

4.

## DESCRIPTION OF THE PROPOSED DEVELOPMENT

4.1

### Part 1: Introduction

This section of the Environmental Impact Assessment Report (EIAR) describes the development and its component parts (the 'Proposed Development') including the works subject of two proposed applications for planning permission to An Bord Pleanála.

The Chapter is divided into six sections, as outlined below:

- Part 1 sets out the two proposed applications and the nature and extent of the overall project.
- Part 2 sets out the elements of the Wind Farm Site which is subject to the Section 37E planning application including the construction methodologies.
- Part 3 sets out the elements of the Grid Connection which is subject to the Section 182A planning application including the construction methodologies.
- Part 4 sets out a programme for the timing of the works and the construction management proposals for the Wind Farm and Grid Connection.
- Part 5 provides a description of the operational phase for the Wind Farm and Grid Connection.
- Part 6 provides a description of the decommissioning phase for the Wind Farm and Grid Connection.

The full description of the Proposed Development, as per the public planning notices is as follows:

#### An Bord Pleanála – Planning Notice Project Description – Wind Farm Site

- i. Construction of 9 no. wind turbines with a blade tip height range from 179.5m to 185m inclusive, a hub height range from 102.5m to 110.5m inclusive and a rotor diameter range from 149m to 163m inclusive with associated foundations, hard-standing and assembly areas.*
- ii. Construction of 1 no. permanent 110 kV electrical substation including 2 no. control buildings, lightning protection, welfare facilities, car parking, and all associated electrical plant and apparatus, security fencing, external lighting, underground cabling, wastewater holding tank and all associated infrastructure, apparatus and landscaping;*
- iii. Underground electrical cabling (33kV) and communications cabling connecting the wind turbines to the proposed on-site 110kV electrical substation and associated ancillary works;*
- iv. Erection of 1 no. Meteorological Mast of 105 metres above existing ground level for the measuring of meteorological conditions, including a lightning rod which will extend above the mast ;*
- v. Construction of new permanent access roads and upgrade of existing roads to provide access within the site and to connect the wind turbines and associated infrastructure;*
- vi. Construction of 1 no. new permanent access to the site off the R465 regional road to serve as the sole entrance to the wind farm during its operational phase and to facilitate the delivery of the construction materials and turbine components to site during the construction, operational and decommissioning phases;*
- vii. Construction of 2 no. new permanent access points off the L-3042 and L-30144-0 local roads to facilitate traffic movement across the site during construction, operation and decommissioning phases. Both accesses will be gated and opened when required during the operational phase;*

- viii. Development of 5 no. borrow pits;*
- ix. Construction of 3 no. temporary construction compounds and associated ancillary infrastructure including temporary site offices, staff facilities and car-parking areas, all to be removed at end of construction phase;*
- x. Temporary works at 3 no. locations along the R465 regional road associated with the facilitation of turbine component and abnormal load delivery to site. These works will primarily include the trimming of vegetation and strengthening of road verges;*
- xi. Installation of a temporary transition compound to facilitate turbine blade delivery during the construction phase, within the townland of Court, Co. Limerick. The works will include installation of a temporary stone hard standing area and associated entrance and egress to and from the N69 national road and will be removed at the end of the construction phase.*
- xii. Permanent amenity works comprising the construction of 1 no. new marked trail, the development of 2 no. new viewing areas and upgrade to 1 no. existing viewing area, including the installation of associated signage and seating;*
- xiii. Permanent and temporary Site Drainage;*
- xiv. Operational Stage Site Signage;*
- xv. Ancillary forestry felling to facilitate construction and operation of the proposed development;*
- xvi. Biodiversity enhancement measures including the permanent clear-felling of land, and;*
- xvii. All related site works and ancillary development including landscaping considered necessary to facilitate the proposed development.*

This application is seeking a ten-year permission and 35 year operational life from the date of commissioning of the wind energy development.

#### An Bord Pleanála – Planning Notice Project Description – Grid Connection

- i. The provision of underground electrical cabling (110kV) from the proposed Knockshanvo Wind Farm development to the existing Ardnacrusha 110kV electrical substation to facilitate the connection to the national grid;*
- ii. Provision of 14 joint bays, communication chambers and earth sheath links along the proposed underground electrical cabling route;*
- iii. Permanent and temporary Site Drainage;*
- iv. Ancillary forestry felling to facilitate construction and operation of the proposed development;*
- v. Reinstatement of land, road and track surface above the proposed cabling trench;*
- vi. All related site works and ancillary development considered necessary to facilitate the proposed development.*

All elements of the overall project, comprising works on the Wind Farm Site, and the Grid Connection route to Ardnacrusha 110kV electrical substation have been assessed as part of this EIAR.

For the purpose of this EIAR, where the ‘Wind Farm Site’ is referred to, this relates to all components within the Wind Farm Application under Section 37E of the Planning and Development Act 2000, as amended, as described above and all associated lands. This is shown on Figure 1-1a of Chapter 1.

Where ‘Grid Connection’ is referred to, this relates to all components within the Grid Connection Application under Section 182A of the Planning and Development Act 2000, as amended, as described above and all associated lands. This is shown on Figure 1-1b of Chapter 1.

Where the ‘Proposed Development’ is referred to, this relates to all the project components described above as part of the Planning Notice Project Descriptions i.e. the Wind Farm Site and Grid Connection.



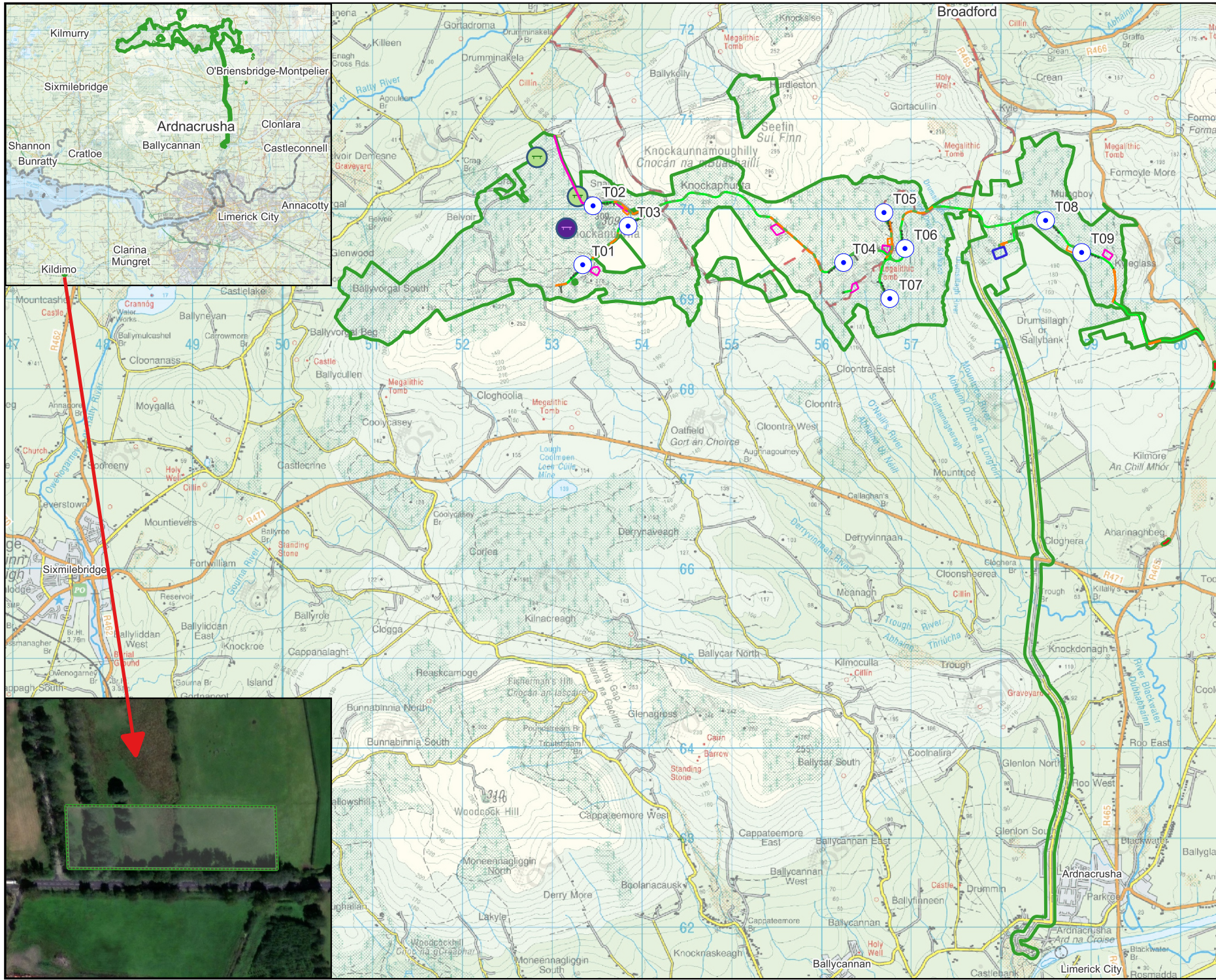
#### 4.1.2

## Development Layout

The layout of the Proposed Development has been designed to minimise the potential environmental effects of the wind farm, while at the same time maximising the energy yield of the wind resource passing over the Wind Farm Site. A constraints study, as described in Section 3.5.1 of this EIAR, has been carried out to ensure that turbines and ancillary infrastructure are located in the most appropriate areas of the Wind Farm Site. The Proposed Development layout makes maximum use of the existing access road and tracks within the site.

The overall layout of the Proposed Development is shown on Figure 4-1. The layout for the Wind Farm Site application under Section 37E of the Planning and Development Act 2000, as amended, is shown in Figure 4-1a. This drawing shows the proposed locations of the wind turbines, electrical substation, borrow pits, temporary construction compounds, internal roads layout, temporary transition compound and the main site entrance. The layout for the Grid Connection Application under Section 182A of the Planning and Development Act 2000, as amended, is shown in Figure 4-1b. Detailed site layout drawings of the Proposed Development are included in Appendix 4-1 to this EIAR.





## Map Legend

- Proposed Development Study Boundary
- Proposed Turbine Layout [9]
- Proposed Turbine Hardstand [9]
- Proposed 110kV Electrical Substation [1]
- Proposed Internal Underground Cabling
- Proposed Permanent Meteorological Mast [1]
- Proposed Upgrade of Existing Roads
- Proposed New Roads
- Proposed Borrow Pit [5]
- Proposed Temporary Construction Compound [3]
- Proposed Amenity Trail
- Proposed Amenity Viewing Area [2]
- Upgraded Amenity Viewing Area [1]
- Proposed Turbine Delivery Overrun Area [3]
- Proposed Turbine Delivery Temporary Transition Compound [1]
- Proposed Security Cabin [1]
- Proposed 110kV Underground Grid Connection Route



Drawing Title

## Proposed Development Layout

Project Title

Knockshanvo Wind Farm

Drawn By

SD

Checked By

EOS

Project No.

200513

Drawing No.

Figure 4-1

Scale

1:55,000

Date

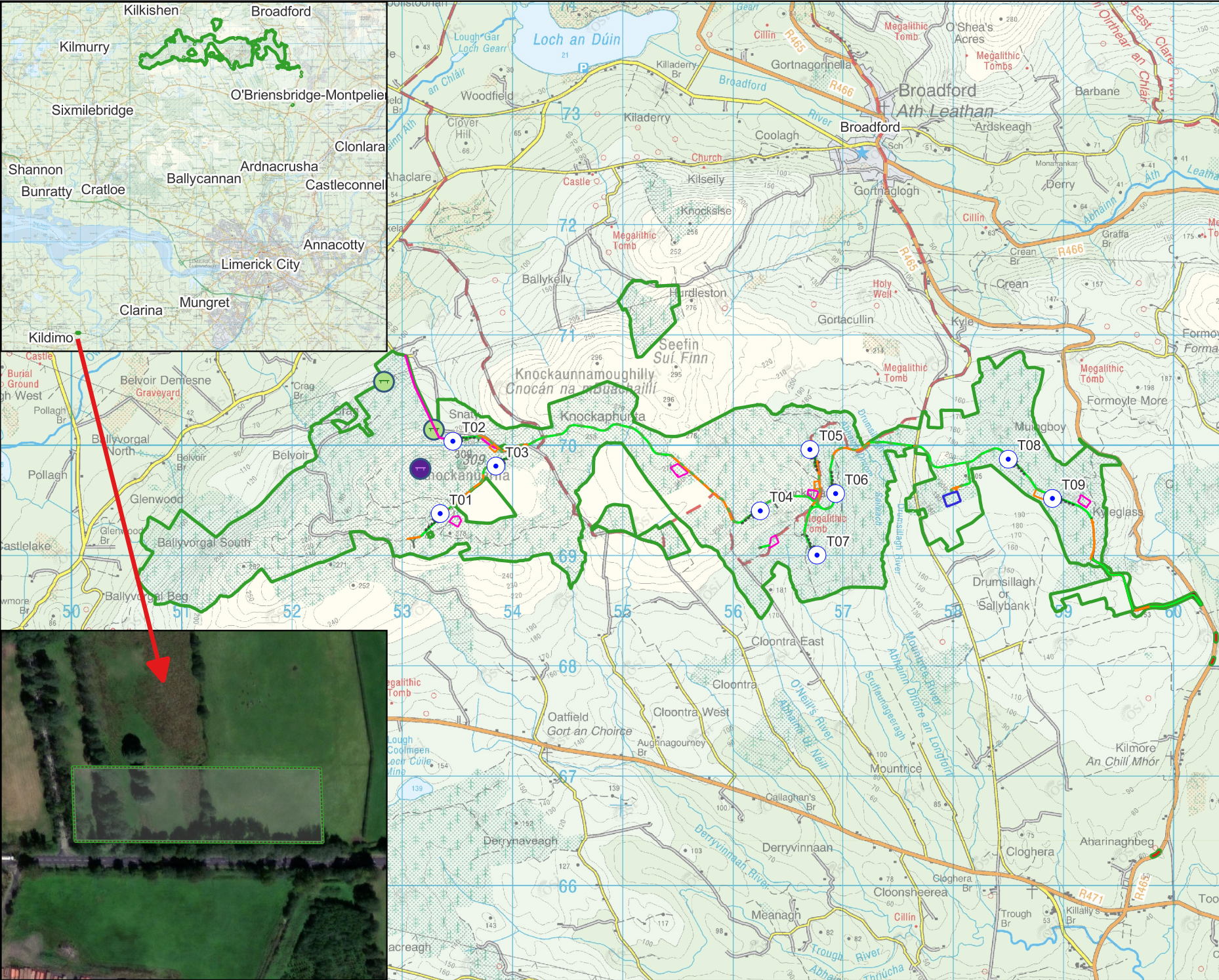
2024-08-01

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### Map Legend

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- Proposed Turbine Delivery Overrun Area [3]
- Proposed Turbine Delivery Temporary Transition Compound [1]
- Proposed Security Cabin [1]

Drawing Title

### Wind Farm Site Layout

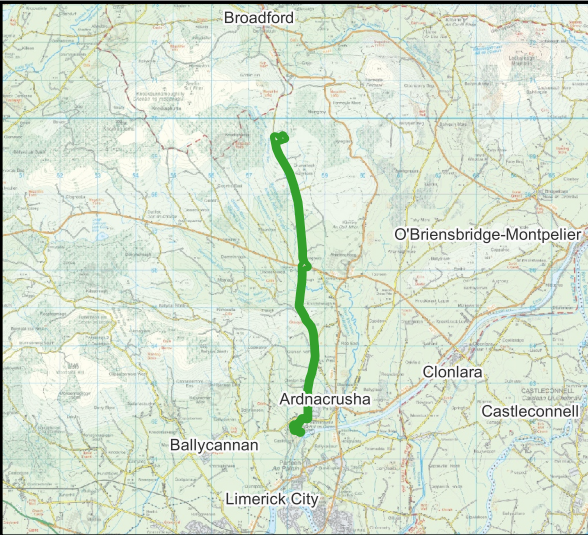
Project Title

### Knockshanvo Wind Farm




Drawn By	SD	Checked By	EOS
Project No.	200513	Drawing No.	Figure 4-1a
Scale	1:45,000	Date	2024-08-01

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Map Legend

-  Grid Connection Study Boundary
-  Proposed 110kV Underground Grid Connection Route
-  Ardnacrusha 110kV Substation



Drawing Title  
**Proposed Grid Connection Layout**

Project Title  
**Knockshanvo Wind Farm**

Drawn By	SD	Checked By	EOS
Project No.	200513	Drawing No.	Figure 4-1b
Scale	1:45,000	Date	2024-04-30



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4.2

## Part 2: Development Components of the Wind Farm Site Application under Section 37E of the Planning and Development Act 2000, as amended

The planning application for the Proposed Development under Section 37E of the Planning and Development Act 2000, as amended, comprises the turbines and associated foundations and hard-standing areas, meteorological mast, site entrance, junction accommodation works, access roads, temporary construction compounds, temporary transition compound, 110kV electrical substation, underground cabling, borrow pits, site drainage, tree felling, amenity works, biodiversity enhancement measures and all ancillary works.

Detailed site layout drawings of the Proposed Development are included in Appendix 4-1 of this EIAR.

The following sections will describe each of the development components within this planning application in further detail, in the following order:

1. *Wind Turbines*
2. *Onsite 110kV Electrical Substation and Control Buildings*
3. *Internal Site Cabling*
4. *Meteorological Mast*
5. *Access Roads*
6. *Wind Farm Site entrance*
7. *Borrow Pits*
8. *Peat and Spoil Management Plan*
9. *Temporary Construction Compounds*
10. *Amenity Works*
11. *Temporary Works Associated with Turbine Component and Abnormal Load Delivery*
12. *Ancillary Forestry Felling*
13. *Biodiversity Management and Enhancement Plan*
14. *Wind Farm Site Drainage*
15. *Construction Site Signage*

4.2.1

### Wind Turbines

4.2.1.1

#### Turbine Locations

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

Table 4-1 Proposed Wind Turbine Locations and Elevations

Turbine No.	Irish Transverse Mercator Co-ordinates		Top of Foundation Elevation (m OD)
	Easting (m)	Northing (m)	
1	553306	669420	248
2	553422	670076	232.5

Turbine No.	Irish Transverse Mercator Co-ordinates		Top of Foundation Elevation (m OD)
	Easting (m)	Northing (m)	
3	553812	669851	266.5
4	556212	669444	221.5
5	556663	670001	191.5
6	556896	669601	180.5
7	556727	669042	176
8	558463	669913	186
9	558864	669557	196.5

#### 4.2.1.2 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 Wind Farm Site will have a ground-to-blade tip height, hub height and blade length within the following, limited, ranges:



- Turbine Tip Height – Maximum height 185 metres, Minimum height 179.5 metres
- Hub Height – Maximum height 110.5 metres, Minimum height 102.5 metres
- Blade Length: - Maximum length 81.5 metres, Minimum length 74.5 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 Wind Farm Site will be conventional three-blade turbines, which will be geared to ensure the rotors of all turbines rotate in the same direction at all times.

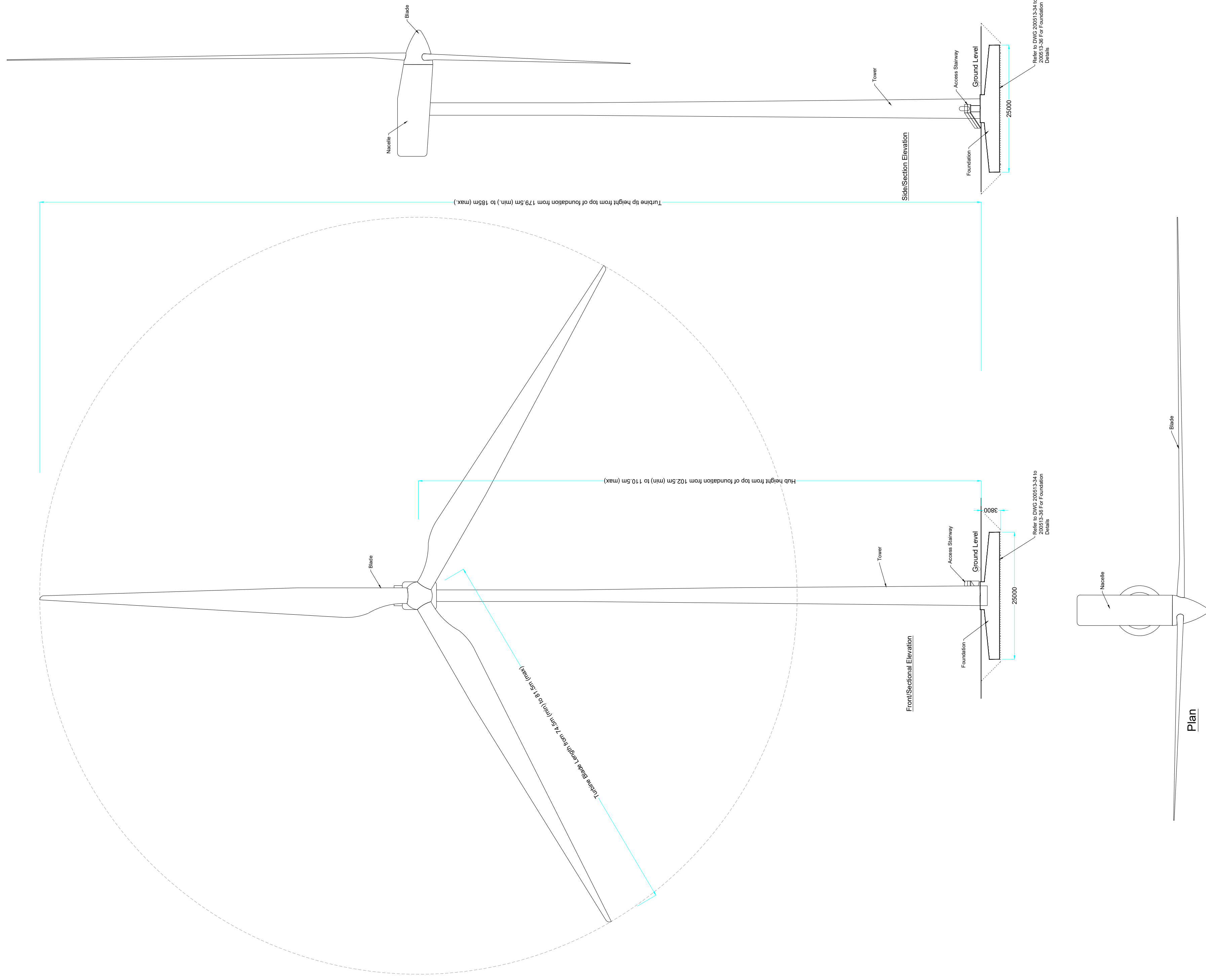
- Wind turbines are typically equipped with one or more lightning rods, also known as air terminals, installed at the highest points of the turbine structure. These rods are made of conductive materials such as copper or aluminum.
- Down conductors, usually made of copper, aluminum, or a combination of both, connect the lightning rods to the ground. These conductors provide a low-resistance path for the lightning current to safely dissipate into the ground.
- The down conductors are connected to a grounding system, which typically consists of buried conductive cables or rods that extend deep into the earth. The grounding system disperses the lightning energy harmlessly into the ground, preventing damage to the turbine or surrounding structures.
- Surge protection devices are installed within the electrical system of the wind turbine to prevent transient voltage spikes caused by lightning strikes from damaging sensitive electronic components. These devices divert excess electrical energy to the ground, protecting the turbine's electrical systems
- Additional measures such as bonding conductive components together and shielding sensitive equipment can further reduce the risk of damage from lightning strikes. Bonding ensures that electrical potentials are equalized across the turbine structure, while shielding helps to minimize electromagnetic interference.
- Regular inspection, testing, and maintenance of the lightning protection system are essential to ensure its effectiveness. This includes checking for corrosion, loose connections, and damage to components, as well as verifying that grounding resistance levels are within acceptable limits

For the purposes of this EIAR, various types and sizes of wind turbines, within the proposed ranges outlined above, have been selected and considered in the relevant sections of the EIAR. This allows for a robust assessment of the proposed range of dimensions. 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.

The Wind Farm planning application will include a design flexibility opinion from the Board to allow for a limited range of turbine dimensions under Section 37CC(1) of the PDA (case reference ABP-319151-24). The certain details include the following:

- Turbine Dimensions
  - Turbine Tip Height
  - Rotor Diameter
  - Hub Height

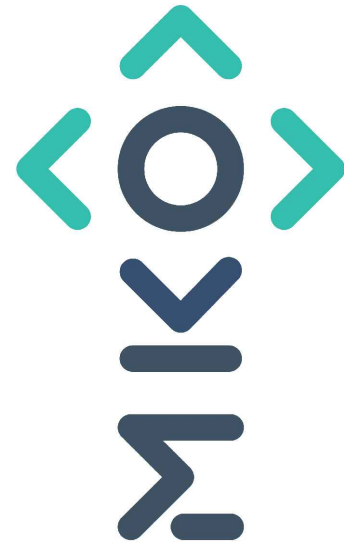
It should also be noted that the assessment of the development footprint of the Proposed Development site, within this EIAR, is based on the maximum potential footprint for all of the infrastructural elements. This precautionary approach is taken as the assessment of the maximum development footprint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



## Drawing Notes

1. Proposed wind turbines to have a maximum ground to blade tip height of up to 185m.
2. Exact make and model of the turbine to be dictated by a competitive tender process.
3. Ground level represents the top of turbine foundation.

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A drawing of the proposed wind turbine range is shown in Figure 4-2. Figure 4-2 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 4-3 below.

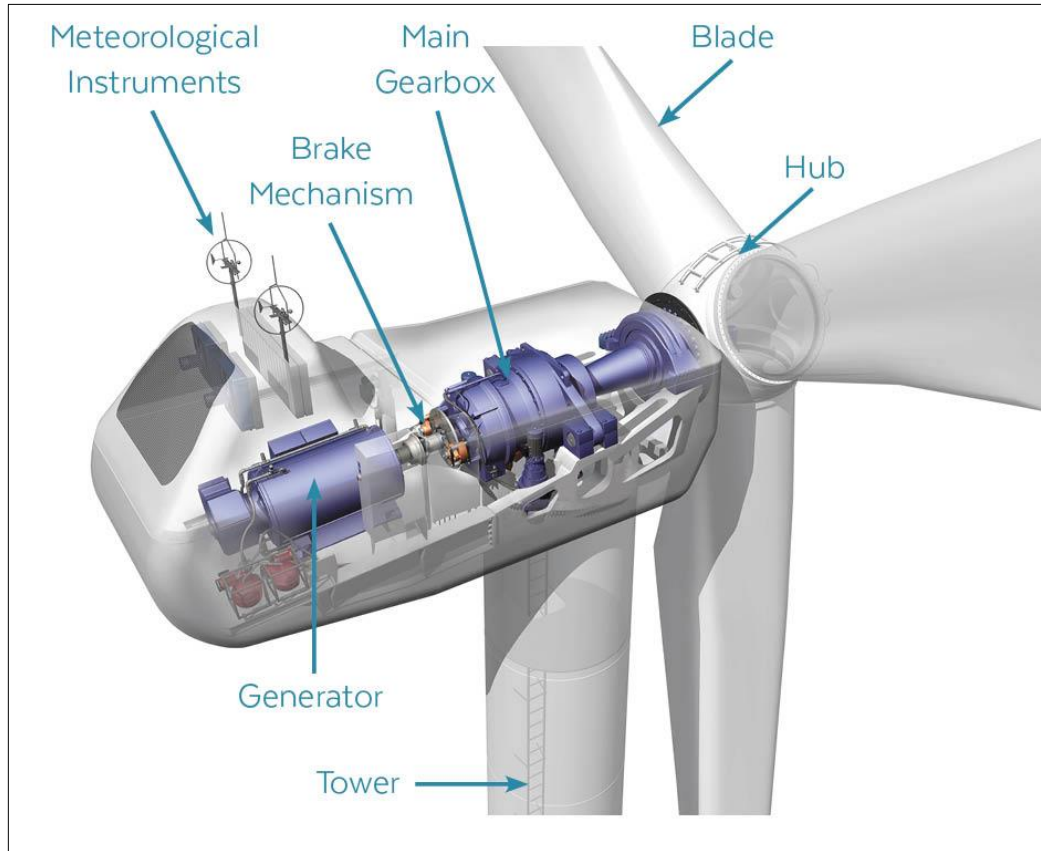


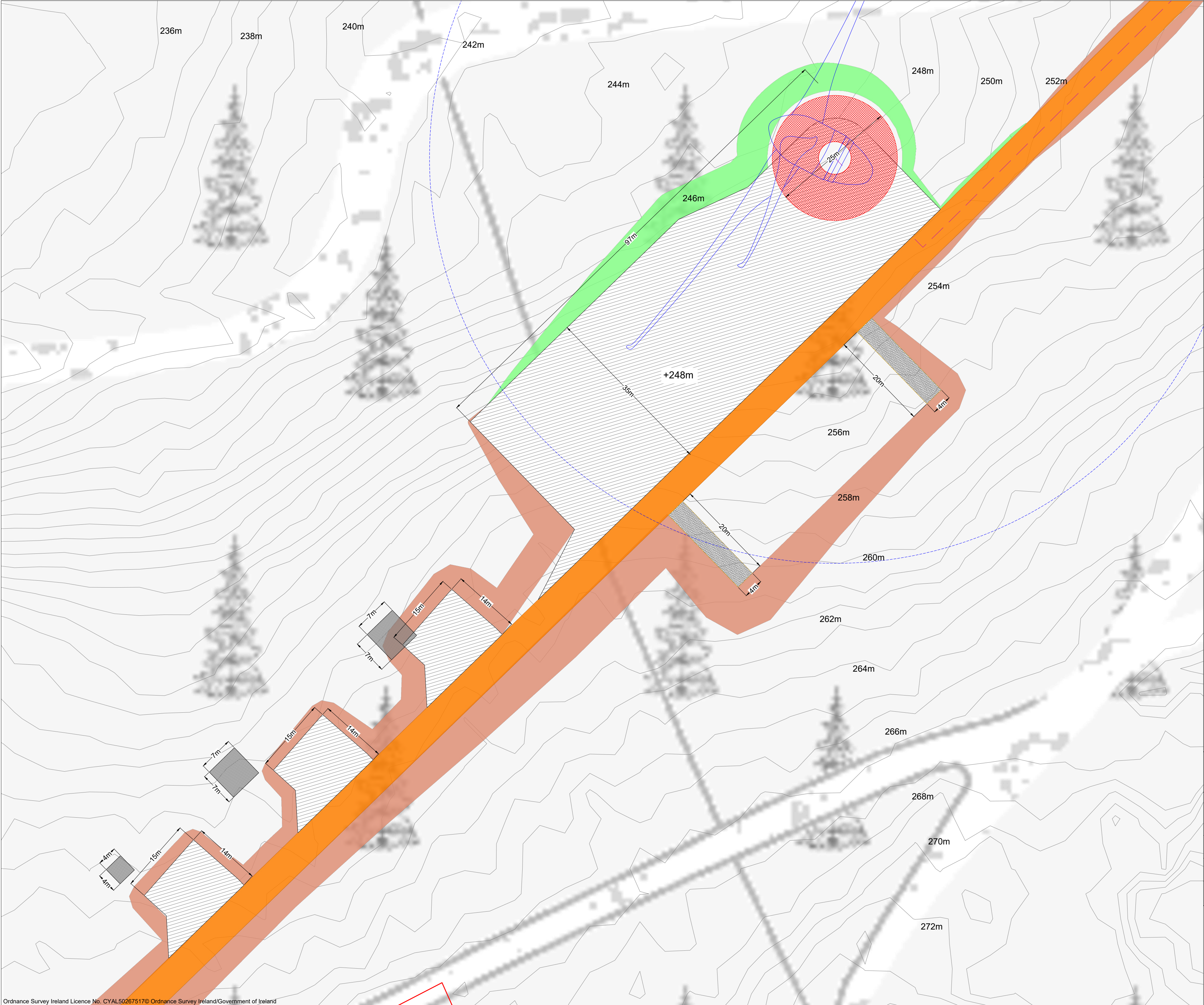
Figure 4-3 Turbine nacelle and hub components

#### 4.2.1.3 Turbine Foundations

Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground level. The turbine foundation transmits any load on the wind turbine into the ground. The horizontal and vertical extent of a turbine's foundation is shown in Figure 4-4. The foundation footprint, at each proposed turbine location, is assessed in this EIAR.

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





**Project Design Drawing Notes**

1. Drawings issued are for planning application purposes only.
2. Drawings not to be used for construction/contract conditions.
3. Copyright, all rights reserved. No part herewith may be copied or reproduced partially or wholly in any form whatsoever without the prior notice of the copyright owner McCarthy Keville O'Sullivan.
4. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.
5. All contractors, whether main or sub-contractors, must visit the site and are responsible for taking and checking any and all dimensions and levels that relate to the works.
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	
	Planning Application Boundary
	Existing Road to be Upgraded
	Proposed Road
	Electrical Cable Trench
	Boom Support
	Soft Levelled Area
	Hardstand
	Turbine Foundation
	Turbine Sweep Area
	Cut
	Fill

PROJECT TITLE: <b>Proposed Knockshanvo Wind Farm</b>		
DRAWING TITLE: <b>Typical Turbine Base Layout</b>		
PROJECT No.: <b>200513</b>	DRAWING No.: <b>Figure 4-4</b>	SCALE: <b>1:500 @ A2</b>
DRAWN BY: <b>KD</b>	CHECKED BY: <b>EOS</b>	DATE: <b>19.08.2024</b>
OS SHEET No.:		REVISION: <b>P01</b>
4384,4385,4386,4387,4442,4443,4444,4445,4501,4502,4503,4504,4561,4562,4563,4564		







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

#### 4.2.1.4 Hard Standing Areas

Hard standing areas consisting of levelled and compacted hardcore will be installed 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 turbine hardstand assessed in this EIAR measure 35m x 112m. Figure 4-4 shows the turbine base layout, including turbine foundation, hard standing area, assembly area, access road and surrounding works area.

A two-metre wide working area will be required around each hard standing area, with the sides of the excavated areas sloped sufficiently to ensure that slippage does not occur. Material excavated to create the working area will be stored locally at turbine hardstands for later reuse in backfilling the working area around the turbine foundation or transported immediately on excavation to one of the 5 no. borrow pits. The excavated material stored locally will be sealed using the back of the excavator bucket and surrounded by silt fences to ensure sediment-laden run-off does not occur. All peat placement areas will be upslope of founded roads/hardstands and will be inspected by the Project Geotechnical Engineer before material is temporarily stored in the 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 measure 35m x 112m.

#### 4.2.1.5 Assembly Area

Levelled assembly areas comprising of bare soil surface will be located on either side of the hard-standing area as shown on Figure 4-4 above. 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. Refer to Appendix 4-1 for the planning application drawings assessed in this EIAR.

#### 4.2.1.6 Power Output

It is anticipated the proposed wind turbine will have a rated electrical power output in the range of 5.7 to 7.2 megawatt (MW) depending on further wind data analysis and power output modelling. Therefore, the potential installed capacity of the proposed wind farm will range from a minimum of 51.3 MW up to a maximum 64.8 MW. Turbines of the exact same make, model and dimensions can also have different power outputs depending on the capacity of the electrical generator installed in the turbine nacelle.

Assuming an installed capacity of 64.8 MW, the Proposed Development therefore has the potential to produce up to 204,353 MWh (megawatt hours) of electricity per year, based on the following calculation:

$$A \times B \times C = \text{Megawatt Hours of electricity produced per year}$$

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 36%<sup>1</sup> is applied here

C = ..... Rated output of the wind farm: 64.8 MW

The 204,353 MWh of electricity produced by the Proposed Development would be sufficient to supply 48,656 Irish households with electricity per year, based on the average Irish household using 4.2 MWh<sup>2</sup> of electricity.

The 2022 Census of Ireland recorded a total of 46,441 occupied households in Co. Clare. Per annum, based on a capacity factor of 36%, the Proposed Development would therefore produce sufficient electricity for all households in Co. Clare.

If the installed capacity is the minimum proposed (51.3MW), the electricity produced by the Proposed Development would be sufficient to supply approximately 38,519 households.

#### 4.2.1.7 Construction Methodology - Turbine Foundations

Each of the turbines to be erected on the Wind Farm Site will have a reinforced concrete base that is installed below the finished ground level. The turbine foundation will either 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 or in borrow pit restoration. 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 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

<sup>1</sup> EirGrid, 2022 Enduring Connection Policy 2.2 Constraints Report for Solar and Wind [ECP-2-2-Solar-and-Wind-Constraints-Report-Area-D-v1.0.pdf \(eirgridgroup.com\)](https://www.eirgridgroup.com/Report-Area-D-v1.0.pdf)

The Proposed Development is located within the D wind region for Ireland with an associated 2020 capacity factor of 36%.  
2 March 2017 CER (CRU) Review of Typical Consumption Figures Decision [https://www.cru.ie/document\\_group/review-of-typical-consumption-figures-decision-paper/](https://www.cru.ie/document_group/review-of-typical-consumption-figures-decision-paper/)



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 Development site in two 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 the hard-standing areas will be extended to cover the turbine foundations, by placing crushed stone over the foundation.

#### 4.2.2 Onsite 110kV Electrical Substation and Control Buildings

It is proposed to construct one 110 kV electrical substation within the Wind Farm Site, as shown in Figure 4-1. The proposed onsite 110kV electrical substation will have 2 no. control buildings, associated electrical plant and equipment, a wastewater holding tank and will be constructed in accordance with EirGrid substation specifications and requirements. The construction and electrical components of the electricity substation will be to EirGrid specifications<sup>3</sup>. Further details regarding the connection between the site substation itself and then on to the national electricity grid are provided in Section 4.3.1 below and Drawings No. '05783-DR-150' to '05783-DR-160' in Appendix 4-5 of this EIAR chapter.

The footprint of the proposed onsite electrical substation compound measures approximately 13,450 square metres, and will include 2 no. wind farm control buildings and the electrical substation components necessary to consolidate the electrical energy generated by each wind turbine, and export that electricity from the wind farm substation to the national grid. The onsite substation will be a permanent development under the ownership of the ESB/EirGrid. The layout and elevation of the onsite substation is shown on Drawings No. 05783-DR-150 and 05783-DR-101 in Appendix 4-5 of this EIAR.

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

<sup>3</sup> EirGrid Document XDS-GFS-00-001-R4 110/220/400kV Substation General Requirements (2019). Available at: <https://cms.eirgrid.ie/sites/default/files/publications/6-110-220-400-kV-Substation-General-Requirements.pdf>

#### 4.2.2.1 Wind Farm Control Buildings

2 no. wind farm control buildings will be located within the substation compound. The EirGrid Control Building will be located towards the centre of the substation compound and will measure 25 metres by 18 metres and 8.51 metres in height. The Independent Power Provider (IPP) Control Building located at the eastern edge of the substation compound will measure 20.15 metres by 10.74 metres and 6.74 metres in height. Layout and elevation drawings of the control buildings are included in Drawings No. 05783-DR-154 and 05783-DR-155 in Appendix 4-5.

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

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

Such a proposal for managing the wastewater arising on site has 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. The wastewater storage tank alarm will be part of a continuous stream of data from the site's turbines, wind measurement devices and electrical substation that will be monitored remotely 24 hours a day, 7 days per week. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007(as amended), will be employed to transport wastewater away from the site.

#### 4.2.2.2 Construction Methodology – Onsite 110kV Electrical Substation and Control Buildings

The proposed onsite electrical 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 will be either temporarily stockpiled locally at the substation location, or transported immediately on excavation to one of the 5 no. borrow pits.
- The dimensions of the onsite substation area have been designed to meet the requirements of EirGrid and the necessary equipment to safely and efficiently operate the permitted wind farms;
- A generator will be temporarily located in the area of the onsite substation to provide a local electricity supply during construction;
- 2 no. control buildings will also 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 damp proof course 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 concrete 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 have been designed to EirGrid specifications.

### 4.2.3 Internal Site Cabling

Each turbine will be connected to the on-site electrical substation via an underground 33 kV (kilovolt) electrical cable. Fibre-optic cables will also connect each wind turbine to the wind farm control buildings in the onsite 110kV electrical substation compound. The electrical and fibre-optic cables running from the turbines to the onsite substation compound will be run in cable ducts approximately 1.3 metres below the ground surface, in the roadways. The route of the cable ducts will follow the access track from each turbine location to the proposed onsite 110kV electrical substation, and are visible on the site layout drawings included as Appendix 4-1 to this report. Figure 4-5 below shows two variations of a cable trench, one for off-road trenches (to be installed on areas of soft ground that will not be trafficked) and one for on-road trenches (to be used where trenches run along or under a roadway).

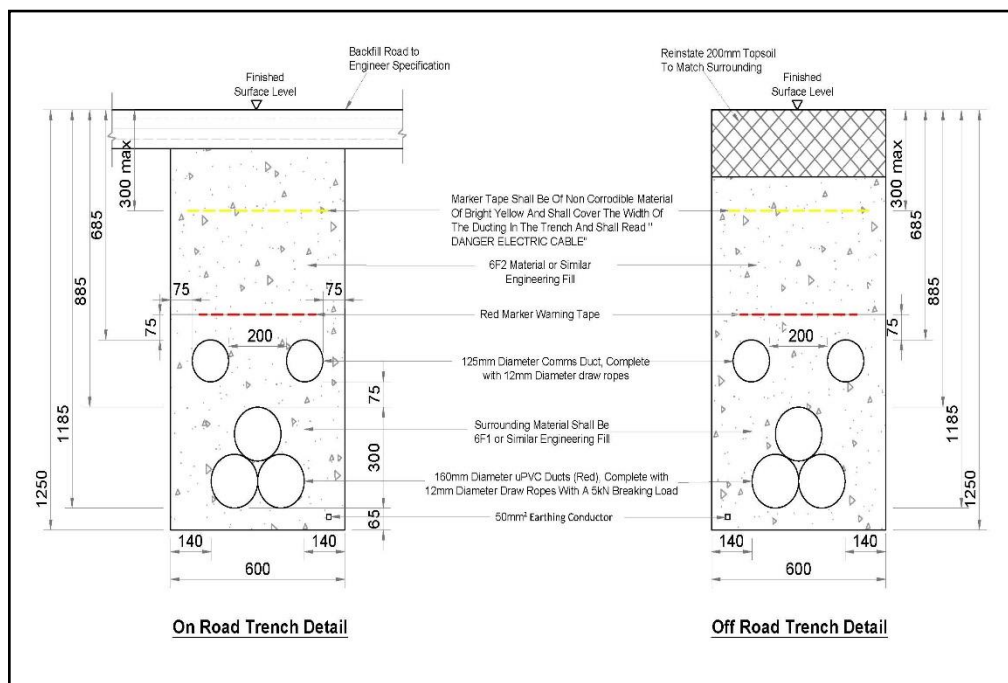


Figure 4-5 Typical Collector Cable trench cross-section detail

#### 4.2.3.1 Construction Methodology – Internal Site Cabling

The transformer in each turbine is connected to the substation through a network of buried electrical cables. The ground is trenched using a mechanical excavator. The top layer of soil is removed and saved so that it is replaced on completion. The cables are bedded with suitable material unless the ground conditions are such that no bedding is required. The cables will be laid at a depth that meets all national and international requirements, and will be approximately 1.3m below ground level; a suitable marking tape is installed between the cables and the surface. On completion, the ground will be reinstated as previously described above. The route of the cable ducts will follow the access track to each turbine location and are visible on the site layout drawings included as Appendix 4-1 of the EIAR.

Clay plugs will be installed at regular intervals of not greater than 50 metres along the length of the trenches to prevent the trenches becoming conduits for runoff water. While the majority of the cable trenches will be backfilled with native material, clay subsoils of low permeability will be used to prevent conduit flow in the backfilled trenches. This material will be imported onto the Wind Farm Site should sufficient volumes not be encountered during the excavation phase of roadway and turbine foundation construction. Potential quarries that will be considered for the delivery of materials to the Site include; Jim Bolton Sand & Gravel Ltd, Fahey more, Bridgetown, Co Clare: Dereen Sand & Gravel Ltd, O'Brien's Bridge, Montpelier, Limerick and Bobby O'Connell & Sons Ltd, Ballycar, Ardnacrusha, Co Clare.

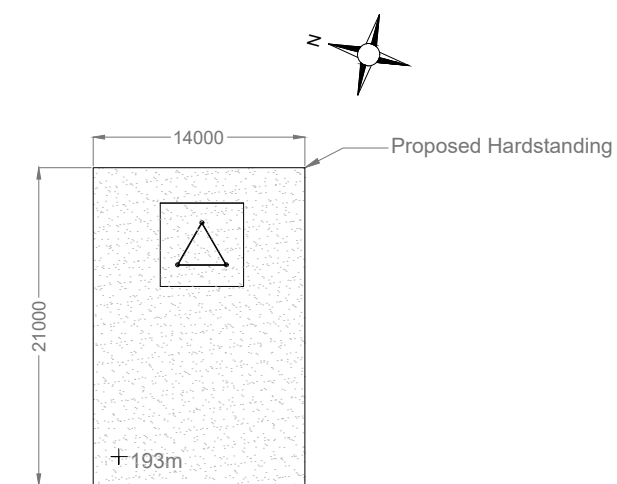
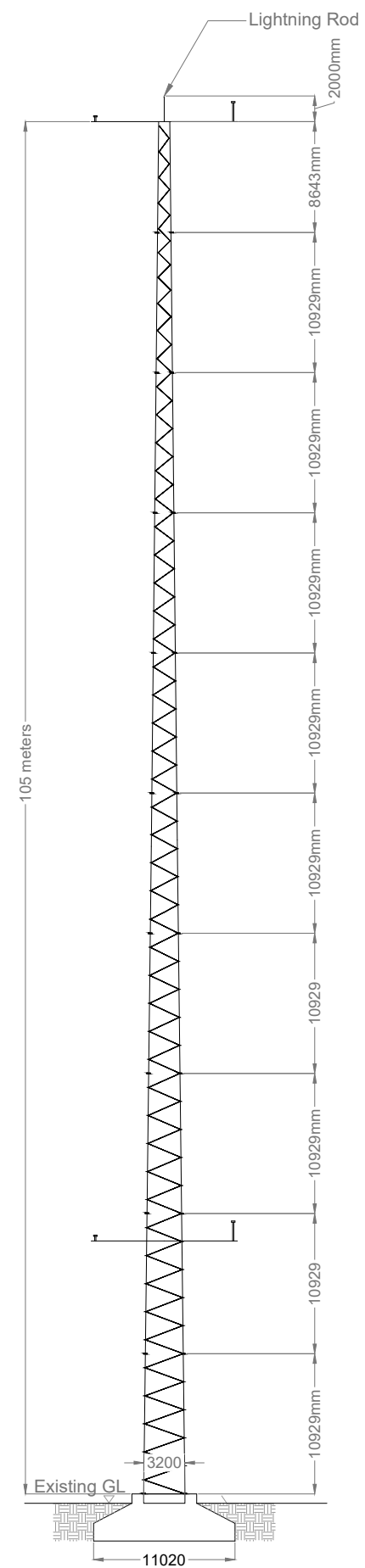
Further details of the Site Cabling Construction Methodology are outlined in Appendix 4-5.

#### 4.2.4 Meteorological Mast

One permanent meteorological mast is proposed as part of the Proposed Development. The meteorological mast will be equipped with wind monitoring equipment at various heights. The mast will be located at E556203 N669109 as shown on the site layout drawing in Figure 4-1. The mast will be a self-supporting slender structure 105 metres in height with a lightning mast on top. The mast will be constructed on a hard standing area measuring 21m by 14m and accommodate the crane that will be used to erect the mast. Approximately 75 m of new track roads will be required to access the meteorological mast hard standing area. The meteorological mast is shown in Figure 4-6.

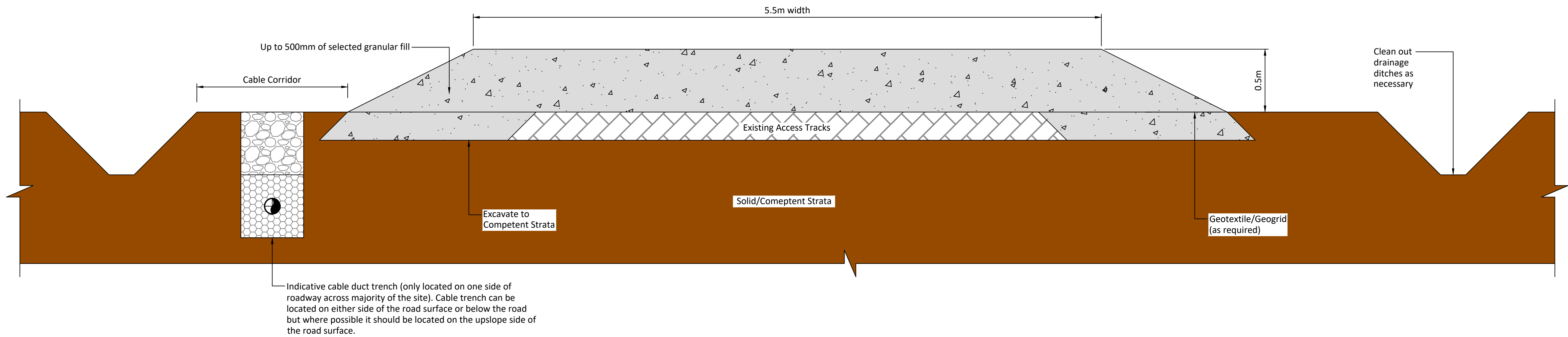
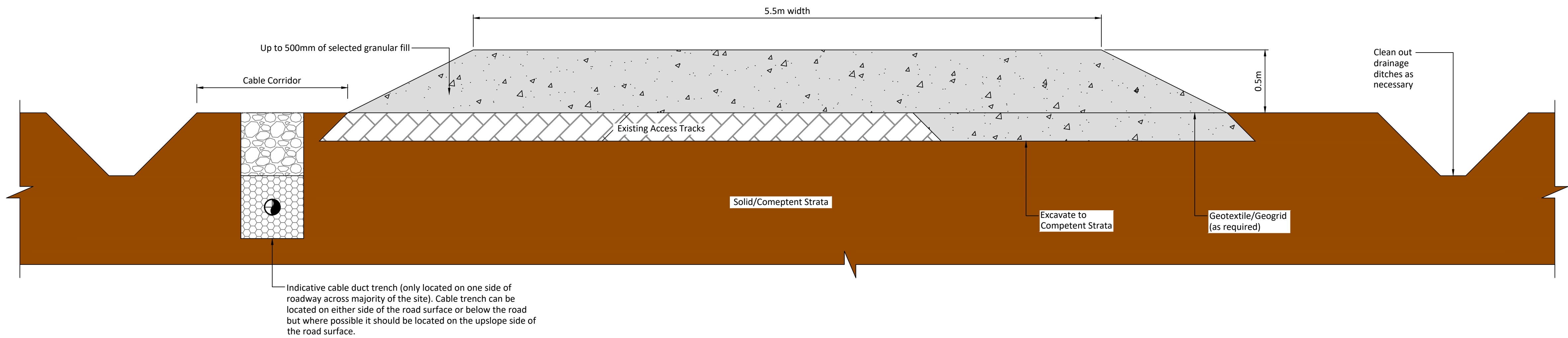
##### 4.2.4.1 Construction Methodology – Meteorological Mast

The meteorological mast foundation will comprise a gravity type foundation. Given the ground conditions present at the proposed meteorological mast, the foundation will be founded on glacial till, or weathered bedrock. The founding depth for the met mast foundation is envisaged to be 0.5 to 1.0m below ground level. At the underside of the met mast foundation, a layer of structural up-fill (class 6N) will be required. The meteorological mast will be supported by guyed lattices.



PROJECT TITLE: <b>Proposed Knockshanvo Wind Farm</b>			
DRAWING TITLE: <b>Met Mast</b>			
PROJECT No.: <b>200513</b>		DRAWING No.: <b>Figure 4-6</b>	
SCALE: <b>1:500 @ A3</b>			
DRAWN BY: <b>KD</b>	CHECKED BY: <b>EOS</b>	DATE: <b>19.08.2024</b>	REVISION: <b>P01</b>





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Rev.	Description	App By	Date
A	FOR INFORMATION	BDH	02.08.23

PROJECT		CLIENT		
KNOCKSHANVO WIND FARM		MKO		
SHEET	TYPE A - UPGRADE OF EXISTING EXCAVATED ACCESS TRACKS	Date	Project number	Scale (@ A1 )
		02.08.23	P20-153	1:20
		Drawn by	Drawing Number	Rev
		POR	Figure 4-7	A
		Checked by		
		IH		



## 4.2.5 Access Roads

### 4.2.5.1 Road Construction Types

To provide access within the Wind Farm Site and to connect the wind turbines and associated infrastructure existing tracks will need to be upgraded and new access roads will need to be constructed. The road construction design has taken into account the following key factors as stated in the Fehily Timoney & Company's (FTC) *Peat and Spoil Management Plan* in Appendix 4-2 of this EIAR:

1. *Buildability considerations.*
2. *Serviceability requirements for construction and wind turbine delivery and maintenance vehicles.*
3. *Minimise excavation arisings.*
4. *Requirement to minimise disruption to peat hydrology.*

The access roads on site will be constructed as excavate and replace (founded) type construction, which, given the ground conditions and type of terrain present, this is deemed the most appropriate construction approach. Floating road construction will not be undertaken on the Proposed Development.

The total length of new proposed access road to be constructed on site is 9.3km (see Drawings P20-153-0600- 0013 to 0015 of the Peat and Spoil Management Plan – Appendix 4-2 of the EIAR).

The proposed make-up of the founded access roads is a minimum stone thickness of 750mm. The requirement for a layer of geotextile and geogrid and the necessary stone thickness will be confirmed at pre-construction stage.

See the Peat & Spoil Management Plan (Appendix 4-2) for the Proposed Development for further detail on how peat and spoil will be managed during road construction.

#### 4.2.5.1.1 Upgrade to Existing Roads or Tracks

The construction methodology for upgrading of existing sections of excavated roads or tracks, as presented in FTC's *Peat & Spoil Management Plan* in Appendix 4-2 of this EIAR, is summarised below. This methodology includes procedures that are to be included in the construction to avoid any adverse impact on peat stability.

1. *Access road construction will be to the line and level requirements as per design/planning conditions.*
2. *For upgrading of existing access roads (Type A) the following guidelines apply:*
  - a. *Excavation of the access road will take place to a competent stratum beneath the peat, removing all peat and any soft clay and backfilling with suitable granular fill.*
  - b. *Benching of the excavation will be required between the existing section of access road and the widened section of access road where the depth of excavation exceeds 500mm.*
  - c. *The surface of the existing access track will be overlaid with up to 500mm of selected granular fill.*
  - d. *Access roads will be finished with a layer of capping across the full 6m width of the track.*
  - e. *A layer of geogrid/geotextile may be required at the surface of the existing access road and at the base of the widened section of access road, where*

- shallow groundwater or surface water is encountered, and where there is a cohesive subgrade to prevent missing of materials(to be confirmed by the designer).*
- f. *For excavations in peat, side slopes will not greater than 1 (v): 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker peat are encountered then slacker slopes will be required to ensure stability.*
  3. *The finished road width will have a running width of 5m, with wider section on bends and corners.*
  4. *On side long sloping ground any road widening works required will be done on the upslope side of the existing access road, where possible. Where not possible, a specific Risk Assessment Method Statement (RAMS) from the contractor will be produced, detailing how the downslope works will be undertaken, including that all plant would operate from the already constructed section of track, with no loading of the peat on the downslope slope, limiting the length of ground to be stripped/excavated at any one time.*

A typical section of existing excavated road for upgrade is shown in Figure 4-7. Please refer to Section 4.2.14 for details on drainage proposals for road upgrades.

#### 4.2.5.1.2 Construction of New Excavated Roads

Excavate and replace type access roads are the conventional method for construction of access roads on peatland sites and the preferred construction technique in shallow peat provided sufficient placement/reinstatement capacity is available on site for the excavated peat, as is the case for the Proposed Development Site (see FTC's *Peat & Spoil Management Plan* in Appendix 4-2 of this EIAR for how peat and spoil will be managed on site).

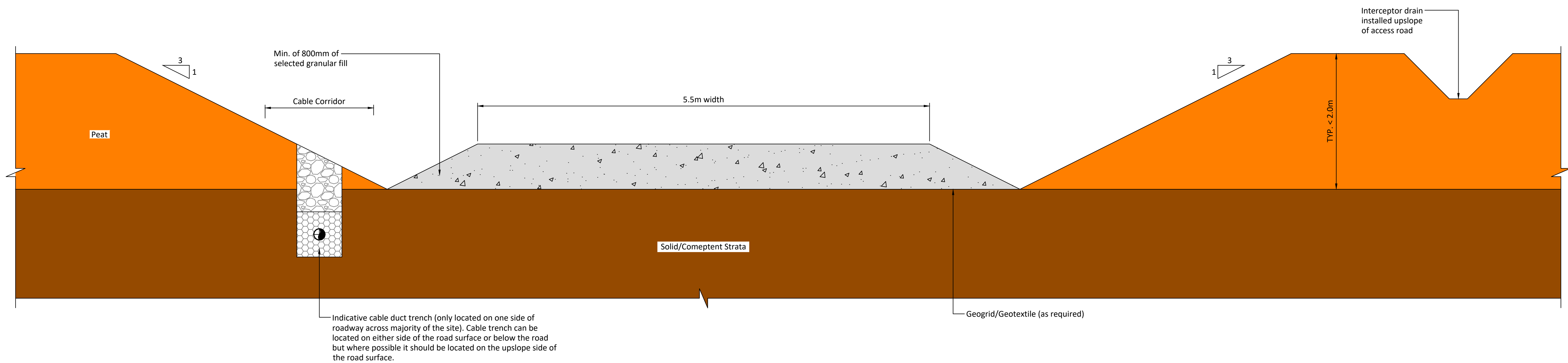
The construction methodology for the construction of excavated roads, as presented in FTC's *Peat & Spoil Management Plan* in Appendix 4-2 of this EIAR, is summarised below. This methodology includes procedures which will be implemented during the construction phase to avoid any adverse impact on peat stability.

1. *Prior to commencing the construction of the excavated roads, movement monitoring posts will be installed in areas where the peat depth is greater than 2.0m.*
2. *Interceptor drains will be installed upslope of the access road alignment to divert any surface water away from the construction area.*
3. *Excavation of roads will be to the line and level given in the design requirements. Excavation will take place to a competent stratum beneath the peat.*
4. *Road construction will be carried out in sections of approximately 50m lengths i.e. no more than 50m of access road will be excavated without re-placement with stone fill.*
5. *Once excavated, peat will be temporarily stored in localised areas adjacent to excavations for roads and hardstands before being placed into the permanent peat storage areas within the borrow pits. All peat placement areas will be upslope of founded roads/hardstands and will be inspected by the Project Geotechnical Engineer before material is temporarily stored in the area.*
6. *Excavation of materials with respect to control of peat stability.*

- a. *Acrotelm (top about 0.3 to 0.4m of peat) will be required for landscaping and will be stripped and temporarily stockpiled either alongside the roads, or in clearfell areas around turbines/hardstands for re-use as required. Acrotelm stripping will be undertaken prior to main excavations.*
  - b. *The acrotelm will be placed with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation.*
  - c. *All catotelm peat (peat below about 0.3 to 0.4m depth) will be transported immediately on excavation to the designated placement areas.*
7. *Excavation side slopes in peat will not greater than 1 (v): 3 (h). This slope inclination will be reviewed during construction. Should areas of weaker peat be encountered then slacker slopes will be required. Battering of the side slopes of the excavations will be carried out as the excavation progresses.*
8. *End-tipping of stone onto the road during the construction/upgrading of the access road will be carefully monitored to ensure the excessive impact loading, which may adversely affect the adjacent peat, is limited.*
9. *The excavated access road will be constructed with a minimum of 750mm of selected granular fill. Granular fill will be placed and compacted in layers in accordance with the TII Specification for Road Works<sup>4</sup>.*
10. *Access roads will be finished with a layer of capping across the full width of the road.*
11. *A layer of geogrid/geotextile will be required at the surface of the competent stratum, where this stratum is cohesive in nature.*
12. *Where slopes of greater than 5 degrees are encountered along with relatively deep peat (i.e., greater than 1.5m) and where it is proposed to construct the access road perpendicular to the slope contours, it is best practice to start construction at the bottom of the slope and work towards the top, where possible. This method avoids any unnecessary loading to the adjacent peat and greatly reduces any risk of peat instability.*
13. *Where the above is not possible, a specific Risk Assessment Method Statement (RAMS) from the contractor will be produced, detailing how the downslope works will be undertaken, including that all plant would operate from the already constructed section of track, with no loading of the peat on the downslope slope and limiting the length of ground to be stripped/excavated at any one time. Movement monitoring posts (as described in the Peat & Spoil Management Plan, Appendix 4-2) will also be installed downslope of the works area to allow for ongoing monitoring during the construction works.*
14. *A final surface layer will be placed over the excavated road and graded to accommodate wind turbine construction and delivery traffic.*
15. *The construction and upgrading of access roads in areas of deep peat (greater than 2m) will be inspected on a routine basis (by the Site Manager/Ecological Clerk of Works/Project Geotechnical Engineer) during the works, particularly before/following tracking by heavy vehicular loads.*

A section of a new excavated road is shown in Figure 4-8.

<sup>4</sup> TII Specification for Road Works Series 600 – Earthworks (including Erratum No. 1), June 2013, CC-SPW-00600. Available at: <https://www.tiipublications.ie/library/CC-SPW-00600-03.pdf>



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Rev.	Description	App By	Date
A	FOR INFORMATION	BDH	02.08.23
B	FOR INFORMATION	BDH	01.05.24

PROJECT	CLIENT		
KNOCKSHANVO WIND FARM	MKO		
SHEET	Date 01.05.24	Project number P20-153	Scale (@ A1) 1:25
TYPE B - NEW EXCAVATE AND REPLACE ACCESS ROAD	Drawn by POR	Drawing Number Figure 4-8	Rev B
	Checked by IH		

#### 4.2.5.2 Construction Methodology - Access Roads

Site roads will be constructed to each turbine base and at each base a crane hard standing will be constructed to the turbine manufacturer's specifications.

The road excavations will follow a logical route working away from the borrow pit locations. Excavated material will be transported back to the borrow pits in haul trucks.

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

#### 4.2.6 Wind Farm Site Entrance

It is proposed to access the Wind Farm Site via a newly proposed access track off the R465 Regional Road to the east of the site. The proposed entrance takes the form of a priority type junction with the R465 forming the priority route. This entrance will be created to facilitate the delivery of the construction materials and turbine components. The 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 in Chapter 15: Material Assets of this EIAR. Appropriate sightlines will be established to the north and south of the proposed site entrance for the safe egress of traffic. The visibility splays at the main site entrance off the R465, as shown in Figure 15-7, will require to be provided and kept clear of obstruction during construction, operation and decommissioning phases. The proposed works will result in a permanent site access from the regional road, which will also form the sole entrance to the Proposed Development during the operational phase.

The location of the Wind Farm Site entrance is shown on the site layout drawing in Figure 4-1. A Traffic Management Plan is included in the Construction and Environmental Management Plan (CEMP) in Appendix 4-3 and Appendix 15-2 of this EIAR.

As construction, operational and decommissioning traffic travels through the internal layout all traffic requiring to access turbines Nos 1 to 7 will require to cross the L-3042 at Location 29 indicated in Figure 15-1c in Chapter 15. As the junction will take the form of a crossroads traffic management measures will be required during both the construction, decommissioning and operational stages of the Proposed Development. The default for the junction will be that general traffic flow on the L-3042 will be permitted, while access to the proposed Wind Farm Site to the west and east will be closed by means of gates. Similarly, all traffic requiring access to turbines Nos 1 to 3 will require to pass through the junctions with the local roads at Locations 30 and 31.

In the event planning permission is granted for the Proposed Development, the final Traffic Management Plan will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned.

#### 4.2.6.1 Construction Methodology – Wind Farm Site Entrance

The construction methodology for the site access follows the same methodology as the site roads, as discussed above in Section 4.2.5.

## 4.2.7 Borrow Pits

### 4.2.7.1 Description

It is proposed to develop 5 No. on-site borrow pits as part of the Proposed Development. It is proposed to obtain approximately 60% of all rock and hardcore material that will be required during the construction of the Proposed Development from the on-site borrow pits. Usable rock may also be won from other infrastructure construction including the substation and the turbine base excavations. Some aggregate material due to a requirement for specific grade, quality or quantity may be sourced from suitable licenced quarries around the site. An example of quarries located within 3km of the Proposed Development include:

- Jim Bolton Sand & Gravel Ltd., Fahey more, Bridgetown, Co. Clare, V94 4A37
- Bobby O'Connell & Sons Ltd., Ballycar, Ardnacrusha, Clare
- Dereen Sand & Gravel Ltd, O'Brien's Bridge, Montpelier, Limerick
- Roadstone Ltd, Ballylin, Foynes, Co. Limerick, V94 NY54

Borrow pit No. 1 located approximately 110 metres to the west of Turbine No. 1, measures approximately 6,400m<sup>2</sup> in area and is intended to supply hardcore materials for the construction of the turbines in the west of the site, access roads thereto and a temporary construction compound.

Borrow pit No. 2 located approximately 750 metres to the northwest of Turbine No. 4, measures approximately 9,900m<sup>2</sup> in area and is intended to supply hardcore materials for the construction of turbines in the northwest of the site and access roads thereto.

Borrow pit No. 3 located approximately 260 metres to the southeast of Turbine No. 4, measures approximately 5,500m<sup>2</sup> in area and is intended to supply hardcore materials for the construction of the turbines in the centre of the site, access roads thereto, and the permanent meteorological mast.

Borrow pit No. 4 located approximately 160 metres to the west of Turbine No. 6, measures approximately 5,500m<sup>2</sup> in area and is intended to supply hardcore materials for the construction of the turbines in the centre of the site, access roads thereto, electrical substation and a temporary construction compound.

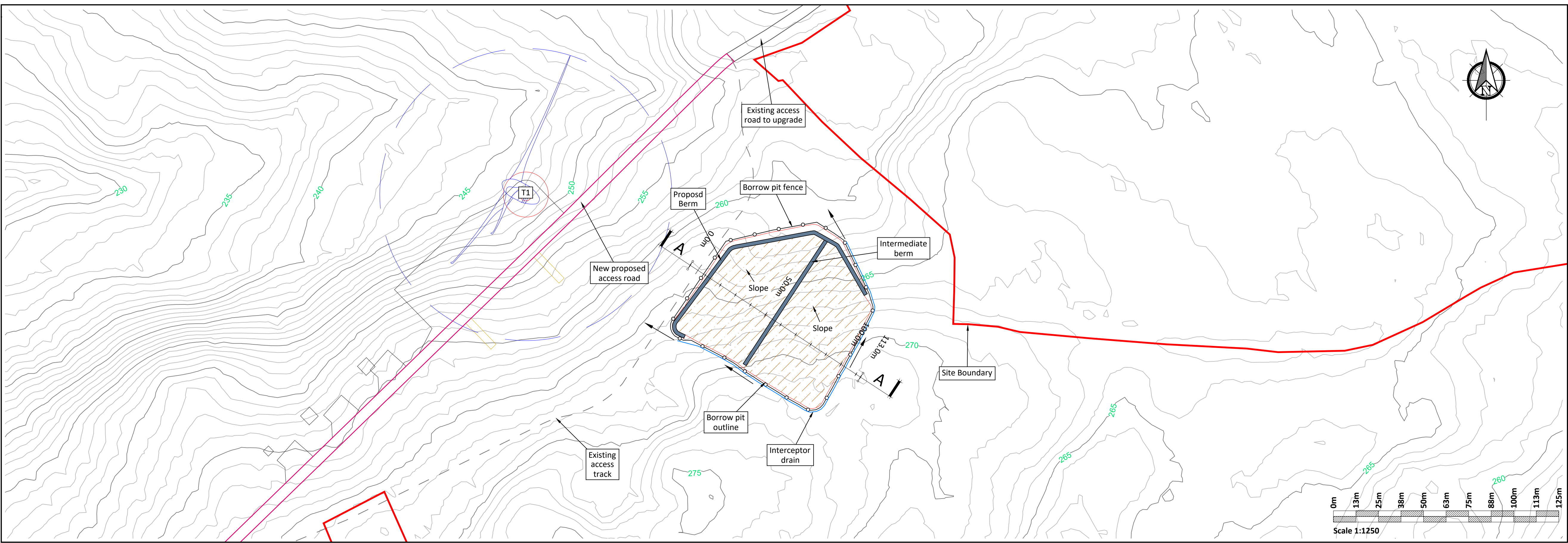
Borrow pit No. 5 located approximately 240 metres to the east of Turbine No. 9, measures approximately 6,700m<sup>2</sup> in area and is intended to supply hardcore materials for the construction of the turbines in the east of the site, access roads thereto, electrical substation and a temporary construction compound.

All borrow pits are shown on Figure 4-1 and on the detailed site layout drawings included as Appendix 4-1 to this EIAR. Figure 4-9 to Figure 4-13 below show detailed sections through the proposed borrow pits. The borrow pits will, on removal of all necessary and useful rock, will be reinstated with excavated peat and subsoils as described in Section 4.2.7.3 below.

Post-construction, the borrow pits areas will be permanently secured and a stock-proof fence will be erected around the borrow pit areas to prevent access to these areas. Appropriate health and safety signage will also be erected on this fencing and at locations around the fenced area.

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



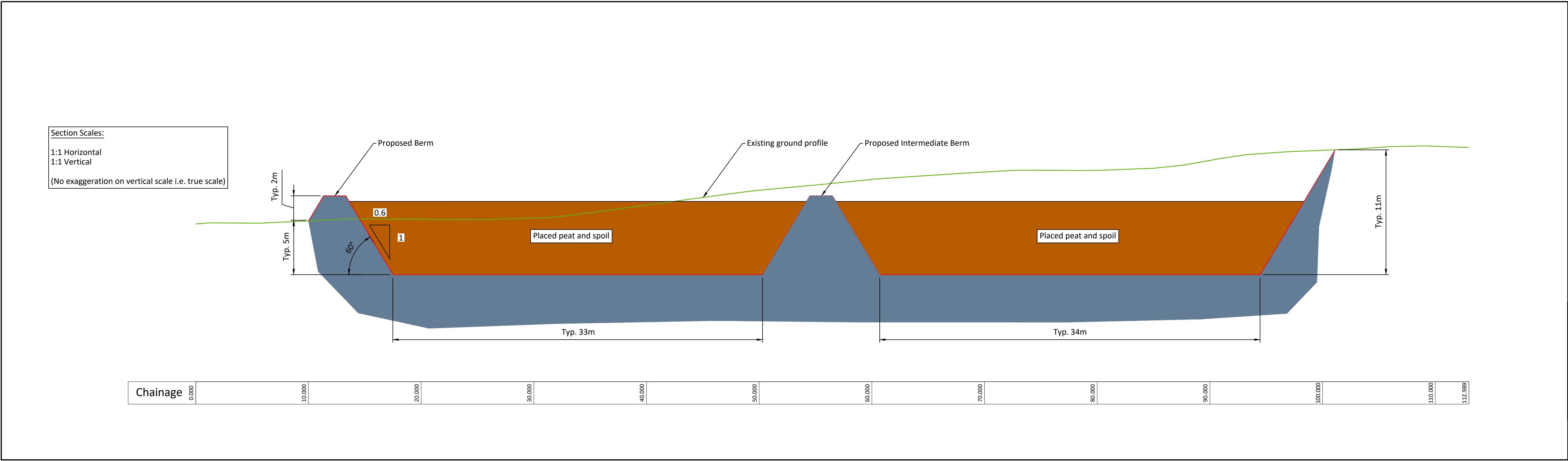


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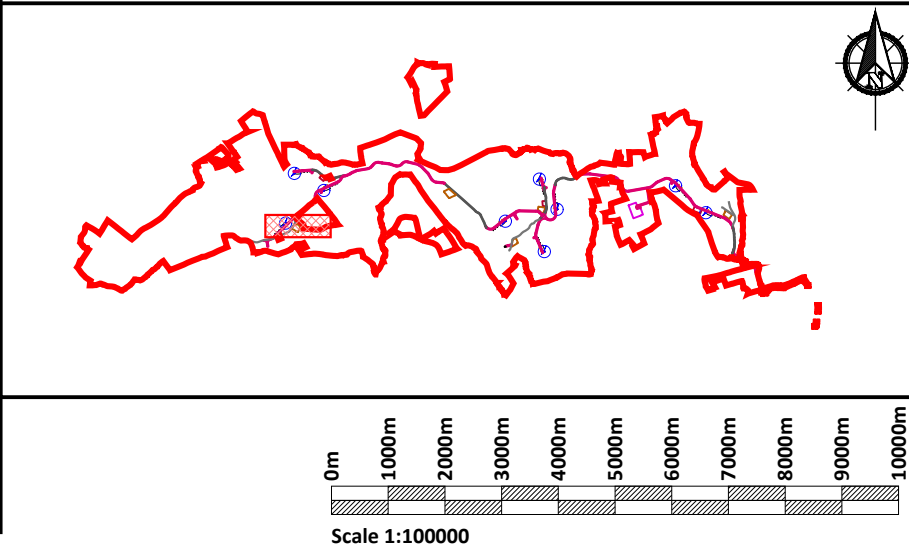
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- EIAR Planning Boundary
  - Turbine Location
  - Existing Access Track (to be upgraded)
  - New Proposed Access Track
  - Substation
  - Construction Compound
  - Borrow Pit
  - Grid Route Options
  - Turbine Delivery Route

**Borrow Pit Construction Notes:**

- It is proposed to construct the borrow pit so that the base of the borrow pit is below the level of the adjacent section of access road.
- Slopes within the excavated rock formed around the perimeter of the borrow pit will be formed at stable inclinations to suit local in-situ rock conditions.
- Infilling of the peat & spoil will commence at the back edge of the borrow pit and progress towards the borrow pit entrance/rock buttress. Leaving in place upstands/segments of intact rock which will help to retain the placed peat & spoil and will allow the borrow pit to be developed and infilled in cells.
- A rock buttress is required at the downslope edge of the borrow pit to safely retain the infilled peat and spoil. The height of the rock buttresses constructed will be greater than the height of the infilled peat & spoil to prevent any surface peat & spoil run-off. A buttress up to 5m (approx.) in height is likely to be required.
- The rock buttress will be founded on competent strata. The founding stratum for the rock buttress will be inspected and approved by the project geotechnical engineer.
- In order to prevent water retention occurring behind the buttresses, the buttresses will be constructed of coarse boulder fill with a high permeability.
- The surface of the placed peat & spoil will be shaped to allow efficient run-off of surface water from the placed arising's.
- Control of groundwater within the borrow pit may be required and measures will be determined as part of the ground investigation programme.
- All the above-mentioned general guidelines and requirements will be confirmed by the designer prior to construction.
- Further guidelines on the construction of the borrow pit are included within Section 7.4 of the Peat & Spoil Management Plan



SECTION A - A  
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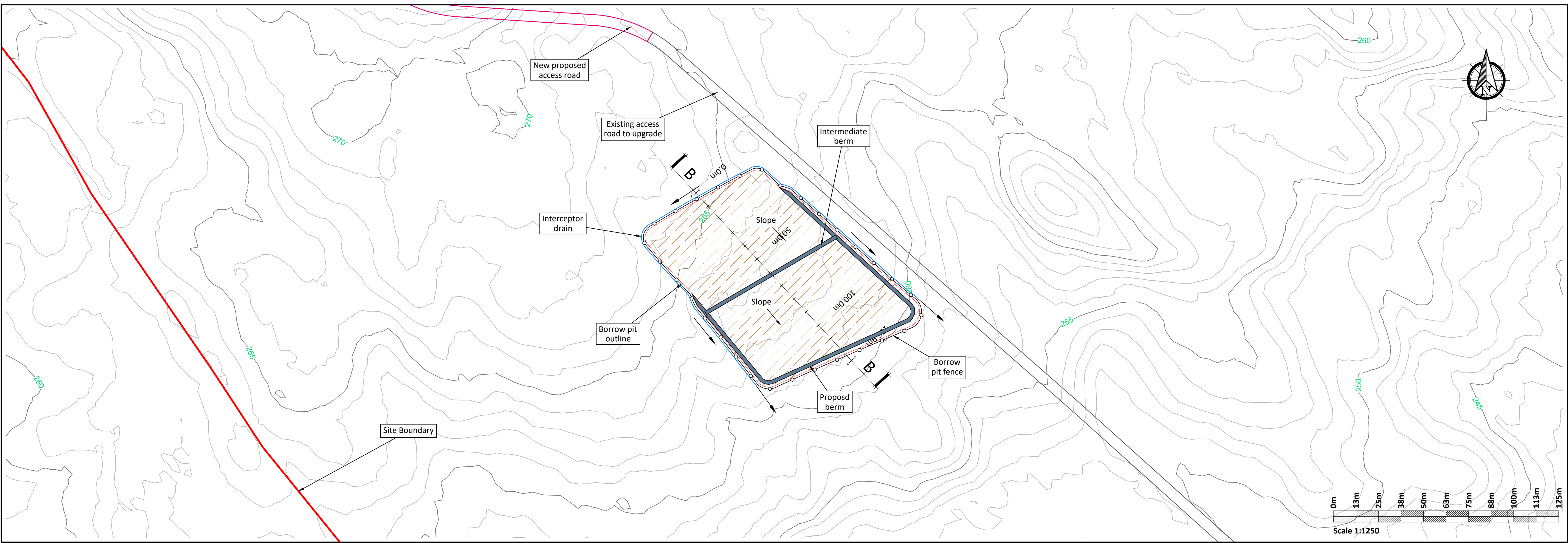
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Rev.	Description	App By	Date
A	FOR INFORMATION	BDH	08.11.23
B	FOR INFORMATION	BDH	01.05.24
C	FOR INFORMATION	BDH	14.06.24
D	FOR INFORMATION	BDH	18.07.24
E	FOR INFORMATION	BDH	19.08.24

PROJECT	CLIENT		
KNOCKSHANVO WIND FARM	MKO		
SHEET	Date	Project number	Scale (@ A1 )
BORROW PIT 1 PLAN AND SECTION	19.08.24	P20-153	As Shown
	Drawn by	Drawing Number	Rev
	POR	Figure 4-9	E
	Checked by		
	IH		



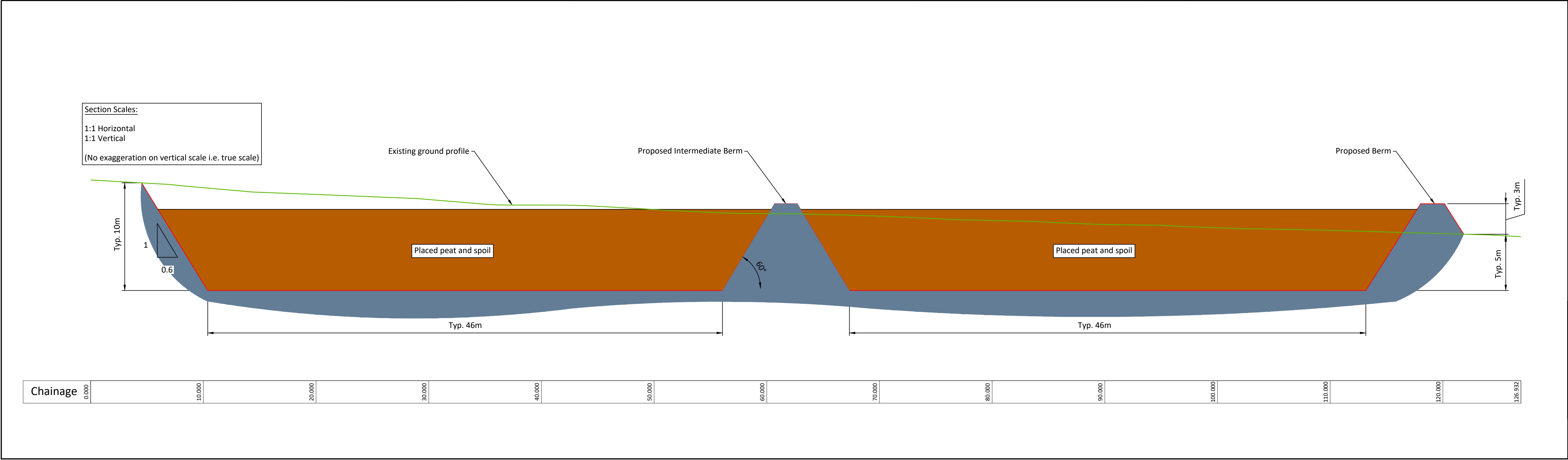


PLAN  
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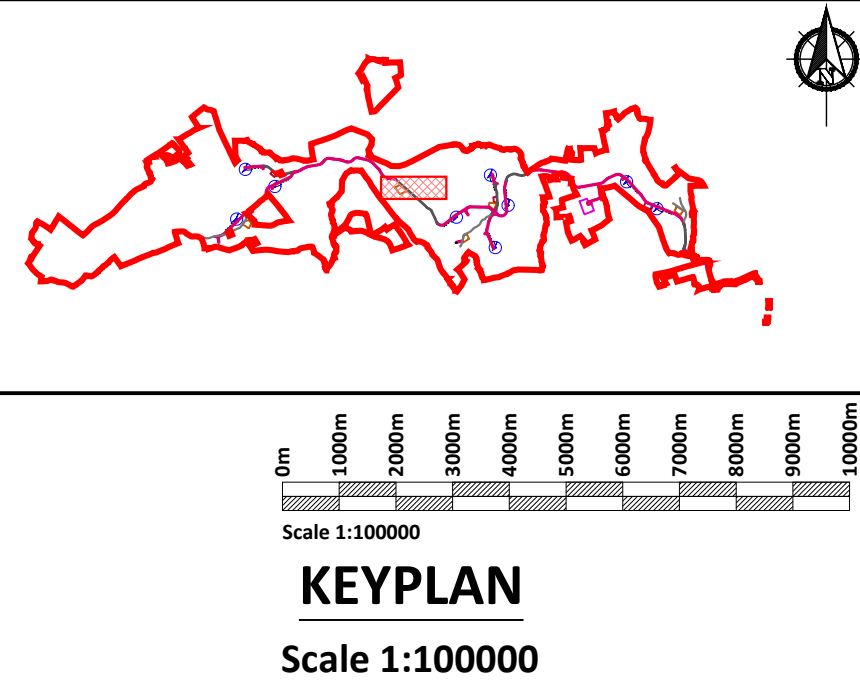
- Legend:**
- EIAR Planning Boundary
  - Turbine Location
  - Existing Access Track (to be upgraded)
  - New Proposed Access Track
  - Substation
  - Construction Compound
  - Borrow Pit
  - Grid Route Options
  - Turbine Delivery Route

**Borrow Pit Construction Notes:**

- (1) It is proposed to construct the borrow pit so that the base of the borrow pit is below the level of the adjacent section of access road.
- (2) Slopes within the excavated rock formed around the perimeter of the borrow pit will be formed at stable inclinations to suit local in-situ rock conditions.
- (3) Infilling of the peat & spoil will commence at the back edge of the borrow pit and progress towards the borrow pit entrance/rock buttress. Leaving in place upstands/segments of intact rock which will help to retain the placed peat & spoil and will allow the borrow pit to be developed and infilled in cells.
- (4) A rock buttress is required at the downslope edge of the borrow pit to safely retain the infilled peat and spoil. The height of the rock buttresses constructed will be greater than the height of the infilled peat & spoil to prevent any surface peat & spoil run-off. A buttress up to 5m (approx.) in height is likely to be required.
- (5) The rock buttress will be founded on competent strata. The founding stratum for the rock buttress will be inspected and approved by the project geotechnical engineer.
- (6) In order to prevent water retention occurring behind the buttresses, the buttresses will be constructed of coarse boulder fill with a high permeability.
- (7) The surface of the placed peat & spoil will be shaped to allow efficient run-off of surface water from the placed arising's.
- (8) Control of groundwater within the borrow pit may be required and measures will be determined as part of the ground investigation programme.
- (9) All the above-mentioned general guidelines and requirements will be confirmed by the designer prior to construction.
- (10) Further guidelines on the construction of the borrow pit are included within Section 7.4 of the Peat & Spoil Management Plan



SECTION B - B  
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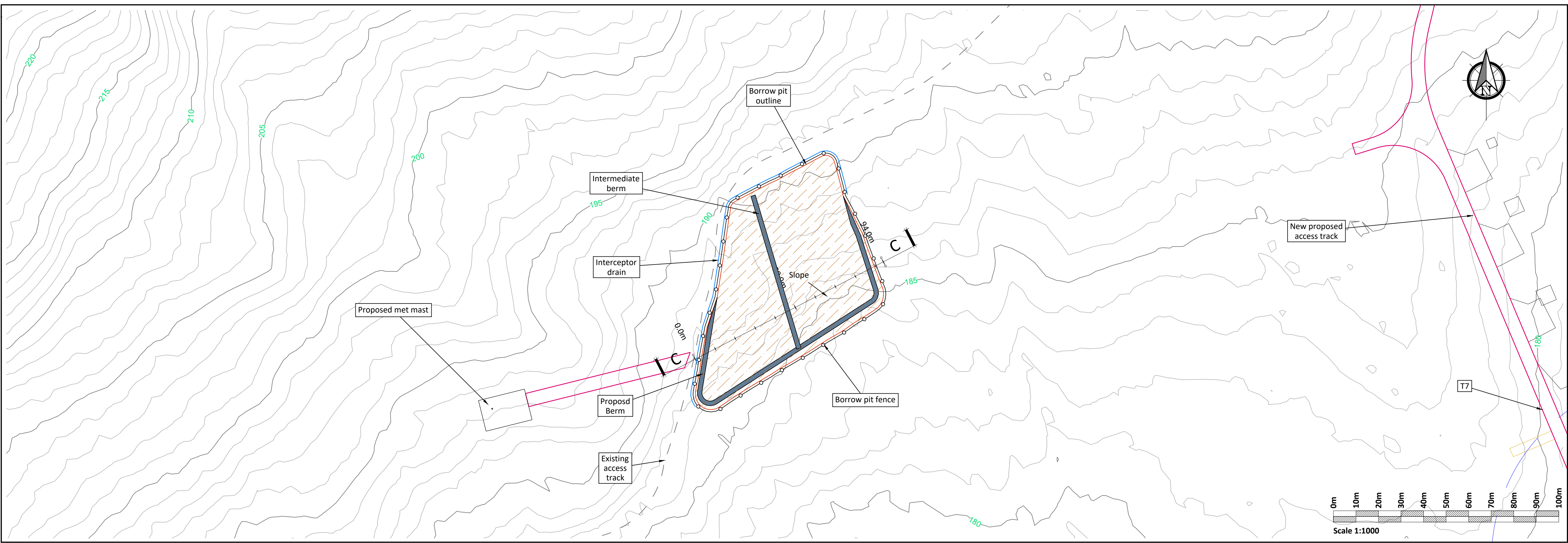
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C	FOR INFORMATION	BDH	18.07.24
D	FOR INFORMATION	BDH	19.08.24

PROJECT	CLIENT		
KNOCKSHANVO WIND FARM	MKO		
SHEET	Date 19.08.24	Project number P20-153	Scale (@ A1) As Shown
BORROW PIT 2 PLAN AND SECTION	Drawn by POR	Drawing Number Figure 4-10	Rev D
	Checked by IH		



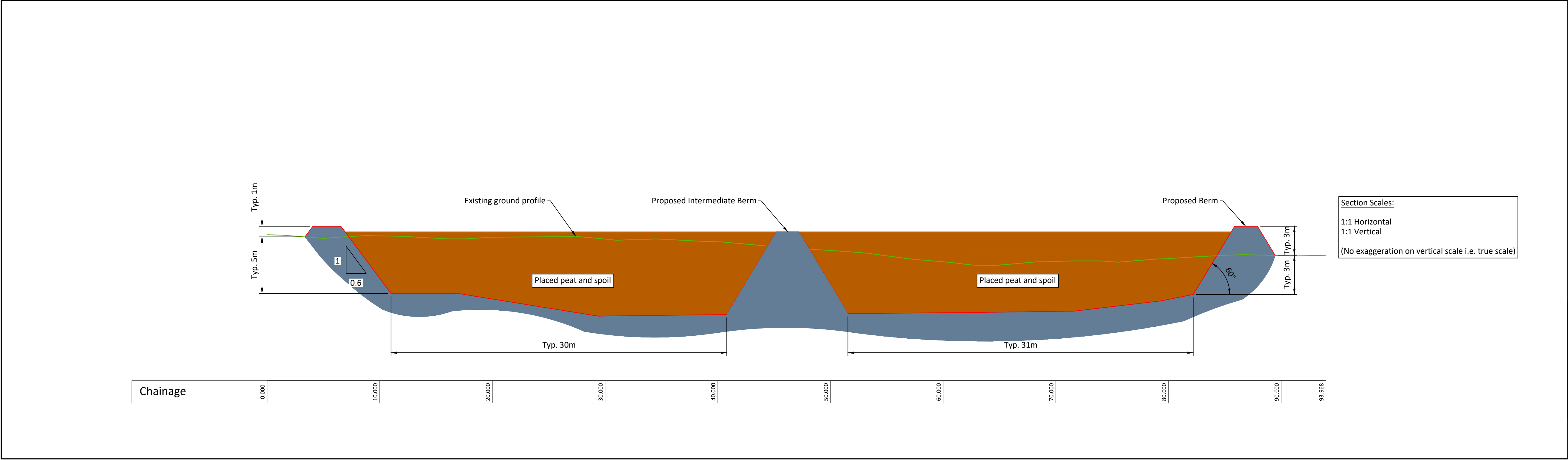


PLAN  
Scale 1:1000

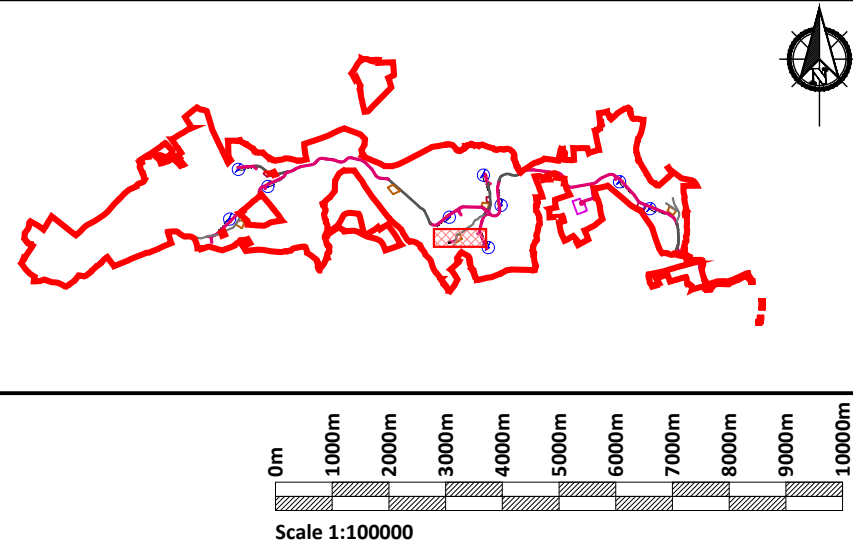
- Legend:
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  - Turbine Location
  - Existing Access Track (to be upgraded)
  - New Proposed Access Track
  - Substation
  - Construction Compound
  - Borrow Pit
  - Grid Route Options
  - Turbine Delivery Route

Borrow Pit Construction Notes:

- (1) It is proposed to construct the borrow pit so that the base of the borrow pit is below the level of the adjacent section of access road.
- (2) Slopes within the excavated rock formed around the perimeter of the borrow pit will be formed at stable inclinations to suit local in-situ rock conditions.
- (3) Infilling of the peat & spoil will commence at the back edge of the borrow pit and progress towards the borrow pit entrance/rock buttress. Leaving in place upstands/segments of intact rock which will help to retain the placed peat & spoil and will allow the borrow pit to be developed and infilled in cells.
- (4) A rock buttress is required at the downslope edge of the borrow pit to safely retain the infilled peat and spoil. The height of the rock buttresses constructed will be greater than the height of the infilled peat & spoil to prevent any surface peat & spoil run-off. A buttress up to 5m (approx.) in height is likely to be required.
- (5) The rock buttress will be founded on competent strata. The founding stratum for the rock buttress will be inspected and approved by the project geotechnical engineer.
- (6) In order to prevent water retention occurring behind the buttresses, the buttresses will be constructed of coarse boulder fill with a high permeability.
- (7) The surface of the placed peat & spoil will be shaped to allow efficient run-off of surface water from the placed arising's.
- (8) Control of groundwater within the borrow pit may be required and measures will be determined as part of the ground investigation programme.
- (9) All the above-mentioned general guidelines and requirements will be confirmed by the designer prior to construction.
- (10) Further guidelines on the construction of the borrow pit are included within Section 7.4 of the Peat & Spoil Management Plan



SECTION C - C  
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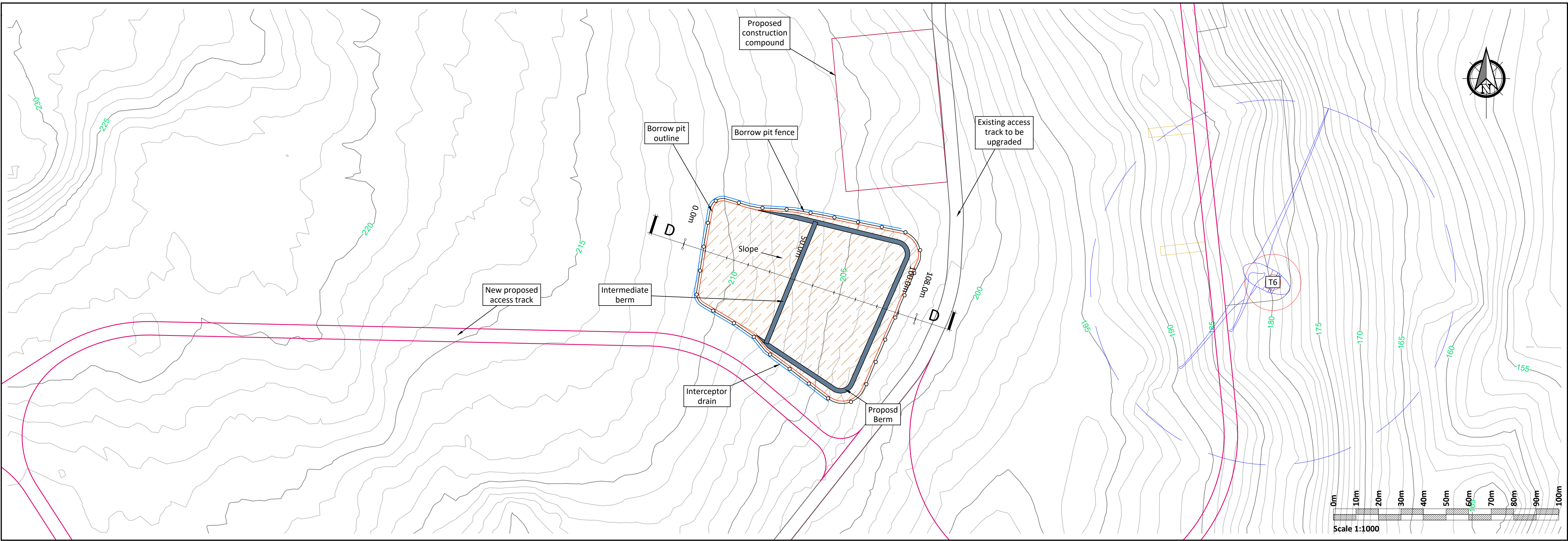
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D	FOR INFORMATION	BDH	18.07.24
E	FOR INFORMATION	BDH	19.08.24

PROJECT	CLIENT		
KNOCKSHANVO WIND FARM	MKO		
SHEET	Date 19.08.24	Project number P20-153	Scale (@ A1 ) As Shown
BORROW PIT 3 PLAN AND SECTION	Drawn by POR	Drawing Number	Rev E
	Checked by IH	Figure 4-11	



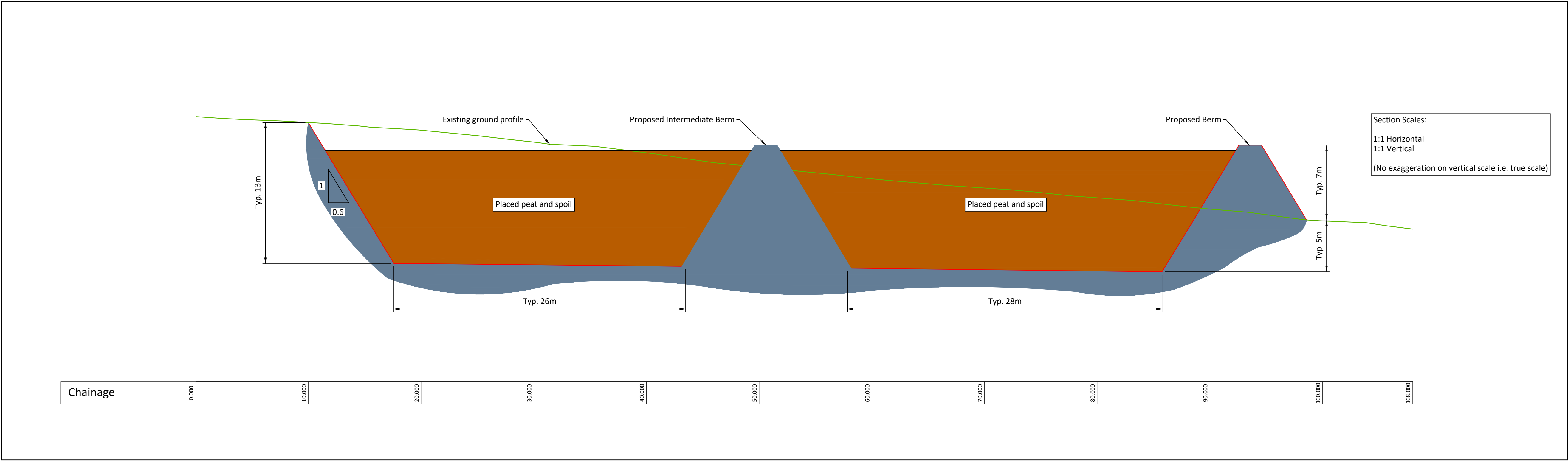


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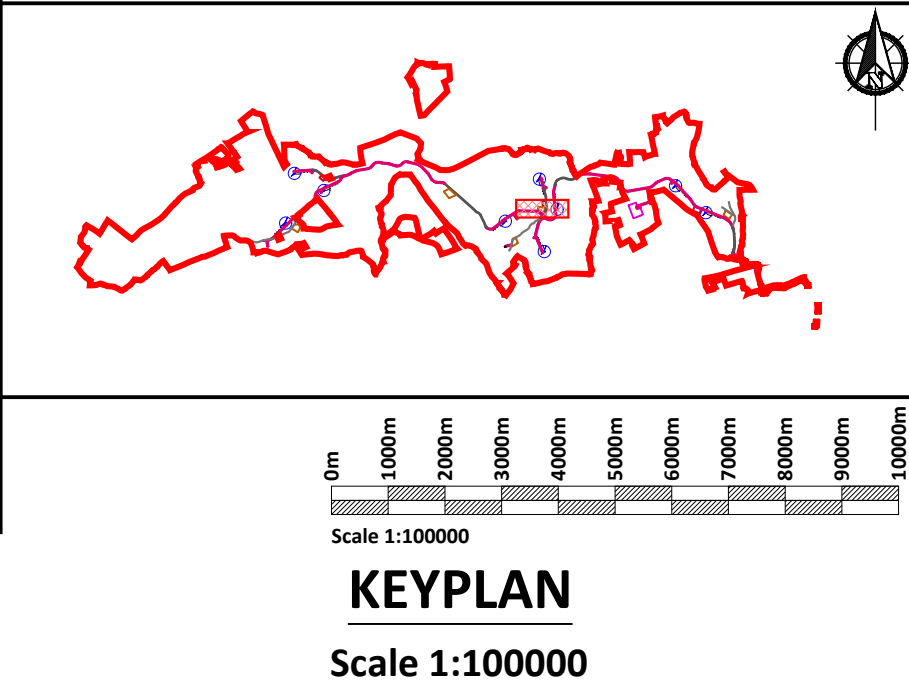
- Legend:**
- EIAR Planning Boundary
  - Turbine Location
  - Existing Access Track (to be upgraded)
  - New Proposed Access Track
  - Substation
  - Construction Compound
  - Borrow Pit
  - Grid Route Options
  - Turbine Delivery Route

**Borrow Pit Construction Notes:**

- It is proposed to construct the borrow pit so that the base of the borrow pit is below the level of the adjacent section of access road.
- Slopes within the excavated rock formed around the perimeter of the borrow pit will be formed at stable inclinations to suit local in-situ rock conditions.
- Infilling of the peat & spoil will commence at the back edge of the borrow pit and progress towards the borrow pit entrance/rock buttress. Leaving in place upstands/segments of intact rock which will help to retain the placed peat & spoil and will allow the borrow pit to be developed and infilled in cells.
- A rock buttress is required at the downslope edge of the borrow pit to safely retain the infilled peat and spoil. The height of the rock buttresses constructed will be greater than the height of the infilled peat & spoil to prevent any surface peat & spoil run-off. A buttress up to 5m (approx.) in height is likely to be required.
- The rock buttress will be founded on competent strata. The founding stratum for the rock buttress will be inspected and approved by the project geotechnical engineer.
- In order to prevent water retention occurring behind the buttresses, the buttresses will be constructed of coarse boulder fill with a high permeability.
- The surface of the placed peat & spoil will be shaped to allow efficient run-off of surface water from the placed arising's.
- Control of groundwater within the borrow pit may be required and measures will be determined as part of the ground investigation programme.
- All the above-mentioned general guidelines and requirements will be confirmed by the designer prior to construction.
- Further guidelines on the construction of the borrow pit are included within Section 7.4 of the Peat & Spoil Management Plan



SECTION D - D  
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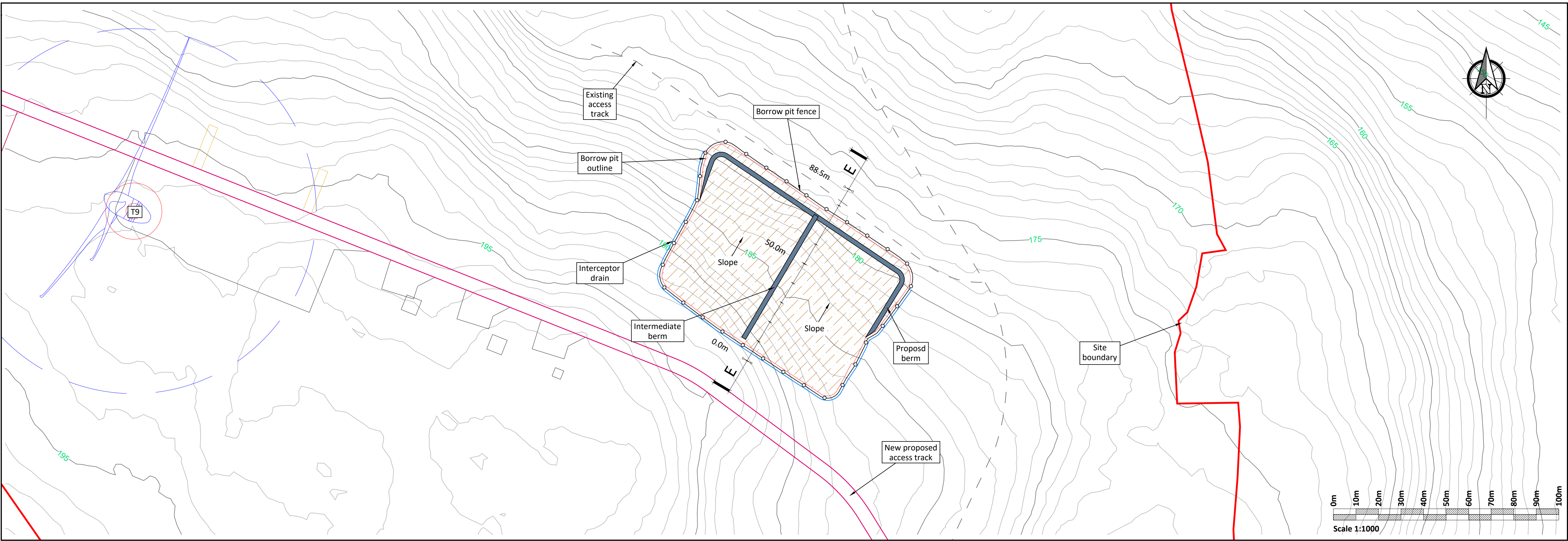
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Rev.	Description	App By	Date
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D	FOR INFORMATION	BDH	19.08.24

PROJECT	CLIENT		
KNOCKSHANVO WIND FARM	MKO		
SHEET	Date 19.08.24	Project number P20-153	Scale (@ A1 ) As Shown
BORROW PIT 4 PLAN AND SECTION	Drawn by POR	Drawing Number	Rev D
	Checked by IH	Figure 4-12	



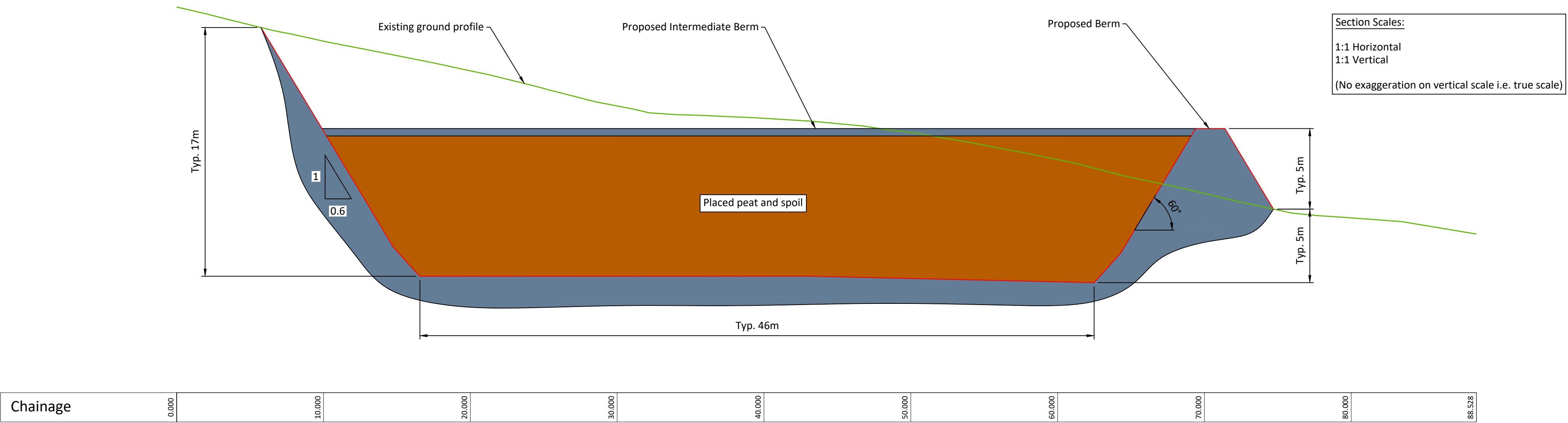


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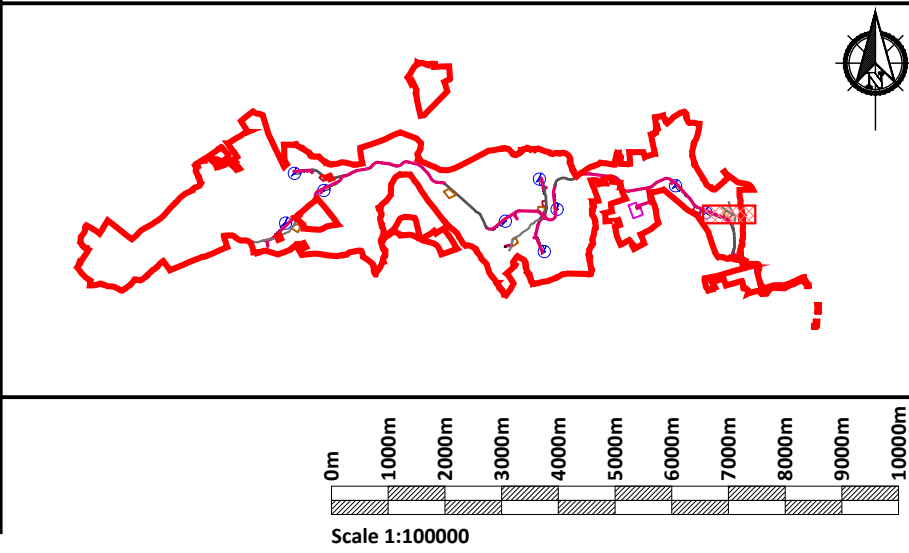
- Legend:**
- EIAR Planning Boundary
  - Turbine Location
  - Existing Access Track (to be upgraded)
  - New Proposed Access Track
  - Substation
  - Construction Compound
  - Borrow Pit
  - Grid Route Options
  - Turbine Delivery Route

**Borrow Pit Construction Notes:**

- (1) It is proposed to construct the borrow pit so that the base of the borrow pit is below the level of the adjacent section of access road.
- (2) Slopes within the excavated rock formed around the perimeter of the borrow pit will be formed at stable inclinations to suit local in-situ rock conditions.
- (3) Infilling of the peat & spoil will commence at the back edge of the borrow pit and progress towards the borrow pit entrance/rock buttress. Leaving in place upstands/segments of intact rock which will help to retain the placed peat & spoil and will allow the borrow pit to be developed and infilled in cells.
- (4) A rock buttress is required at the downslope edge of the borrow pit to safely retain the infilled peat and spoil. The height of the rock buttresses constructed will be greater than the height of the infilled peat & spoil to prevent any surface peat & spoil run-off. A buttress up to 5m (approx.) in height is likely to be required.
- (5) The rock buttress will be founded on competent strata. The founding stratum for the rock buttress will be inspected and approved by the project geotechnical engineer.
- (6) In order to prevent water retention occurring behind the buttresses, the buttresses will be constructed of coarse boulder fill with a high permeability.
- (7) The surface of the placed peat & spoil will be shaped to allow efficient run-off of surface water from the placed arising's.
- (8) Control of groundwater within the borrow pit may be required and measures will be determined as part of the ground investigation programme.
- (9) All the above-mentioned general guidelines and requirements will be confirmed by the designer prior to construction.
- (10) Further guidelines on the construction of the borrow pit are included within Section 7.4 of the Peat & Spoil Management Plan



SECTION E - E  
Scale 1:200



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C	FOR INFORMATION	BDH	14.06.24
D	FOR INFORMATION	BDH	18.07.24
E	FOR INFORMATION	BDH	19.08.24

PROJECT	CLIENT		
KNOCKSHANVO WIND FARM	MKO		
SHEET	Date 19.08.24	Project number P20-153	Scale (@ A1 ) As Shown
BORROW PIT 5 PLAN AND SECTION	Drawn by POR	Drawing Number	Rev E
	Checked by IH	Figure 4-13	

Hardcore materials will be extracted from the borrow pits (and some turbine locations, if necessary), principally by means of rock breaking. Depending on the hardcore volume requirements, blasting may also be used as a more effective rock extraction method, capable of producing significant volumes of rock in a matter of milliseconds. Blasting will only be carried out after notifying any potentially sensitive local residents. However, data available from the ground investigations undertaken to date indicated that the rock can be removed by breaking. The potential noise and vibration effects on sensitive receptors associated with the rock extraction measures, detailed below, are assessed in Chapter 12 of this EIAR.

The two proposed extraction methods are detailed below.

#### 4.2.7.2 **Rock Extraction Methods**

Where present, overburden will be stripped back and stockpiled in dedicated safe locations (please see Appendix 4-2 Peat and Spoil Management Plan) using standard tracked excavators. Two extraction methods will be used and have been assessed for breaking out the useful rock below; rock breaking and blasting.

##### 4.2.7.2.1 **Rock Breaking**

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

A large rock breaking excavator progressively breaks out the solid rock from the ground in the borrow pit area. The large rock breaker is typically supported by a smaller rock breaker which can often be in the 30-40 tonne size range, and works to break the rocks down to a size that they can be fed into a crusher.

The extracted broken rock is loaded into a mobile crusher using a wheeled loading shovel and crushed down to the necessary size of graded stone required for the on-site civil works. The same wheeled loader takes the stone from the crusher conveyor stockpile and stockpiles it elsewhere away from the immediate area of the crusher until it is required elsewhere on the Wind Farm Site.

##### 4.2.7.2.2 **Rock Blasting**

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

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



A properly designed blast will generate rock of a size that can be loaded directly into a mobile crusher, using the same wheeled loader description outlined above. From that point on, the same method is used for processing the rock generated from a blast, as would be used to process rock generated by rock breaking. It would be likely that a drilling rig would recommence drilling blast holes for the next blast as soon one blast finished. Rock blasting will be undertaken in line with the Safety and Health Commission for the Mining and other Extractive Industries report on *Guidance on the Safe Use of Explosives in Quarries 2001*<sup>5</sup> to ensure the safe use of explosives on-site. Only authorised people will handle explosives for rock blasting at the site. Given the small quantities of explosives to be used on site, it is considered that there is negligible risk of a major accident occurring from the use of explosives on site (see Section 16.4 of Chapter 16: Vulnerability of the Proposed Development to Major Accidents and Natural Disasters of this EIAR). The potential impacts associated with noise are assessed in Chapter 12 Noise and Vibration.

#### 4.2.7.3 Construction Methodology – Borrow Pits

The Peat and Spoil Management Plan in Appendix 4-2 outlines the guidelines for the construction and reinstatement of borrow pits. The borrow pit locations were selected based on the shallow depth of peat and overburden and accessibility from the existing forestry tracks.

The borrow pits will be constructed as follows:

1. *Peat and overburden will be removed and temporarily stored in localised areas adjacent to the borrow pit locations before being placed into the permanent peat storage areas within the borrow pits. The rock within the proposed borrow pit footprints will be removed by either breaking or blasting depending on its excavatability, which will be determined from confirmatory ground investigation carried out at the proposed borrow pits. The ground investigation will comprise rotary core drilling with associated engineering logging including rock quality designation and strength and durability testing. Data available from the ground investigation undertaken to date indicates that the rock can be removed by breaking.*
2. *It is proposed to construct the borrow pits so that the base of the borrow pits are below the level of the adjacent section of access road. As excavation progresses into the back edge of the borrow pits, localised deepening of the borrow pit floors may be required depending on extraction operations.*
3. *Slopes within the excavated rock formed around the perimeter of the borrow pits will be formed at stable inclinations to suit local in-situ rock conditions. Exposed sections of the rock slopes will be left with irregular faces and declivities to promote re-vegetation and provide a naturalistic appearance.*
4. *The stability of the rock faces within the borrow pits will be inspected by the Project Geotechnical Engineer upon excavation to ensure stability during construction works and in the long term. This inspection will allow unfavourable rock conditions to be identified and suitable mitigation measures to be applied such as removal of loose rock, in line with best practice guidelines.*
5. *It will be necessary to construct rock buttresses founded on in-situ rock within the borrow pits to create individual cells (2 or 4 no.). The cells will be opened in sequence and filled as needed. The rock buttresses will be constructed of rock fill from the*

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[https://www.hsa.ie/eng/publications\\_and\\_forms/publications/mines\\_and\\_quarries/guidance%20on%20the%20safe%20use%20of%20explosives%20in%20quarries.pdf](https://www.hsa.ie/eng/publications_and_forms/publications/mines_and_quarries/guidance%20on%20the%20safe%20use%20of%20explosives%20in%20quarries.pdf)

*borrow pit excavation, placed and compacted in layers. The founding stratum for each rock buttress will be inspected and approved by the Project Geotechnical Engineer.*

- 6. The rock buttresses will be constructed in stages to allow infilling of peat and spoil within cells. The buttress will be constructed of selected rock fill and placed and compacted in suitable layers to form a buttress of sufficient stability to retain the placed peat and spoil.*
- 7. Infilling of the peat and spoil will commence at the back edge of the borrow pit and progress towards the borrow pit entrance/rock buttress, allowing the borrow pit to be developed and infilled in cells. The contractor excavating the rock will be required to develop the borrow pits in a way which will allow the excavated peat and spoil to be reinstated safely.*
- 8. A number of rock buttresses to form cells with the borrow pits will be required to ensure access for trucks and excavators can be achieved. See Drawings P22-153-0600-0018 to 0022 for the location of the rock buttresses. The locations of the rock buttresses shown on Drawings P22-153-0600-0018 to 0022 for the borrow pits are indicative only and may change subject to local conditions encountered on site during construction and as a result of the confirmatory ground investigation.*
- 9. The rock buttresses will be wide enough (up to 4m) to allow construction traffic access for tipping and grading during the placement of the excavated peat and spoil. The permanent side slopes of the rock buttress will be constructed at between 40 to 60 degrees.*
- 10. A rock buttress (perimeter berm) will be required on the downslope side of the borrow pits to safely retain the infilled peat and spoil. The height of the berm constructed will be greater than the height of the reinstated peat and spoil to prevent any surface peat and spoil run-off. A berm up to 7m in height will be required at each borrow pit. The highest berm is required at borrow pit 4.*
- 11. The perimeter berm will be founded on weathered bedrock i.e. competent strata. The founding stratum for the perimeter berm will be inspected and approved by the Project Geotechnical Engineer.*
- 12. A level surface in the underlying granular mineral soil or weathered bedrock will be prepared before placing and compacting the rock fill used to construct the berms. Both of these materials will be encountered at the borrow pit locations and both are suitable founding strata for the berms.*
- 13. In order to prevent water retention occurring behind the buttresses, the buttresses will be constructed of coarse boulder fill with a high permeability. The buttress will be constructed of well graded granular rock fill of 100mm up to 500mm in size. In addition, drains will be placed through the buttresses to allow surface water to drain from the surface of the placed peat. These drains will be inspected periodically, both during construction and during operation of the Proposed Development, to ensure they do not become blocked.*
- 14. A layer of geotextile will be placed on the inside face of the perimeter berm to act as a separator layer between the berm and the placed peat/spoil, to prevent the placed peat/spoil infilling any voids on the inside face of the berm, maintaining the permeability of the berm.*
- 15. The use of temporary access ramps and long reach excavators during the placement of the excavated peat and spoil will be required.*

16. *The surface of the placed peat and spoil will be shaped using excavators to allow efficient run-off of surface water from the placed arisings.*
17. *As the berms are slightly higher than the retained peat, drains will be provided at regular intervals through the berms, at the same level as the top of the peat surface, to prevent ponding of water around the edges of the repositories. These drains will be 150mm diameter flexible plastic drainage pipes or equivalent.*
18. *A layer of geogrid to strengthen the surface of the placed peat within the borrow pits will be required.*
19. *An interceptor drain will be installed upslope of the borrow pit. This drain will divert any surface water away from the borrow pit and hence prevent water from ponding and lodging during construction and also when reinstated.*
20. *Temporary control of groundwater within the borrow pits will be required and exact measures will be determined as part of the confirmatory ground investigation programme. A temporary pump and suitable outfall locations will be required during construction.*
21. *Perimeter drains will be installed around the individual cells within the borrow pits and will discharge to a settlement pond at the lower side/outfall location of the borrow pits.*
22. *The acrotelm will be placed with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the peat and spoil within the borrow pits.*
23. *Supervision by the Project Geotechnical Engineer is required for the development of the borrow pits.*
24. *All the above-mentioned general guidelines and requirements will be implemented by the Contractor during construction.*

A temporary access track will be placed around the perimeter of the borrow pit area to allow for the tipping of peat over the edge of the borrow pit area. This track will be constructed using granular fill (excavated from the borrow pits) and will be placed and compacted as per the main site access roads.

## 4.2.8 Peat and Spoil Management Plan

The purpose of Peat and Spoil Management Plan (Appendix 4-2) is to provide a management plan, with particular reference to peat stability for the construction phase of the Proposed Development. The report describes how peat and spoil, which will be excavated from infrastructure locations such as turbine bases, hardstands, borrow pits and roads, will be handled and placed/reinstated onsite. The report also provides construction details for the types of roads which will be put in place at the site and proposed peat and spoil placement/reinstatement areas which will be developed at the site. The full Peat and Spoil Management Plan, as produced by Fehily Timoney and Company (FT) is available in Appendix 4-2.

### 4.2.8.1 Quantities

The quantity of peat and non-peat material (spoil), requiring management on the site of the Proposed Development has been calculated, as presented in Table 4-2 below. These quantities were calculated by FTC as part of the *Peat and Spoil Management Plan* in Appendix 4-2 of this EIAR.

Table 4-2 Peat and Spoil Volumes requiring management.

Infrastructure Element	Proposed Dimensions	Peat Volume (m <sup>3</sup> )	Spoil (non-peat) Volume (m <sup>3</sup> )
<b>9 no. Turbines and Hardstands</b>	27m diameter excavation footprint for turbine foundation with 95m x 35m hardstand area.	16,000	50,000
<b>Access Roads</b>	5m running surface with 6m wide development footprint.	40,000	32,000
<b>3 no. Temporary Construction Compounds</b>	Hardstanding area of 45m x 65m.	3,800	9,500
<b>Substation</b>	Hardstanding area of 125m x 100m.	7,300	3,000
<b>Met Mast</b>	Hardstanding area of 30m x 30m	300	300
<b>5 no. Borrow Pits</b>	5 no. borrow pits.	14,000	28,000
<b>Grid Connection</b>	9.2 km in length	100	6,800
<b>Total</b>		<b>81,500</b>	<b>129,600</b>
<b>Total Peat &amp; Spoil to be managed (m<sup>3</sup>)</b>		<b>211,100</b>	

Note a factor of 10% (bulking factor of 10%) has been applied and is included in the excavated peat and spoil volumes above to allow for expected increase in volume upon excavation and to allow for a variation in ground conditions across the site.

It should also be noted that the excavated rock volume from turbines, hardstands and the borrow pits is not included in the total volume quoted above in Table 4-2. The excavated rock volume will be re-used on site as part of the construction works for the development and hence will not require reinstatement on site.

#### 4.2.8.2 Peat and Spoil Usage in Restoration of Borrow Pits

Once the required volume of rock has been extracted from the borrow pit areas it is proposed to reinstate these areas with peat and overburden excavated from the works areas of the Proposed Development. The borrow pits will be extracted and reinstated in sequence, beginning with the borrow pit nearest the Wind Farm Site entrance (Borrow pit No. 5).

The construction methodology for the construction of the borrow pits, as presented in FTC's *Peat & Spoil Management Plan* in Appendix 4-2 of this EIAR, is summarised in Section 4.2.7.3 above. This methodology prescribes procedures that will be applied during the construction to avoid any adverse impact on peat stability.

Where possible, the acrotelm peat that has been excavated from across the site and not retained for reinstatement and landscaping works in those locations, will be stored with the vegetated side facing up so as to promote the growth of vegetation and placed across the surface of the stored peat within the borrow pit areas.

#### 4.2.9 Temporary Construction Compounds

3 no. temporary construction compounds are proposed for the Wind Farm Site to avoid excessive movements around the site. Construction compound 1 and 2 each measure approximately 68 metres by 45 metres and 3,060 m<sup>2</sup> in area, located in the western and central sections of the site, adjacent to

the existing access road, approximately 125 metres north of Turbine No. 3, and approximately 155 metres west of Turbine No. 6, respectively.

Construction compound 3 measures approximately 104 metres by 60 metres and 6,240 m<sup>2</sup> in area is proposed for the east of the site, adjacent to the proposed new access road approximately 65 metres to the west of Turbine No. 9, and approximately 700 metres east of the electricity substation. The location of the proposed construction compounds is shown on the site layout drawing in Figure 4-1.

The construction compounds will consist of temporary site offices, staff facilities and car-parking areas for staff and visitors. The layout of these construction compounds is shown on Figure 4-14.

Construction materials and turbine components will be brought directly to the proposed turbine locations following their delivery to the site. Temporary port-a-loo toilets located within a staff portacabin will be used during the construction phase. Wastewater from staff toilets will be directed to a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. The nearest licenced primary wastewater treatment plant is located in O'Briensbridge, approximately 7km east of the Proposed Development.

#### 4.2.9.1 Construction Methodology - Temporary Construction Compounds

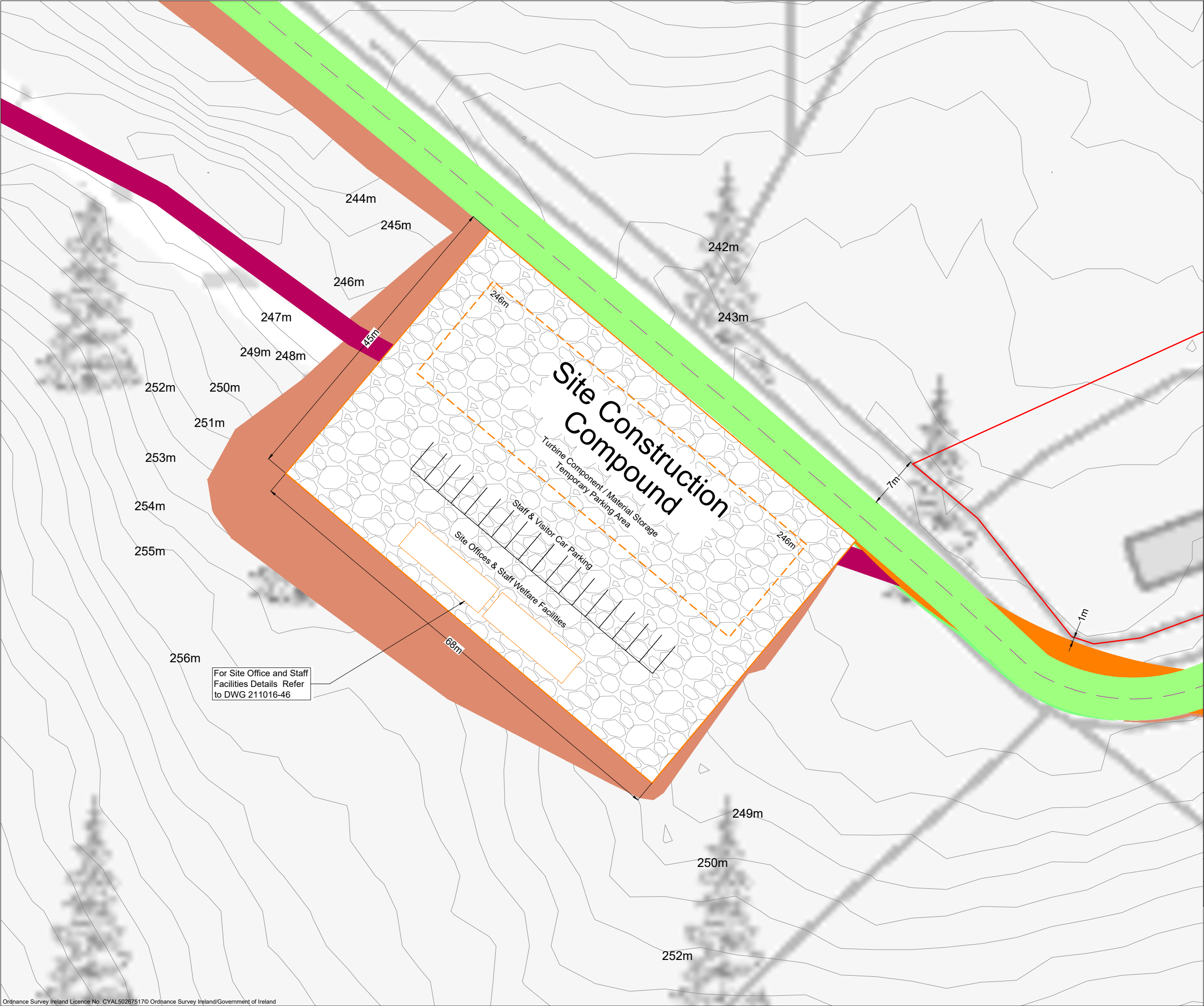
The 3 no. temporary construction compounds will be constructed as follows:

- The area to be used for each 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 4.2.2 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 Development 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 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 compounds;
- The compounds will be fenced and secured with locked gates if necessary; and,
- Upon completion of the Proposed Development the temporary construction compounds will be decommissioned and allowed to vegetate naturally.

#### 4.2.10 Amenity Works

The Proposed Development will provide approximately 1.4km of a dedicated amenity trail in the form of a new track within and connecting to the 12 O'Clock Hills Trailhead. This amenity trail in the townlands of Snaty (Wilson) and Snaty (Massy) will allow walkers to relocate from the existing trail on the public road, into the forest environment, thus increasing the appeal and safety of the existing trail. Two new viewing areas and one upgrade to an existing viewing area will be provided by the Proposed Development. The new viewing area will be placed along the northern end of the existing 12 O'Clock Hills' Fairy Trail, while upgrades will be made to the existing viewing area at the Lower Summit of Knockanuarha. Seating, signage and fixed binoculars are proposed for these two viewing areas, where there will be long-ranging views available. The proposed amenity trail and viewing areas are illustrated in Figure 4-15.





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

- Drawing Legend**
- Planning Application Boundary
  - Existing Road to be Upgraded
  - Proposed Road
  - Amenity Walking Trail
  - Electrical Cable Trench
  - Cut
  - Fill

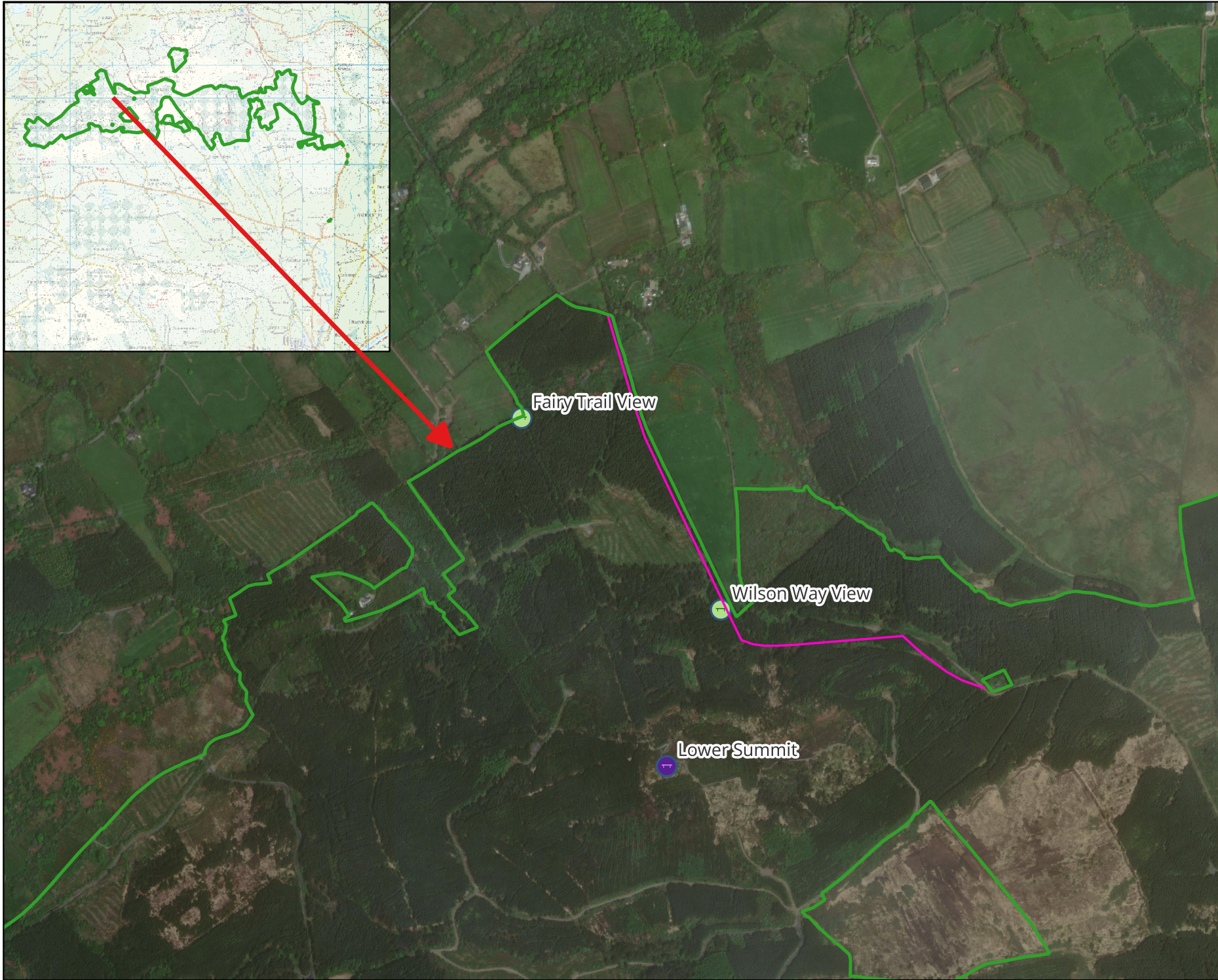
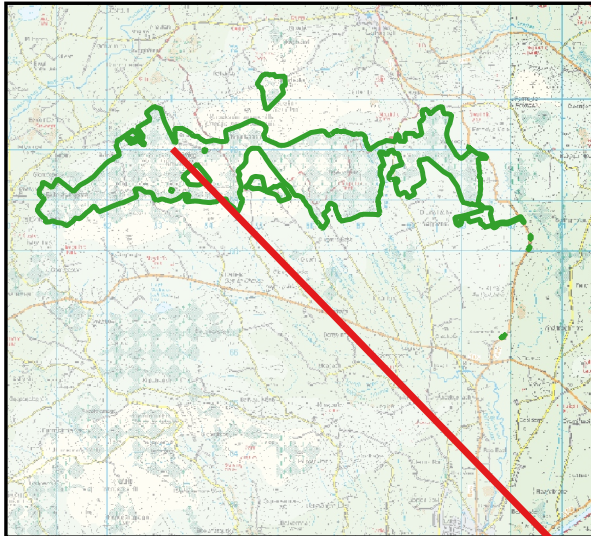


PROJECT TITLE: <b>Proposed Knockshanvo Wind Farm</b>			
DRAWING TITLE: <b>Construction Compound Layout</b>			
PROJECT No.: <b>200513</b>	DRAWING No.: <b>Figure 4-14</b>		SCALE: <b>1:500 @ A3</b>
DRAWN BY: <b>KD</b>	CHECKED BY: <b>EOS</b>	DATE: <b>19.08.2024</b>	REVISION.: <b>P01</b>
OS SHEET No.: 4384, 4385, 4386, 4387, 4442, 4443, 4444, 4445, 4501, 4502, 4503, 4504, 4561, 4562, 4563, 4564			



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## Map Legend

- Proposed Amenity Trail
- Proposed Amenity Viewing Areas [2]
- Upgraded Amenity Viewing Area [1]



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Drawing Title	
Proposed Amenity Trail and Viewing Areas	
Project Title	
Knockshanvo Wind Farm	
Drawn By	Checked By
MV	EOS
Project No.	Drawing No.
200513	Figure 4-15
Scale	Date
1:11,250	2024-08-01
MKO	
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#### 4.2.10.1 Construction Methodology – Amenity Works

Development works for this amenity trail will require felling of one row trees and the inclusion of a hardcore track. Please refer to Section 4.2.12 for tree felling methodology. Due to the proposal to incorporate a turbine hardstand area into this amenity trail, it will not be possible to open this trail until the operational stage of the Proposed Development.

#### 4.2.11 Temporary Works Associated with Turbine Component and Abnormal Load Delivery

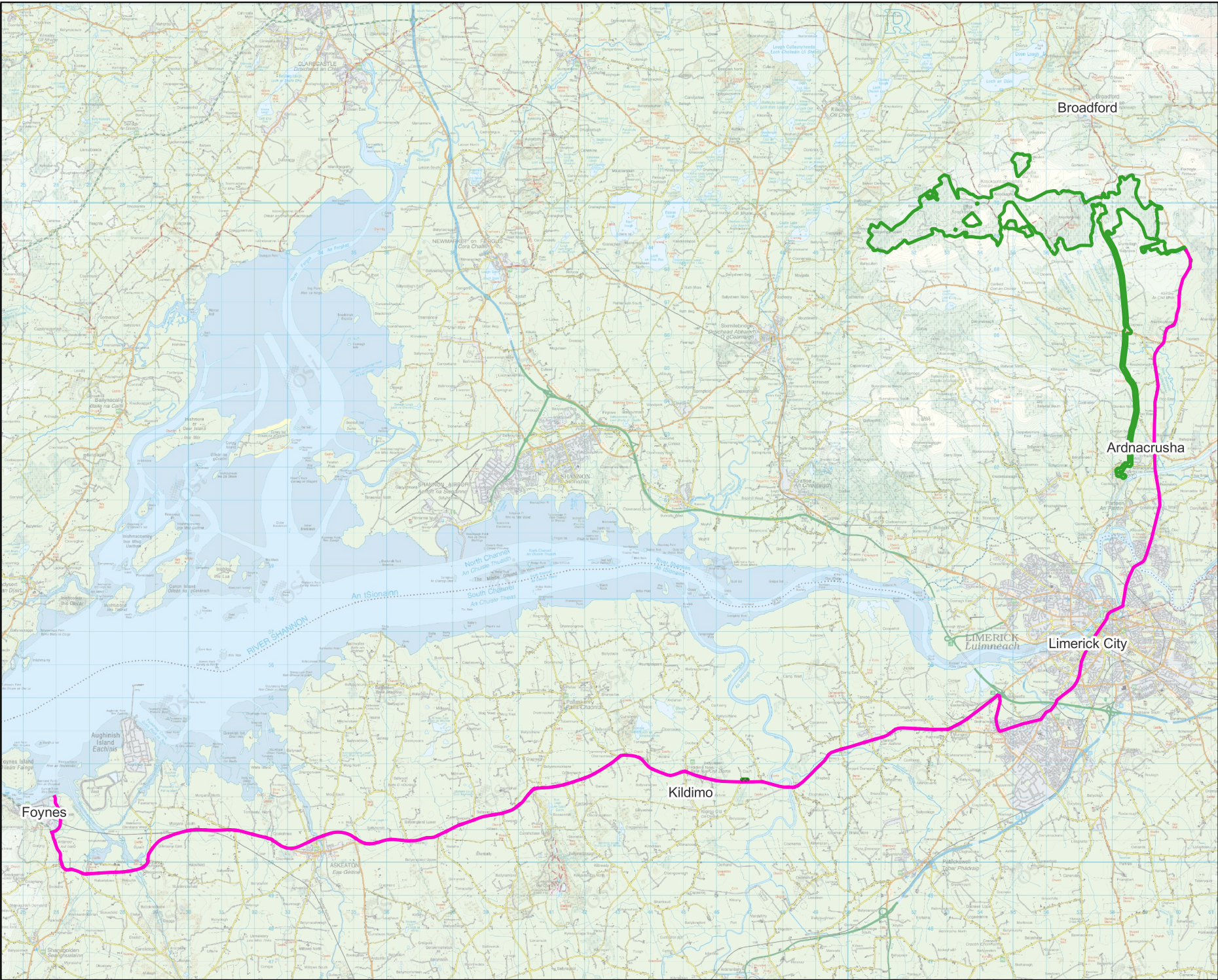
It is proposed that large wind turbine components will be delivered to the Wind Farm Site from Shannon Foynes Port, via the N69 National Secondary Road. A summary of the turbine delivery route is as follows:

- From the access road serving Shannon Foynes Port the route turns south onto the N69 National Secondary Road at the existing priority junction.
- From this point the route heads east on N69 for approximately 32 km.
- The route then turns at the N69 / R510 roundabout to head south for approximately 1.1km, passing through Ard Aulin roundabout to reach the roundabout of the R510 and Father Russell Road.
- From here the route turns heading northeast on Father Russell Road for approximately 1.3km passing through the Oakfield Roundabout to reach the roundabout that connects with the R526.
- The route continues northeast on the R526 for approximately 1.5km passing through the roundabout with Dooradoyle Road to the traffic signals at Ballinacurra Road.
- From this point the route travels northeast through Limerick City Centre for approximately 2.9km via O'Connell Avenue, O'Connell Street, Bridge Street and Athlunkard Street to the roundabout of R463 Corbally Road / Pa Healy Road.
- The route then heads north on the R463 for approximately 4.3km crossing the River Shannon, which forms the County Limerick and County Clare border, onto the river crossing at Ardnacrusa.
- From here the route merges and continues on the R465 for approximately 7.2km, to the location of the proposed Wind Farm Site access junction on the R465.




The total length of the Turbine Delivery Route from Foynes Port to the access junction off the R465 is approximately 50 kms. All deliveries of abnormally sized loads will be made using An Garda Síochána escorts and local transient traffic management measures put in place by the haulage company. The Turbine Delivery Route from Foynes Port is displayed in Figure 4-16 below.

The delivery route for general construction traffic including site staff and heavy goods vehicles (HGVs) delivering general construction materials to the site may vary depending on the location of the suppliers used for concrete and other materials required to construct the Proposed Development. Based on the location of suppliers in the vicinity of the Proposed Development (as described in Chapter 15 of the EIAR), it is estimated that concrete and general construction traffic will all travel on one of the following routes (as shown in Figure 15-2a of this EIAR).





Map Legend

-  EIAR Study Boundary
-  Proposed Turbine Delivery Temporary Transition Compound
-  Proposed Turbine Delivery Route



Drawing Title  
**Turbine Delivery Route Map**

Project Title  
**Knockshanvo Wind Farm**

Drawn By	SD	Checked By	EOS
Project No.	200513	Drawing No.	Figure 4-16
Scale	1:150,000	Date	2024-08-20

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### Concrete / Rock / Stone

At this stage it is not confirmed where the concrete required for the turbine foundations or the finer crushed stone required during the construction phase will be transported from. There are quarries located to the south of the Proposed Development (R465 Limerick and south), from the north and northwest (R465 from Broadford) and from the southeast (via R466 and R465 from Broadford) that may be used to provide concrete, rock and stone. While it is proposed that quarries situated closest to the site will be used in order to minimise the traffic effects of the Proposed Development, in order to test a robust traffic scenario it is assumed that all concrete, rock and stone may be delivered from any one of these directions.

### General construction materials, felled timber, other miscellaneous items and waste

- Similarly, it is not confirmed at this stage where general construction materials, felled timber, miscellaneous items and waste will be transported from or to. Again, in order to test a robust traffic scenario, it was assumed that all general construction traffic may be delivered from the same directions as described above. A list of the nearest licenced quarries to the Proposed Development is provided in Section 4.2.7 above.

### Other wind turbine component deliveries (components delivered using standard HGVs)

- All other wind turbine components delivered by standard HGVs will arrive at Shannon Foynes Port and will be delivered by via the same haul route as for the abnormally sized loads as set out above.

## 4.2.11.2 Accommodation Works

Works such as road widening are sometimes required along proposed turbine transport routes to accommodate the large vehicles used to transport turbine components to wind farm sites. The proposed transport route for the Proposed Development has been the subject of a route assessment to determine if any widening works are required along its length. Full details of the locations described below are shown in Figure 15-1b in Chapter 15 and 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:

### Location 1 – Left turn onto N69

Vehicles will be accommodated with some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, removal/trimming of trees. Oversail of the blade outside the carriageway edge is required, with a potential oversail impact on third-party lands.

### Location 2 – S-Bend on N69

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, at this location. Oversail of the blade outside the carriageway edge is required.

### Location 3 – Bends on N69

There will be no impacts at this location.

### Location 4 – Left bend on N69

There will be no impacts at this location.

#### Location 5 – Left bend on N69

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, at this location. Oversail of the blade outside the carriageway edge is required.

#### Location 6 – Right bend on N69

Vehicles will be accommodated with some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables. Oversail of the blade outside the carriageway edge is required, with a potential oversail impact on third-party lands.

#### Location 7 – Right bend on N69 - Kildimo

Vehicles will be accommodated with some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, including parking restrictions. Oversail of the blade outside the carriageway edge is required, with a potential oversail impact on third-party lands.

#### Location 8 – N69 Ferrybridge

There will be no impacts at this location as the load on the tower transporter will be fully raised to avoid contact with the road.

#### Location 9 – Roundabout on N69 - Clarina

Tower transporter vehicles will be accommodated with some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables. A minor temporary over-run through the roundabout centre island will be required in order to accommodate the tower transporter vehicle.

#### Location 10 – N69/N18 east/R510 roundabout

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, at this location to accommodate the tower transporter vehicle. Oversail of the tower transporter over the grass verge is required, with a potential for a minor temporary over-run through splitter islands required. The blade lifter vehicle will not impact this location.

#### Location 11 – R510 roundabout

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, including pruning of trees at this location to accommodate both the tower transporter and blade lifter vehicles. Oversail over the roundabout centre island is required for the tower transporter vehicle, with a slight over-run of the centra island required from the blade lifter vehicle.

#### Location 12 & 13 – R510/Father Russell Road roundabout

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, at this location to accommodate both the tower transporter and blade lifter vehicles. There will be oversail required outside the carriageway edge, with a temporary over-run through the roundabout island and splitter island required.

#### Location 14 – Father Russell Road/R526 roundabout

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, including the removal of an EIR box, electric cables and cycle lane separation bollards at this location to accommodate both the tower transporter and blade lifter vehicles. There will be slight oversail required outside the carriageway edge.

#### Location 15 – R526/R926 roundabout

The tower transporter vehicle will require for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables at this location. There will be slight oversail required outside the carriageway edge. The blade lifter vehicle will not impact this location.

#### Location 16 & 17 – Right bend and crest on R463

There will be no impacts at this location as the tower transporter and blade lifter loads will be fully raised to avoid contact with the road.

#### Location 18 & 19 – Crest on bridge and R463 roundabout

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, with the removal of overhead cables also included due to the blade lifter vehicle at this location to accommodate both the tower transporter and blade lifter vehicles. There will be slight oversail required outside the carriageway edge, and the tower transporter load will be fully raised to avoid contact with the road.

#### Location 20 – Crest on bridge on R463

There will be no impacts at this location as the tower transporter load will be fully raised to avoid contact with the road.

#### Location 21 – Dip in road on R463

There will be no impacts at this location as the tower transporter load will be fully raised to avoid contact with the road.

#### Location 22 – Crest on R463

There will be no impacts at this location as the tower transporter load will be fully raised to avoid contact with the road.

#### Location 23

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, including trees and vegetation to be trimmed and poles to be removed at this location to accommodate both the tower transporter and blade lifter vehicles. There will be minor oversail of the blade only outside the carriageway edge, with the requirement for road verges to be strengthened for both the tower transporter and blade lifter vehicles.

#### Location 24 & 25

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, including trees and vegetation to be trimmed and poles to be removed at



this location to accommodate both the tower transporter and blade lifter vehicles. There will be minor oversail outside the carriageway edge, with the requirement for road verges to be strengthened for both the tower transporter and blade lifter vehicles, which will impact on third-party lands.

#### Location 26

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, including trees and vegetation to be trimmed at this location to accommodate both the tower transporter and blade lifter vehicles. There will be minor oversail outside the carriageway edge, with the requirement for road verges to be strengthened for both the tower transporter and blade lifter vehicles, which will impact on third-party lands.

#### Location 27

There will be requirement for some minor temporary removal of street furniture, poles/posts, signs, cabinets, overhead cables, including trees and vegetation to be trimmed at this location to accommodate both the tower transporter and blade lifter vehicles. There will be minor oversail outside the carriageway edge, with the requirement for road verges to be strengthened for both the tower transporter and blade lifter vehicles, which will impact on third-party lands.

#### Location 28 – Proposed access junction A on R465

The proposed junction on the R465 will provide access to the Proposed Development for all traffic during the construction phase, including abnormally sized loads, standard HGV deliveries and construction staff. When the Proposed Development is operational the junction will provide for all maintenance trips.

The junctions design includes 13m junction radii and 1:10 tapers in accordance with TII Junction Design Guidelines (TII DN-GEO-03060) for junctions with HGV turning movements. The junction design also includes a temporary run-over area required to accommodate the abnormally sized loads.

The locations of all site access junctions that connect the Proposed Development with the existing public road network are shown as locations 28, 29, 30 and 31 in Figure 15-1c in Chapter 15.

#### Location 29 – Proposed access junction B on L-3042, Drumshillagh or Sallybank (Parker)

As construction, operational and decommissioning traffic travels through the internal layout all traffic requiring to access Turbines No 1 to 7 will require to cross the L-3042 at the proposed junction set out in Figure 15-8 in Chapter 15 of this EIAR. The junction takes the form of a crossroads with traffic management measures required during the construction and decommissioning stages of the Proposed Development to ensure a safe environment for existing and development generated traffic. The junction designs and the visibility splays proposed in the horizontal and vertical planes are in accordance with guidelines and will therefore operate without traffic management measures during the operational phase, when background traffic volumes on the L-3042, and the traffic generated by the Proposed Development are low. It is proposed that the site accesses are gated to restrict access to the site to authorised personnel only.

Once operational, access to the site at this location will be required for occasional maintenance trips only. During this period the gates will remain closed and will be opened by the maintenance staff for the duration of their visit.

At present there is an existing agricultural/forest access that links into the L-3042 from the west. It is proposed to retain this access, improved to provide 13m junction radii appropriate for existing vehicle types. The western arm then continues west, which will accommodate all development generated traffic.

Outside construction periods, this arm will be gated just to the west of the existing agricultural/forestry access. During the operational stage the gate will be opened by maintenance staff to gain access.

A new access is proposed on the east side of the L-3042. This access is for the purpose of all development generated traffic to cross the L-3042, with no turning movements permitted between the new access and the existing L-3042. For this reason, nominal junction radii of 3m are proposed. Similarly, once construction of the Proposed Development is complete this access will be gated and opened when required by staff for access during maintenance visits.

#### Locations 30 & 31 – Proposed access junctions C and D, Snaty (Massy)

All construction, operational and decommissioning traffic requiring access to Turbines No 1 to 3 will require to cross the existing un-named local road at Access Junction C and Junction D, with the proposed junction layout.

At present there is an existing agricultural/forest access that links into the un-named local road from the east. It is proposed to retain this access, with 6m junction radii proposed in accordance with the existing access.

A new access is proposed on the west side of the un-named local road. This access is for the purpose of development generated traffic only, with no turning movements permitted. Nominal junction radii of 3m is proposed at this location. It is proposed that the access on the western side is gated and opened during construction periods and for maintenance visits only.

The junction layout proposed at Access Junction D, also shown in Figure 15-11, takes the form of 2 no. staggered priority junctions that will be in place permanently during the operational phase, with temporary routes through the junction to be used during the construction phase only.

Both of these junctions will be managed by site staff during the construction of the Proposed Development.

#### 4.2.11.3 Temporary Transition Compound

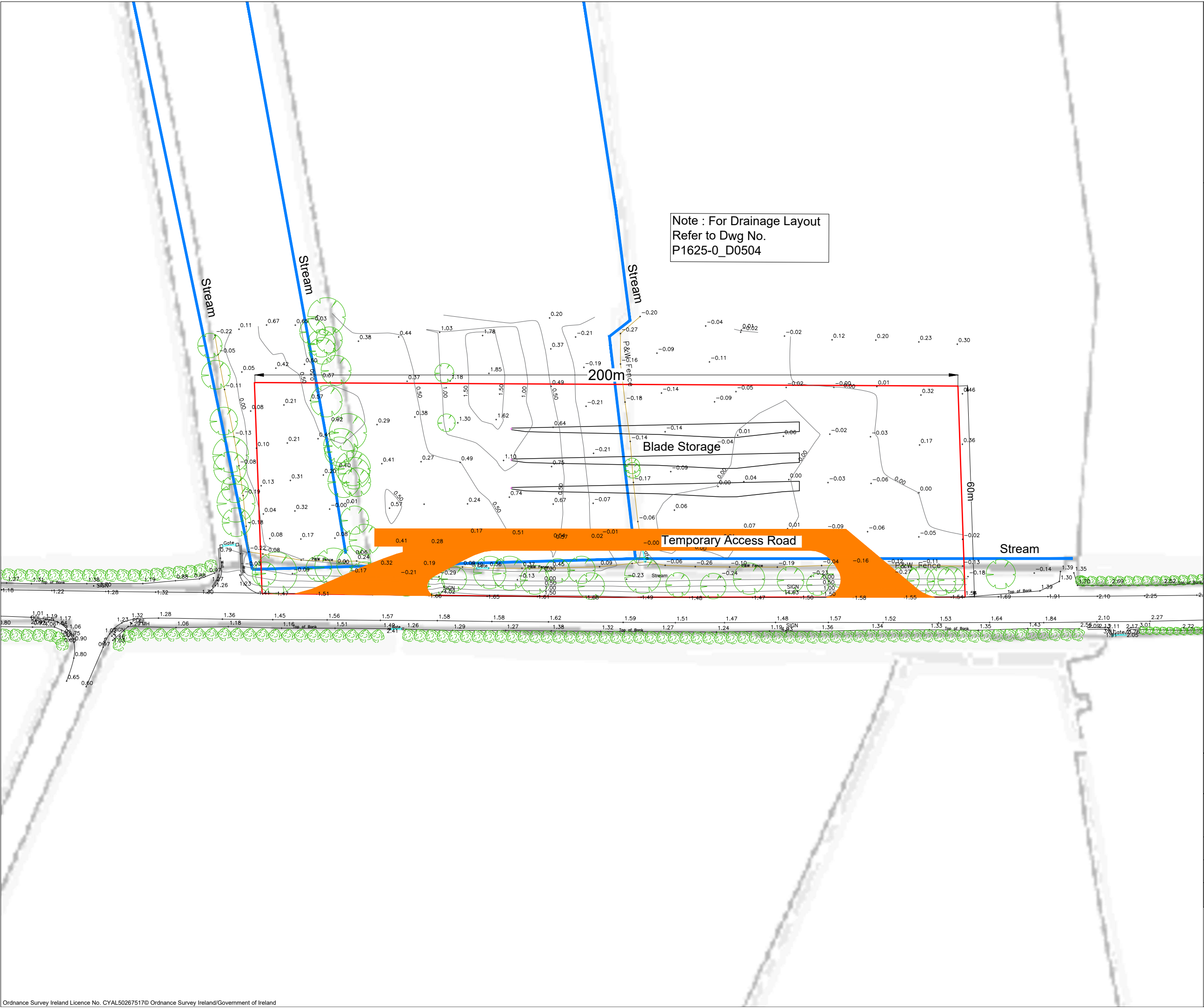
A temporary transition compound is proposed adjacent to the N69, in the townland of Court, Co. Limerick, to facilitate turbine blade delivery. The compound measures approximately 200m along the N69 and 60m in width. Turbine components are generally transported at night when traffic is lightest and this is done in consultation with the roads authorities and An Garda Síochána, and special permits are generally required.

#### 4.2.11.4 Construction Methodology – Temporary Works Associated with Turbine Component and Abnormal Load Delivery

It is proposed that large wind turbine components will be delivered to the Wind Farm Site from Shannon Foynes Port, via the N69 National Secondary Road. As discussed above and in Section 15.1.8 of this EIAR, road widening works are required along sections of the proposed turbine delivery route. The works include the trimming of vegetation and strengthening of road verges using the methodologies outlined in Section 4.2.5 above.

The construction methodology of the compound will be similar to that of the turbine hardstands, and will be in place solely for the duration of turbine blade delivery to the Wind Farm Site. The layout proposed for the temporary transition compound is illustrated in Figure 4-17.

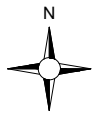
Once the turbines have been delivered to the Wind Farm Site, the temporary transition compound will be decommissioned, and the site will be reinstated to its original form. Therefore, it is proposed to replant the trees being lost in their original locations.



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

**Drawing Legend**

— Planning Application Boundary



PROJECT TITLE: <b>Proposed Knockshanvo Wind Farm</b>		
DRAWING TITLE: <b>Proposed Turbine Delivery Temporary Transition Compound Layout</b>		
PROJECT No.: <b>200513</b>	DRAWING No.: <b>Figure 4-17</b>	SCALE: <b>1:1,000 @ A3</b>
DRAWN BY: <b>KD</b>	CHECKED BY: <b>EOS</b>	DATE: <b>19.08.2024</b>
		REVISION: P01
OS SHEET No.: 4384, 4385, 4386, 4387, 4442, 4443, 4444, 4445, 4501, 4502, 4503, 4504, 4561, 4562, 4563, 4564		





Advanced nursery stock will be planted in order to reduce the amount of time required to reach the age class of the trees being removed. The species to be planted will comprise poplar, willow, or hawthorn preferably, or another native species that is found locally and which is suited to local soil conditions and to be being planted as advanced stock.

It is also proposed to plant a full treeline along the drain that currently bisects the site which is intended to be restored following turbine delivery. Native willow species would be the most suitable species to plant in this area.

## 4.2.12 Ancillary Forestry Felling

### 4.2.12.1 Tree Felling

Some of the proposed Wind Farm Site is occupied by commercial forestry. As part of the Proposed Development, tree felling will be required within and around the development footprint to allow the construction of turbine bases, bat buffers, access roads, and the other ancillary infrastructure.

It should be noted that forestry on the proposed Wind Farm Site was originally planted as a commercial crop and will be felled in the future should the Proposed Development proceed or not.

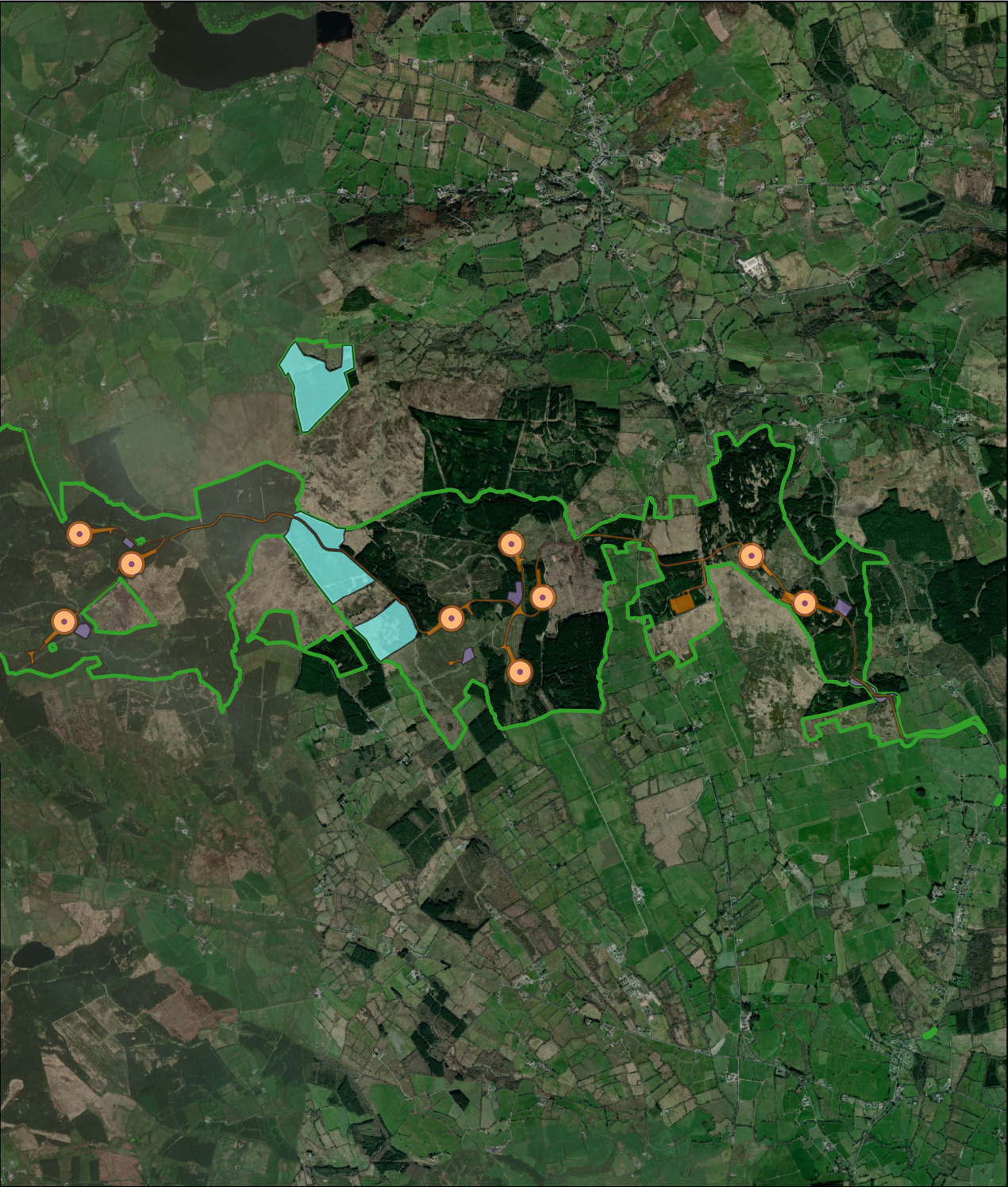
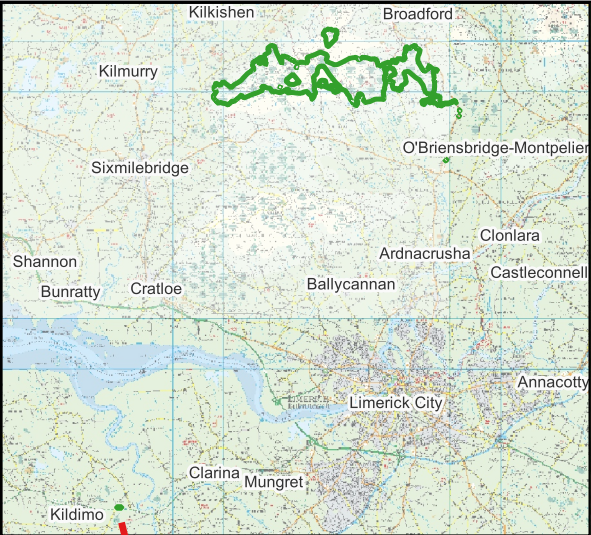
A total of 107.56 hectares of forestry will be felled for the Proposed Development. This includes a total of 48.89 hectares permanently felled within the footprint of the Wind Farm Site (including the 50m buffer to all habitat features used by bats, as discussed in Section 6.3 in Chapter 6 Biodiversity of this EIAR), approximately 5.69 hectares temporarily felled within the footprint of the Wind Farm Site and 52.98 hectares as part of the Hen Harrier Compensation and Enhancement Plan, as discussed in Appendix 6-3. Figure 4-18 shows the extent of the areas to be felled as part of the Proposed Development.

The tree felling activities required as part of the Proposed Development will be the subject of a Felling Licence application to the Forest Service, in accordance with the Forestry Act 2014, 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 wind farm be submitted with the felling licence applications; therefore, the felling licenses cannot be applied for until such time as planning permission is obtained for the Proposed Development.

### 4.2.12.2 Replanting

Detailed consideration of the approach to afforestation requirements associated with the Proposed Development is attached in Appendix 2-3 of this EIAR. It should be noted that the clearfelling of trees in the State requires a felling licence, as discussed above. The associated afforestation of alternative lands equivalent in area to those lands being permanently clearfelled is also subject to licensing ('afforestation licensing'). The Forest Service of the Department of Agriculture, Food & the Marine is Ireland's national forest authority and is responsible for all forest licensing. In light of the foregoing and for the purposes of this project, the developer commits that the location of any replanting (alternative afforestation) associated with the project will be greater than 10km from the Wind Farm Site and also outside any potential hydrological pathways of connectivity i.e., outside the catchment within which the Proposed Development is located. Areas of forestry proposed to be permanently clearfelled for this Wind Farm are located in upland, marginal land locations.





Map Legend

- Wind Farm Site Boundary
- Forestry Felling for Hen Harrier Compensation and Enhancement Plan (52.98 ha)
- Permanent Felling Area (48.89 ha)
- Temporary Felling Area (5.69 ha)
- Proposed Turbine Layout V8



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Drawing Title  
**Wind Farm Site Forestry Felling Areas Map**

Project Title  
**Knockshanvo Wind Farm**

Drawn By	SD	Checked By	EOS
Project No.	200513	Drawing No.	Figure 4-18
Scale	1:45,000	Date	2024-08-20

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Some of these areas are of low forest productivity due to the nature of the environment and will be replaced by alternative afforestation which will be of higher forest productivity, corresponding to the latest afforestation guidelines, thus providing increased carbon sequestration.

On this basis, it is reasonable to conclude that there will be no more than imperceptible indirect, or in-combination effects associated with the replanting. In addition, the developer commits to not commencing the project until both felling and afforestation licences are in place and this ensures the afforested lands are identified, assessed and licensed appropriately by the relevant consenting authority.

#### 4.2.12.3 Construction Methodology – Ancillary Forestry Felling

The proposed methodology for the ancillary 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 areas for peat and spoil management as identified in the Peat and Spoil Management Plan in Appendix 4-2.
- 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 will 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 saw mills. Timber is likely to be diverted to different sawmill customers based on species and size. Heavier sawlog may go to larger sawmills like Murray Timber Products, Ballygar, Co. Galway; Glennon Bros. in Fermoy, Co. Cork or ECC Timber Products, Cornamona, Co.



Galway. These may also take the smaller palletwood material which may also be diverted to pallet/fencing producers like Coolrain Timber or Laois Sawmills, both located close to Portlaoise, Co. Laois. Poor quality pulp material will be diverted to pulpmills consisting of either Medite [MDF production] in Clonmel, Co. Tipperary or SmartPly [OSB production] in Belview, Co. Waterford. Depending on total volume available, merchantable timber may be sold in its entirety to a smaller, local sawmill like Glenmorgan Wood Supplies, Hollyford, Co. Tipperary.

## 4.2.13 Biodiversity Management Plan

The measures described in the Biodiversity Management Plan (BMP) in Appendix 6-5 will serve to offset the loss of 0.9ha of wet heath, 0.45ha of oak-ash-hazel woodland and 920m of hedgerow/treeline associated with the Proposed Development. The plan provides for sufficient habitat restoration to ensure no net permanent loss of these habitats occur. A total of 1,170m of linear hedgerow and treeline habitat is proposed which will result in a net gain of approximately 290m in the linear landscape features within the Wind Farm Site.

### 4.2.13.1 Hen Harrier Enhancement Areas

As outlined in Chapter 7, Section 7.6.2.1, there is the potential for long term significant negative effect (EPA, 2022) on foraging hen harrier during the operational phase of the Wind Farm Site. As outlined, there is the potential for the loss of 58.57 hectares of foraging habitat for hen harrier through displacement within the Wind Farm Site post-construction. It is proposed to reduce the impact on foraging hen harrier through compensation and enhancement of the surrounding lands. A detailed description of the compensation and enhancement measures for hen harrier are outlined in the BMP in Appendix 6-5 of the EIAR. A total of 54.2ha of compensation lands is being proposed for the benefit of hen harrier. A further 46.5ha of upland grassland and peatland is now also proposed for enhancement and safeguarding for foraging hen harrier. It is proposed to enhance habitats such as heath/bog, scrub and grassland through the retention and reinstatement of beneficial landscape features (e.g. scrub and hedgerows), through rush management, and through the management of grazing timing and intensity. It is proposed that these compensation and enhancement measures will be in place before the construction phase begins, to ensure that there is ample foraging habitat for the local hen harrier pair before disturbance or displacement occurs.

### 4.2.13.2 Construction Methodology – Hen Harrier Enhancement Areas

Management prescriptions to be implemented by the applicant include:

#### Open Peatland Restoration Measures

- The identified area of existing forestry will be permanently removed. The timber, brash and stumps will be collected and removed off-site. The area will be allowed to revert to peatland habitat. This process will be aided by drain blocking as discussed below. Pre-mature felling of forestry will be undertaken before the first breeding season of the construction phase of the project programme. This would allow time (i.e. min. three growing seasons) for the clear-felled site to revegetate in advance of the operational phase. Thereby ensuring replacement habitat would be available should the predicted displacement effect occur.
- A hydrology/hydrogeology study will be undertaken to map the movement of ground and surface water to inform the requirement for drain blocking. Forestry drainage channels will be blocked where necessary, using peat dams or plastic dams, as appropriate. In flat areas drain blocks should be placed every 15 metres and more frequently when accounting for a slope. When drains are blocked this reinstates the

waterlogged conditions which are crucial for the survival of peatland plants. These works will be subject to a separate planning application if required.

- Self-seeding conifers originating as windblown seedlings from adjacent and nearby commercial conifer plantations, are a threat to the viability of the compensation and enhancement area. They gradually take hold, and if unmanaged, would eventually make the area unsuitable for nesting/foraging hen harrier. Habitat maintenance of the area will involve the eradication of self-seeding conifers, and removal off-site. It is envisaged that the compensation areas will require maintenance twice during the life of the wind farm, once after approximately 10 and 20 years. The monitoring outlined in the BMP below will monitor the level of encroachment by self-seeding conifers and will bring the scheduled removal forward as required.
- No invasive species were recorded onsite during the February 2020 site visit. A confirmatory pre-commencement survey for invasive species will be undertaken as part of preparatory work. In the event of any invasive species being recorded within the area identified for enhancement measures, an invasive species management plan will be put in place to eradicate any stands of such species.
- Herbicides will not be used for the eradication of self-seeding trees and will not be relied upon for the clearance of invasive species.
- Enhancement and maintenance works will be undertaken outside of the nesting season as per the Wildlife Acts 1976 – 2012 as amended. A suitably qualified ornithologist will be present at the removal of all woody vegetation, to ensure that identified breeding bird sites are avoided. If breeding activity of birds of high conservation concern is identified, no works shall be undertaken within a species-specific buffer (as per Goodship and Furness, 2022) in line with best practice, until it can be demonstrated that the nest is no longer occupied.
- The felling license for these lands will be applied for in tandem with the felling license application that will be required to facilitate the construction of the wind farm within the proposed development area. The felling license will include management prescriptions for the felling of the forestry. Following felling, these compensation lands will be managed for the benefit of hen harrier and peatland restoration.
- If at any point, hen harrier are identified to be nesting on any part of the compensation or enhancement lands, the wind farm development company in cooperation with the individual landowner will provide for the protection of the nest site.
- The use of poisons or stupefying baits is not permitted within compensation or enhancement lands. Hen harriers and other birds of prey can fall victim to secondary and direct poisoning.

## 4.2.14 Wind Farm Site Drainage

### 4.2.14.1 Introduction

The drainage design for the Wind Farm Site has been prepared by Hydro Environmental Services Ltd. (HES). Please refer to Section 1.8.2.2 for biopics of relevant project team members. The drainage design has been prepared based on experience of the project team of other wind farm sites in more peat-dominated environments than the proposed Wind Farm Site, and the number of best practice guidance documents referred to in the References section of Chapter 9 of the EIAR.

The protection of the watercourses within and surrounding the site, and downstream catchments that they feed is of utmost importance in considering the most appropriate drainage proposals for the site of the Proposed Development. The Proposed Development's drainage design has therefore been proposed specifically with the intention of having no significant negative effect on the water quality of the site and its associated rivers and lakes, and consequently no significant effect on downstream catchments and ecological ecosystems.

No routes of any natural drainage features will be altered as part of the Proposed Development 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. The distance will vary between 5-20m depending on local slope, the nature of local soil deposits and also the type of vegetation present. Buffer zones around the existing natural drainage features have been used to inform the layout of the Proposed Development.

#### 4.2.14.2 Existing Drainage Features

The Wind Farm Site is located across 2 no. regional surface water catchments. The east and south of the Wind Farm Site is located in a total of 6 no. river sub-basins, 3 no. sub-basins in the Lower Shannon surface water catchment and 3 no. sub-basins in the Shannon Estuary North catchment. The Wind Farm Site is drained by several 1<sup>st</sup> and 2<sup>nd</sup> order streams. These natural watercourses originate within the Wind Farm Site boundaries and flow downslope before discharging into the Owenogarny River to the northwest and the Blackwater river to the south. In places the natural drainage is further facilitated by a network of manmade drains. These manmade drains are concentrated within the areas of coniferous forestry and along sections of the existing forestry access roads. Lidar data was used to map in detail the existing forestry drainage at the site and how the proposed infrastructure interacts with this existing drainage. Using these Lidar data mapped potential runoff pathways that are >150m in length have been mapped. The routes of any natural drainage features will not be altered as part of the Proposed Development. Turbine locations have been selected to avoid natural watercourses. It is proposed that 5 no. new watercourse crossings and 1 no. existing watercourse crossing upgrade will be required to facilitate the Wind Farm Site.

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

Existing artificial drains in the vicinity of existing site roads will be maintained in their present location where possible. If it is expected that these artificial drains will receive clean 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, the works will take place on the opposite side of the road to the drain.

The Grid Connection is mapped within the Lower Shannon surface water catchment and Hydrometric Area 25D. There are a total of 4 no. crossings over EPA mapped watercourses

#### 4.2.14.3 Construction Drainage Design

Drainage water from any works areas on the Wind Farm Site will not be directed to any natural watercourses within the site. Two distinct methods will be employed to manage drainage water within the site. The first method involves keeping clean water clean by avoiding disturbance to natural drainage features, minimising any works in or around artificial drainage features, and diverting clean surface water flow around excavations and construction areas. The second method involves collecting any drainage waters from works areas within the site that might carry silt or sediment, to allow attenuation and settlement prior to controlled diffuse release. Grid Connection drainage measures are discussed in Section 4.3.2 below.

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. Sediment laden 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 4-19 below.

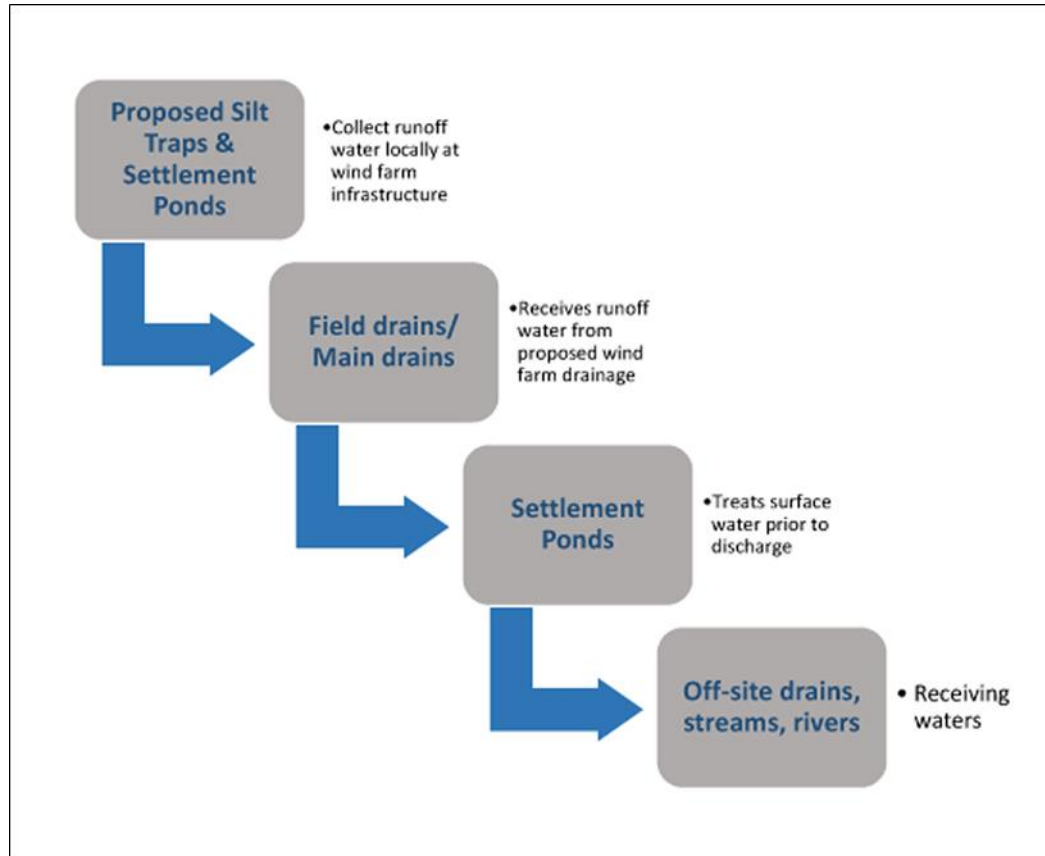


Figure 4-19 Proposed Wind Farm Drainage Process Flow

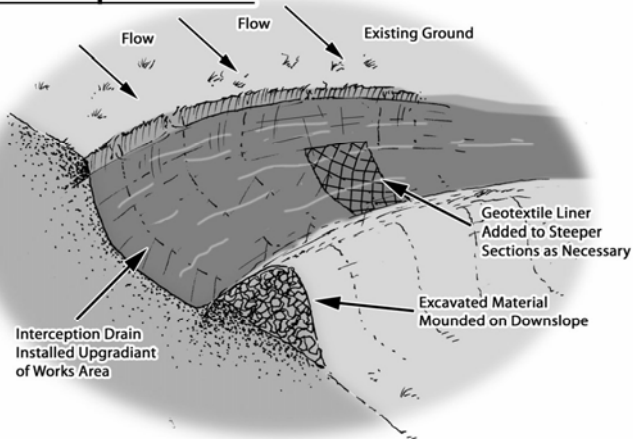
A detailed drainage design for the Proposed Development, incorporating all principles and measures outlined in this drainage design description, has been prepared, and is included in Appendix 4-4 to this EIAR. The drainage design employs the various measures further described in the sub-sections below and is cognisant of the relevant guidance documents as outlined in Chapter 9 of this EIAR.

#### 4.2.14.3.1 **Interceptor Drains**

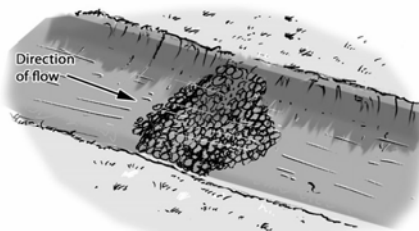
Interceptor drains will be installed upgradient of any works areas to collect surface flow runoff and prevent it reaching excavations and construction areas of the site where it might otherwise have come into contact with exposed surfaces and picked up silt and sediment. The drains will be used to divert 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.

## Interceptor Drain

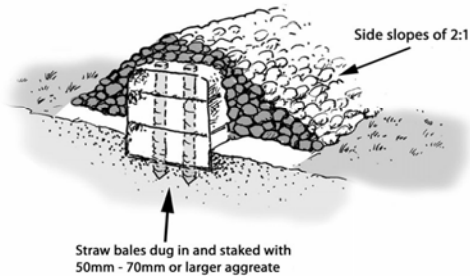


## Check Dam (Stone Dam in Drain)

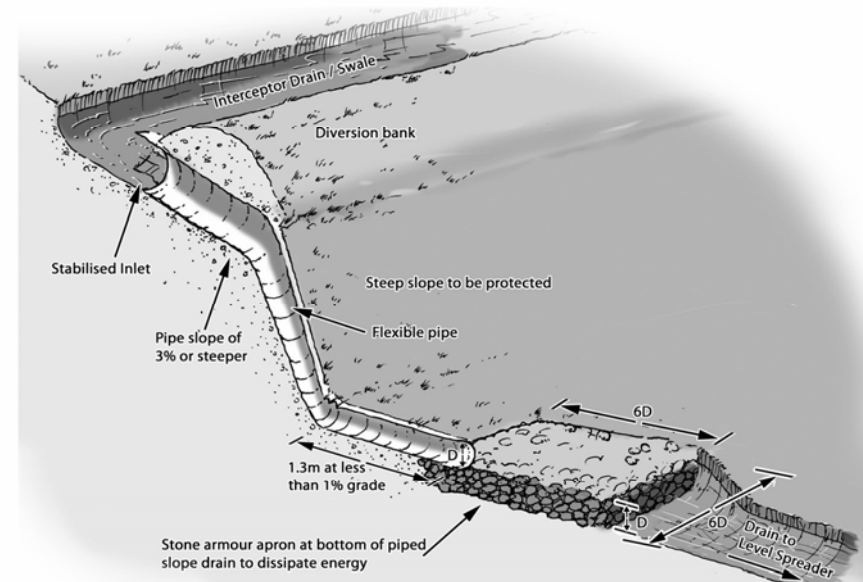


## Check Dam

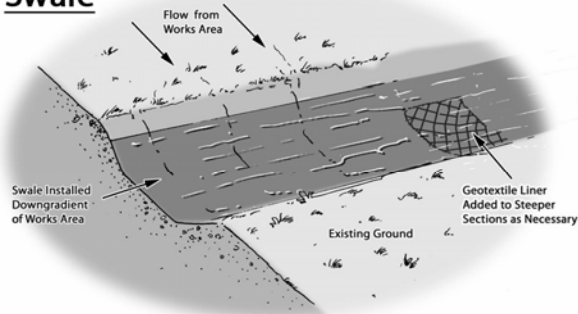
(Straw Bale & Stone Dam - Cross Section)



## Slope Pipe Drain

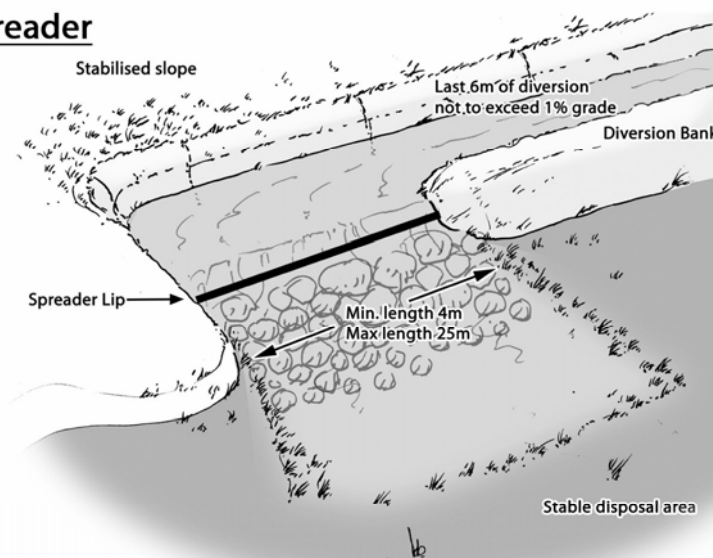


## Swale



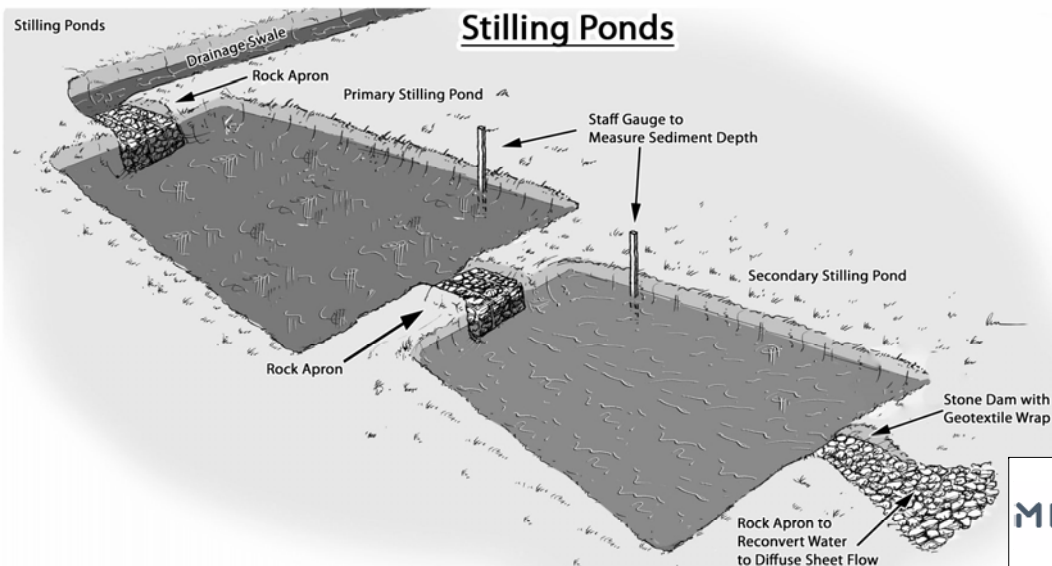
# Drainage Design Measures

## Level Spreader



## Stilling Ponds

## Stilling Ponds



MAP TITLE: **Drainage Design Measure Illustrations**

MAP NO.: **Figure 4-20**

SCALE: **NTS**

PROJECT TITLE: **Knockshanvo Wind Farm**

DATE: **21-08-2024**

DRAWING BY: **Eoin O'Sullivan**

CHECKED BY: **Michael Watson**

ISSUE NO.: **200513- 2024.08.21 - F**

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The velocity of flow in the interceptor will be controlled by check dams (see Section 4.2.14.3.3 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 4.2.14.3.4 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. Figure 4-20 above shows an illustrative drawing of an interceptor drain.

#### 4.2.14.3.2 **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. 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 4-20 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.

#### 4.2.14.3.3 **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 4-20, above, 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 as this ensures the velocity of flow in the drain is controlled. 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 ensure adequate performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.

#### 4.2.14.3.4 **Level Spreader**

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 level spreaders will be located downgradient of any proposed works areas in locations where they will not 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 re-concentrated 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 4-20, above, shows an illustrative example of a level spreader.

The slope in the channel leading into the spreader will be less than or equal to 1%. The slope downgradient of the spreader onto which the water will dissipate will have a grade of less than 6%. The availability of slopes with a grade of 6% or less will determine the locations of level spreaders. If a slope grade of less than 6% is not available in the immediate area downgradient of a works area at the end of a diversion drain, a piped slope drain (see Section 4.2.14.3.5 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.

#### 4.2.14.3.5 **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 4-20, above, shows a diagrammatic example of a piped slope drain and rock apron.

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.

#### 4.2.14.3.6 **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.

#### 4.2.14.3.7 **Stilling Ponds**

Stilling ponds will be used to attenuate runoff from works areas of the Wind Farm Site during the construction 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 4-20, 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 and accounts for climate change. 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 between 1-1.5 metres in depth. Deeper ponds will be used to minimise the excavation area needed for the required volume. The proposed locations of the drainage measures that will be installed prior to wind farm construction commencing are identified on the drainage plans in Appendix 4-5.

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. Stilling ponds will require perimeter fencing and signage to ensure that there are no health and safety risks to workers.

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 to 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.

A water level indicator such as a staff gauge will be installed in each stilling pond with marks to identify when sediment is at 10% of the stilling pond capacity. Sediment will be cleaned out of the still pond when it exceeds 10% of pond capacity. 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.

#### 4.2.14.3.8 **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 4-21 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.



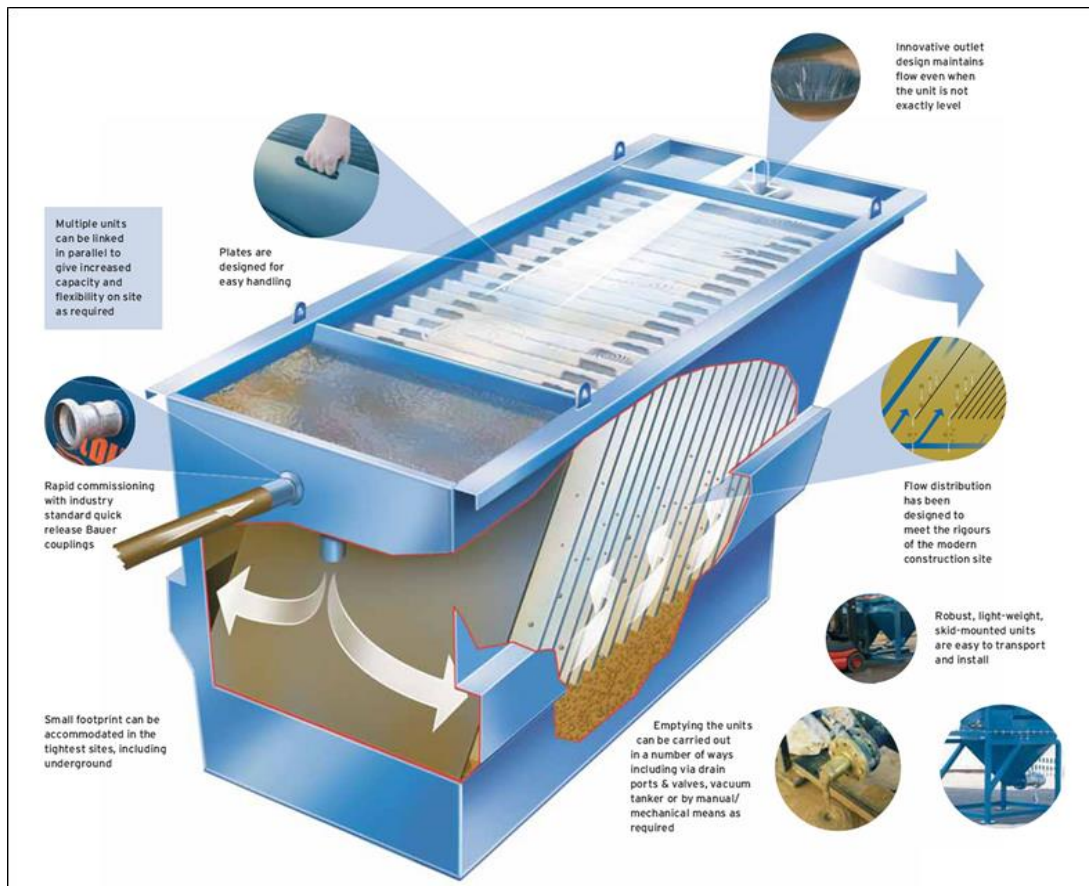


Figure 4-21 Siltbuster (Source: [https://www.siltbuster.co.uk/sb\\_prod/siltbuster-fb.50-settlement-unit/](https://www.siltbuster.co.uk/sb_prod/siltbuster-fb.50-settlement-unit/))

#### 4.2.14.3.9 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 peaty 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 4-3 and Plate 4-4 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 4-3 Silt Bag with water being pumped through



Plate 4-4 Silt bag under inspection

#### 4.2.14.3.10 **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 as shown in Plate 4-5 below.



Plate 4-5 Typical Sedimat Details (Source: <https://www.hy-tex.co.uk/>)

#### 4.2.14.3.11 **Culverts**

Some culverts may be installed to transport drainage waters from works areas of the Proposed Development, particularly where the waters have to be taken from one side of an existing roadway to the other for discharge and treatment. The size of culverts will be influenced by the depth of the track or road sub-base. In all cases, culverts will be oversized to allow mammals to pass through the culvert. Furthermore, all new proposed culverts and proposed culvert upgrades will be suitably sized for the 100-yr flood flow from the upstream catchment with an included factor (+20%) for climate change.

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 doesn't 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.

#### 4.2.14.3.12 **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, which is inevitable where existing roads in proximity to watercourses are to be upgraded as part of the Proposed Development. These areas include around existing culverts, around the headwaters of watercourses, and the proposed locations are indicated on the detailed drainage design drawings included in Appendix 4-5.

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.

Site fences will be inspected regularly, at least once a week, to ensure water is continuing to flow through the fabric, and the fence is not coming under strain from water backing up behind it. Standard silt fence details are shown below in Plate 4-6.



Plate 4-6 Silt Fence Details



#### 4.2.14.4 Permanent Drainage Design

##### 4.2.14.4.1 *Interceptor Drains and Associated Infrastructure*

On completion of the construction phase works, it is envisaged that the majority of the interceptor drains will 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 will have to be retained in certain locations, for example where roadways are to be installed on slopes, to prevent the roadways acting as conduits for water that might infiltrate the roadway sub-base. In these cases, interceptor drains will be maintained in localised areas along the roadway with culverts under the roadway, which will 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 under the road will be left in situ following construction.

##### 4.2.14.4.2 *Swales and Associated Infrastructure*

Drainage swales will remain in place to collect runoff from roads and hardstanding areas of the Proposed Development during the operational phase.

##### 4.2.14.4.3 *Stilling Ponds and Associated Infrastructure*

Stilling ponds will remain in place to handle runoff from roads and hardstanding areas of the Wind Farm Site during the operational phase.

#### 4.2.14.5 Drainage Works for Ancillary Structures

The drainage works for ancillary infrastructure not covered in section 4.2.14.3 above are summarised below.

##### 4.2.14.6 Borrow Pit Drainage

While surface water will be contained in the borrow pits areas, the design proposal is to control the level of water in the borrow pit area by creating a single point outlet from the basin-like area that will ensure the water does not overtop the pit area. Run-off from the proposed borrow pit areas will be controlled via a single outlet that will be installed at the edge of the borrow pit. The single outfall point will be constructed to control runoff from the borrow pit and its immediate surrounds. Interceptor drains will already have been installed upgradient of the borrow pit area before any extraction begins.

During the construction phase of the project, it will be necessary to keep the borrow pit area free of standing water while rock is still being extracted. This will be achieved by using a mobile pump, which will pump water into the same series of drains, settlement ponds and level spreader, which will receive the water from the single outlet.

##### 4.2.14.7 Wind Farm Internal Cable Trench Drainage

Cable trenches will be 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 Development, would be transported to one of the on-site borrow pits or used for landscaping and reinstatements of other areas elsewhere on site or removed to an appropriately licenced waste/recovery facility.

On steeper slopes, silt fences, as detailed in Section 4.2.14.3.12, 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.

#### 4.2.14.8 Forestry Felling Drainage Measures

Tree felling to facilitate the Proposed Development will not be undertaken simultaneously with construction groundworks at the same location. Keyhole felling to facilitate construction works will take place prior to groundworks commencing at that location. Some further felling may take place after all groundworks have been completed and while turbines are being commissioned.

Before the commencement of any felling works, an Environmental Clerk of Works (ECoW) will be appointed to oversee the keyhole felling and extraction works. The ECoW will have the following functions:

- 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 agree 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 (DAFM, 2008).
- 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 / river bank, with no in-stream access permitted.
  - The following minimum analytical suite shall be used: pH, Electrical Conductivity, Total Suspended Solids, Biochemical Oxygen Demand, Total Phosphorus, Ortho-Phosphate, Total Nitrogen, 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.

All relevant measures set out in the most recent versions of the *Forestry & Freshwater Pearl Mussel Requirements*, *Forestry & Water Quality Guidelines*, *Forest Harvesting & the Environment Guidelines* and the *Forest Protection Guidelines* will apply. In particular, to protect watercourses, the following measures will be adhered to during all keyhole/tree felling activities.

- Works will be overseen by an ECoW as described above.
- 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 (which may include a combination of the drainage components outlined in Section 4.2.12) 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.
- Where felling is required inside the buffers silt fences will be installed around existing watercourses. 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.
- All new collector drains will taper out before entering the aquatic buffer zone to ensure 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 will 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 will 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.



## 4.2.14.9 Wind Farm Site and Drainage Management

### 4.2.14.9.1 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.

### 4.2.14.9.2 Pre-emptive Site Drainage Management

The works programme for the groundworks part of the construction phase of the Proposed Development will also take account of weather forecasts, and predicted rainfall in particular. 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.

### 4.2.14.9.3 Reactive Site Drainage Management

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. 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 the situation on the ground at a particular time.

Daily visual inspections of drains and outfalls will be performed during the construction period to ensure suspended solids are not entering streams and rivers on site, to identify any obstructions to channels and to allow appropriate maintenance of the drainage regime. 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.

## 4.2.14.10 Drainage Maintenance

Regular inspections (weekly and monthly) of all installed drainage features will be undertaken. Additional event based inspections will also be completed, i.e. after heavy rainfall in order to check for blockages and to ensure there is no build-up of standing water at parts of the drainage systems where it is not intended. The inspection of the drainage system will be the responsibility of the ECoW or the supervising 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 project to ensure 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 following rainfall events to ensure the structure of the dam is still effective in controlling flow. Any scouring around the edges of the check dams or overtopping of the dam in normal flow conditions will be rectified by reinforcement of the check dam.

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

A water level indicator such as a staff gauge will be installed in each stilling pond with marks to identify when sediment is at 50% of the trap's capacity. Sediment will be cleaned out of the silt trap when it exceeds 50% of trap capacity. Silt traps will be inspected weekly during the construction phase of the Proposed Development 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 Development. Weekly inspections during the construction phase will be reduced to monthly, bi-monthly and eventually quarterly inspections during the operational phase up until the site has revegetated and the natural silt controls regenerate. The frequency will be increased or decreased depending on the effectiveness of the measures in place and the amount of remedial action required in any given period.

#### 4.2.14.11 Construction Methodology – Site Drainage

A detailed drainage design for the Proposed Development, incorporating all principles and measures outlined in the drainage design descriptions above is included in Appendix 4-4 of this EIAR.

#### 4.2.15 Construction Site Signage


All Site Signage for the construction phase of the Proposed Development will be in compliance with *Safety, Health and Welfare at Work (General Application) Regulations 2007, Chapter 1 of Part 7: Safety Signs at Place of Work*.




The Project Supervisor for the Construction Stage (PSCS), and all responsible contractors, will adequately risk assess their work activities and implement the Hierarchy of Controls/General Principles of Prevention to eliminate/minimise hazards.

Where residual risks remain, appropriate safety signage will be identified, appropriate to the identified risks, and installed in the appropriate site locations. For the operational phase, clear signage relating to the Proposed Development will be provided at the permanent entrance to the site.

The regulations above, and the associated guidance, outlines specific requirements around signage, as detailed in Table 4-3 below.

Table 4-3 Site Signage within the Wind Farm Site

Type of Sign	Sign Description	Example of Sign
<b>Prohibition signs</b>	These sign types will typically be placed at the site entrance indicating unauthorised persons are prohibited from access / entering the site. Similar prohibition signs may be necessary at other site locations, where necessary.	E.g. - 

Type of Sign	Sign Description	Example of Sign
<b>Warning signs</b>	These sign types will typically be placed on the site boundary, e.g. 'Warning Construction Traffic Ahead', 'Site Entrance Ahead' etc. and around the site e.g. 'Heavy lift in progress' etc.	E.g. - 
<b>Mandatory signs</b>	These signs outline the mandatory safety requirements on site e.g. Safety boots must be worn, eye protection is required etc.	E.g. - 
<b>Information signs</b>	These sign types are located at the site entrance, and offices, and provide a summary of the other Prohibition, Warning and Mandatory signs and safety requirements on site.	E.g. - 

#### 4.2.15.1 Construction Methodology – Site Signage

Where possible, Site Signage will be securely fastened to gates, fencing and infrastructure within the Proposed Development. Where it is not possible, Site Signage will be secured using 60cm deep concrete foundations, and visibly plotted where required throughout the Proposed Development.



## 4.3

## Part 3: Development Components of the Grid Connection Application under Section 182A of the Planning and Development Act 2000, as amended

The planning application for the Proposed Development under Section 182A of the Planning and Development Act 2000, as amended, comprises the connection to the national electricity grid from the proposed onsite 110kV electrical substation at the eastern end of the Wind Farm Site (as part of the Wind Farm Site planning application under Section 37E of the Planning and Development Act 2000, as amended) to the existing Ardnacrusha 110kV substation via underground 110kV electrical cabling, measuring approximately 9.2 km in total, located within the public road corridor, forestry tracks and agricultural land for the entirety of the route. New Gas Insulated Switchgear (GIS) bay equipment will be required at Ardnacrusha 110kV electrical substation located within the existing GIS building to facilitate connection for the proposed Wind Farm. It is considered that any works or modifications required to Ardnacrusha substation arising from and separate to the Grid Connection would be minor in nature and would not be likely to have any significant environmental effects. Please refer to Drawing No. 05783-DR-110 in Appendix 4-5 of this EIAR for temporary and permanent reinstatement details where the ducting will traverse through the private Ardnacrusha roadway, and Drawing No. 05783-DR-112 for ducting details within private ESB lands.

The following sections will describe each of the development components within this planning application in further detail, in the following order:

- Grid Connection Cabling
- Grid Connection Site Drainage
- Ancillary Forestry Felling

## 4.3.1

### Grid Connection Cabling

A connection between the Wind Farm Site and the national electricity grid will be necessary to export electricity from the proposed wind farm.

It is proposed to construct a 110kV substation at the eastern end of the Wind Farm Site and to connect from here to the existing Ardnacrusha 110kV substation via underground 110kV electrical cabling, measuring approximately 9.2 km in total, utilising public local road networks, existing Coillte forest access tracks, existing private forestry access tracks and private agricultural lands.

This underground Grid Connection route is illustrated in Figure 4-1b.

## 4.3.1.1

#### Construction Methodology - Grid Connection Cable Trench from substation to the National Grid

The underground cabling works will consist of the installation of ducts in an excavated trench to accommodate power cables, and a fibre communications cables to allow communications between the proposed 110kV onsite substation and the existing 110kV Ardnacrusha substation. The proposed Grid Connection will involve 2 No. bridge crossings including 2 No. horizontal directional drilling (HDD) crossings. The underground cable will encounter 5 no. water culverts along the Grid Connection route.

The proposed Grid Connection works will require a road opening licence from Clare County Council. A Traffic Management Plan (TMP) (Appendix 15-2 of this EIAR) will be agreed with the local authority prior to the commencement of the development. The TMP will outline the location of traffic management signage, together with the location of any necessary road closures and the routing of

appropriate diversions. Where diversions are required, these will be agreed with the local authority in advance of the works commencing.

The underground cable for the Grid Connection will be a single circuit connection consisting of 3 no. 160mm diameter high-density polyethylene (HDPE) power cable ducts, 2 no. 125mm diameter HDPE communications ducts and 1 no. 63mm diameter earth continuity duct to be installed in an excavated trench, to a width of between 600mm and 825mm, and a maximum depth of 1,315mm. Minimum trench depths will depend on the crossings and space restrictions, where ducting arrangements can run flat, where crossings are very shallow. Please refer to TLI Drawing No. '05783-DR-113' in Appendix 4-5 for ducting in flat formation. For trench designs there will be variations on the design to adapt to service crossings and watercourse crossings. Existing services will be under crossed, where possible. For instances where a crossing will be required, please refer to TLI Drawing No's '05783-DR-116', '05783-DR-117', '05783-DR-118', '05783-DR-119', '05783-DR-120' & '05783-DR-121' in Appendix 4-5.

The Grid Connection route utilises public local road networks (8,077m), existing access tracks (460m), private forestry access tracks and private lands (650m). The following methodology will be followed during the trenching works:

- The Contractor, and their appointed Site Manager, will prepare a targeted Method Statement concisely outlining the construction methodology and incorporating all mitigation and control measures included within the planning application and accompanying reports and as required by planning conditions where relevant;
- All existing underground services shall be identified on site prior to the commencement of construction works;
- At watercourse crossings, the contractor will be required to adhere to the environmental control measures detailed in the CEMP (see Appendix 4-3);
- Where the cable route intersects with culverts, the culvert will remain in place (where possible) and the ducting will be installed either above or below the culvert to provide minimum separation distances in accordance with ESB and Uisce Éireann specifications<sup>6</sup>;
- In the event that existing culverts require movement/reinstatement for ducting installation, the trench will be installed to the desired width and be supported by rapid hardening wet concrete grade C25/30 between the culvert and the pipe ducting. Existing culverts will be supported until the rapid hardening concrete sets, the desired backfill will be reinstated with the desired backfill as per guidelines for the opening (Guidelines for Managing Openings in Public Roads, 2017<sup>7</sup>). Once the ducts are installed the culvert will be reinstated to match existing levels and dimensions;
- Traffic management measures will be implemented as described in the Traffic Management chapter, and detailed Traffic Management Plan (see Appendix 15-2)
- Excavated material will be temporarily stockpiled onsite for re-use during reinstatement. Stockpiles will be restricted to less than 2m in height. Stockpiles will be located a minimum of 50m from surface water features and all stockpiling locations will be subject to approval by the Site Manager and ECoW. Please refer to Appendix 4-5 for Grid Connection construction methodology;

<sup>6</sup> ESB Document PE424-F7001-R00-001-001 HV Cables – General Construction Methodology (2012). Available at: [http://eirgridlaoisilkenny.ie/media/pdf/21%20The%20Final%20Planning%20Application%20\(Jan%202013\)/Vol%203B%20Environmental%20Supplemental%20Documents/Supplementary%20Environmental%20Documents/4%20Underground%20Cables%20Construction%20Methodology.pdf](http://eirgridlaoisilkenny.ie/media/pdf/21%20The%20Final%20Planning%20Application%20(Jan%202013)/Vol%203B%20Environmental%20Supplemental%20Documents/Supplementary%20Environmental%20Documents/4%20Underground%20Cables%20Construction%20Methodology.pdf)

Uisce Éireann Document IW-CDS-5050-03 Code of Practice for Water Infrastructure (2020). Available at: <https://www.water.ie/docs/connections/faqs/Water-Code-of-Practice.pdf>

EirGrid Documents CDS-GFS-00-001-R1 110kV, 220kV and 400kV Underground Cable Functional Specification (2021). Available at: <https://www.eirgrid.ie/site-files/library/EirGrid/110kV-Underground-Cable-Functional-Specification-General-Requirements.pdf>

<sup>7</sup> Department of Transport, Tourism and Sport Guidelines for Managing Openings in Public Roads (2017). Available at: <https://www.gov.ie/pdf/?file=https://assets.gov.ie/44340/93268cf8e49943cb836fda4f6ea6dfd0.pdf#page=null>

- Excavated material will be employed to backfill the trench and any surplus material will be transported off site and disposed at a fully authorised soil recovery site, as identified in Appendix 4-3 of this EIAR;
- Any earthen (sod) banks to be excavated will be carefully opened with the surface sods being stored separately and maintained for use during reinstatement;
- The excavated trench will be dewatered if required, from a sump installed within the low section of the opened trench. Where dewatering is required, dirty water will be fully and appropriately attenuated, through silt bags, before being discharged to vegetation or surface water drainage feature;
- Reinstatement of Private Land - Where required, grass will be reinstated by either seeding or by replacing with grass turves;
- No more than a 100m section of trench will be opened at any one time. The second 100m will only be excavated once the majority of reinstatement has been completed on the first;
- The excavation, installation and reinstatement process will take on average of 1 no. day to complete a 100m section;
- Where the cable is being installed in a roadway, temporary reinstatement may be provided to allow larger sections of road to be permanently reinstated together;
- Following the installation of ducting, pulling the cable will take approximately 1 no. day between each joint bay, with the jointing of cables taking approximately 1 week per joint bay location.

For the trenching and ducting works, the following step by step methodology will apply:

- Grade, smooth and trim trench floor when the required 1315mm depth and 825mm width have been obtained.
- Place bedding layer of Cement Bound Granular Mixture B (CBGM B) material in accordance with the specification and compact it so that the compacted thickness is as per the drawings.
- Lay the bottom row of ducts in trefoil formation as detailed on the design drawings. Use spacers as appropriate to establish horizontal duct spacing. Fit a secure cap / bung to the end of each duct run to prevent the ingress of dirt or water.
- Carefully surround and cover ducts with CBGM B in accordance with the design drawings and specifications and thoroughly compact without damaging ducts.
- Place cable protection strips on compacted CBGM B directly over the ducts.
- Lay the top row of ducts onto the freshly compacted CBGM B including the cable protection strips above the bottom row of ducts. Place a secure cap at the end of each duct to prevent the ingress of dirt or water.
- Carefully surround and cover ducts with CBGM B material in accordance with the drawings and thoroughly compact without damaging ducts.
- Place red cable protection strip on top of compacted CBGM B over each set of ducts as shown on the drawings.
- Place and thoroughly compact CBGM B material or Clause 804 backfill or soil backfill as specified and place warning tape at the depth shown on the drawings.
- For concrete and asphalt/bitmac road sections, carry out immediate permanent reinstatement in accordance with the specification and to the approval of the local authority and/or private landowners, unless otherwise agreed with local authorities.
- Clean and test the ducts in accordance with the specification by pulling through a brush and mandrel. Install 12 mm polypropylene draw rope in each duct and seal all ducts using robust duct end seals fitted with rope attachment eyes in preparation for cable installation at a later date. All the works should be witnessed by ESNB Clerk of Works (ECOW) as required.



The proposed on-site 110kV electrical substation will be connected to the existing 110kV Ardnacrusha electrical substation via underground 110kV electrical cabling which will be constructed to EirGrid specifications<sup>8</sup>, guided by the methodology outlined above.



Plate 4-7 Typical Cable Trench View

#### 4.3.1.1.1 Existing Underground Services

Any underground services encountered along the grid cable routes 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 ESB ducts where adjacent services are within 600mm, with marker tape on the side of the trench. Back fill around any utility services will be with dead sand/pea shingle.

#### 4.3.1.1.2 Joint Bays

Joint bays are 6m x 2.5m x 2.05m pre-cast concrete chambers where lengths of cable will be joined to form one continuous cable. They will be located at various points along the grid ducting route approximately every 700 metres – 850 metres along the route. Please refer to Appendix 4-5 for further details on joint bay construction and cable installation.

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. During construction the joint bay locations will be completely fenced off, and once they have been constructed, they will be backfilled until cables are being installed.

In association with Joint Bays, Communication Chambers are required at every joint bay location to facilitate communication links between the proposed onsite 110kV electrical substation and the existing

<sup>8</sup> <https://www.eirgrid.ie/site-files/library/EirGrid/110kV-Underground-Cable-Functional-Specification-General-Requirements.pdf>

110kV electrical substation at Ardnacrusha. Earth Sheath Link Chambers are also required at every joint bay along the cable route. Earth Sheath Links are used for earthing and bonding cable sheaths of underground power cables, so that the circulating currents and induced voltages are eliminated or reduced.

Earth Sheath Link Chambers and Communication Chambers are located in close proximity to Joint Bays. Earth Sheath Link Chambers and Communication Chambers will typically be pre-cast concrete structures with an access cover at finished surface level.

Marker posts will be used on non-roadway routes to delineate the duct route and joint bay positions.

#### 4.3.1.1.3 **Grid Connection Watercourse/Culvert Crossings**

The cable route will involve 2 No. bridge crossings, both of which will be horizontal directional drilling (HDD) crossings and will not interact with the existing bridge structure. As there is insufficient cover and depth in the bridge to cross with the bridge deck, HDD will be required. Drawings of the 2 no. bridge crossings and further details on culvert crossing methodology are included in Appendix 4-5 of this EIAR.

Where the cable 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 Local Authority and relevant environmental agencies.

The underground cable will encounter 5 no. water culverts along the route. Existing culverts will be crossed using open trenching with an undercrossing, due to the depth of the culvert. A confirmatory site survey of all culverts has been completed as part of this phase of the project prior to planning to confirm the crossing methods. The locations of the bridges and culverts are shown on the site layout drawings included in Appendix 4-5. The schedule of culvert crossing methodologies is shown in Appendix A of Appendix 4-5 of the EIAR.

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 (Eastern Regional Fisheries Board, 2004)*”, and these guidelines will be adhered to during the construction of the Proposed Development.

#### 4.3.2 **Grid Connection Site Drainage**

Please refer to Section 4.3.1.1 above for details on trenching and drainage methodology.

#### 4.3.3 **Grid Connection Ancillary Forestry Felling**

##### 4.3.3.1 **Tree Felling**

As stated above in Section 4.2.12, some of the proposed Grid Connection route is occupied by commercial forestry. As part of the Proposed Development, tree felling will be required within and around the grid connection and the other ancillary infrastructure.

It should be noted that forestry along the route of the Grid Connection was originally planted as a commercial crop and will be felled in the future should the Proposed Development proceed or not.

##### 4.3.3.1.1 **Construction Methodology – Ancillary Forestry Felling**

The proposed methodology for the ancillary forestry felling activities are as described in Section 4.2.12 above.

## 4.4 Part 4: Wind Farm and Grid Connection – Construction and Monitoring

### 4.4.1 Construction Phasing and Timing

It is estimated that the construction phase of the Proposed Development (i.e. Wind Farm as set out in Section 4.2 and Grid Connection as set out in Section 4.3) will take 18 to 24 months from starting on site to the commissioning of the electrical system. Construction will not commence (excluding any activity associated with the biodiversity management enhancement plan), until the forestry which hosted the 2023 hen harrier nest is no longer suitable for hen harrier. Please refer to Section 4.2.13 for details relating to the hen harrier enhancement. This forestry was planted in 2018. It is considered that pre-thicket forestry is suitable for breeding hen harrier within the first ten years of planting. It is therefore considered that during the normal course of events, this forestry block will become unsuitable for hen harrier in c. 2028. Before construction works can begin, habitat surveys must be undertaken to demonstrate that the forestry is no longer suitable for breeding hen harrier. The forestry must be confirmed to be unsuitable closed canopy forestry. These surveys will be conducted after the breeding season has ended (September/October) by a suitably qualified ornithologist, at the location of the 2023 hen harrier nest site, from 2026 onward, until it can be demonstrated that the forestry is no longer suitable for breeding hen harrier. Further details of the construction phase mitigation measures related to ornithology are described in Section 7.7 of Chapter 7 Ornithology of this EIAR.

#### 4.4.1.1 Construction Sequencing

The construction phase can be broken down into three main, overlapping phases: 1) civil engineering works - 10 months, 2) electrical works including grid connection works - 6 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

- Create new entrance.
- Felling of forestry (as outlined in Section 4.2.12)
- Construct new site roads (permanent), drainage ditches and culverts.
- Clear and hardcore area for construction compound incorporating temporary site offices. Install same.
- Construct remaining new site roads and hard-standings and crane pads.
- Construct the substation, control buildings and groundworks for the substation compound.
- Excavate/pile for turbine bases where required. Excavate borrow pits. Store soil/peat locally for backfilling and re-use. 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.

##### Electrical Works

- Construct bases/plinths for transformer in the sub-station.
- Excavate trenches for site cables, lay cables and backfill. Provide ducts at road crossings.
- Install external electrical equipment at substations
- Install transformer at compound.
- Erect stock proof and palisade fencing around substation area.
- Install internal collector network and communication cabling.
- Construct grid connection.



## Turbine Erection and Commissioning

- Backfill tower foundations and cover with suitable material.
- Erect towers, nacelles and blades.
- Complete electrical installation.
- Install anemometry masts and decommission and remove existing mast.
- Commission and test turbines.
- Complete site works reinstate site.
- Remove temporary site offices. Provide any gates, landscaping, signs etc. which may be required.

All relevant Site Health & Safety procedures, in accordance with the relevant Health and Safety Legislation and guidance (listed in Section 5.5 of Chapter 5: Population and Human Health of this EIAR), including the preparation of the Health & Safety Plan, erection of the relevant and appropriate signage on site, inductions and toolbox talks will take place prior to and throughout the construction phase of the Proposed Development. Further details of on-site health, safety and welfare are included in Chapter 5 of this EIAR.

The phasing and scheduling of the main construction task items are outlined in Figure 4-22 below, where 1<sup>st</sup> January has been selected as an arbitrary start date for construction activities.

ID	Task Description	Duration (months)	Year 1				Year 2			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Mobilisation	1								
2	Set-up Construction Compound	1								
3	Construct Roads	6								
4	Turbine Foundations	4								
5	Site Ducting	4								
6	Site Cabling	4								
7	Turbine Delivery	2								
8	Turbine Erection	3								
9	Turbine Commissioning	3								
10	Site Substation Civils	4								
11	Grid Connection Cable Civils	3								
12	Substation electrical fit-out	4								
13	Grid Connection cable and jointing	3								
14	Substation Commissioning	3								
15	Power on	1								
16	Commissioning	3								
17	Operational	0								

Figure 4-22 Indicative Construction Schedule

### 4.4.1.2 Construction Phase Monitoring and Oversight

The requirement for a CEMP to be prepared in advance of any construction works commencing on any wind farm site and submitted for finalisation to the Planning Authority is now well-established.

The proposed procedures for the implementation of the mitigation measures outlined in the CEMP and their effectiveness and completion will be audited by way of a CEMP Audit Report. The CEMP Audit Report lists all mitigation measures prescribed in the planning documentation and all conditions attached to the grant of planning permission and allows them to be audited on a systematic and regular basis. The first assessment is a simple 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 will 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 audit report. Depending on the importance and urgency of rectifying the issue, the construction site manager will be given a timeframe by when the remedial works need to be completed.

A CEMP has been prepared for the Proposed Development and is included in Appendix 4-3 of this EIAR. The CEMP includes details sets out details of the environmental controls to be implemented on site, site drainage measures, peat stability monitoring measures and a waste management plan. The CEMP also outlines the Emergency Response Procedure to be adopted in the event of an emergency in terms of site health and safety and environmental protection. In the event planning permission is granted for the Proposed Development, 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 the Audit Report. Their implementation will be overseen by the ECoW or supervising hydrogeologists, environmental scientists, ecologists or geotechnical engineers, depending on who is best placed to advise on the implementation. The system of auditing referred to above ensures that the mitigation measures will be maintained for the duration of the construction phase, and into the operational phase where necessary.

## 4.4.2 Construction Management

### 4.4.2.1 Environmental Management

All proposed activities on the site of the Proposed Development will be provided for in an environmental management plan. This EIAR Chapter should be read in conjunction with the CEMP, which includes more detailed information on the environmental management framework to be adhered to during the pre-commencement and construction phases. A brief summary of the key information is presented in the following sections.

#### 4.4.2.2 Refuelling

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 mobile double skinned fuel bowser in bunded areas.

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 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 wind farm. 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 used during all refuelling operations.

#### 4.4.2.3 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. The closest concrete batching plant to the Proposed Development is McMahon's Concrete Products Limited, located approximately 10km to the southeast. 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. Chute cleaning water will be isolated in temporary lined wash-out pits located near the Wind Farm Site entrance. These temporary lined wash-out pits will be removed from the Wind Farm Site at the end of the construction phase. 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, or a Siltbuster-type concrete wash unit ([https://www.siltbuster.co.uk/sb\\_prod/siltbuster-roadside-concrete-washout-rcw/](https://www.siltbuster.co.uk/sb_prod/siltbuster-roadside-concrete-washout-rcw/)) or equivalent. 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 will be disposed of off-site at an appropriate waste facility. Where temporary lined impermeable containment areas are used, such containment areas will be built using straw bales and lined with an impermeable membrane. Two examples are shown in Plate 4-8 and Plate 4-9 below.



Plate 4-8 Concrete washout area



Plate 4-9 Concrete washout area

The areas are covered when not in use to prevent rainwater collecting. In periods of dry weather, the areas will 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 will be broken up and disposed of along with other construction waste.

Due to the volume of concrete required for each turbine foundation, and the requirement for the concrete pours to be continuous, deliveries will be 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 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 be constructed to a high standard to allow transport of the turbine components around the site, and hence, concrete delivery trucks will be able to access all areas where the concrete will be needed. 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, confirming 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.

#### 4.4.2.4 Concrete Pouring

Because of the scale of the main concrete pours that will be required to construct the Wind Farm, 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 will include:

- Using weather forecasting to assist in planning large concrete pours, and avoiding large pours where prolonged periods of heavy rain is forecast.
- Restricting concrete pumps and machine buckets from slewing over watercourses 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/](https://www.siltbuster.co.uk/sb_prod/siltbuster-roadside-concrete-washout-rcw/)) or equivalent (see Section 4.2.14.3.8 above).
- Disposing of surplus concrete after completion of a pour in suitable off-site locations away from any watercourse or sensitive habitats.

#### 4.4.2.5 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 ponds in the site's drainage system, and will be pumped into a bowser or water spreader to dampen down haul roads and site 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.

#### 4.4.2.6 Vehicle Washing

Wheels or vehicle underbodies are often washed before leaving sites to prevent the build-up of mud on public (and site) roads. It is not anticipated that vehicle or wheel washing will be required as part of the construction phase of the Proposed Development because site roads will be already formed using on-site materials before other road-going trucks begin to make regular or frequent deliveries to the site (e.g. with steel or concrete). 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 were to be dirtied by trucks associated with the Proposed Development.

#### 4.4.2.7 Waste Management

The CEMP, Appendix 4-3 of this EIAR, provides a waste management plan (WMP) which outlines the best practice procedures during the excavation and construction phases of the project. The WMP outlines the methods of waste prevention and minimisation by recycling, recovery and reuse at each stage of construction of the Proposed Development. Disposal of waste will be seen as a last resort.

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 has to have all necessary licenses and authorisations. It will be the duty of the Waste Manager on the site of the development to ensure that all contractors hired to remove waste from the site have valid Waste Collection Permits. It will then be necessary to ensure that the waste is delivered to a licensed or permitted waste facility. The nearest licensed waste facility to the Proposed Development is Clare Waste & Recycling Company Limited, Raheen Rd, Raheen, Tuamgraney, Co. Clare, which is located approximately 14km to the northeast. 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 Waste Manager will be appointed by the Contractor. The 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 will have sufficient authority so that they can ensure everyone working on the development adheres to the management plan.

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

#### 4.4.2.8 Traffic Management

A turbine with a blade length of 81.5 metres has been used in assessing the traffic impact of the Proposed Development. The blade transporter for such a turbine blade would have a total vehicle length of 87.3 metres, including the blade which overhangs the back of the vehicle. The total length of the tower transporter is 62.8 metres with the axles located at the front and rear of the load with no overhang. The vehicles used to transport the nacelles will be similar to the tower transporter. All other vehicles requiring access to the site of the Wind Farm Site will be smaller than the design test vehicles. The largest turbine delivery vehicles have been modelled accurately in the Autotrack assessments for the site access junctions, as detailed in Section 15.1 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 Development. 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 get unusual 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, accessed in May 2024, on [www.windenergyireland.com](http://www.windenergyireland.com)), transport challenges are something the wind energy industry and specialist transport sector has become particularly adept in finding solutions to.

A Traffic Management Plan has been prepared as set out in the CEMP in Appendix 4-3 of the EIAR. In the event planning permission is granted for the Proposed Development, the final Traffic Management Plan will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned.

Traffic management measures included the following:

- Identification of a delivery schedule,
- Details of the alterations required to the infrastructure identified in Section 15.1.8 of this EIAR, and any other minor alteration identified,
- A dry run of the route using vehicles with similar dimensions.

The deliveries of turbine components to the site will be made in convoys of five 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, at night, to avoid disruption to work and school-related traffic.

A full dry run of the transport operation along the proposed route 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 submitted for agreement with Limerick and Clare County Councils. All turbine deliveries will be provided for in the Transport Management Plan which will be finalised in advance of the construction stage, when the exact transport arrangements are known, delivery dates confirmed and escort proposals in place. The finalised Transport Management Plan will be submitted to the Planning Authority 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

# Part 5: Operation

The Proposed Development is expected to have a lifespan of 35 years. Planning permission is being sought for a 35-year operation period commencing from the date of full operational commissioning of the wind farm. During the operational period, on a day-to-day basis the wind turbines will operate automatically, responding by means of anemometry equipment and control systems to changes in wind speed and direction.

The wind turbines will be connected together and data relayed from the wind turbines to an off-site control centre. Each turbine will also be monitored off-site by the wind turbine supplier. The monitoring of turbine output, performance, wind speeds, and responses to any key alarms will be monitored at an off-site control centre 24-hours per day.

Each turbine will be subject to a routine maintenance programme involving a number of checks and changing of consumables, including oil changes. In addition, there will be a requirement for unscheduled maintenance, which could vary between resetting alarms to major component changes requiring a crane. Maintenance traffic will consist of four-wheel drive vehicles or vans. In the event that a single replacement turbine blade is required to be delivered to the Wind Farm Site, a blade lifter vehicle will be used to transport the turbine blade from the port of delivery to the Wind Farm Site and hence the temporary measures for turbine delivery proposed during construction, including a set down area, are not anticipated during operation. The electricity substation and site tracks will also require periodic maintenance.

## 4.5.1

# Community Gain Proposal

Knockshanvo Wind Farm has the potential to bring significant positive benefit to the local community. The project will create sustainable local employment and it will contribute annual rates to the local authority. A community benefit fund will be put in place for the lifetime of the project to provide direct funding to those areas surrounding the project (further details below).

## 4.5.1.1

# Renewable Energy Support Scheme

The Renewable Energy Support Scheme (RESS) Terms and Conditions, published by the Department of Communications, Climate Action and Environment in August 2023, make some high-level provisions for how this type of community benefit fund will work. Any project which wants to export electricity to the national grid 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. The 1-kilometre distance specified is measured from the base of the nearest turbine of the Project to the nearest part of the structure of the household, the location of which is identified in the An Post's GeoDirectory;*
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. The Generator may supplement this spend on administration from its own fund should it be deemed necessary to do so; and*
4. *The balance of the funds shall be spent on*
  - a. *initiatives successful in the annual application process, as proposed by clubs and societies and similar not-for-profit entities; and*
  - b. *in respect of Onshore Wind RESS 3 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. The distance specified is measured from the base of the nearest turbine of the Project to the nearest part of the structure of the household, the location of which is identified in the An Post's GeoDirectory.*

#### 4.5.1.2 Community Benefit Fund

FuturEnergy Knockshanvo Designated Activity Company (DAC) expects that for each megawatt hour (MWh) of electricity produced by the wind farm, the project will contribute €2 into a community fund for the RESS period i.e. first 15 years of operation and €1 per MWh for the remaining lifetime of the wind farm. If this commitment is improved upon in upcoming Government Policy, we will adjust accordingly.

If this project is constructed as currently proposed, we estimate that a total of approximately €6 million will be available in the local area for community funding over the lifetime of the project. The above figure is indicative only and will be dependent on the generation capacity of the wind farm which is influenced by a number of factors including:

1. *Number of wind turbines.*
2. *Capacity and availability of energy production of those turbines.*
3. *Quantity of wind*

## Part 6: Decommissioning

The wind turbines proposed as part of the Wind Farm Site are expected to have a lifespan of 35 years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the Proposed Development will be decommissioned fully. The onsite 110kV electrical substation and 110kV electrical cabling will remain in place as it will be under the ownership of the ESB and will form a permanent part of the national electricity grid.

Upon decommissioning of the Proposed Development, the wind turbines will be disassembled in reverse order to how they were erected. All above ground turbine components will be separated and removed off-site for recycling.

Turbine hardstands and foundations will remain in place underground and will be left to revegetate naturally. Leaving the turbine hardstands and foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in significant environment nuisances such as noise, dust and/or vibration.

Site roadways will be left in situ, as appropriate to facilitate on-going forestry operations. Underground cables, including grid connection, will be removed and the ducting left in place.

A decommissioning plan will be agreed with the local authorities three months prior to decommissioning the Proposed Development. The principles that will inform the final decommissioning plan are contained in the Decommissioning Plan in Appendix 4-6.