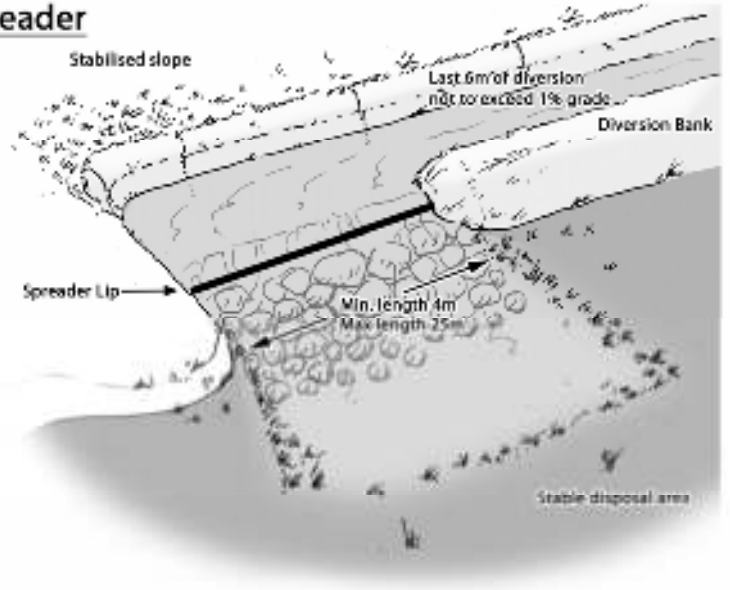

## Swale




## Stilling Ponds




## Level Spreader

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|---|---|---|---|
| MAP TITLE: **Drainage Design Illustrations** | | MAP NO.: **Figure 4-28** | SCALE: **NTS** |
| PROJECT TITLE: **Seskin Wind Farm, Co. Carlow** | | | DATE: **25.04.2024** |
| DRAWING BY: **Catherine Johnson** | CHECKED BY: **Ellen Costello** | ISSUE NO.: **220246 - 2024.04.25- F** | |

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### 4.7.4.4 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 4-28, below, 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 (see Section 4.7.4.5 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.

### 4.7.4.5 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 4-28, 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 drain at the top of the pipe will be repaired promptly.



#### 4.7.4.6 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.

#### 4.7.4.7 Stilling Ponds (Settlement Ponds)

Stilling ponds will be used to attenuate runoff from works areas of the site of the Proposed Project 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 4-28, 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.

#### 4.7.4.8 Siltbuster

A "siltbuster" or similar equivalent piece of equipment will be available to filter any water pumped out of excavation areas, if necessary, prior to its discharge to stilling ponds or swales.

Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. The mobile units are specifically designed for use on construction sites.

The unit stills the incoming water/solids mix and routes it upwards between a set of inclined plates for separation. Fine particles settle onto the plates and slide down to the base for collection, whilst treated water flows to an outlet weir after passing below a scum board to retain any floating material. The inclined plates dramatically increase the effective settling area of the unit giving it a very small footprint on site and making it highly mobile. Figure 4-29 below shows an illustrative diagram of the Siltbuster.

The Siltbuster units are now considered best practice for the management of dirty water pumped from construction sites. The UK Environment Agency and the Scottish Environmental Protection Agency have all recommended/specified the use of Siltbuster units on construction projects.

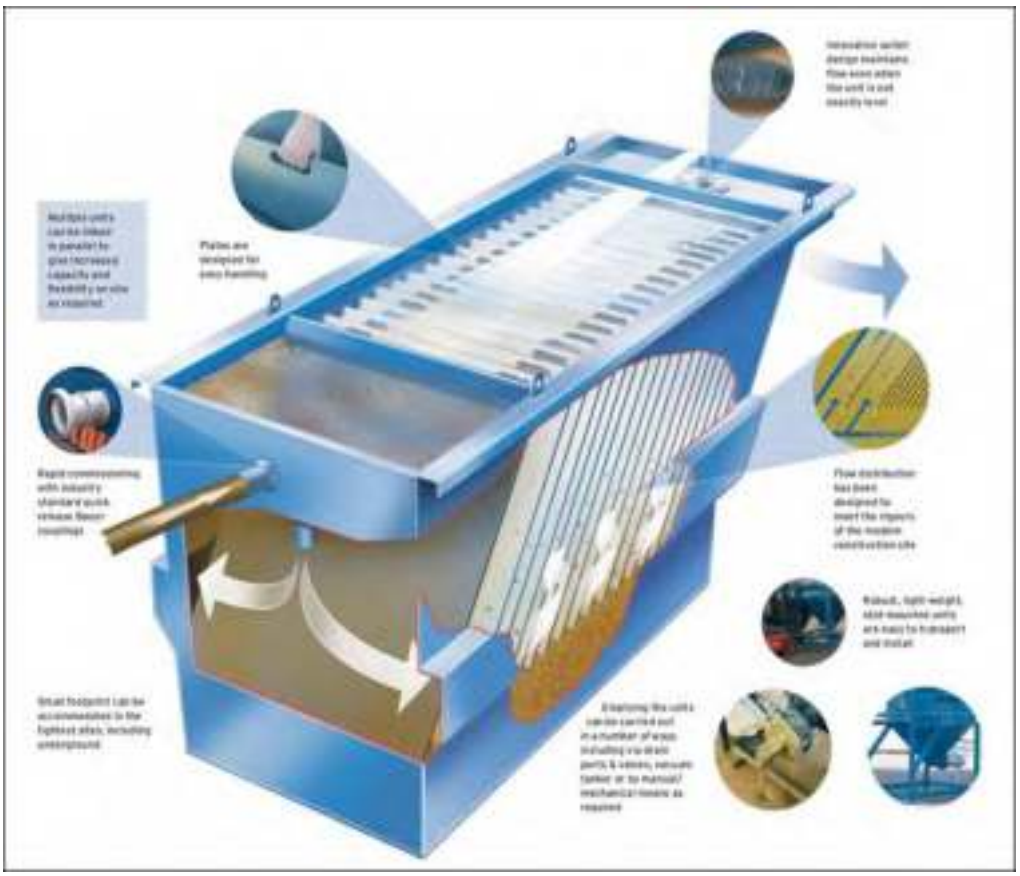


*Figure 4-32 Siltbuster (Source: https://www.siltbuster.co.uk/sb_prod/siltbuster-fb50-settlement-unit/)*

### 4.7.4.9 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 4-5 and Plate 4-6 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.

*Plate 4-5 Silt bag with water being pumped through*

*Plate 4-6 Silt bag under inspection*

### 4.7.4.10 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.

### 4.7.4.11 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 some cases, two or more smaller diameter culverts may be used where this depth is limited, though this will be avoided as they will have a higher associated risk of blockage than a single, larger pipe. 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.



#### 4.7.4.12 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 or 100m buffer zone of a lake, 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 9-1.

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.

#### 4.7.4.13 Hydrocarbon Interceptors

A hydrocarbon (or petrol) interceptor is a trap used to filter out 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) or where it is proposed to park vehicles during the construction and operational phases of the Proposed Project (i.e., construction compounds and substation compound).

#### 4.7.4.14 Forestry Felling Drainage

As part of the Proposed Project, tree felling will be required within and around Proposed Project footprint to allow for the construction of the turbine bases, access roads underground cabling, and the other ancillary infrastructure.

Tree stumps will only be removed in areas around the Proposed Wind Farm footprint. 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 Section 9.5.2.1 of Chapter 9 Water 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, 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 on site 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 site 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 Section 9.5.2.1 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. Straw bales and 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.

### 4.7.5 Cable Trench Drainage

Cable trenches are developed in short 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 upgradient side of the trench. Should any rainfall cause runoff from the excavated material, the material is 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 used for landscaping and reinstatements of other areas elsewhere on site or disposed off-site at an appropriate licensed soil recovery facility.

On steeper slopes, silt fences, as detailed in Section 4.7.4.12, 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.

### 4.7.6 Site and Drainage Management

#### 4.7.6.1 Preparative Site Drainage Management

All materials and equipment necessary to implement the drainage measures outlined above, will be brought on-site in advance of any works commencing. An adequate amount of straw bales, clean stone, terram, stakes, etc will be kept on site at all times to implement the drainage design measures as

necessary. The drainage measures outlined in the above will be installed prior to, or at the same time as the works they are intended to drain.



#### 4.7.6.2 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 in particular, working under a schedule of works operation system (SOWOR) system as proposed in the planning application. 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.

#### 4.7.6.3 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 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.

### 4.7.7 Drainage Maintenance

An inspection and maintenance plan for the drainage system onsite 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.

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 be 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.

## 4.7.8 Construction Phasing and Timing

It is estimated that the construction phase of the Proposed Project will take approximately 18-24 months from starting on site to the commissioning of the electrical system. Works will commence outside the bird nesting season (1st of March to 31st of August inclusive) if possible. Any requirement for construction works to commence or run into the breeding season following commencement will be informed by pre-construction bird surveys.

## 4.7.9 Construction Sequencing

The construction phase can be broken down into three main phases, which overlap partially and will take approximately 18-24 months to complete 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 roads to temporary compound.
- Clear and hardcore area for temporary site offices. Install same.
- Construct bunded area for oil storage.
- Construct new site roads and hard-standings and crane pads.
- Construct drainage ditches, culverts etc. integral to road construction.
- Excavate for turbine bases. Place blinding concrete to turbine 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 1-2 days.
- Excavate trenches for site cables, lay cables and backfill. Provide ducts at road crossings.
- Backfill tower 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

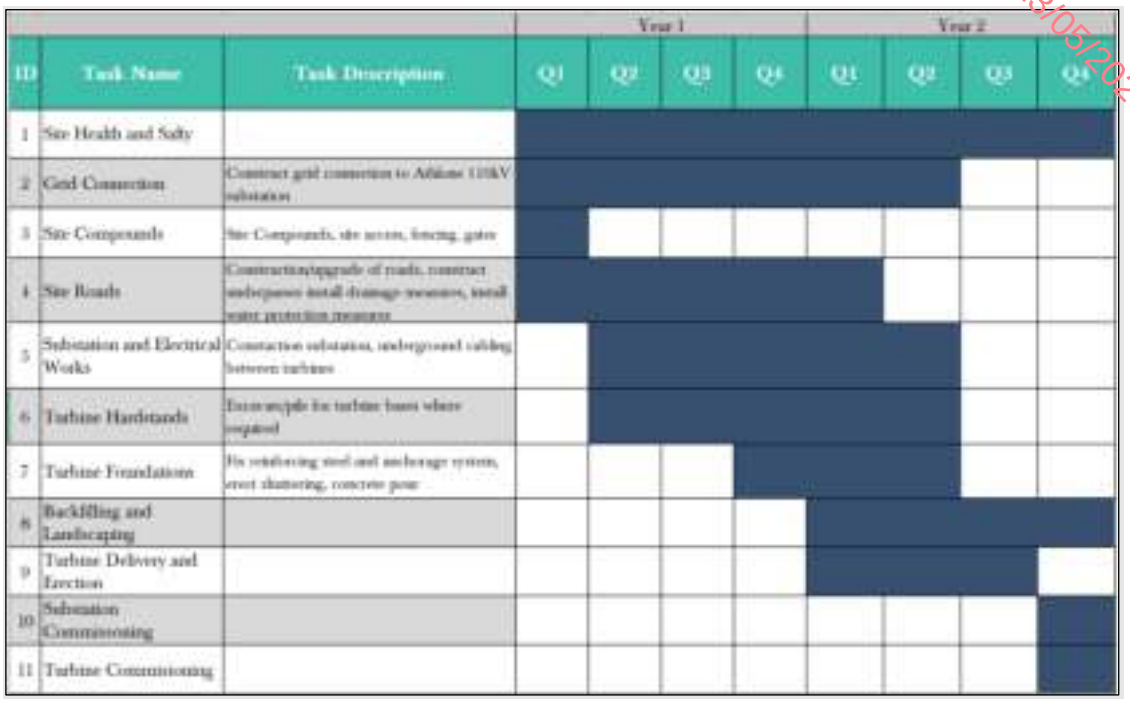
- Construct bases/plinths for substation building.
- Install external electrical equipment at substation.
- Install transformer at compound.
- Erect stock proof and palisade fencing around substation area.
- Install internal collector network and communication cabling.
- Construct grid connection cabling.

Turbine and Meteorological Mast Erection

- Erect towers, nacelles and blades.
- Complete electrical installation.
- Grid connection.
- 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.

The phasing and scheduling of the main construction task items are outlined in Figure 4-33 below, where the 1st of January has been selected as an arbitrary start date for construction activities.



| | | | Year 1 | | | | Year 2 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| ID | Task Name | Task Description | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| 1 | Site Health and Safty | | | | | | | | | |
| 2 | Grid Connection | Connect grid connetion to Athlone 110kV substation | | | | | | | | |
| 3 | Site Compounds | Site Compounds, site access, fencing, gates | | | | | | | | |
| 4 | Site Roads | Construct/upgrade of roads, construct underpasses install drainage measures, install water protection measures | | | | | | | | |
| 5 | Substation and Electrical Works | Construct substation, underground cabling between turbines | | | | | | | | |
| 6 | Turbine Hardstands | Excavate/pile for turbine bases where required | | | | | | | | |
| 7 | Turbine Foundations | Fix reinforcing steel and anchorage system, erect shuttering, concrete pour | | | | | | | | |
| 8 | Backfilling and Landscaping | | | | | | | | | |
| 9 | Turbine Delivery and Erection | | | | | | | | | |
| 10 | Substation Commissioning | | | | | | | | | |
| 11 | Turbine Commissioning | | | | | | | | | |

*Figure 4-33 Indicative Construction Schedule*

## 4.7.10 Construction Phase Monitoring and Oversight

The requirement for a Construction and Environmental Management Plan (CEMP) to be prepared in advance of any construction works commencing on any development site and submitted for agreement to the Planning Authority is now well-established. The proposed procedures for the implementation of the mitigation measures outlined in such a CEMP and their effectiveness and completion is typically audited by the Ecological Clerk of Works (ECoW) on behalf of the Project Developer, in an and objective manner. The basis for auditing is presented in Section 6 of the CEMP which effectively lists all mitigation measures prescribed in any of the planning documentation. 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 effectiveness of the mitigation measures has to be the subject of regular review and audit during the full construction stage of the project. If some 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 findings of the audit. 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 4-4 of this EIAR. The CEMP includes details of drainage, spoil management, waste management etc, and describes how the above-mentioned audit will function and how the findings are 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 compiled in Section 6 of the CEMP. 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

## 4.8.1 Keyhole Forestry Felling

As part of the Proposed Project, keyhole felling of forestry will be required within and around the development footprint to enable the construction of turbine bases, access roads and the other ancillary infrastructure. Felling is also required around turbine bases for the reduction of potential effects on bats (refer to Appendix 6-2 of this EIAR). A total of 19 hectares of forestry will be permanently felled within and around the footprint of the Proposed Wind Farm in order to facilitate infrastructure construction and turbine erection.

The proposed methodology for the forestry felling activities is as follows:

Felling works will conform to current best practice Forest Service policies and strategic guidance documents as well as Coillte produced guidance documents, including the specific guidelines listed below, to ensure that the felling works provides minimal potential impacts to the receiving environment.

- 'Standards for Felling and Reforestation' (Department of Agriculture, Food and the Marine, 2019)
- 'Forest Operations & Water Protection Guidelines' (Coillte, 2009)
- 'Methodology for Clear Felling Harvesting Operations' (Coillte, 2009)
- 'Forestry and Water Quality Guidelines' (Forest Service, 2000)
- 'Forestry Biodiversity Guidelines' (Forest Service, 2000)
- 'Forestry Protection Guidelines' (Forest Service, 2002)
- 'Forestry Harvesting and Environmental Guidelines' (Forest Service, 2000)

The proposed methodology for the forestry felling activities is as follows:

- The extent of all necessary forestry felling areas will be identified and demarcated with markings on the ground in advance of any felling commencing.
- All roads and culverts will be inspected by the ECoW and contractor prior to any machinery being brought on site to commence the felling operation.
- Existing drains that drain an area to be felled towards surface watercourses will be blocked, and temporary silt/sediment traps (i.e., check dam / silt fence) 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.
- 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.
- Sediment traps will be sited in drains downstream of felling areas. Machine access will be maintained to enable the accumulated sediment to be excavated.
- Sediment removed from traps will be carefully disposed of in the peat repository areas.
- Machine combinations (i.e., hand-held or mechanical) will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils

disturbance; however, the general proposed machine combination will comprise a harvester and a low-ground pressure harvester with a 14-tonne bunk capacity.
- Trees will be cut manually inside the 50m construction watercourse buffer and using machinery to extract whole trees only;
- Brash mats will be put in place to support vehicles on soft ground, reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur.
- Brash mat renewal will take place when they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting.
- No tracking of vehicles through watercourses will occur. Vehicles will only use existing road infrastructure and established watercourse crossings.
- Brash which has not been pushed into the soil may be moved to facilitate the creation of mats elsewhere within the site.
- 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 prior to removal off site to authorised sawmills.

### 4.8.2 Turbine Foundations

Each of the turbines to be erected on the Proposed Wind Farm site will have a reinforced concrete base that is installed below the finished ground level. The turbine foundation may be formed using piling methods or on competent strata (i.e., bedrock or subsoil of sufficient load bearing capacity). Where the ground conditions do not have a competent stratum of sufficient load bearing capacity, piling methods will be utilised. Overburden will be stripped off the foundation area to a suitable formation using a 360° excavator and will be stored locally for later reuse in backfilling around the turbine foundation. A two-metre-wide working area will be required around each turbine base, 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 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 clause 804 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 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 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 blinding 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 Proposed Wind Farm 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 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.



Formwork to concrete bases will be propped/supported sufficiently so as to prevent failure. Concrete for bases 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.

## 4.8.3 Site Roads and Hardstand Areas

### 4.8.3.1 Construction Methodology for Site Roads

#### Construction of New Excavated Roads – Type A

The general construction methodology for upgrading of existing sections of access roads or tracks, as presented in AFRY's *Peat & Spoil Management Plan* in Appendix 4-2 of this EIAR, is summarised below.

1. All the access tracks across the site will be constructed to solid sub-formation. For excavations in peat and spoil, side slopes shall be not greater than 1 (v): 2 or 3 (h). This slope inclination should be reviewed during construction, as appropriate.
2. Where areas of weaker peat are encountered then slacker slopes will be required.
3. New excavated roads constructed through excavation and the removal of organic material and soft subsoil to achieve a suitable formation level.
4. A layer of geogrid or geotextile material will be laid at the formation level to separate the road building material from the subsoil.
5. A minimum of 450mm of granular fill material, such as Class 6F2 stone, will then be placed and compacted in layers, as specified by the detailed designer.
6. The road will then be finished with a 150mm layer of capping material, such as Cl. 804.
7. The finished road width will have a running width of 5m, with wider sections on bends and passing bays.
8. Access road construction will be to the line and level requirements as per design/planning conditions.
9. 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 Section 4 of the CEMP.

Sections of New Excavated Roads – Type A are shown in Figure 4-7 above.

#### Upgrade of Existing Access Roads or Tracks – Type B

The general construction methodology for upgrading of existing sections of access roads or tracks, as presented in AFRY's *Peat & Spoil Management Plan* in Appendix 4-2 of this EIAR, is summarised below.

1. All the access tracks across the site will be constructed to solid sub-formation. For excavations in peat and spoil, side slopes shall be not greater than 1 (v): 2 or 3 (h). This slope inclination should be reviewed during construction, as appropriate.
2. Where areas of weaker peat are encountered then slacker slopes will be required.
3. Upgrading of these existing tracks will involve both widening and resurfacing works, and will typically take place on both sides of the road. However, in areas of steeper slopes, widening of existing tracks will take place on the upslope side of the road.
4. The existing roads will be widened through excavation and the removal of organic material and soft subsoil to achieve a suitable formation level.
5. The new section of the road will be constructed by placing a minimum of 450mm of granular fill material, such as Class 6F2 stone, and compacting it in layers on top of a layer of geogrid or geotextile, depending on site conditions and as specified by the detailed designer.
6. This road construction will be similar in build up to the construction of the Type A - New Excavated Road. The increased road width and the existing road surface, where necessary, will be capped with a 150mm layer of Clause 804 similar material.
7. The finished road width will have a running width of 5m, with wider sections on bends and passing bays.
8. Access road construction will be to the line and level requirements as per design/planning conditions.
9. 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 Section 4 of the CEMP.

Sections of Upgrade of Existing Access Roads or Tracks – Type B are shown in Figure 4 8 above.

### 4.8.4 Proposed Clear-Span Watercourse Crossings

It is proposed to construct a clear-span watercourse crossing along the Proposed Wind Farm site access roads at 2 no. locations using a clear-span bridge. The locations of these crossings are shown on the layout drawings included in Appendix 4-1 of this EIAR.

Clear-Span Watercourse Crossing 1, located at X 662895, Y 668307 will include for the removal of an existing degraded culvert crossing. The construction methodology for the removal of the degraded culvert and concrete slab is as follows:

- Prior to any works commencing, Inland Fisheries Ireland (IFI) will be consulted to inform detailed design of the culvert removal.
- These works will only be carried out during the period permitted by Inland Fisheries Ireland for in-stream works according to the IFI (2016) guidance document “Guidelines on protection of fisheries during construction works in and adjacent to waters”, i.e., July to September inclusive. This time period coincides with the period of lowest expected rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses (any deviation from this will be done in discussion with the IFI);
- Timing of these works will be planned based on expected weather within the optimum period of July to September, ground conditions and current flow in the drainage ditch, to minimise construction period and disturbance to any potential downstream aquatic environment. It was noted that during the summer period in 2022 and 2023, when this watercourse was visited this drainage channel was running dry, so this would indicate that this would be the optimum period for removal of the existing culvert and installation of new culvert.
- The existing 450mm culvert is proposed to be replaced with a clear span bottomless culvert which will be agreed with the OPW/IFI prior to any works commencing.
- The Project Engineer will set out the works area.
- The works area will be fenced off with post and rope to demarcate the works area.

- The centre line of the new culvert will be set out by the engineer on both upstream and downstream sides
- The topography and ground conditions will be reviewed at the location. Safe access will be provided for all operatives. This may involve the creation of ramps, temporary walkways etc.
- Pumping equipment will be set up at the upstream end of the works area. The hose will have a suction head fitted which will reduce the possibility of any aquatic species that may be present being sucked into the pump. Additionally, the hose will be positioned to one side of the channel and surrounded by clean stone offering further protection. The delivery hose shall be laid out across the road, which shall discharge, re-entering the watercourse downstream of the works area on the opposite side of the road.
- The delivery line may need to be undergrounded across the access track to allow site traffic to access the works area.
- A dam will be constructed at the upstream end by an excavator placing impermeable 1m3 sandbags within the drainage channel. These can be supplemented with smaller sandbags to plug any gaps.
- Water will be allowed to partially self-empty from the isolated section. If the drainage channel is deemed to be fisheries sensitive, a smaller dam will then be placed at the downstream end before the section completely empties out. Following agreement with IFI, this isolated section will then be electrofished to ensure there are no fish stranded. Once the presence of fish has been ruled out, the section can be fully dewatered. A pump may be used to aid this if necessary.
- Water will be over pumped and discharged to an approved location downstream.
- Clean stone may be used at the discharge point to protect the drainage channel against scouring. It will also act to filter silty water arising from dam installation and removal afterwards.
- A suitable sized excavator will then commence the initial excavation down to the top of the existing structure.
- The excavation of the culvert works will continue by excavating out the existing concrete piped culvert to the existing formation.
- The excavated culvert and associated structure will be loaded into a dumper and transported to a suitable disposal area.
- Any suitable materials from the drainage channel bed will be removed and stockpiled for reinstatement in the new bed upon completion of the construction works.
- The strip foundations for the new bottomless culverts will be prepared to line and level.
- The bottomless culvert units will be lifted into place by an excavator. A banksman will be in place to guide this operation.
- Tag lines will be set up on all units being lifted to provide protection to the banksman and other operatives.
- Backfilling with 6N stone can begin. This will be placed in layers, levelled, and compacted.
- Selected rock armour will be installed as wingwalls on the upstream and downstream sides
- The new bed will be reinstated with previously stockpiled material to ensure uniformity of the drainage channel bed.
- Once completed, the upstream dam will be slowly removed, and the drainage channel will be allowed to run through the new culverts. The over-pumping equipment will be de-mobilised.
- The access roads will be reinstated as per agreed design

Following removal of degraded culvert and concrete slab, Clear-Span Watercourse Crossing 1 will be installed using the methodology outlined below. Clear Span Watercourse Crossing 2 is located at X 663551, Y 669642 and will also be installed using the methodology outlined below.

The standard construction methodology for the installation of a clear-span bridge 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 the 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 box 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.
- Where the box culvert is installed in sections, the joints will be sealed to prevent granular material entering 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.

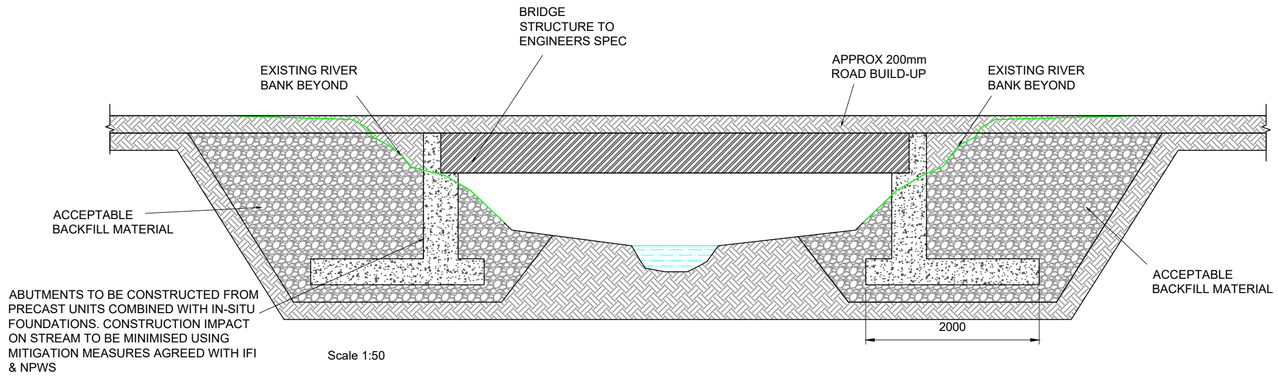
A standard design drawing of a pre-cast concrete, clear span crossing is shown in Figure 4-31.

The clear-span watercourse crossing methodologies presented will ensure that no instream works are necessary.

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 location will be carried out by the Project Civil/Structural Engineer and the Project Hydrologist prior to the construction of the crossing.




Scale 1:50

Figure 4-31

| | | | |
|---|---|---|---|
| PROJECT TITLE: **EDF Seskin Wind Farm Co. Carlow / Co. Kilkenny** | | | |
| DRAWING TITLE: **Clear Span Watercourse Crossing** | | | |
| PROJECT No.: **220246** | | DRAWING No.: **220246 - 18** | SCALE: **1:50 @ A2** |
| DRAWN BY: **GO** | CHECKED BY: **JW** | DATE: **03.05.2024** | REVISION.: P01 |

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

## 4.8.5 Site Underground Electrical and Communication Cabling

The transformer in each turbine is connected to the onsite substation through a network of buried electrical cables. 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 cables and the surface (see Plate 4-7 below illustrating an example of a single cable trench). On completion, the ground will be reinstated as previously described above. The route of the cable will follow the access tracks as illustrated on the site layout drawings included as Appendix 4-1 of the EIAR. The cabling may be located on either side of the road and/or within the road footprint.

*Plate 4-7 Standard Cable Trench View*

## 4.8.6 Onsite Electricity Substation and Control Buildings

The proposed onsite substation will be constructed by the following methodology:

- The area of the onsite substation will be marked out using ranging rods or wooden posts and the soil and overburden stripped and removed to a nearby spoil management area for later use in landscaping. Any excess material will be sent to one of the on-site spoil management areas.
- The dimensions of the onsite substation area have been designed to meet the requirements of the ESB and the necessary equipment to safely and efficiently operate the Proposed Wind Farm;
- 1 no. control buildings will be built within the onsite 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 electrical equipment will be installed and commissioned.
- Perimeter fencing will be erected.
- The construction and components of the substation are to ESB specifications.

## 4.8.7 Temporary Construction Compounds

The temporary construction compounds will be constructed 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 substation platform as discussed in Section 4.7.6 above;
- 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 on the Proposed Wind Farm site and for the grid connection in appropriately bunded containers and a bunded area for oil storage will be constructed within the compound.
- Areas within the compound will be constructed as site roads and used as vehicle hardstanding's 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,
- Upon completion of the Proposed Project the temporary construction compounds will be decommissioned and allowed to vegetate naturally.

## 4.8.8 Grid Connection Cabling Trench

### 4.8.8.1 Underground Cabling Trench

The Proposed Grid Connection Route cabling works will consist of the installation of 3 No. 110mm diameter power ducts, and 1 No. 110mm fibre communications ducts to be installed in an excavated trench, 600mm wide by 1,220mm deep, with variations in trench design adapting to bridge, service and watercourse crossings. The power cable ducts will accommodate the power cables and the communications duct will accommodate a fibre cable to allow communications between the proposed 38kV onsite substation and the existing 110kV Kilkenny substation.

The ducts will be installed, and the trench will be reinstated in accordance with the relevant Local Authority specifications, and then the electrical cabling/fibre cable is pulled through the installed ducts in approximately 1000/1150m sections. Construction methodologies to be implemented and materials to be used will ensure that the Proposed Grid Connection Route works is installed in accordance with the requirements and specifications of ESB.

The underground cabling required to facilitate the Proposed Grid Connection Route will be laid beneath the surface of the internal site road network and public road using the methodology outlined in detail in Section 4 of TLI Group's *Seskin Wind Farm 38kV Grid Connection – Construction*

*Methodology* which is included as Appendix 4-7 of this EIAR. This Appendix includes for two Construction Methodology Reports, one for the section of the Proposed Grid Connection Route in Kilkenny, and one for the section of the Proposed Grid Connection Route in Carlow.



#### 4.8.8.2 Existing Underground Services

Any underground services encountered along the Proposed Grid Connection 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.

#### 4.8.8.3 Joint Bays

Joint bays are typically pre-cast concrete chambers where lengths of cable will be joined to form one continuous cable. The Construction Methodology provided by TLI (Appendix 4-7) states that the joint bays will be located at various points along the ducting route generally between 1000 to 1150 metres intervals or as otherwise required by ESB and electrical requirements. Joint Bays are typically 2.03m x 4.5m x 1.475m 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. Mitigation measures will be implemented throughout the construction process to ensure the installation and construction of the joint bays does not impact nearby protected structures and/or watercourses.

In association with Joint Bays, Communication Chambers are required at every joint bay location to facilitate communication links between the onsite 38kV substation and the existing Kilkenny 110kV substation. Earth Sheath Link Chambers are also required approximately every second joint bay along the Proposed Grid Connection Route. Communication Chambers will typically be pre-cast concrete structures with an access cover at finished surface level. The locations of the joint bays and chambers are shown in Appendix 4-1.

The precise siting of all Joint Bays, Earth Sheath Link Chambers and Communication Chambers within the corridor assessed is subject to approval by ESBN and EirGrid.

#### 4.8.8.4 Underground Cable Watercourse/Culvert/Service Crossings

The Proposed Grid Connection Route will involve 7 No. bridge crossings, all of which will involve Horizonal Directional Drilling (HDD). HDD is deployed where there is insufficient depth and width available on the bridge. The HDD methodology is outlined in detail in Section 5 of both reports included in Appendix 4-7 of the EIAR and an illustration of the same is shown in Figure 4-32 below. The detailed bridge crossing drawings are included in Appendix 4-1 as part of the TLI drawing pack.

- **Bridge 1** is located along the L2627, imagery of the bridge and proposed work is outlined in Figures 12 and 13 of the Kilkenny Report in Appendix 4-6. Insufficient clearance exists within the bridge structure and therefore the bridge will be crossed utilising the HDD method.
- **Bridge 2** is located along the L2627, imagery of the bridge and proposed work is outlined in Figures 14 and 15 of the Kilkenny Report in Appendix 4-6. Insufficient clearance exists within the bridge structure and therefore the bridge will be crossed utilising the HDD method.
- **Bridge 3** is located along the L2627, imagery of the bridge and proposed work is outlined in Figures 16 and 17 of the Kilkenny Report in Appendix 4-6. The Bridge has insufficient room to install the cable to ESB specifications (300mm cover) and the suitability of the bridge is inadequate to accommodate the scope of works, therefore HDD will be required.
- **Bridge 4** crosses a small stream along the L2627, imagery of the bridge and proposed work is outlined in Figures 18 and 19 of the Kilkenny Report in Appendix 4-6. The Bridge has insufficient room to install the cable to ESB specifications (450mm cover) and the suitability of the bridge is inadequate to accommodate the scope of works. HDD will be implemented to bore approximately 1500mm beneath the waterway and bridge foundations.
- **Bridge 5 (Kane's Bridge)** is located along the L-2627, imagery of the bridge and proposed work is outlined in Figures 20 and 21 of the Kilkenny Report in Appendix 4-6. Insufficient clearance exists within the bridge structure and therefore the bridge will be crossed utilising the HDD method.
- **Bridge 6 (Philips Bridge)** is located along the L30371, imagery of the bridge and proposed work is outlined in Figures 22 and 23 of the Kilkenny Report in Appendix 4-6, and Figures 10 and 11 of the Carlow Report in Appendix 4-6. Insufficient clearance exists within the bridge structure and therefore the bridge will be crossed utilising the HDD method.
- **Bridge 7** is located on the L30371, imagery of the bridge and proposed work is outlined in Figures 12 and 13 of the Carlow Report in Appendix 4-6. Insufficient clearance exists within the bridge structure and therefore the bridge will be crossed utilising the HDD method.

Crossing existing culverts will be implemented using open trenching with either an undercrossing or an overcrossing, depending on the depth of the culvert. The Proposed Grid Connection Route will include for 3 no. culvert crossing locations which will be crossed via a flat formation undercrossing. These culverts will remain in place and the ducting will be installed beneath / adjacent to these culverts to provide minimum separation distances in accordance with ESB and Úisce Éireann specification. Where the Proposed Grid Connection Route intersects with existing watercourses, a detailed construction method statement will be prepared by the Contractor prior to the commencement of construction and is to be approved by the relevant Local Authority and relevant environmental agencies.

The bridge and culvert crossing locations are shown below in Figure 4-33, and in further detail in the following drawings included in Appendix 4-1:

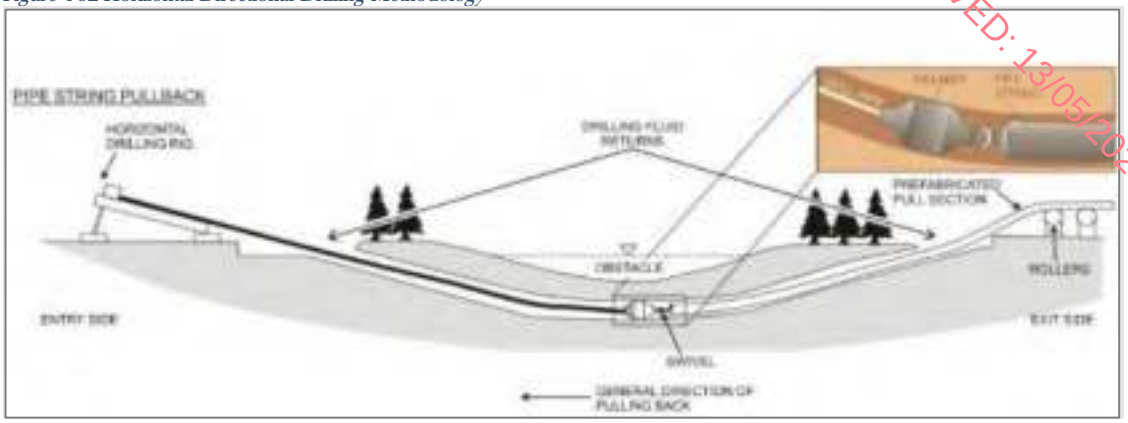
- Bridge 1: Drawing No. 05908-DR-131
- Bridge 2: Drawing No. 05908-DR-132
- Bridge 3: Drawing No. 05908-DR-133
- Bridge 4: Drawing No. 05908-DR-134
- Bridge 5: Drawing No. 05908-DR-135
- Bridge 6: Drawing No. 05908-DR-136
- Bridge 7: Drawing No. 05-908-DR-137
- Culvert/Service Crossing: 05908-DR-126

Inland Fisheries Ireland have published guidelines relating to construction works along water bodies entitled "*Requirements for the Protection of Fisheries Habitats during Construction and Development*

*Works at River Sites*", and these guidelines will be adhered to during the construction of the Proposed Project .



*Figure 4-32 Horizontal Directional Drilling Methodology*






Map Legend

- EIAR Site Boundary
- Proposed Grid Connection Cable Route
- Proposed Onsite 38kV Substation and Battery Storage Compound
- Kilkenny 110kV Substation

Bridge and Culvert Crossing Locations

- Bridge Crossing
- Culvert Crossing



Drawing Title
Grid Connection Cable Route Bridge and Culvert Crossings

Project Title
Seskin Wind Farm, Co. Carlow

| Drawn By | Checked By |
|---|---|
| EC | EC |
| Project No. 220246 | Drawing No. Figure 4-33 |
| Scale 1:55,000 | Date 2024-01-30 |

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## 4.8.9 Carriageway Strengthening Works at the Black Bridge

The Black Bridge carriageway strengthening, and parapet works will be carried out using the following methodology:

### Rubbing Strips

- Holes will be drilled into the existing concrete rubbing strips for short steel dowels in accordance the final design, these will be set in place using cementitious grout.
- Circa 100mm high shutters will be fixed in place on the existing rubbing strips and concrete poured to the desired height.
- The concrete mix design will be per the agreed specifications and vibrated to remove air and compact the concrete using suitable “poker” units driven electricity or by compressed air.
- The shutters will be tripped and removed when the concrete has cured sufficiently.

### Transverse Beams

- The top 50mm of the existing road surface will be removed by mechanical planer and the resulting material removed to a licenced waste facility.
- At the specified locations the road surface will be cut and excavation formed to accommodate beams on which the concrete slab will rest.
- Formwork and any necessary reinforcing steel per the final design will be placed in the excavation to provide for the desired final profile and both beams will be poured in one operation.
- The formwork will be stripped only when the concrete has sufficiently cured.
- The remaining road surface will be swept clean by a mechanical sweeper.
- C503 steel mesh will be laid with the bars at 100m centres laid longitudinally along the bridge. Adjoining sheets will be overlapped by the recommended amount.
- The newly installed rubbing strips will be used to rest a concrete tamp beam from one side of the road to the other, concrete from a mixer truck will be discharged onto the road surface and the mesh lifted onto spacer blocks to give the correct final cover to the bars.
- As the concrete is laid it will be screeded by the tamp beam to the correct level and be vibrated to remove air and compact the concrete using suitable “poker” units driven electricity or by compressed air.
- Works will progress from one end of the ridge to the other in one continuous operation.

### Parapet Works

- Once the concrete slab has sufficiently cured teams of stone masons, using hand held and mechanical tools, will work along both parapet walls removing mortar from the individual stones, where necessary these will be removed to a level where additional stone can be laid in place to increase the parapet height to 1.25m above the concrete rubbing strip.
- When all works to the parapet are complete and the slab has had sufficient time to cure tarmacadam to an agreed design will be laid by Blaw-Knox or similar paving machine to a compacted depth of 50mm. A soon as practicable white lines will be placed along the centre of the road and the structure returned to normal use.

The Black Bridge carriageway strengthening works will be carried out 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.



A detailed Architectural Assessment will be carried out by the Project Archaeologist/Conservation Architect prior to any construction works, and agreed with the Local Authorities. Construction phase mitigation is identified in Chapter 13 of this EIAR: Cultural Heritage and detailed in the CEMP included as Appendix 4-4.

## 4.9 Operation

The Proposed Wind Farm is expected to have a lifespan of approximately 35 years. As part of the Proposed Wind Farm planning application, permission is being sought for the full operational life of the Proposed Project. 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 wind turbines will be connected together, and data relayed from the wind turbines to a central control unit at the on-site substation which will facilitate off-site remote monitoring of the wind farm. Each turbine will be monitored off-site by the appointed Operations and Maintenance contractor (typically the wind turbine manufacturer) and also 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.

### 4.9.1 Maintenance

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

The onsite 38kV substation and site tracks will also require periodic maintenance. The onsite substation and battery energy storage system 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 Route infrastructure is minimal, the impacts associated with traffic volumes for this period are assessed in Chapter 15 Material Assets: Traffic and Transport.



### 4.9.2 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 brief summary of the key information is provided below:

- Monthly sampling and laboratory analysis will be undertaken for 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 which includes breeding bird surveys, winter roost surveys and corpse searching on the site determine the level of fatalities for the site as a result of collisions with the installed turbines. These surveys will be completed in accordance with guidelines issued by the Scottish Natural Heritage (SNH, 2009)
- Post-construction bat monitoring will be undertaken for at least three years' post construction of the renewable energy development. The monitoring will also include corpse searching in the areas surrounding the turbines to gather data on any actual collisions.
- Post-construction linear habitat restoration monitoring following the main growing season (i.e., in September) in a given year for the first five years of growth
- Monitoring for shadow flicker at properties where any exceedance of the shadow flicker limit has been predicted as outlined in Chapter 5.
- Post turbine commissioning noise monitoring.

## 4.10 Decommissioning

The wind turbines proposed as part of the Proposed Wind Farm site 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 may be decommissioned fully.

Upon decommissioning of the Proposed Wind Farm, the wind turbines will be disassembled in reverse order to how they were erected. The turbines will be disassembled with a similar model of crane that was used for their erection. The turbine will likely be removed from site using the same transport methodology adopted for delivery to site initially. The turbine materials will be transferred to a suitable recycling or recovery facility.

The underground electrical cabling connecting the turbines to the on-site substation will be removed from the cable ducts and any direct buried cables will be cut and left in situ. 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.

All above ground turbine components would be separated and removed off-site for recycling. Turbine foundations would remain in place underground and would be covered with earth and reseeded as appropriate. Leaving the turbine foundations in-situ is considered a more environmentally prudent

option, as to remove that volume of reinforced concrete from the ground could result in unnecessary environment emissions such as noise, dust and/or vibration.



Site roadways could be in use for purposes other than the operation of the Proposed Project by the time the decommissioning of the Proposed Wind Farm site is to be considered, and therefore it may be more appropriate to leave the site roads in situ for future use. It is envisaged that the roads will provide a useful means of extracting the commercial forestry crop which exists on the site, and as agricultural roads.

The Proposed Grid Connection Route and onsite substation will remain in place as it will be under the ownership and control of the ESB Networks and/or EirGrid, and will form a permanent part of the national electricity grid. The battery energy storage system will remain in place.

A Decommissioning Plan has been prepared (Appendix 4-8) the detail of which will be agreed with the local authority prior to any decommissioning. 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 Project 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 Project, 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".*