Planning and Environmental Consultants

Environmental Impact Assessment Report (EIAR)

Lackareagh Wind Farm, Co. Clare

Chapter 4 – Description of the Proposed Project

Table of Contents

TABLE OF TABLES

TABLE OF PLATES

TABLE OF FIGURES

4. DESCRIPTION OF THE PROPOSED PROJECT

4.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) describes the Proposed Project and all its component parts. The planning application for the proposed development, will be made to Clare County Council (CCC). This chapter also describes elements of the overall project, i.e., the underground 38kV cabling from the 38kV on-site substation to the national grid at Ardnacrusha 110kV substation and the turbine delivery route (TDR), which are not subject to this planning application but are assessed in this EIAR. Construction methodologies for the main infrastructural components of the development are also included in this chapter (or its associated appendices) of the EIAR.

The development will consist of:

i. *The construction of 7 no. wind turbines with the following parameters:*
    a. *Total tip height range of 179.5m – 180m,*
    b. *Rotor diameter range of 149m – 155m,*
    c. *Hub height range of 102.5m to 105m,*
ii. *Construction of associated foundations, hardstand and assembly areas;*
iii. *All associated wind farm underground electrical and communications cabling connecting the turbines and mast to the proposed electrical substation;*
iv. *Construction of 1 no. permanent 38kV electrical substation including a single-story control building with welfare facilities, all associated electrical plant and equipment, security fencing, entrance on to new access road, all associated internal underground cabling, drainage infrastructure, wastewater holding tank, retention separator tank, and all ancillary works, in the townland of Killeagy (Goonan), Co. Clare;*
v. *A Battery Energy Storage System within the 38kV electrical substation compound;*
vi. *1 no. permanent meteorological mast of c. 36.5m in height, associated foundation and hard-standing area in the townland of Shannaknock;*
vii. *The permanent upgrade of 1 no. existing site entrance off the L7080 ('The Gap Road') for the provision of construction and operational access;*
viii. *Provision of 3 no. new permanent site entrances off the L7080 for the provision of construction and operational access;*
ix. *Provision of 3 no. new temporary site entrances off the L7080 for the provision of construction access;*
x. *Upgrade of existing tracks/roads, including the L7080, and the provision of new site access roads, 4 no. watercourse crossings, junctions and hardstand areas;*
xi. *1 no. temporary construction compound with temporary offices and staff facilities in the townland of Killeagy (Goonan);*
xii. *1 no. temporary storage area in the townland of Killeagy (Goonan);*
xiii. *1 no. borrow pit in the townland of Killeagy (Goonan);*
xiv. *Peat and Spoil Management;*
xv. *Tree Felling to accommodate the construction and operation of the proposed development;*
xvi. *Operational stage site and amenity signage; and*
xvii. *All ancillary apparatus and site development works above and below ground, including soft and hard landscaping and drainage infrastructure*

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

The Proposed Project includes for an onsite 38kV electricity substation and battery energy storage solution and underground grid connection cabling, connecting the onsite substation to the national electricity grid via the existing Ardnacrusha 110kV electricity substation located in the townlands of

Castlebank and Ballykeelaun. The cabling will be located within the public road corridor or existing tracks for its entire length. The total length of the Proposed Grid Connection Route is approximately 14.7km, the full length of the Proposed Grid Connection Route is located within Co. Clare. To ensure clarity, the Proposed Grid Connection Route will be the subject of a separate future planning application to CCC.

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

4.2 Proposed Project Location

The Proposed Wind Farm is located approximately immediately east of the village of Kilbane, Co. Clare and 6km west of Killaloe, Co. Clare. It is proposed to access the Proposed Wind Farm via upgrades to the Gap Road (L7080) which bisects the Proposed Wind Farm site, with proposed infrastructure located both north and south of the Local Road. The Proposed Wind Farm is served by a number of existing public, forestry and agricultural roads and tracks. The nearest Natura 2000 site to the Proposed Wind Farm, i.e., Special Area of Conservation (SAC) or Special Protection Area (SPA) is the Slieve Bernagh Bog SAC and is located immediately north of the Proposed Wind Farm. Elevations within the Proposed Wind Farm site range from ~185mOD (metres above Ordnance Datum) to ~320m across the site.

The Proposed Grid Connection Route includes for underground 38kV cabling from the proposed onsite 38kV substation, in the townland of Killeagy (Goonan), to the existing Ardnacrusha 110kV substation in the townlands of Ballykeelaun and Castlebank. The Proposed Grid Connection Route to the existing Ardnacrusha 110kV substation, measuring approximately 14.7 km in length, is primarily located within the public road corridor. Current land-use along the Proposed Grid Connection Route comprises of public road corridor, public open space, pastures, mixed forestry and land principally used by agriculture with significant areas of natural vegetation, as well as discontinuous urban fabric.

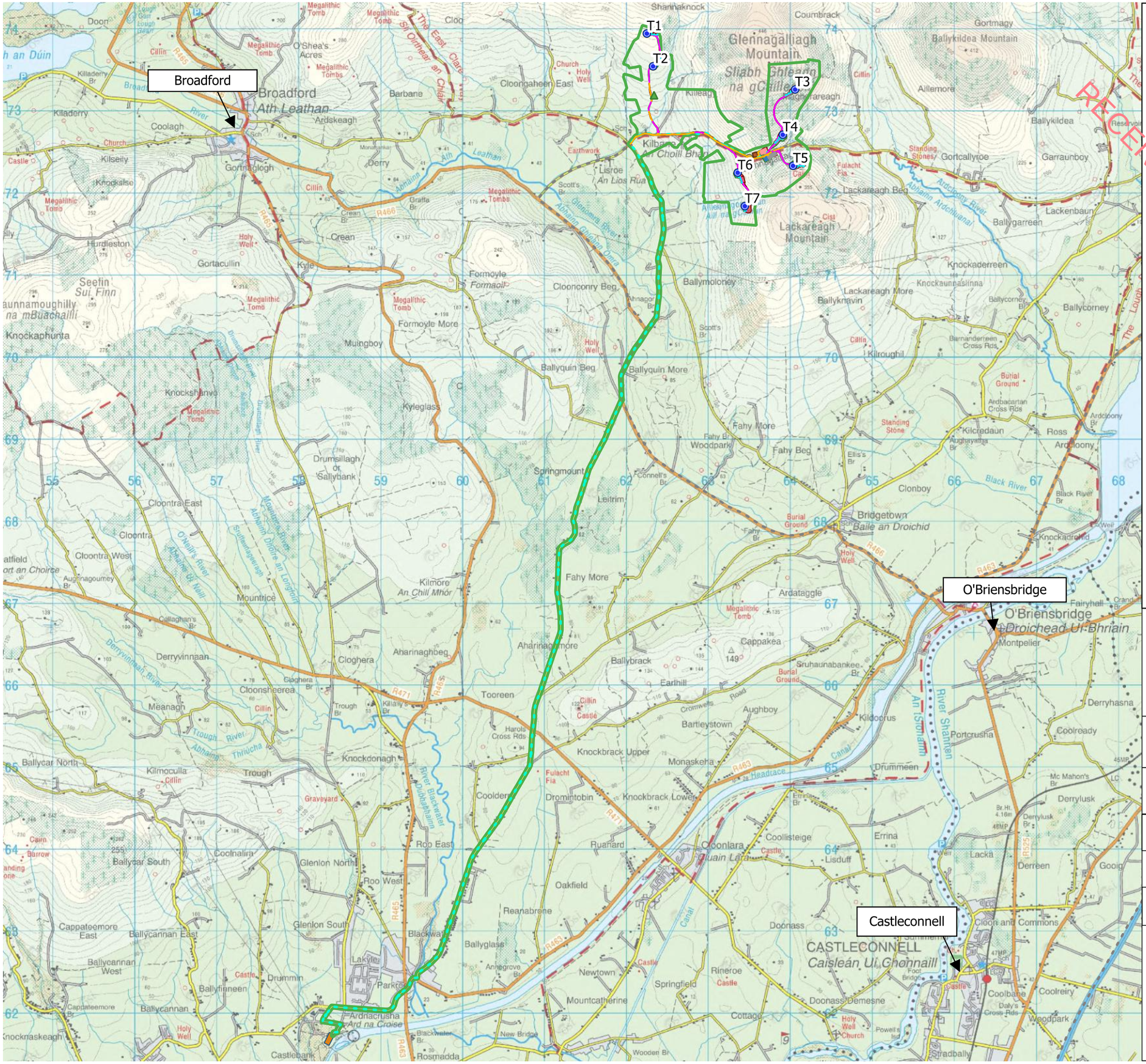
The overall Proposed Project layout is included as Figure 4-1. The Proposed Wind Farm is shown overlain on aerial imagery in Figure 4-2. The Proposed Grid Connection Route is shown on Figure 4-3 below.

4.3 Proposed Project Layout

The layout of the Proposed Project 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 site. A constraints study, as described in Section 3.2 of Chapter 3 of this EIAR, has been carried out to ensure that turbines and all ancillary infrastructure are located in the most appropriate areas of the site. The Proposed Project layout makes maximum use of the existing access roads and tracks within the site, thereby minimising the extent of proposed new roads required.

The overall layout of the Proposed Project is shown on Figure 4-1. This drawing shows the proposed locations of the wind turbines, met mast, electricity substation, Proposed Grid Connection Route, peat and spoil management areas, construction compounds, internal roads layout, and the main site entrance.

A drawing focusing on the Proposed Wind Farm site is shown on Figure 4-2 and a drawing focusing on the Proposed Grid Connection Route underground cabling is shown on Figure 4-3. Detailed site layout drawings of the proposed development are included in Appendix 4-1 to this EIAR.



Map Legend

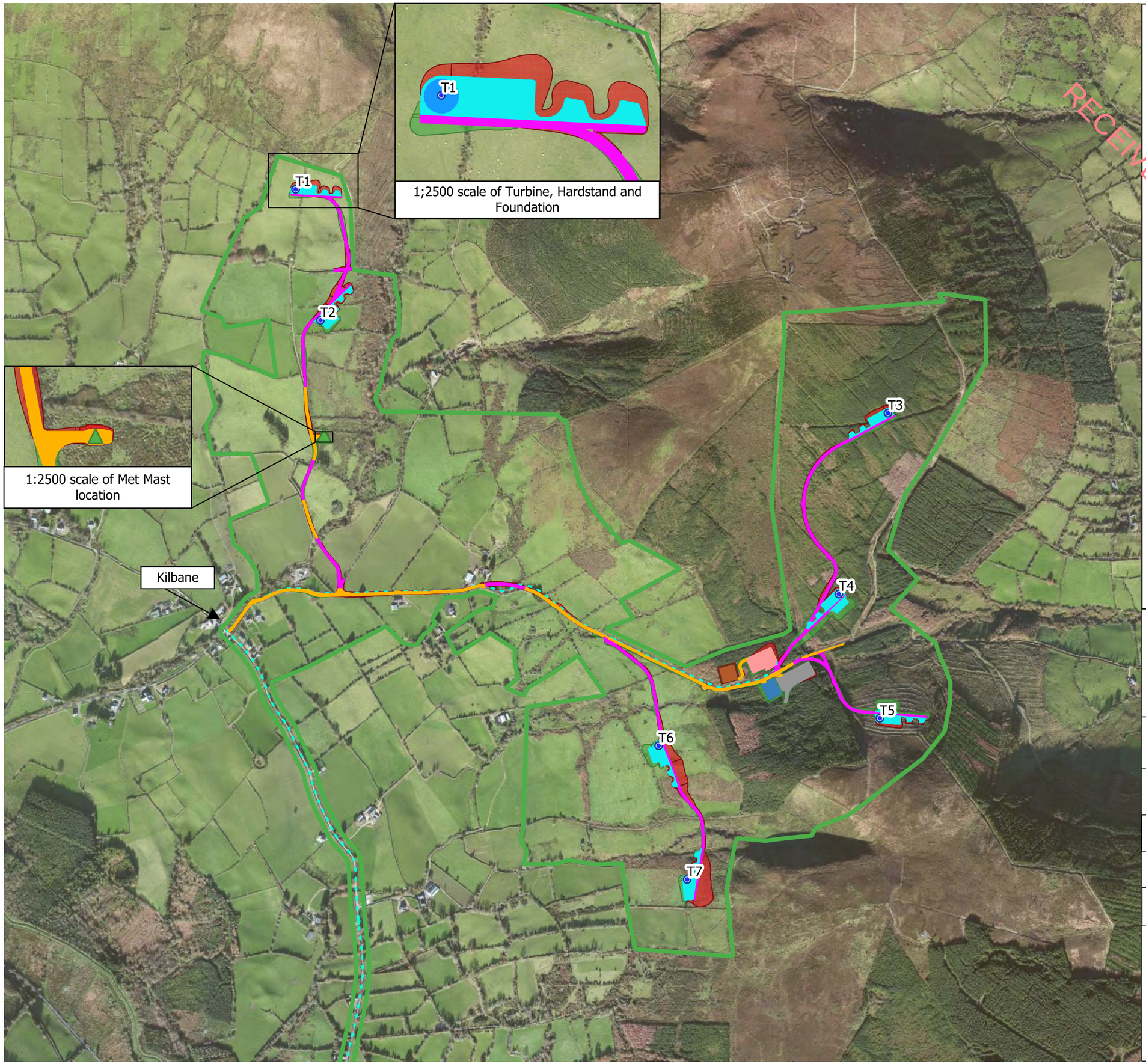
- EIAR Site Boundary
- Proposed Turbine Layout
- Proposed Hardstands
- Proposed Grid Connection Route
- Proposed Onsite 38kV Substation and Battery Energy Storage Compound
- Proposed Met Mast
- Proposed New Roads
- Proposed Upgrades to Existing Roads
- Proposed Borrow Pit
- Proposed Storage Area
- Proposed Temporary Construction Compound
- Proposed Turbine Delivery Route
- Ardnacrusha 110kV Substation

Drawing Title
Proposed Project Layout

Project Title
Lackareagh Wind Farm, Co. Clare

Drawn By	Checked By
CJ	NMcH
Project No. 220245	Drawing No. Figure 4-1
Scale 1:45,000	Date 2024-07-12

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- EIAR Site Boundary
- Proposed Turbine Layout
- Proposed Foundations
- Proposed Hardstands
- Proposed Grid Connection Route
- Proposed Onsite 38kV Substation and Battery Energy Storage Compound
- Proposed Met Mast
- Proposed New Roads
- Proposed Upgrades to Existing Roads
- Ardnacrusha 110kV Substation
- Proposed Temporary Construction Compound
- Proposed Turbine Delivery Route
- Proposed Borrow Pit
- Proposed Storage Area
- Proposed Cut
- Proposed Fill

N

Drawing Title
Proposed Wind Farm Layout

Project Title
Lackareagh Wind Farm, Co. Clare

Drawn By	Checked By
CJ	NMcH
Project No. 220245	Drawing No. Figure 4-2
Scale 1:11,250	Date 2024-07-12

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

Broadford

O'Briensbridge

Map Legend

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

Drawing Title: Propsoed Grid Connection Route	
Project Title: Lackareagh Wind Farm	
Drawn By: CJ	Checked By: NMcH
Project No.: 220245	Drawing No.: Figure 4-3
Scale: 1:45,000	Date: 2024-07-12

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

4.4 Proposed Project Components

This section of the EIAR describes the components of the Proposed Project. Further details regarding Access and Transportation (Section 4.4), Site Drainage (Section 4.6), and Construction Methodologies (Section 4.7) are provided subsequently in this chapter.

4.4.1 Proposed Wind Farm

4.4.1.1 Wind Turbines

4.4.1.1.1 *Turbine Locations*

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

The final Top of Foundation Level of the turbine foundations will be determined by the actual ground conditions at each proposed turbine location and may differ slightly from those levels listed in Table 4-1. Also, in accordance with the '*Wind Energy Development Guidelines for Planning Authorities*' (Department of the Environment, Heritage and Local Government (DOEHLG), 2006) micro-siting of the turbine positions may be required within the criteria set out in the guidelines.

Table 4-1 Proposed Wind Turbine Locations and Elevations

Turbine	ITM Coordinates		Top of Foundation Elevation (m OD)
	X (ITM)	Y (ITM)	
T1	562207	673988	230
T2	562283	673588	187
T3	564015	673305	366
T4	563865	672753	291
T5	563990	672374	295.5
T6	563315	672290	201
T7	563402	671882	202

4.4.1.2 Turbine Type

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

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

Plate 4-1 Wind turbine components

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

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

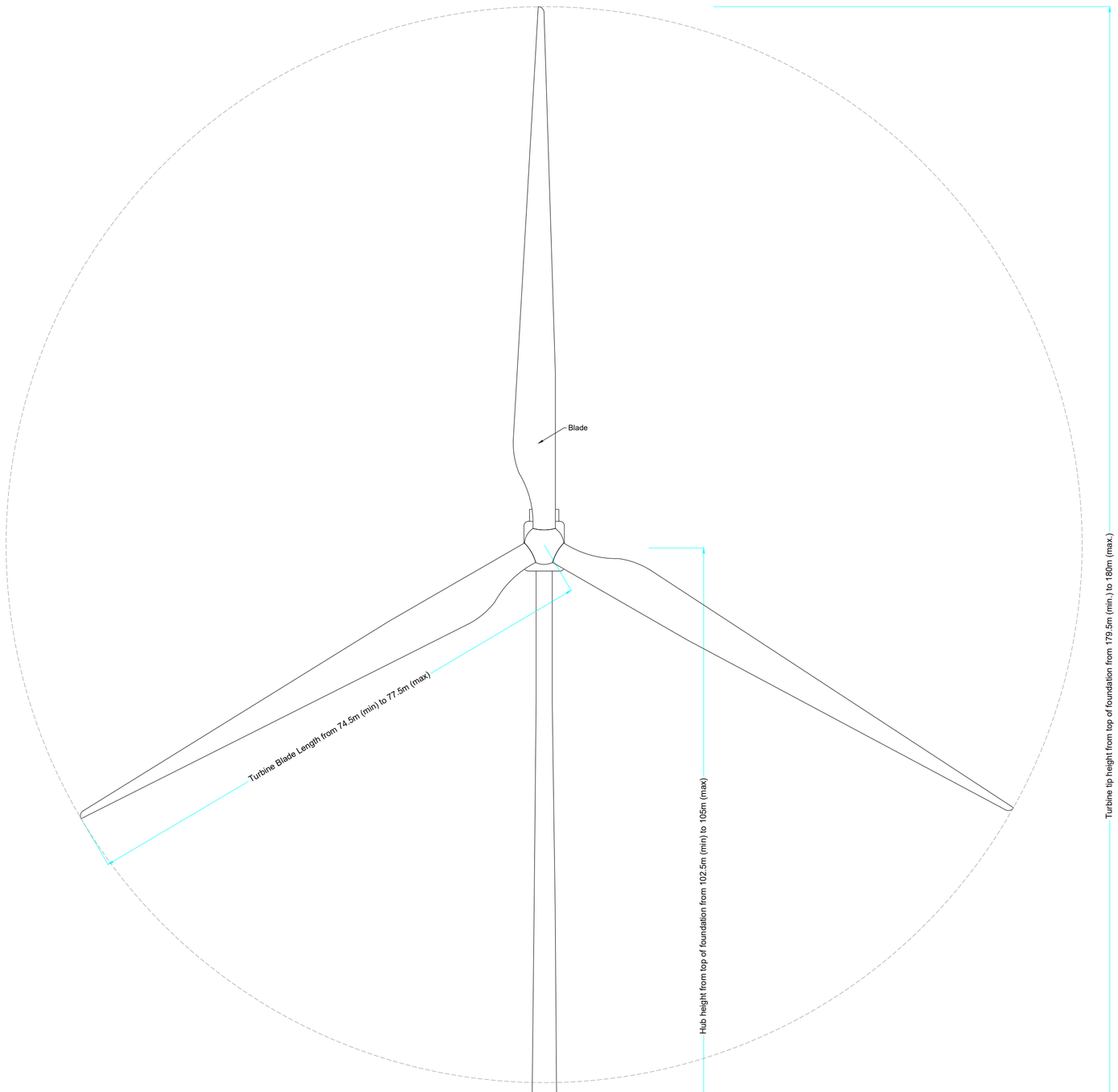
Modern wind turbines from the main turbine manufacturers have evolved to share a common appearance and other major characteristics, with only minor cosmetic differences differentiating one from another. The wind turbines that will be installed on the Proposed Project site will be conventional three-blade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

For the purposes of this EIAR and in compliance with the Opinion issued by Clare County Council and further detailed in Chapter 2, Section 2.8.2, various dimensions of wind turbines, within the proposed ranges outlined above, have been selected and considered in the relevant sections of the EIAR. The Planning Authority considers that the above details can be confirmed after the proposed application has been made and decided. This allows for a robust assessment of the likely environmental effects of wind turbines within the proposed range of turbines. Turbine design parameters have a bearing on the assessment of shadow flicker, noise, visual impact, traffic and transport and ecology (specifically birds), as addressed elsewhere in this EIAR.

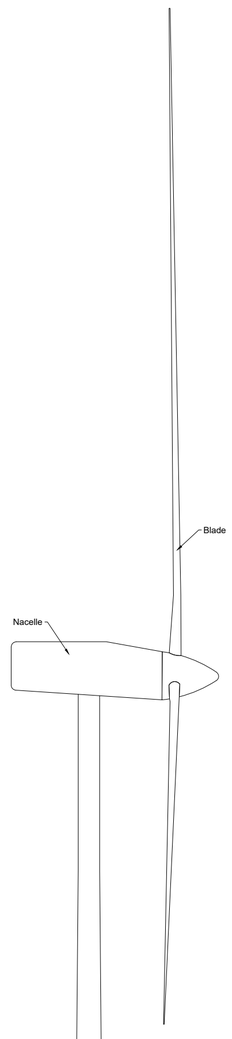
It should also be noted that the assessment of the development footprint of the Proposed Project site, within this EIAR, is based on the maximum potential footprint for all of the infrastructural elements. This precautionary approach is taken as the assessment of the maximum development footprint will,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

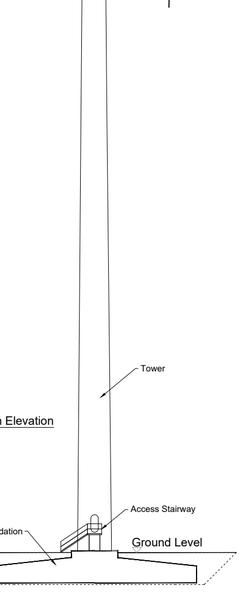
A drawing of the proposed wind turbine is shown in Figure 4-4. Figure 4-4 also shows the turbine base layout, including turbine foundation, hard standing area, assembly area, access road and surrounding works area.

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

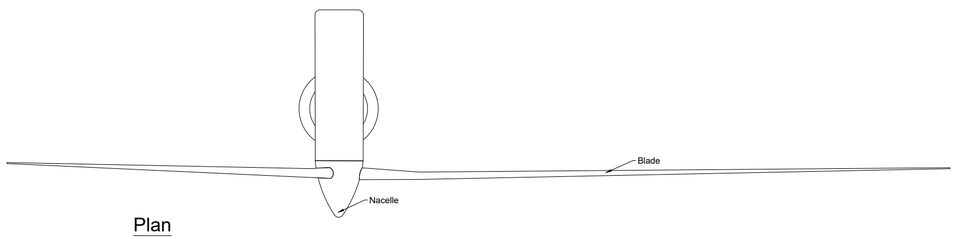


Front/Sectional Elevation





Side/Section Elevation



Plan

PROJECT TITLE:

Lackareagh Wind Farm, Co. Clare

DRAWING TITLE:

Wind Turbine Elevations & Plan Range

PROJECT No.:	DRAWING No.:	SCALE:
220245	**Fig 4-4**	**1:500 @ A1**

DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	**CJ**	**16.08.2024**	D01

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

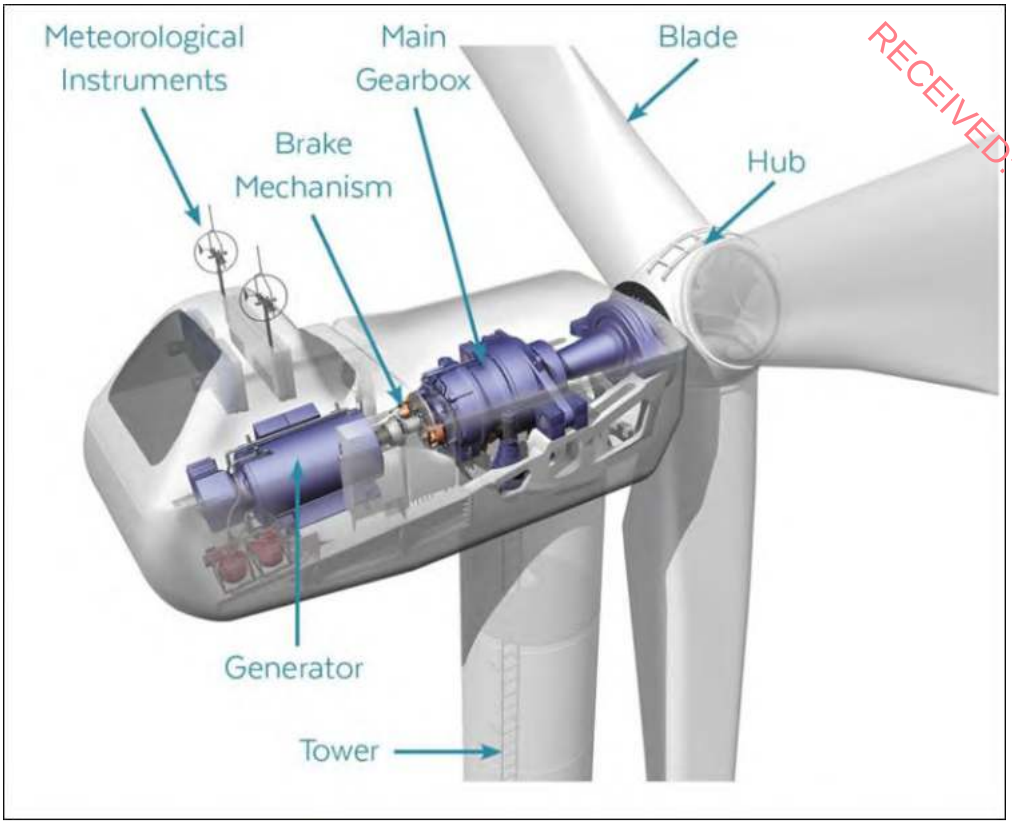


Figure 4-5 Turbine nacelle and-5 hub components

4.4.1.3 Turbine Foundations

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

After the foundation level of each turbine has been formed on competent strata (i.e., bedrock or subsoil of sufficient load bearing capacity), the “Anchor Cage” (anchors the first section of the turbine tower to the foundation) is levelled and reinforcing steel is then built up around and through the anchor cage. The outside of the foundation is shuttered with demountable formwork to allow the pouring of concrete and is backfilled accordingly with appropriate granular fill to finished surface level (Plate 4-2 below).

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

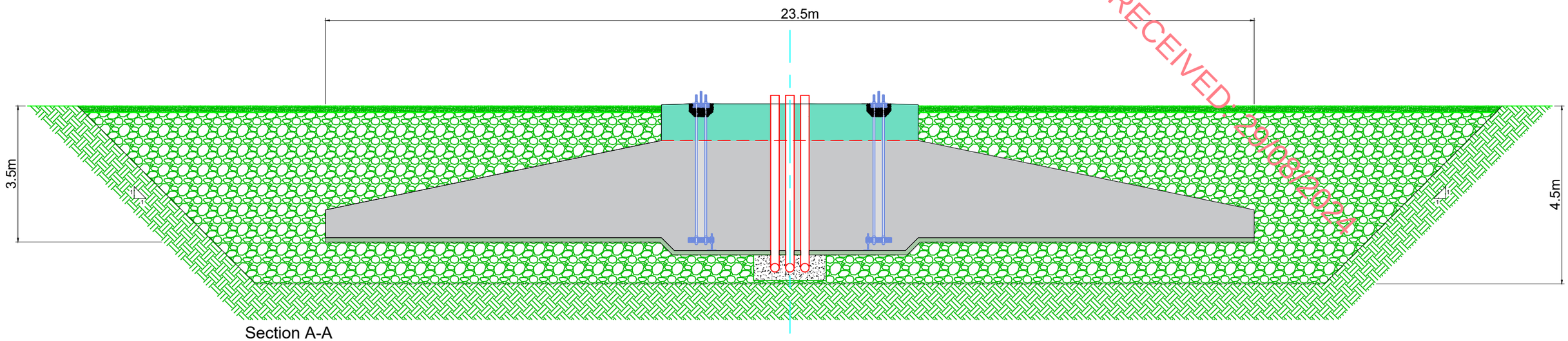
4.4.1.4 Hard Standing Areas

Hard standing areas consisting of levelled and compacted hardcore are required around each turbine base. These will facilitate access, turbine assembly and turbine erection. The hard-standing areas are used to accommodate cranes required in the assembly and erection of the turbine. The hardstands also allow for the offloading and storage of turbine components, and generally provide a safe, level working area around each turbine position. The hard-standing areas are extended to cover the turbine foundations, once completed, by placing crushed stone over the foundation. The arrangement and positioning of hard standing areas are dictated by turbine suppliers. Figure 4-6 shows a turbine base layout, including turbine foundation, hard standing area, assembly area, access road and surrounding works area.

The proposed hard standing areas for each individual turbine are shown as part of the detailed layout drawings included in Appendix 4-1 and represent the maximum sizes required. However, the extent of the required areas at each turbine location may be optimised on-site within the parameters set out and assessed in this EIAR. This will depend on the turbine supplier's exact requirements.

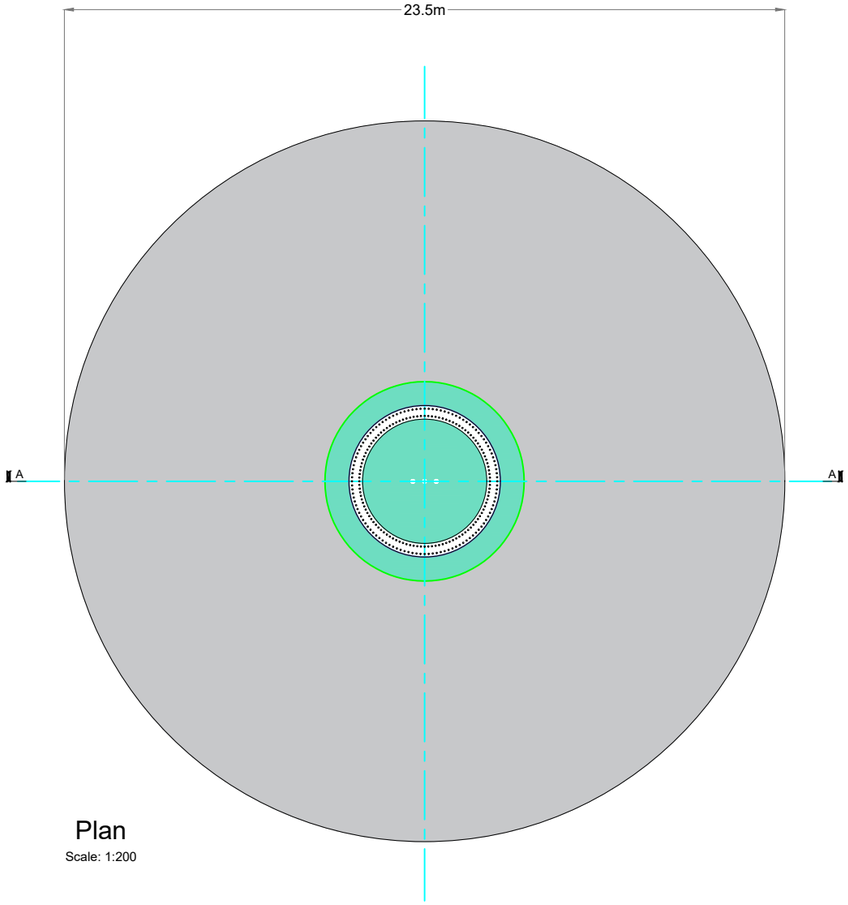
4.4.1.5 Assembly Area

Levelled assembly areas will be located on either side of the hard-standing area as shown on Figure 4-6. These assembly areas are required for offloading turbine blades, tower sections and hub from trucks until such time as they are ready to be lifted into position by cranes and to assist the main crane during turbine assembly. The extent of the area required for the assembly areas is shown on Figure 4-6 and the detailed drawing in Appendix 4-1.



Section A-A

Scale 1:100



Plan

Scale: 1:200

PROJECT TITLE: **Lackareagh Wind Farm, Co. Clare**			
DRAWING TITLE: **Turbine Base Layout Gravity Foundation Method**			
PROJECT No.: **220245**		DRAWING No.: **Fig 4-6**	SCALE: **As shown @ A3**
DRAWN BY: **JOB**	CHECKED BY: **CJ**	DATE: **16.08.2024**	REVISION.: D01

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

4.4.1.6 Power Output

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

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

Assuming an installed capacity of 46.2MW, the Proposed Project therefore has the potential to produce up to 145,649 MWh (megawatt hours) of electricity per year, based on the following calculation:

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

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

B = ... The capacity factor, which takes into account the intermittent nature of the wind, the availability of wind turbines and array losses etc. A capacity factor of 35% is applied here[1].

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

The 145,649 MWh of electricity produced by the Proposed Project would be sufficient to supply approximately 33,726 Irish households with electricity per year, based on the average Irish household using 4.2 MWh of electricity[2] (this figure is available from the March 2017 CER Review of Typical Consumption Figures Decision Paper).

The 2022 Census of Ireland Summary Results recorded a total of 46,553 occupied households in Co. Clare. Per annum, based on a capacity factor of 35%, the Proposed Project would therefore produce sufficient electricity for the equivalent of over 72% of all households in Co. Clare.

With regards to the modern turbine range of 4 – 7MW, the resulting electricity produced would range from 85,848MWh to 150,234MWh per annum. The lower end of this range (85,848MWh) would be sufficient to supply approximately 20,440 Irish households with electricity per year, based on the average Irish household using 4.2MWh of electricity. The higher end of this range (150,234Wh) would be sufficient to supply approximately **35,770** Irish households with electricity per year, based on the average Irish household using 4.2MWh of electricity. Based on the 2022 Census of Ireland results for Co. Clare, the output range would produce sufficient electricity for the equivalent of 44% and 77% respectively.

4.4.1.7 Site Roads

4.4.1.7.1 *Road Construction Types*

To provide access within the Proposed Project and to connect the wind turbines and associated infrastructure, existing roads and tracks will need to be upgraded and new access roads will need to be

[1] *EirGrid, 2023 Enduring Connection Policy 2.3 Constraints Report for Area D Solar and Wind* https://cms.eirgrid.ie/sites/default/files/publications/ECP-2.3-Solar-and-Wind-Constraints-Report-Results-for-Area-D-v1.0.pdf
[2] *March 2017 CER (CRU) Review of Typical Consumption Figures Decision Paper* https://www.cru.ie/document_group/review-of-typical-consumption-figures-decision-paper/

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

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

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

The Proposed Project site makes use of the existing road network insofar as possible. It is proposed to upgrade approximately 2.1 kilometres of existing site roads and tracks, and to construct approximately 3.9 kilometres of new access road on the Proposed Project site. It is proposed to construct passing bays along the proposed access road network.

Construction of New Excavated Roads – Type A

The proposed new roads will be constructed, comprising a total length of 3.9km. Approximately, 0.4km of the proposed new roads are located within Coillte lands in the southeast.

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

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

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

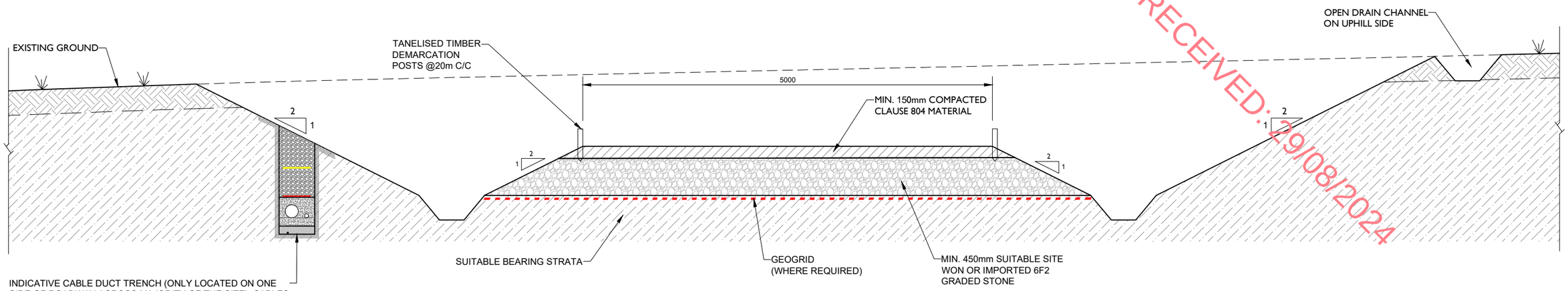
Upgrade of Existing Access Roads or Tracks – Type B

For the construction of the Proposed Project, it is proposed to utilise 2.1km of existing roads, 0.4km of which are forestry tracks located on Coillte lands. The general construction methodology for upgrading of existing sections of access roads or tracks, as presented in AFRY's *Peat & Spoil Management Plan* in Appendix 4-2 of this EIAR, is summarised below.

1. *All the access tracks across the site will be constructed to solid sub-formation. For excavations in peat and spoil, side slopes shall be not greater than 1 (v): 2 or 3 (h). This slope inclination should be reviewed during construction, as appropriate.*

2. *Where areas of weaker peat are encountered then slacker slopes will be required.*
3. *Upgrading of these existing tracks will involve both widening and resurfacing works and will typically take place on both sides of the road. However, in areas of steeper slopes, widening of existing tracks will take place on the upslope side of the road.*
4. *The existing roads will be widened through excavation and the removal of organic material and soft subsoil to achieve a suitable formation level.*
5. *The new section of the road will be constructed by placing a minimum of 450mm of granular fill material, such as Class 6F2 stone, and compacting it in layers on top of a layer of geogrid or geotextile, depending on site conditions and as specified by the detailed designer.*
6. *This road construction will be similar in build up to the construction of the Type A - New Excavated Road. The increased road width and the existing road surface, where necessary, will be capped with a 150mm layer of Clause 804 similar material.*
7. *The finished road width will have a running width of 5m, with wider sections on bends and passing bays.*
8. *Access road construction will be to the line and level requirements as per design/planning conditions.*

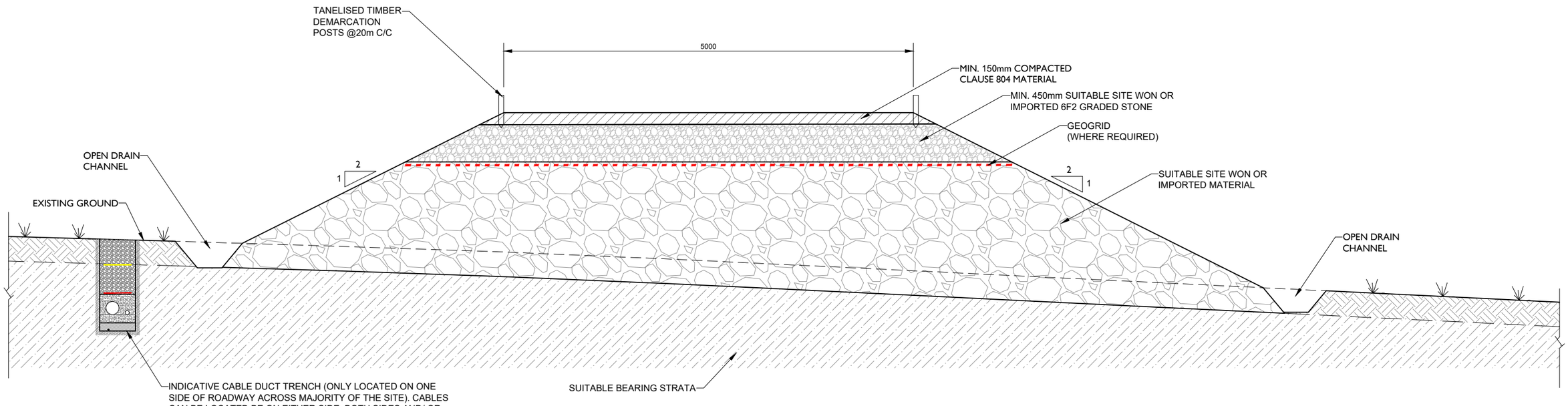
Sections of Upgrade of Existing Roads – Type B are shown in Figure 4-8.



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

(SHOWN IN CUT SCENARIO)

Scale 1:50



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

(SHOWN IN FILL SCENARIO)

Scale 1:50

NOTES

REV	DATE	DRAWN BY	CHECKED BY	DETAILS
A	27/03/2024	M.B.	L.P.	FIRST ISSUE

ENGINEER

AFRY

AFRY Ireland Ltd.
The Hyde Building, The Park,
Carrickmines,
D18VC44
Ireland
Tel. +353 (0) 1 845 5031

CLIENT

PROJECT: LACKAREAGH WIND FARM
CO. CLARE

TITLE: ACCESS ROAD TYPE 'A'
CROSS SECTIONS

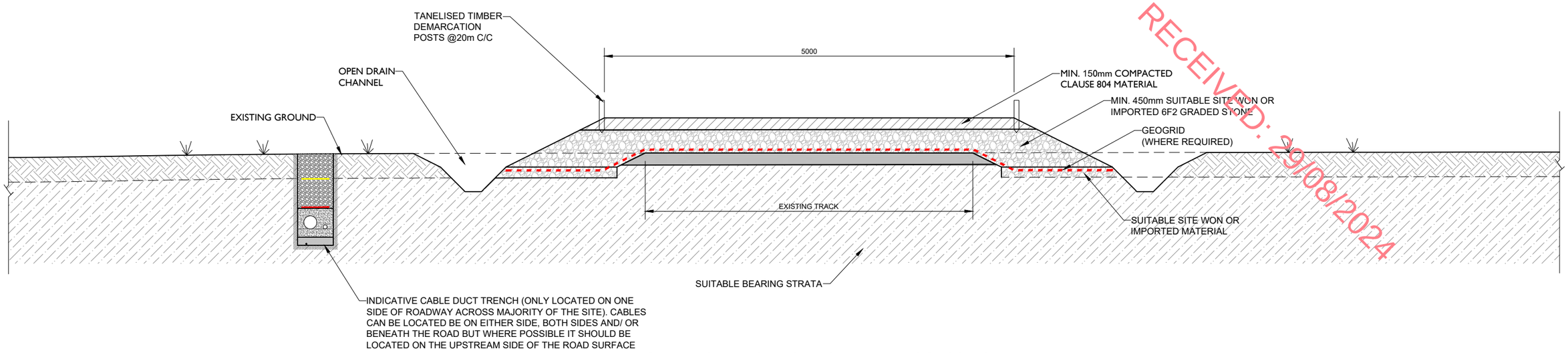
REVISION: A

DRAWN BY	DATE	PAPER SIZE	SCALE
M. BROWNE	27/03/2024	A3	1:50

CHECKED AND APPROVED	DATE	STATUS
L. POWER	27/03/2024	PRELIMINARY

DRAWING NUMBER: Figure 4-7

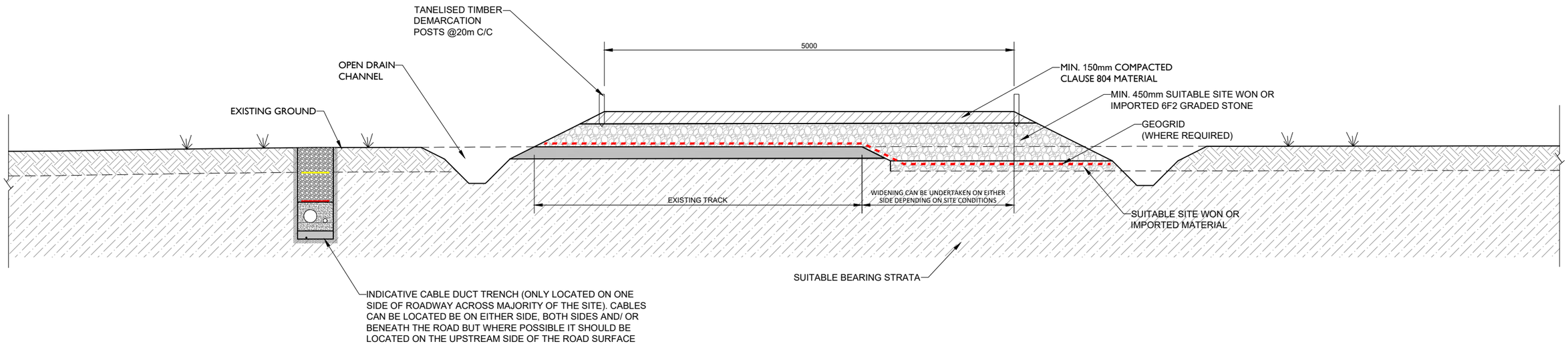
Plotted - 12/08/2024 16:57:33
X:\3-BUI\E\Dublin\Projects\Ireland\Lackareagh LKRH\Drawings\d013 Road Type Map\LKRH D013-2 Typical Access Road Details



TYPE 'B' - UPGRADE OF EXISTING EXCAVATED ACCESS ROAD

(WIDENING ON BOTH SIDES)

Scale 1:50



TYPE 'B' - UPGRADE OF EXISTING EXCAVATED ACCESS ROAD

(WIDENING ON ONE SIDE)

Scale 1:50

NOTES

REV	DATE	DRAWN BY	CHECKED BY	DETAILS
A	27/03/2024	M.B.	L.P.	FIRST ISSUE

ENGINEER
AFRY
AFRY Ireland Ltd.
The Hyde Building, The Park,
Carrickmines,
D18VC44
Ireland
Tel. +353 (0) 1 845 5031

CLIENT

PROJECT
LACKAREAGH WIND FARM
CO. CLARE

TITLE
ACCESS ROAD TYPE 'B'
CROSS SECTIONS

REVISION
A

DRAWN BY	DATE	PAPER SIZE	SCALE
M. BROWNE	27/03/2024	A3	1:50

CHECKED AND APPROVED	DATE	STATUS
L. POWER	27/03/2024	PRELIMINARY

DRAWING NUMBER
Figure 4-8

Plotted : 12/08/2024 16:59:12
X:\3-BUIE\Dublin\Projects\Ireland\Lackareagh LKRH\Drawings\d013 Road Type Map\LKRH D013.2 Typical Access Road Details

4.4.1.8 Borrow Pit

It is proposed to develop 1 no. borrow pit to facilitate the construction of the Proposed Wind Farm. The proposed borrow pit is located adjacent to the proposed onsite 38kV substation off the L7080 Local Road. The borrow pit will provide surplus material needed to construct the Proposed Wind Farm that has not been sourced from the cut and fill exercise and will also act as a peat and spoil deposition area. Usable rock will also be won from the cut exercise to be carried out in order to construct the other project elements, as outlined in Appendix 4-2, Peat and Spoil Management Plan.

A cut and fill assessment was carried out by AFRY in Appendix 4-2, Peat and Spoil Management Plan. A summary of this assessment is provided below:

- The total volume of peat/topsoil requiring management on site is estimated at 35,660m^3. After applying a bulking factor of 15%, this volume estimates to 41,010m^3.
  - A major volume of this material, 30,000m^3, will be used for reinstatement purposes and landscaping across the site
  - The remaining volume will be deposited in the borrow pit.
- The total volume of spoil generated on site is estimated at 129,550m^3. After applying a contingency factor of 15%, this volume estimates to 148,983m^3.
  - Trial pit assessments confirm its suitability for reuse as fill material, therefore, 140,760m^3 of this spoil will be utilized as fill material for hardstands, access roads, met mast, temporary construction compound and storage area.
  - Approximately 4,000m^3 of spoil will be used to backfill the excavated areas around the turbine bases and the remaining will be deposited in the borrow pit.
- The total volume of stone required for construction of the Proposed Project site is estimated at 31,630m^3.
  - Approximately 15,000 m^3 of suitable material be extracted from the borrow pit, out of which approximately 10,000m^3 of rock can be obtained.

The proposed borrow pit measures approximately 2,500m^2 in area and is accessed via an access track to the east. As stated above, the borrow pit will be used to provide any surplus material needed to facilitate the construction of the Proposed Wind Farm that is not sourced from the cut exercise.

The borrow pit is shown in Figure 4-2 and on the detailed layout drawings included as Appendix 4-1 to this EIAR. Figure 4-9 below shows a detailed section through the proposed borrow pit. Upon completion of construction, the borrow pit area will be reinstated with excavated peat and subsoils as described as described in Section 4.4.9 below.

As rock is removed from the borrow pit, it is proposed to backfill the borrow pit area with excavated peat and spoil generated from the cut exercise. The excavated rock from the borrow pit will be used in the construction of the infrastructure elements (turbine foundations, hardstands, access roads, etc.) at the wind farm. The contractor excavating the rock will be required to develop the borrow pit in a way which will allow the excavated peat and spoil to be placed safely. It is proposed to construct cells within the borrow pit for the placement of the excavated peat and spoil. This is to allow for the safe placement and grading of the peat and spoil using dumper trucks and excavators. The text below provides design and construction guidelines for the borrow pit.

Prior to stripping of peaty topsoil, a cut-off drain will first be excavated upslope of the borrow pit, as shown in Appendix 4-2, Peat and Spoil Management Plan, in order to intercept existing overland flows and divert them around the borrow pit prior to discharge via a buffer zone on the downslope side. The shallow peat overburden will then be stripped and temporarily stockpiled; vegetated-side upwards where possible, forming a berm around the borrow pit in order for it to be re-used in its reinstatement on completion. Any subsoil material overlying the rock will then be excavated and stockpiled separately from the peat. The stockpile will be sealed, and a perimeter drain installed to intercept any run-off so that it can be discharged through an appropriately designed silt trap.

To effectively manage potential effects from borrow pit activities, a series of open drains will be constructed within the area to isolate runoff containing increased concentrations of suspended solids. The drainage system, comprised of check dams, will attenuate the flow and provide additional storage capacity during exceptional rainfall events. This design will prevent contaminated runoff from mixing with clean catchment runoff.

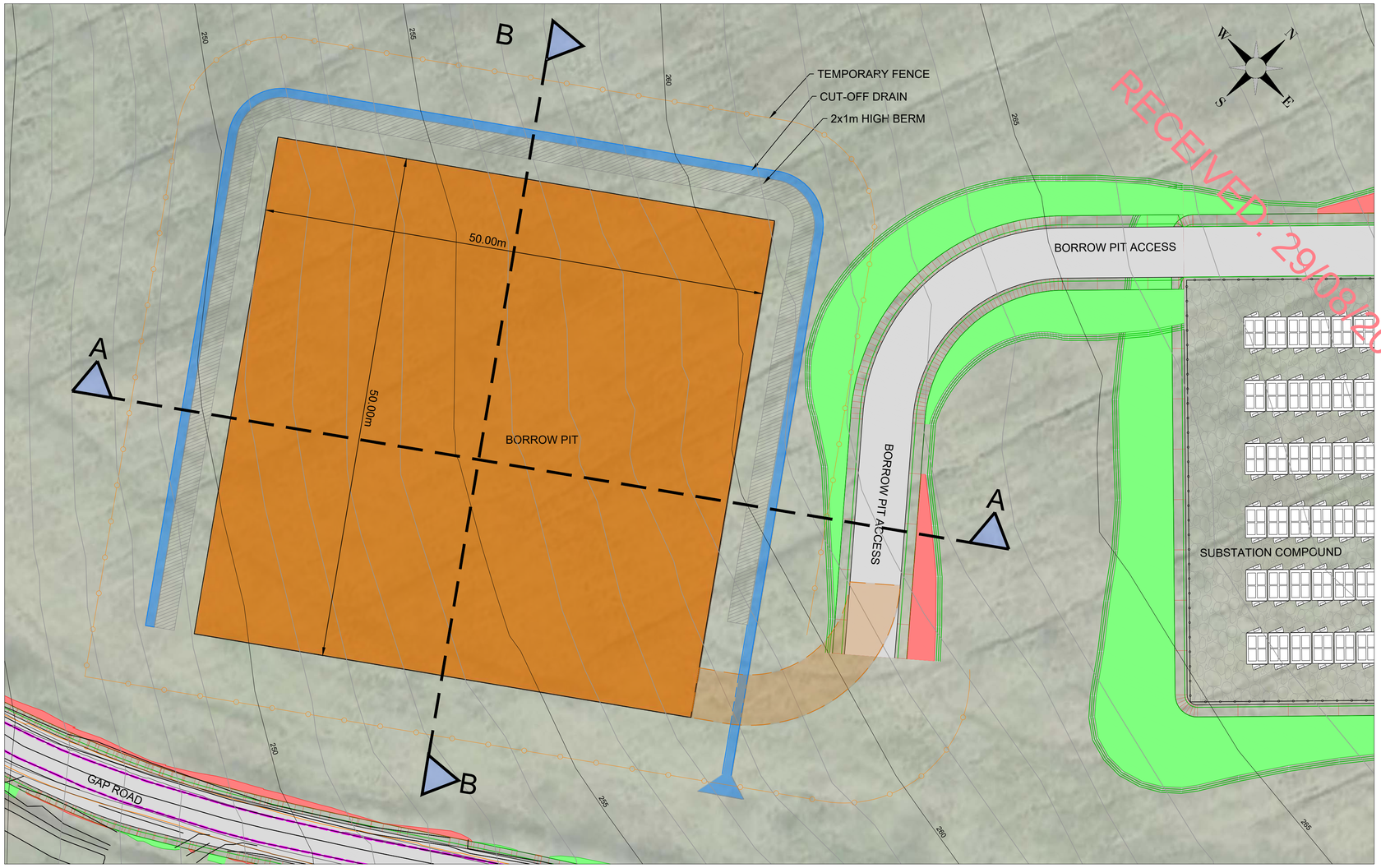
Settlement ponds will be implemented as an additional mitigation measure. These ponds have been designed with a modular approach to accommodate varying runoff volumes. In the event that larger areas of runoff need to be treated at a single discharge point, the size of the settlement pond can be increased proportionately.

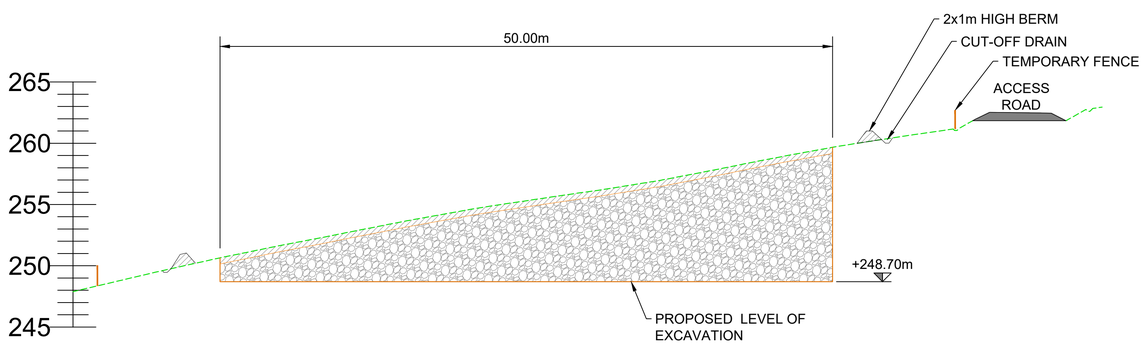
Borrow pit extraction will be closely monitored and inspected by a geotechnical engineer to ensure proper management and safety. The contractor will assess work practices and suspend operations during periods of heavy rainfall to minimize excessive runoff. Extraction methods will be determined based on rock quality, with excavators utilizing various attachments for efficient stone removal. It is anticipated that the hydraulic breaker used to break the stone out of the borrow pit will leave the stone in such a condition that it is suitable to use in construction, thus there is no need for the material to be crushed or graded onsite.

It is proposed to construct the borrow pit so that its base level is below the level of the adjacent section of access road. As excavation progresses into the back edge of the borrow pit, the base of the borrow pit may be raised to suit local conditions. Localised deepening of the borrow pit floor may be required depending on extraction operations.

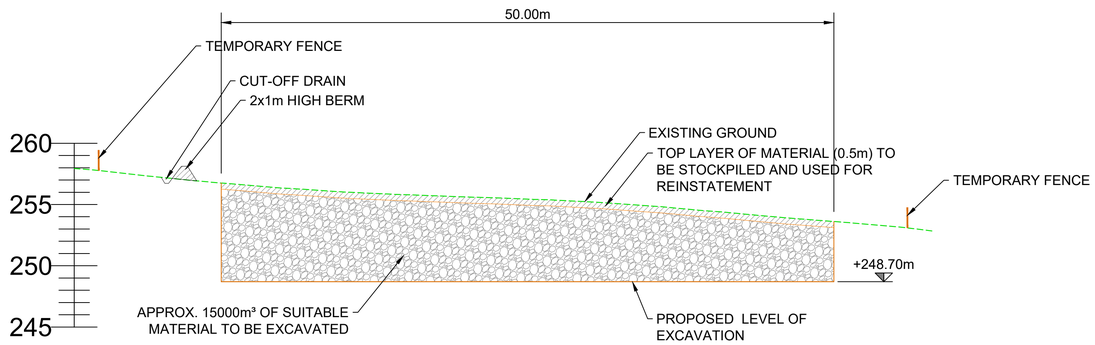
Post-construction, the borrow pit area will be permanently secured. A stock-proof fence will be erected around the borrow pit perimeters to prevent access. Appropriate health and safety signage will also be erected on the fencing and at locations around the fenced area.

The estimated volume of crushed stone to be extracted from the borrow pit and required for the construction of the Proposed Wind Farm is 10,000m^3, with the remainder of the material needed to construct the Proposed Wind Farm site to be sourced from the cut exercise.





CROSS SECTION A-A
Scale 1:250



CROSS SECTION B-B
Scale 1:250

NOTES

REV	DATE	DRAWN BY	CHECKED BY	DETAILS
A	22/03/2024	M.B.	L.P.	FIRST ISSUE

ENGINEER

AFRY Ireland Ltd.
The Hyde Building, The Park,
Carrickmines,
D18VC44
Ireland
Tel. +353 (0) 1 845 5031

CLIENT

PROJECT: LACKAREAGH WIND FARM

TITLE: BORROW PIT
LAYOUT AND CROSS SECTIONS

REVISION: A

DRAWN BY	DATE	PAPER SIZE	SCALE
M. BROWNE	22/03/2024	A1	1:250
CHECKED AND APPROVED	DATE	STATUS	
L. POWER	22/03/2024	PRELIMINARY	

DRAWING NUMBER: Figure 4-9

Plotted - 25/03/2024 12:56:49
Z:\Projects\Ireland\Lackareagh LKRH\Drawings\04 Borrow Pit Details\LKRH D014.1 Borrow Pit Design Plan And Sections

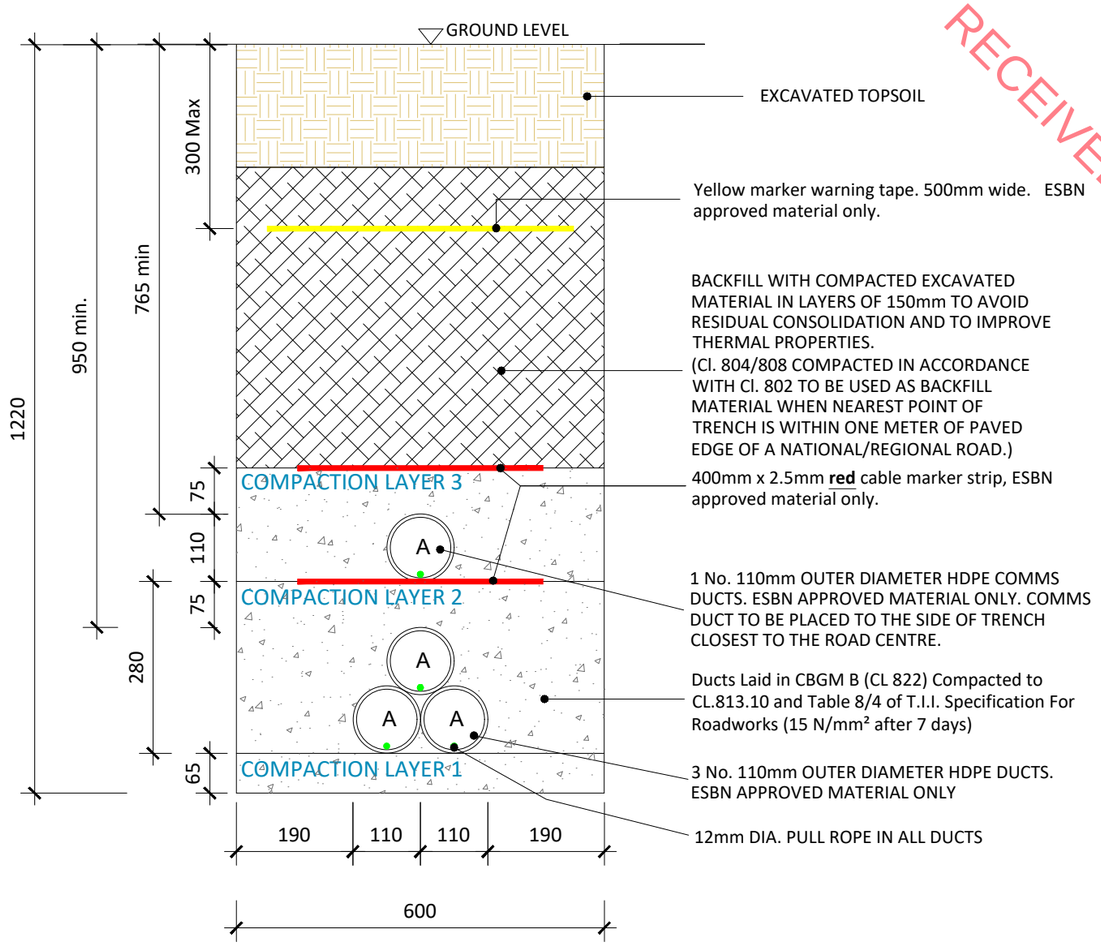
4.4.1.9 Site Underground Electrical (20kV or 33kV) and Communications Cabling

Each turbine will be connected to the on-site electricity substation via underground 20kV or 33kV (kilovolt) electricity cabling. Fibre-optic cables will also connect each wind turbine and the met mast to the proposed onsite 38kV substation. The electricity and fibre-optic cabling connecting to the proposed onsite 38kV substation compound will be run in cable ducts in the road or directly buried alongside the internal tracks approximately 0.9 metres beneath ground level to the top of the cable. The route of the cable will follow the access track to each turbine location and are illustrated on the site layout drawings included as Appendix 4-1, the exact number and configuration of cable(s) may vary within the cabling trench. Figure 4-10 below shows two variations of a typical 33kV cable trench, one for off-road trenches and one for on-road trenches. The cabling may be placed on either side of the roads, on both sides of the road or within the road. The exact configuration of the underground cabling will be set by the requirements of the electrical designers at detailed design stage.

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

4.4.1.10 Meteorological Mast

One meteorological (met) mast is proposed as part of the Proposed Project site. The met mast will be equipped with wind monitoring equipment at various heights. The proposed met mast will be located at X 562294, Y 673235 (ITM) as shown on the Proposed Project layout drawing in Figure 4-2. The mast will be a free-standing slender lattice structure 36.5 metres in height. The mast will be constructed on a hard-standing area sufficiently large to accommodate the equipment that will be used to erect the mast. The proposed meteorological mast is shown in Figure 4-11.



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

Typical Section Through Off Road / Grassland

SCALE 1:10

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

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

tli GROUP
Head Office
Beenreigh,
Abbeydorney,
Tralee, Co. Kerry
Ireland
Tel: 00353 66 7135710

CLIENT
EDF renewables

PROJECT
Lackareagh Wind Farm
38kV Grid Connection

PROJECT NUMBER
05-909

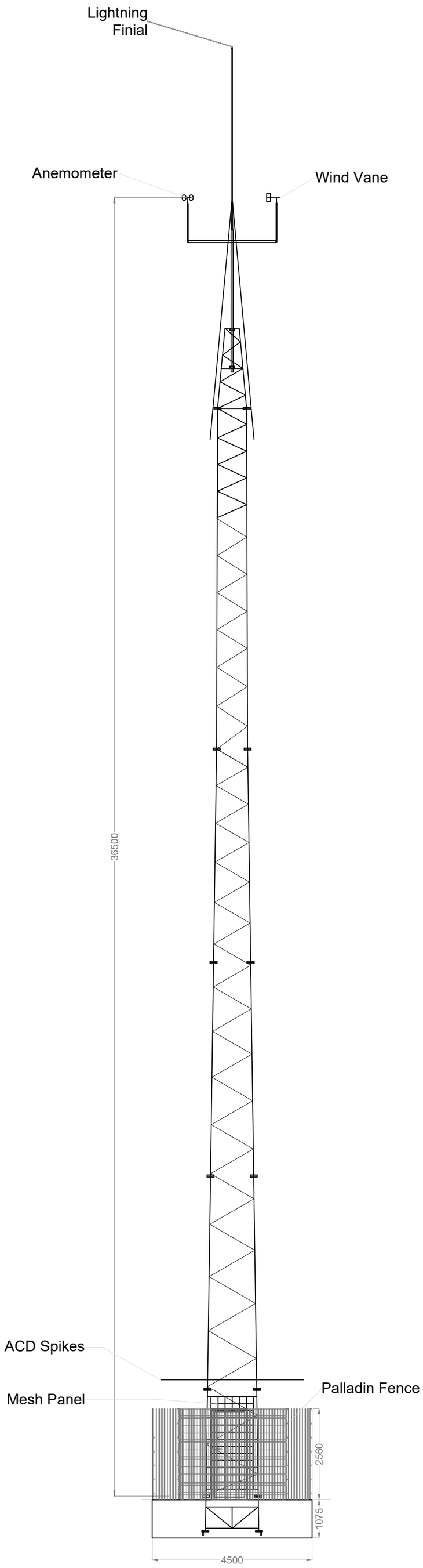
SHEET NUMBER
Figure 4-10

SHEET TITLE
Ducting through Off Road / Grassland Section

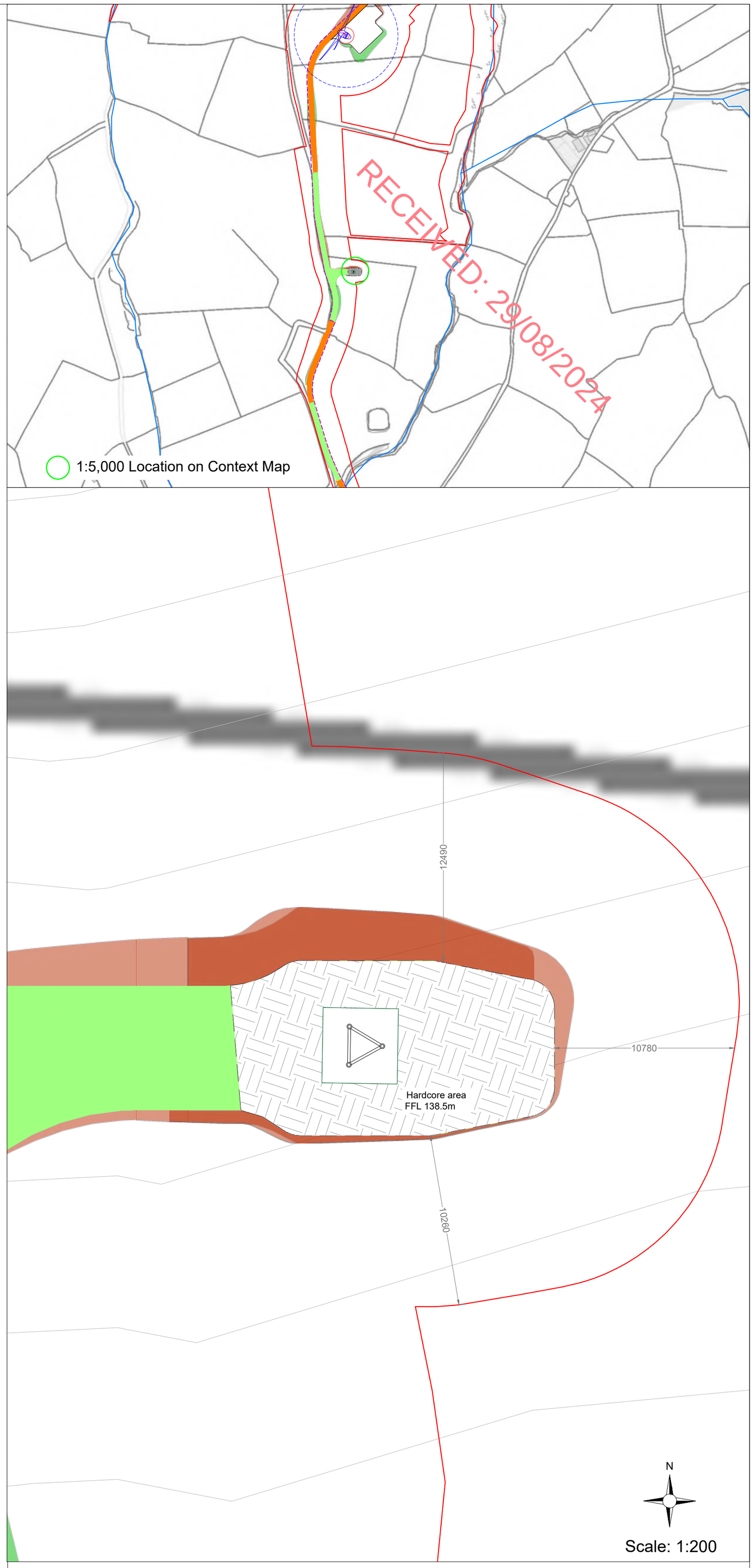
DRAWING STATUS
For Planning

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P2	13.08.24	Issued For EIAR
P1	14.07.23	Issued For Planning



Scale: 1:100



Scale: 1:200

Note:

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

PROJECT TITLE:
Lackareagh Wind Farm, Co. Clare

DRAWING TITLE:
Met Mast

PROJECT No.:	DRAWING No.:	SCALE:
220245	Fig 4-11	As shown @ A2

DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	CJ	16.08.2024	D01

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

4.4.1.11 Temporary Construction Compounds

One temporary construction compound will be located within the Proposed Project site. The construction compound will be located adjacent to the proposed onsite 38kV substation and measures approximately 2,000 square meters in area.

The location of the proposed construction compound is shown on the Proposed Project site layout drawing in Figure 4-2. The layout of the construction compound is shown on Figure 4-12.

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

Temporary toilets, located within staff portacabins, will be used during the construction phase. Wastewater from staff toilets will be directed to a sealed storage tank, with all wastewaters being tankered off site by a permitted waste collector to wastewater treatment plants.

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

4.4.1.12 New Watercourse Crossings within the Proposed Wind Farm

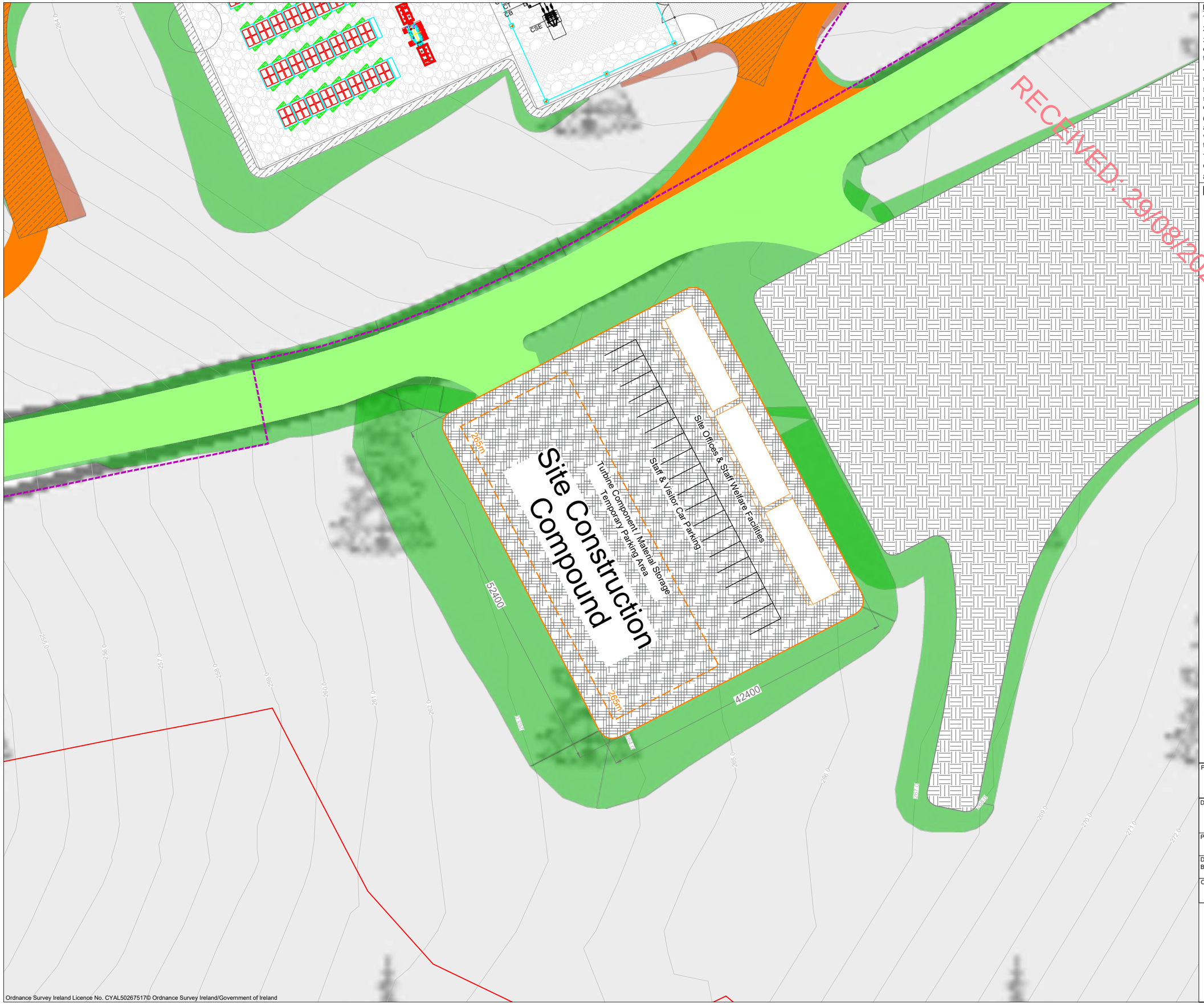
In order to facilitate the construction and operation of the Proposed Wind Farm, 4 no. new watercourse crossings will be constructed along the proposed new access roads. The locations of all 4 no. new watercourse crossings are detailed below:

- **Watercourse Crossing 1**: located along access road to T2, approximately 165m north of the L7080 Local Road along the proposed new access road;
- **Watercourse Crossing 2**: located along the proposed access road to T6, approximately 270m south of the L7080 along the proposed new access road;
- **Watercourse Crossing 3**: located along the access road between T6 and T7, approximately 121m south of T6 along the proposed access road, and
- **Watercourse Crossing 4**: located approximately 52m north of T7 hardstand

All 4 no. watercourses will be traversed using either of the following crossing methodologies:

- Clearspan crossing structure
- Box culvert

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



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
- Proposed Electrical Cable Trench
- Proposed Storage Area

N

PROJECT TITLE:
Lackareagh Wind Farm, Co. Clare

DRAWING TITLE:
Temporary Construction Compound

PROJECT No.:	DRAWING No.:	SCALE:
220245	Fig 4-12	1:500 @ A3

DRAWN BY:	CHECKED BY:	DATE:	REVISION.:
JOB	CJ	16.08.2024	D01

OS SHEET No.: 4387, 4388, 4445,4446

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

4.4.1.13 Onsite 38kV Substation

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

The footprint of the proposed onsite 38kVsubstation compound measures approximately 4,180m^2 in area and will include 1 no. control buildings and the electrical substation components necessary to consolidate the electrical energy generated by each wind turbine and export that electricity from the onsite 38kV substation to the national grid. The layouts, drainage detail and elevations of the proposed onsite 38kV substation are shown on Figures 4-13 and 4-14. The construction and exact layout of electrical equipment in the onsite 38kV substation will be to ESB Networks specifications.

Further details regarding the connection between the onsite 38kV substation and the national electricity grid are provided in Section 4.3.6.5 below.

The onsite 38kV substation compound will include steel palisade fencing (approximately 2.5 metre high), and internal fences will also segregate different areas within the main substation.

4.4.1.14 Wind Farm Control Building

The wind farm control building will be located within the substation compound and will measure 17.5 metres by 7.3 metres and 6 metres in height. This wind farm control building includes for both the Independent Power Provider (IPP) Control Building and the ESB Control Building. Layout and elevation drawings of the control building are included in Figure 4-16. The wind farm control building will include staff welfare facilities for the personnel that will work on the Proposed Project during the operational phase of the project. Toilet facilities will be installed with a low-flush cistern and low-flow wash basin. Due to the specific nature of the Proposed Project, and the transient nature of those who will be working within the control building, there will be a very small water requirement for occasional toilet flushing and hand washing and therefore the water requirement of the Proposed Project does not necessitate a potable source. It is proposed to install a rainwater harvest system from the roofs of the Proposed Wind Farm buildings to facilitate the water requirement during the construction phase of the Proposed Project.

It is not proposed to treat wastewater on site. Wastewater from the staff welfare facilities in the control buildings will be managed by means of a sealed storage tank with a capacity of 10,000 litres, with all wastewaters being tankered off site by permitted waste collector to wastewater treatment plants.

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

The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. Full details of the proposed tank alarm system can be submitted to the Planning Authority in advance of any works commencing on-site. The wastewater storage tank alarm will be part of a continuous stream of data from the Proposed Project turbines, wind measurement devices and electricity substation that will be monitored remotely 24 hours a day, 7 days per week. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007(as amended), will be employed to transport wastewater away from the Proposed Project site.

4.4.1.15 Battery Energy Storage Solution (BESS)

A battery-based energy storage system (BESS) will adjoin the 38kV onsite substation and is located within the substation compound. The BESS primarily consists of 6 no. steel containers assembled in rows within the BESS compound at the site.

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

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

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

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

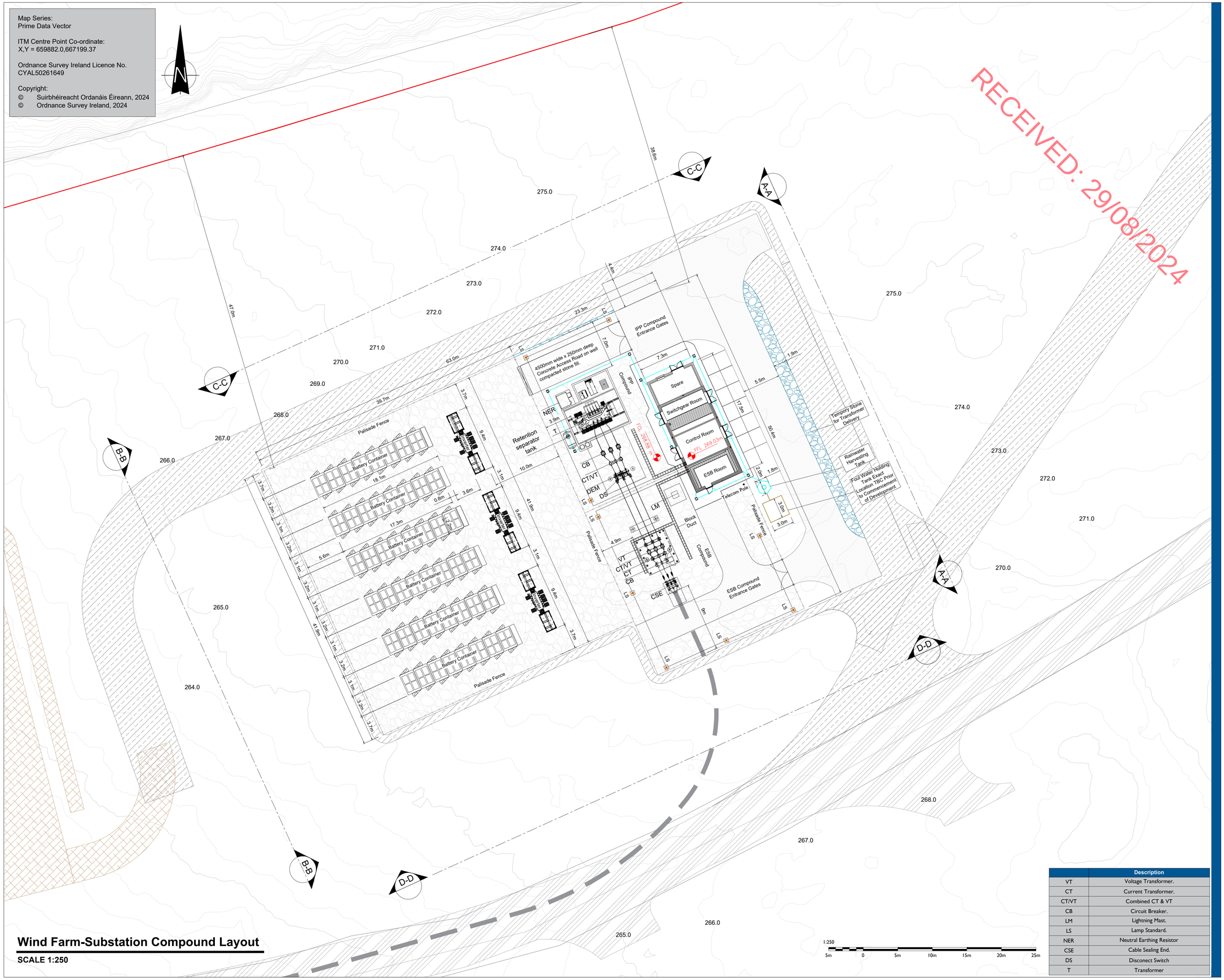
The BESS layout and elevations are shown in Figure 4-13 and Figure 4-14 below.

ISO A1 594mm x 841mm

Map Series:
Prime Data Vector

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

Ordnance Survey Ireland Licence No.
CYAL50261649



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

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

tli GROUP

Head Office
Beenreigh,
Abbeydorney,
Tralee, Co. Kerry
Ireland
Tel: 00353 66 7135710

Regional Office
Basepoint Business Centre
Stroudley Road, Basingstoke,
Hampshire,
RG24 8UP, UK
Tel: 00 44 1256406664

PROJECT

Lackareagh Wind Farm
38kV Grid Connection

CLIENT

EDF renewables

CONSULTANTS

MKO

NOTES: -

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

LEGEND: -

Surface water drainage shown thus
Lamp Standard shown thus
Proposed Levels Shown thus (Planning) FCL 54.60m
Proposed UGC Route Subject to Separate Planning Application
Contours 14.0
Planning Boundary shown thus
Permanent Paved Access Roads shown thus
Compound Stone (Crushed Limestone)
Proposed Borrow Pit shown thus
Proposed New Road Layout shown thus
Proposed Update to Existing Roads shown thus
Temporary Stone for Delivery of Transformer shown thus

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P12	07.08.24	Issued for Planning
P11	06.08.24	Issued for Planning
P10	02.08.24	Issued for Planning
P9	26.07.24	Issued for Planning
P8	25.07.24	Issued for Planning
P7	16.07.24	Issued for Planning
P6	05.03.24	Issued for Planning
P5	21.02.24	Issued for Planning

PROJECT NUMBER

05-909

SHEET TITLE

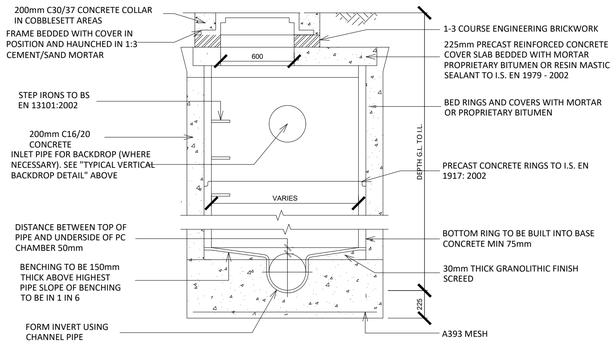
38kV Substation Compound Layout

SHEET NUMBER

Figure 4-13

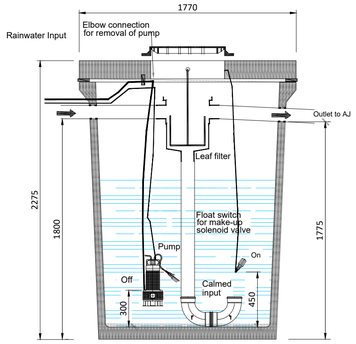
ISO A1 594mm x 841mm

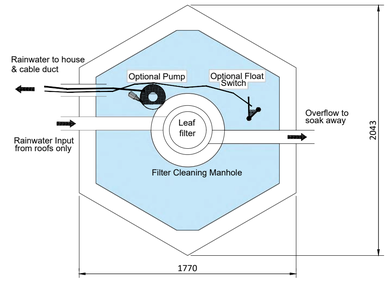
Manhole



Manhole
Scale : 1:25

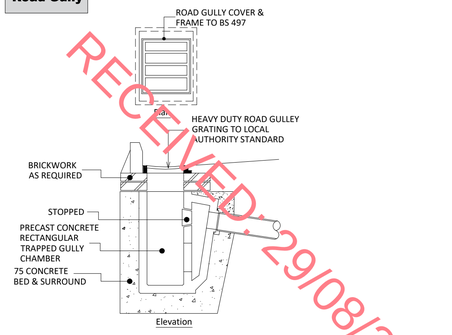
Rainwater Harvesting Tank





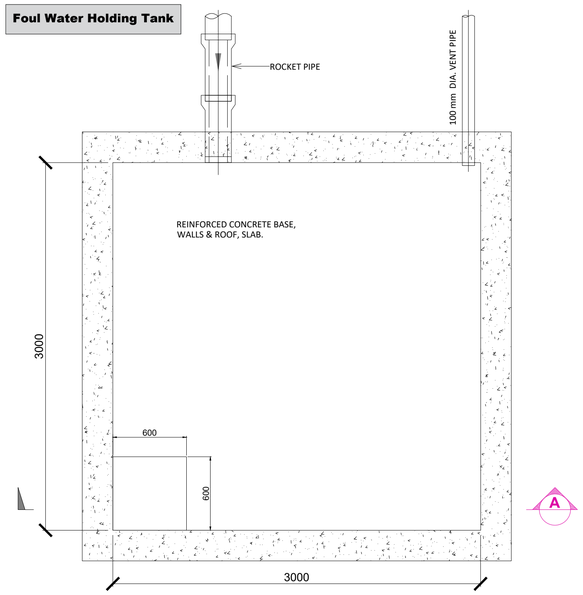
Rainwater Harvesting Tank
Scale : 1:25

Road Gully



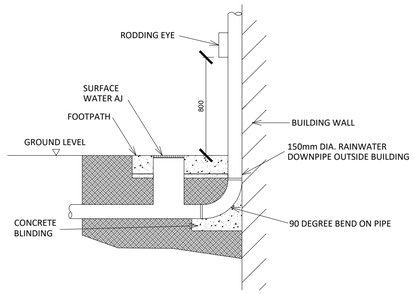
Road Gully Detail
Scale : 1:25

Foul Water Holding Tank



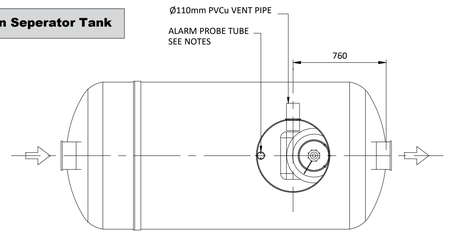
Foul Water Holding Tank - Plan
Scale : 1:25

Rainwater Downpipe Detail - Elevation

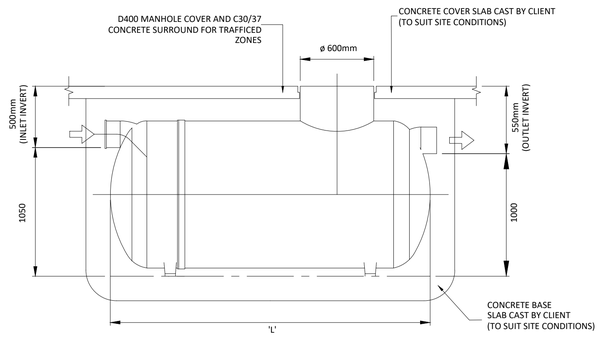


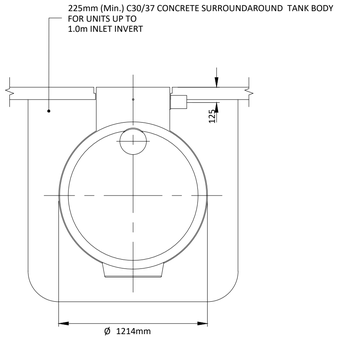
Rainwater Downpipe Detail - Elevation
Scale : 1:25

Retention Seperator Tank



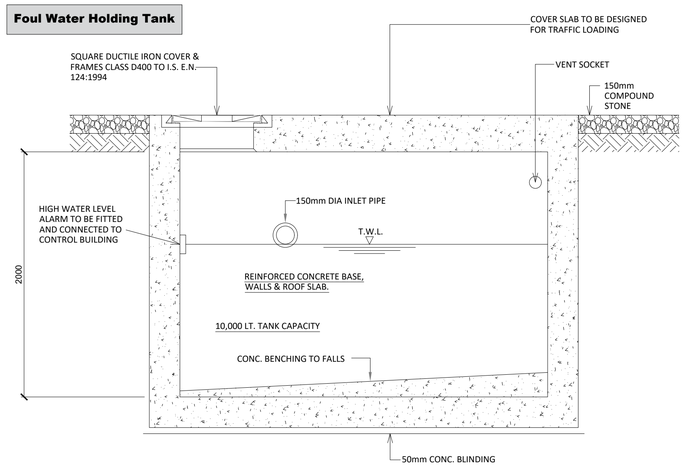
Unit Ref No	Nominal Flow	Dia L (mm)	Approx Empty Weight (kgs)	Fall across Unit
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]





Retention Separator Tank - Plan
Scale : 1:25

Foul Water Holding Tank



Foul Water Holding Tank - Elevation
Scale : 1:25

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

tli GROUP

Head Office
Beenreigh,
Abbeydorney,
Tralee, Co. Kerry
Ireland
Tel: 00353 66 7135710

Regional Office
Basepoint Business Centre
Stroudley Road, Basingstoke,
Hampshire,
RG24 8UP, UK
Tel: 00 44 1256406664

PROJECT

Lackareagh Wind Farm
38kV Grid Connection

CLIENT

EDF renewables

CONSULTANTS

MKO

NOTES: -

LEGEND: -

ISSUE/REVISION

P3	25.07.24	Issued for Planning
P2	16.07.24	Issued for Planning
P1	14.07.23	Issued for Planning
I/R	DATE	DESCRIPTION

PROJECT NUMBER

05-909

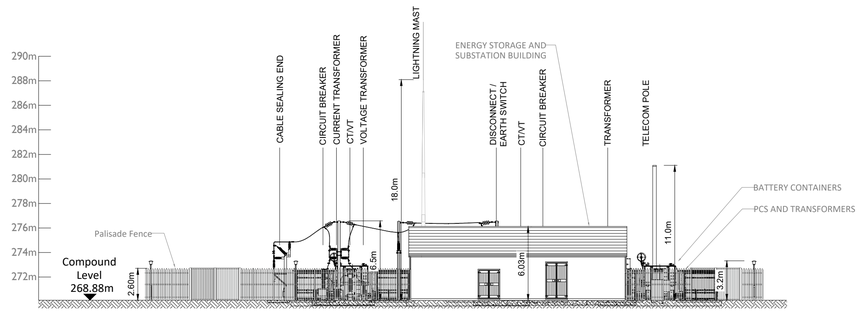
SHEET TITLE

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

SHEET NUMBER

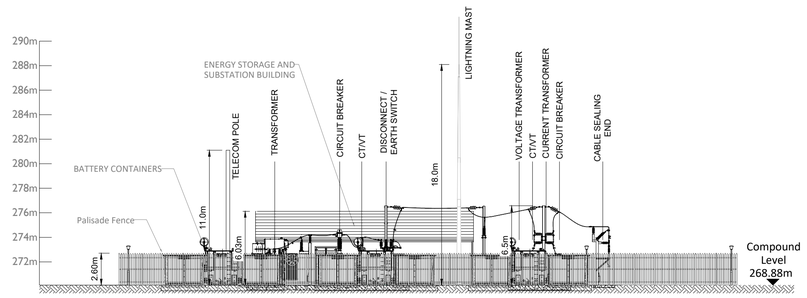
Figure 4-14

ISO A1 594mm x 841mm



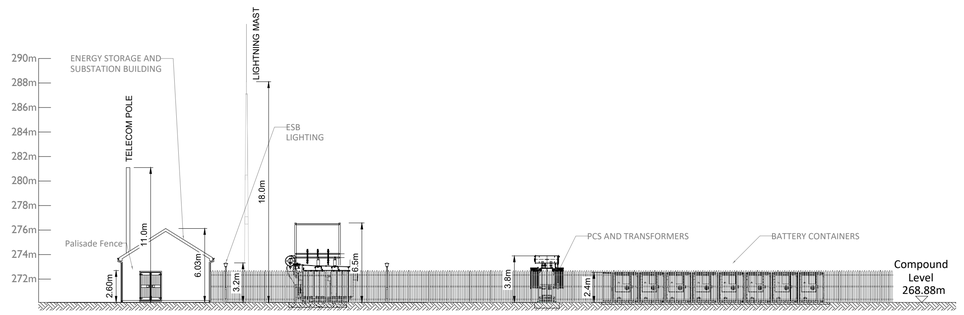
East Elevation A-A

SCALE 1:250



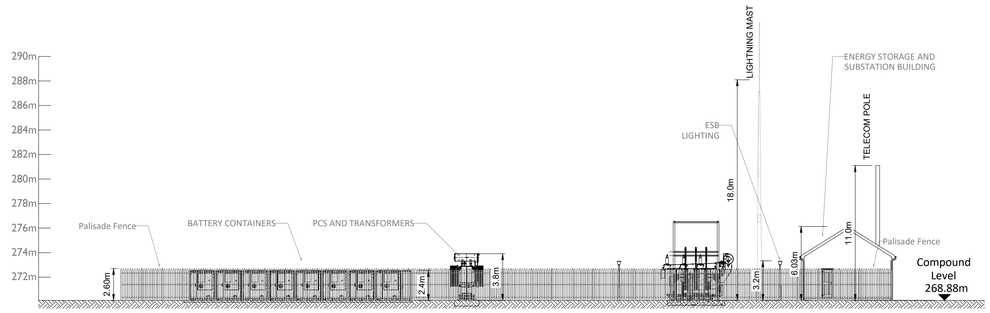
West Elevation B-B

SCALE 1:250



North Elevation C-C

SCALE 1:250



South Elevation D-D

SCALE 1:250

RECEIVED: 29/08/2024

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

Head Office
Beenreigh,
Abbeydorney,
Tralee, Co. Kerry
Ireland
Tel: 00353 66 7135710

Regional Office
Basepoint Business Centre
Stroudley Road, Basingstoke,
Hampshire,
RG24 8UP, UK
Tel: 00 44 1256406664

PROJECT

Lackareagh Wind Farm

38kV Grid Connection

CLIENT

CONSULTANTS

NOTES: -

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

LEGEND: -

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P9	07.08.24	Issued for Planning
P8	06.08.24	Issued for Planning
P7	02.08.24	Issued for Planning
P6	16.07.24	Issued for Planning
P5	21.02.24	Issued for Planning
P4	23.01.24	Issued for Planning
P3	11.10.23	Issued for Planning
P2	09.10.23	Issued for Planning

PROJECT NUMBER

05-909

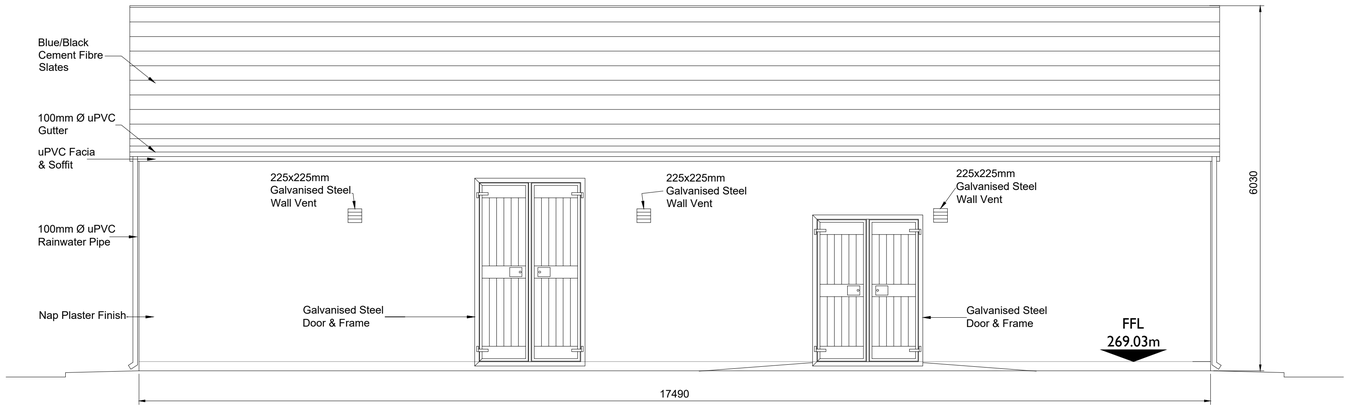
SHEET TITLE

38kV Substation Compound Elevations

SHEET NUMBER

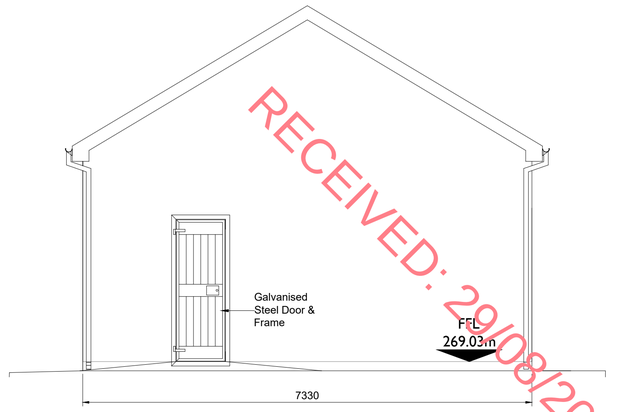
Figure 4-15

ISO A1 594mm x 841mm



Front Elevation (Section A-A)

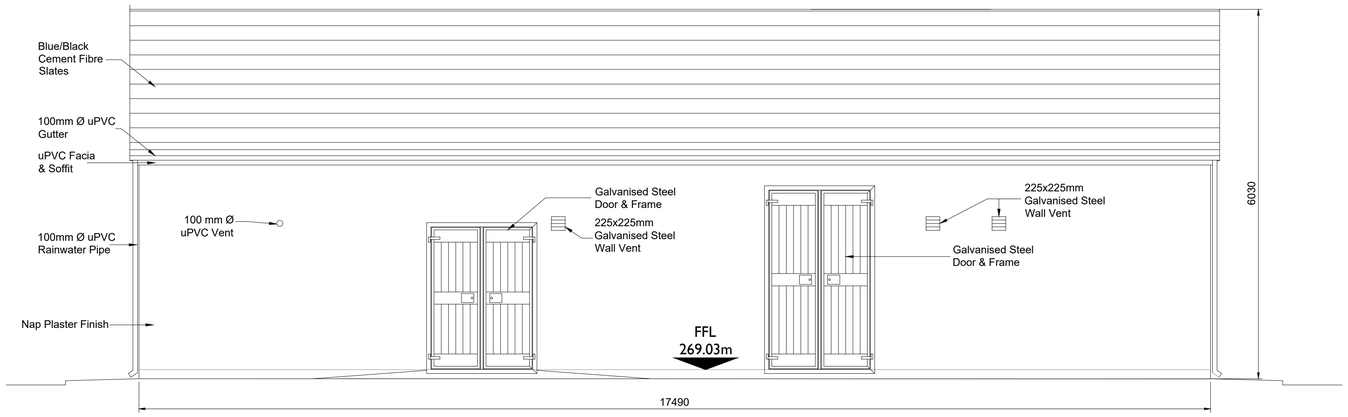
SCALE 1:50



RECEIVED: 29/08/2024

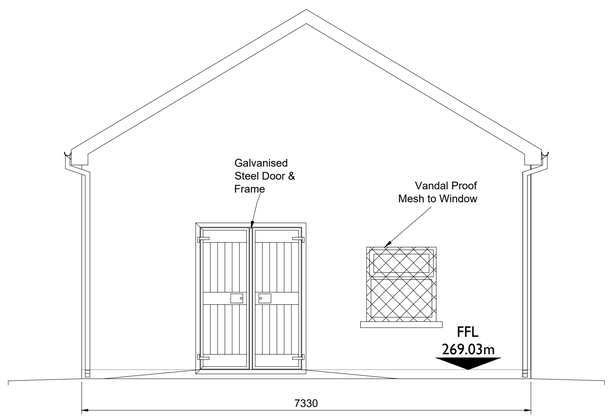
Side Elevation (Section C-C)

SCALE 1:50



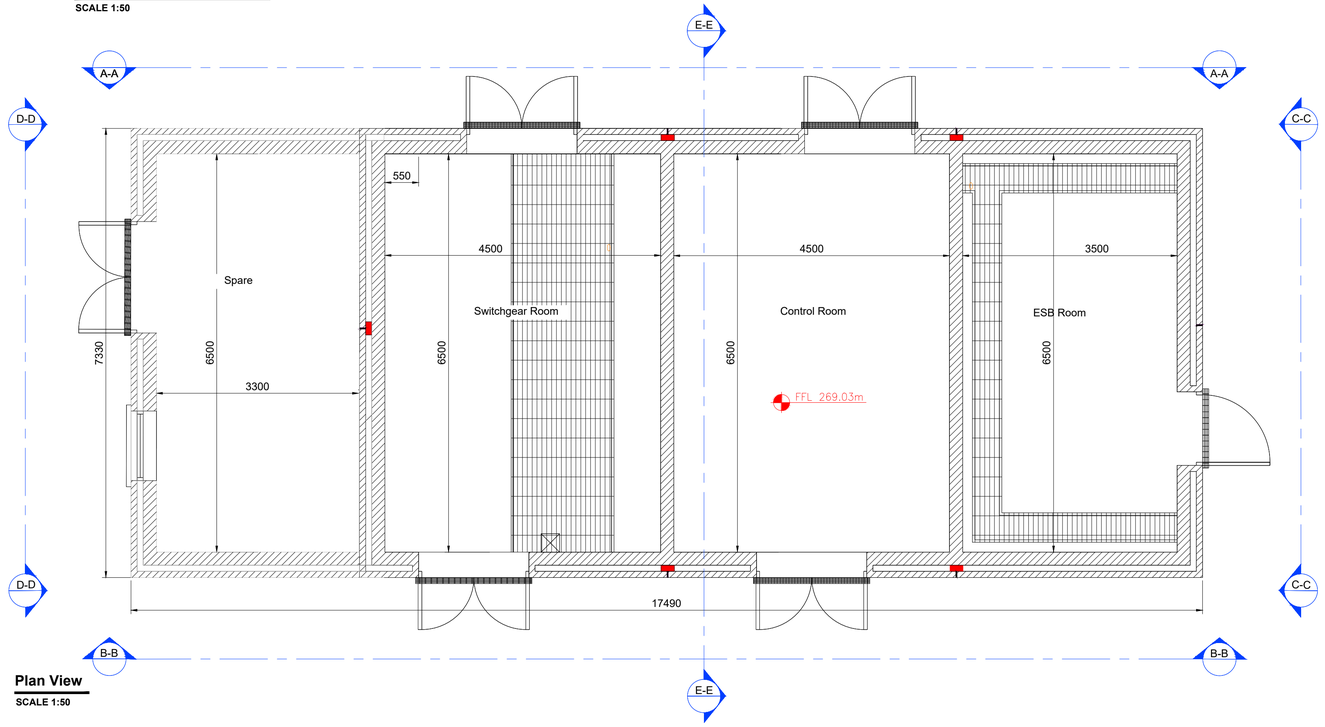
Rear Elevation (Section B-B)

SCALE 1:50



Side Elevation (Section D-D)

SCALE 1:50



Plan View

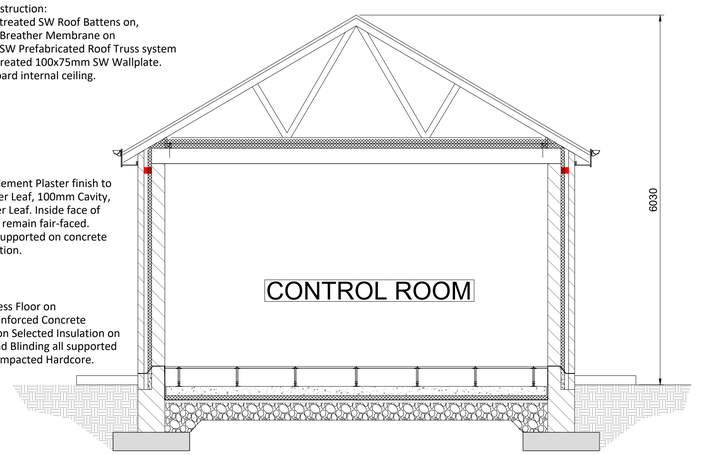
SCALE 1:50

NOTE : Control Building surfaces need to be non - combustible

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

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

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



Section View E - E

SCALE 1:50

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

tli GROUP

Head Office
Beenreigh,
Abbeydorney,
Tralee, Co. Kerry
Ireland
Tel: 00353 66 7135710

Regional Office
Basepoint Business Centre
Stroudley Road, Basingstoke,
Hampshire,
RG24 8UP, UK
Tel: 00 44 1256406664

PROJECT

Lackareagh Wind Farm
38kV Grid Connection

CLIENT

EDF renewables

CONSULTANTS

MKO

NOTES: -

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

LEGEND: -

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

ISSUE/REVISION

P5	07.0.24	Issued for Planning
P4	06.08.24	Issued for Planning
P3	16.07.24	Issued for Planning
P2	11.10.23	Issued for Planning
P1	14.07.23	Issued for Planning
I/R	DATE	DESCRIPTION

PROJECT NUMBER

05-909

SHEET TITLE

Control Building Elevations, Section & Plan

SHEET NUMBER

Figure 4-16

4.4.1.17 Informational Lookout Point

Within the Proposed Wind Farm site, there will be a provision made for information signage along the L7080 Local Road (located at this point: ITM X: 563456 ITM Y:672469). This informational lookout point will be located within a passing bay along the L7080 Local Road, which is also a designated walking trail (the East Clare Way), and will provide information relating to the local area. Information provided is likely to fall under the following headings:

- Landmarks within the view across the Glenomra Valley, where long ranging views are available;
- Local history and heritage;
- Information on the biodiversity of the area, including information on the biodiversity enhancement measures being presented within this EIAR

The presence of the signage within the informational lookout point will enhance the recreational amenity along this section of the East Clare Way and provide walkers with information relating to the locality.

4.4.2 Proposed Grid Connection Route

4.4.2.1 Underground Grid Connection Electrical Cabling Route

A 38kV connection between the Proposed Project and the national electricity grid will be necessary to export electricity from the Proposed Wind Farm. It is proposed to construct an onsite 38kV substation within the of the Proposed Project site and to connect from here via a 38kV underground electrical cable connection to the existing 110kV Ardnacrusha substation, in the townlands of Castlebank and Ballykeelaun near Ardnacrusha, Co. Clare. The underground electrical cabling route is approximately 14.7km in length to Ardnacrusha 110kV substation.

The Proposed Grid Connection Route underground electrical cabling will originate at the Ardnacrusha 110kV substation compound and run northeast onto the L3056 local road for approximately 9.5km. The route adjoins with R466 regional road and continues in a northeasterly direction where it meets the L3022-8 local road for approximately 2.4km, before reaching the proposed site entrance. The existing roads within the EIAR Site Boundary will require upgrades, the Proposed Grid Connection Route will be installed in these existing on-site roads for a total length of 2.3km in west-east direction. No new road infrastructure is required for the installation of the Proposed Grid Connection Route.

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

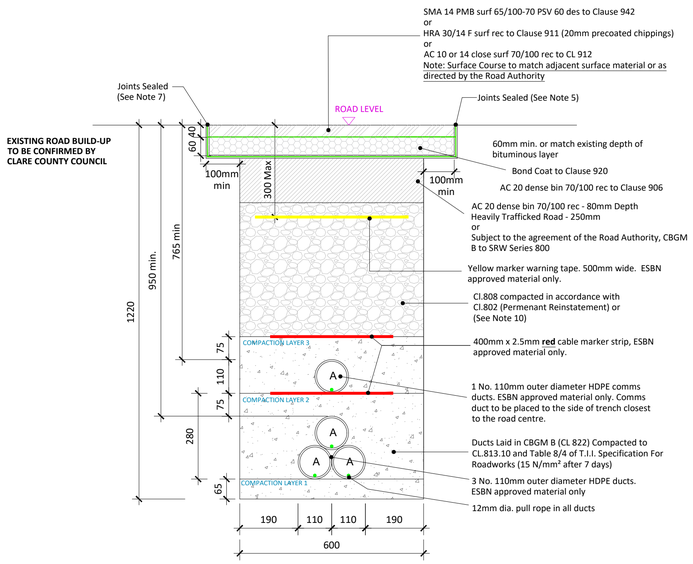
The Proposed Grid Connection Route is shown in Figure 4-1 and Figure 4-3, and a cross section of the grid connection cabling trench is shown in Figure 4-17. The detailed alignment of the Proposed Grid Connection Route is shown in Appendix 4-1.

Further details in relation to the Proposed Grid Connection Route for the Proposed Project are outlined in Section 4.8.8 below.

ISO A1 594mm x 841mm

Permanent Reinstatement

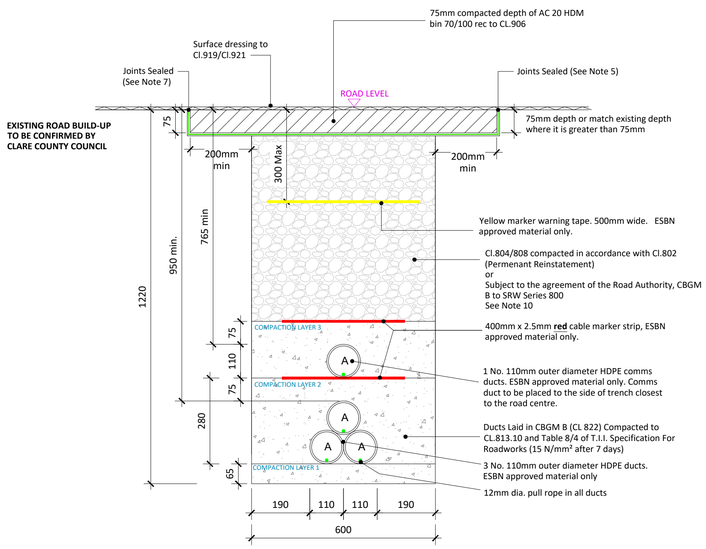
Reinstatement details based on Guidelines for Managing Openings in Public Roads - SD4



Typical Section Through Permanent Reinstatement of Longitudinal Opening in Roadway

SCALE 1:10

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



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

SCALE 1:10

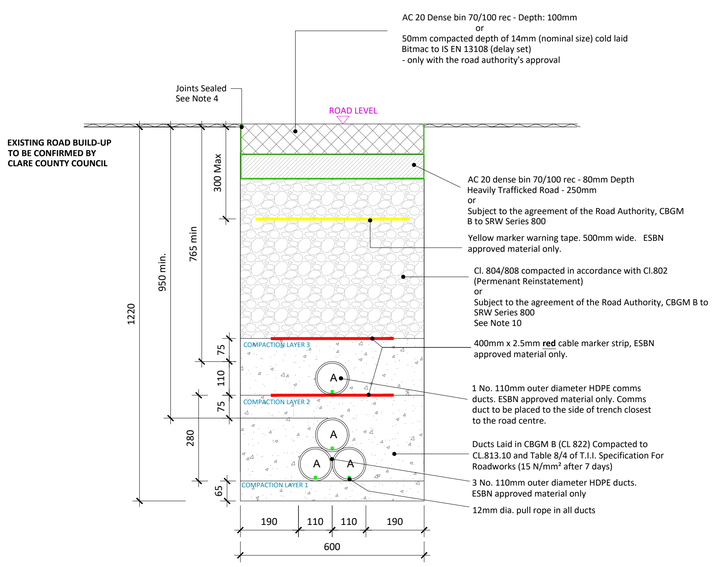
ALL REINSTATEMENT WORKS ARE TO BE IN ACCORDANCE WITH LOCAL AREA ENGINEERS REQUIREMENTS AND GUIDELINES FOR MANAGING OPENINGS IN PUBLIC ROADS

Note:

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

Temporary Reinstatement

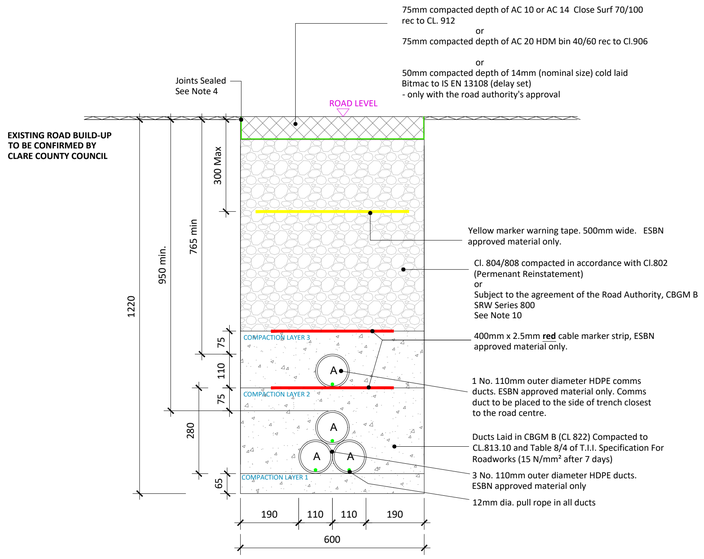
Reinstatement details based on Guidelines for Managing Openings in Public Roads - SD1



Typical Section Through Temporary Reinstatement of Longitudinal Opening in Roadway

SCALE 1:10

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



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

SCALE 1:10

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

Note:

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

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

tli GROUP

Head Office
Beenreigh,
Abbeydorney,
Tralee, Co. Kerry
Ireland
Tel: 00353 66 7135710

Regional Office
Basepoint Business Centre
Stroudley Road, Basingstoke,
Hampshire,
RG24 8UP, UK
Tel: 00 44 1256406664

PROJECT

Lackareagh Wind Farm
38kV Grid Connection

CLIENT

EDF renewables

CONSULTANTS

MKO

NOTES: -

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

LEGEND: -

ISSUE/REVISION

P2	13.08.24	Issued For EIAR
P1	14.07.23	Issued For Planning
I/R	DATE	DESCRIPTION

PROJECT NUMBER

05-909

SHEET TITLE

Ducting Through
Regional / Local Roadways

SHEET NUMBER

Figure 4-17

4.4.3 Peat and Spoil Management Plan

4.4.3.1 Quantities

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

Table 4-2 Spoil Volumes requiring management

Development Component	Area (m2) (approx.)	Peat/ topsoil Volume (m3) (approx.)	Spoil Volume (m3) (approx.)
7 no. Turbines and Hardstanding Areas	25.5m diameter excavation footprint for turbine foundation (23.5m turbine diameter plus 1m working area all around) with 62m x 30m	20,597	114,195
Access Roads	Assumed 5m running surface with 6.8m wide development footprint	13,179	14,375
Meteorological Mast	Area 25m x 15m	242	173
Temporary Construction Compound	Area 80m x 50m approx.	966	0
Onsite 38kV Substation and Battery Storage Compound	Area 85m x 60m	2,225	13,340
Borrow Pit	50m x 50m	1,438	5,750
Setdown Area	110m x 40.5m	2,363	1,150
Total Peat and Spoil to be managed		**41,010**	**148,983**
		189,993	

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

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

4.4.3.2 Peat and Spoil Management Areas

It is proposed to manage any excess overburden generated through construction activities within the Proposed Project site, through deposition in the borrow pit, landscaping proposals, side-casting of materials along proposed infrastructure, and through the reuse of suitable materials as fill volume. The side-casting of materials will take the form of linear berms along access roads where appropriate, and landscaping around turbine bases. A detailed breakdown of the capacity of the peat and spoil management areas within the Proposed Project site is shown in Table 4-3 and Table 4-4 below and is further detailed in the Peat and Spoil Management Plan (Appendix 4-2).

Table 4-3 Spoil Management Areas

Location	Spoil Volume (m^3)	Comment
Borrow Pit	4,223	Further details included in Section 4.3.3 and Figure 4-9
Reuse of materials around excavated turbine base and for ballast	4,000	The excavated area around the turbine bases to be backfilled with surplus spoil material after construction of the foundation
Reuse of material as fill volume	140,760	Surplus suitable cut volume will be utilised as fill material for hardstands, access roads, met mast, temporary construction compound and storage area
Total Volume	**148,983**	

Table 4-4 Peat Management Areas

Location	Peat Volume (m^3)	Comment
Borrow Pit	11,010	Further details included in Section 4.3.3 and Figure 4-9
Reinstatement and Landscaping	30,000	Peaty topsoil to be utilised for reinstatement purposes across the site, including the borrow pit and the hardstands
Total Volume	**41,010**	

As identified in Tables 4-2 to Table 4-4, the total volume of peat requiring management on site is estimated at 41,010m^3. This material will be excavated and deposited in the borrow pit and used in reinstatement and landscaping as identified above. The total volume of spoil requiring management on site is estimated at 148,983m^3. This material will be excavated and deposited primarily around turbine bases and hardstands, for ballast and landscaping, and for use as fill material, with all remaining spoil being deposited in the borrow pit, which has a total capacity volume of 15,000m^3. As such, the proposed borrow pit provides sufficient capacity for the total volume of remaining peat and spoil requiring management at the Proposed Project site. These volumes are detailed in Table 4-2 above. The spoil material to be used for the fill exercise will be used locally within the Proposed Wind Farm site, thus negating the need for a high volume of transporting of materials within the Proposed Wind Farm site.

The temporary management measures, as outlined in Appendix 4-2 Peat and Spoil Management Plan, represent particular recommendations/best practice guidelines for the placement of peat and spoil at a

wind farm with specific aspects of the development being considered and taken into account during the construction phase.

Temporary Management

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

- The amount of peat and spoil necessary for landscaping, reinstatement and backfilling shall be stored locally at turbine hardstands, in distinct stockpiles. Any surplus material will be promptly transported to the proposed borrow pit shown on Figure 5 of Appendix 4-2.
- Before stockpiling any glacial till spoil, the proposed deposition area would be stripped of topsoil/ peat which would be removed and placed in a suitable area to prevent the mixing of materials and facilitate reuse during restoration work.
- Peat will be stored on top of existing and undisturbed peat areas located only on the uphill slopes to ensure stability. The suitability of the underlying peat and the topography will be reviewed by a geotechnical engineer at the detailed design stage and during the construction phase. This will determine the maximum height of peat that maybe stored, which shall not exceed 1.5m.
- Glacial till will not be placed on top of peat or topsoil; instead, it will be deposited only on other glacial till material.
- In order to prevent erosion and surface water contamination, silt fencing can be utilized to secure these stockpiles, where necessary.
- The excavated material which is unsuitable for use in construction will not be spread over any existing heath, bog, or grassed areas.
- Following the reinstatement of the turbine bases and hardstands, all temporarily stockpiled material not required will be removed and transported to the proposed borrow pit.
- The proposed locations for the temporary stockpiling of peat and spoil will be confirmed by the geotechnical engineer at detailed design stage.

4.4.4 Tree Felling and Replanting

4.4.4.1 Tree Felling

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

Further details on tree felling required within and around the development footprint on the Proposed Project site is detailed in Section 6.5.2 of Chapter 6 of this EIAR.

A total of 13.8 hectares of forestry will be permanently felled within and around the Proposed Project along with existing treeline boundaries as detailed in Chapter 6 and its associated appendices. Figure 4-18 shows the extent of the commercial forestry to be permanently felled in order to facilitate the Proposed Project.

The commercial forestry felling activities required as part of the Proposed Project will be the subject of a Limited Felling Licence (LFL) application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm developments. A felling licence will be applied for subject to a grant of planning permission for the Proposed Project.

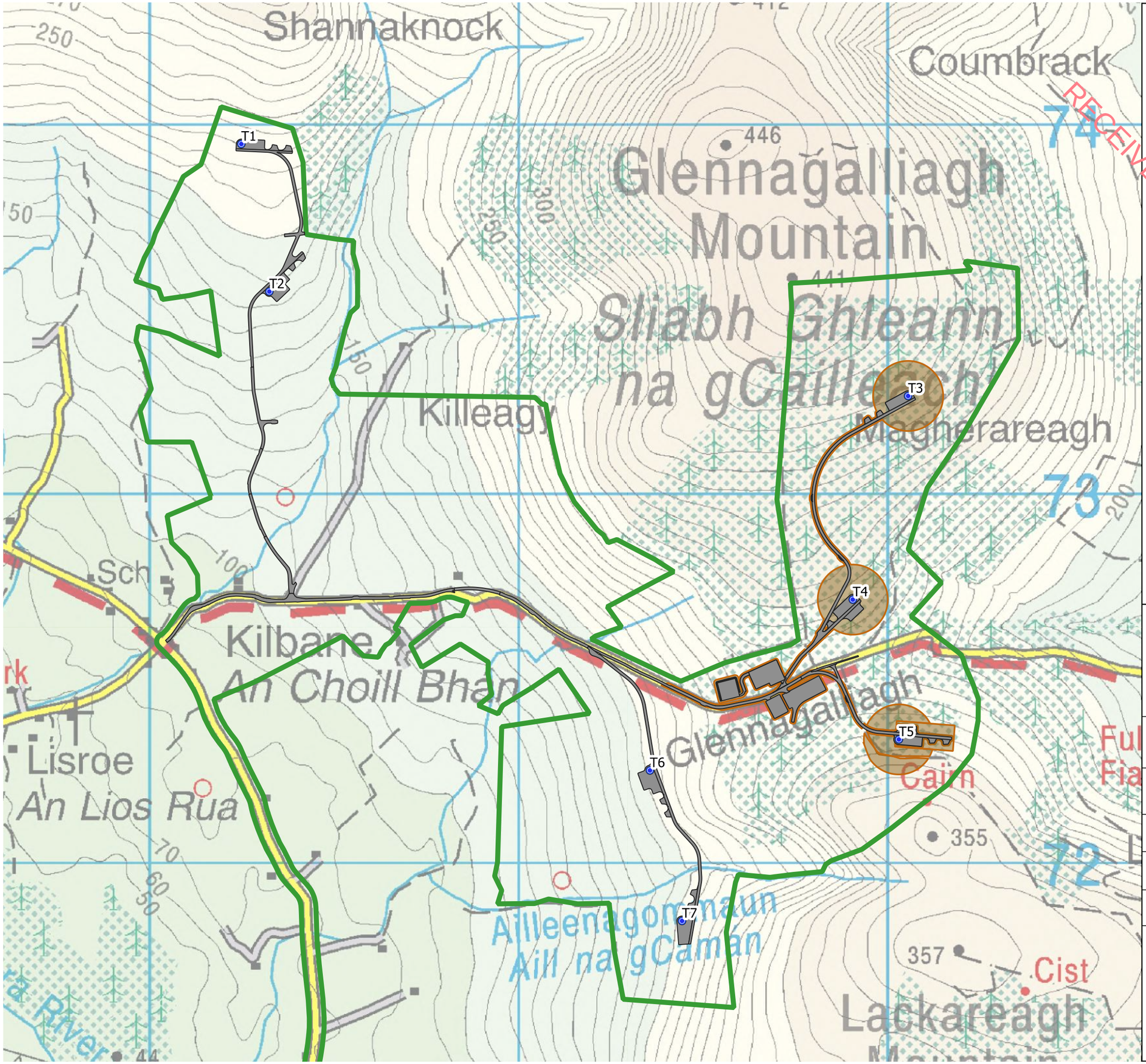
4.4.4.2 Forestry Replanting

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

The estimated 13.8 hectares that will be permanently felled for the footprint of the Proposed Project infrastructure will be replaced or replanted on a hectare for hectare basis as a condition of any felling licence that will be issued in respect of the Proposed Project. Replanting is a requirement of the Forestry Act and is primarily a matter for the statutory licensing processes that are under the control of the Forest Service.

The replacement of the 13.8 hectares of forestry can occur anywhere in the State subject to licence. The replacement of forestry, felled as part of the Proposed Project, may occur on any lands, within the state, benefitting from Forest Service Technical Approval[3] for afforestation, should the Proposed Project receive planning permission. Under the Forestry Regulations 2017, all applications for licences for afforestation require the prior written approval (technical approval) of the Minister for Agriculture, Food and the Marine. Before the Minister can grant approval, he/she must first determine if the project is likely to have significant effects on the environment (for EIA purposes) and assess if the development, individually or in combination with other plans or projects is likely to have a significant effect on a European site (for Habitats purposes).

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



RECEIVED: 29/08/2024

Map Legend

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

Drawing Title
Proposed Commercial Forestry to be Felled

Project Title
Lackareagh Wind Farm, Co. Clare

Drawn By	Checked By
CF	NMcH
Project No. 220245	Drawing No. Figure 4-18
Scale 1:10,000	Date 2024-08-14

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: www.mkoireland.ie

4.4.5 Site Activities

4.4.5.1 Environmental Management

All proposed activities on the site of the Proposed Project will be provided for in an environmental management plan. A Construction and Environmental Management Plan (CEMP) has been prepared for the Proposed Project and is included in Appendix 4-3 of this EIAR.

The CEMP includes details of drainage, spoil management and waste management, and clearly outlines the mitigation measures and monitoring proposals that are required to be adhered to in order to comply with the environmental commitments outlined in the EIAR. In the event planning permission is granted for the Proposed Project, the CEMP will be updated prior to the commencement of the development, to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned and will be submitted to the Planning Authority for approval.

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

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

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

4.4.5.2 Concrete Deliveries

Only ready-mixed concrete will be used during the construction phase, with all concrete being delivered from local batching plants in sealed concrete delivery trucks. Quarries that could potentially provide stone and ready-mix concrete for the Proposed Project are detailed below in Section 4.5.2.

The use of ready-mixed concrete deliveries will eliminate any potential environmental risks of on-site batching. When concrete is delivered to site, only the chute of the delivery truck will be cleaned, using the smallest volume of water necessary, before leaving the site. Concrete trucks will be washed out fully at the batching plant, where facilities are already in place.

The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a temporary lined impermeable containment area. Where temporary lined impermeable containment areas are used, such containment areas are typically built using straw bales and lined with an impermeable membrane. Two examples are shown in Plate 4-3 below.

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

Plate 4-3 Concrete washout area

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

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

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

4.4.5.3 Concrete Pouring

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

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

- Using weather forecasting to assist in planning large concrete pours and avoiding large pours where prolonged periods of heavy rain is forecast.
- Restricting concrete pumps and machine buckets from slewing over watercourses while placing concrete.

- Ensuring that excavations are sufficiently dewatered before concreting begins and that dewatering continues while concrete sets.
- Ensuring that covers are available for freshly placed concrete to avoid the surface washing away in heavy rain.
- The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a temporary lined impermeable containment area, or a Siltbuster-type concrete wash unit (https://www.siltbuster.co.uk/sb_prod/siltbuster-roadside-concrete-washout-rcw/) or equivalent.
- Disposing of surplus concrete after completion of a pour in agreed suitable locations away from any watercourse or sensitive habitats.

4.4.5.4 Dust Suppression

In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. If necessary, water will be taken from stilling/settlement ponds in the Proposed Project drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and temporary construction compounds to prevent the generation of dust. Silty or oily water will not be used for dust suppression, because this would transfer the pollutants to the haul roads and generate polluted runoff or more dust. Water bowser usage will be carefully monitored, as the application of too much water may lead to increased runoff.

4.4.5.5 Vehicle Washing

Wheels or vehicle underbodies are often washed before leaving sites to prevent the build-up of mud on public (and site) roads. A wheel wash facility will be provided and a layout of the same is shown in Figure 4-19. The site roads will be well finished with compacted hardcore, and so the public road-going vehicles will not be travelling over soft or muddy ground where they might pick up mud or dirt.

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

4.4.5.6 Waste Management

The CEMP, Appendix 4-3 of this EIAR, provides a waste management plan (WMP) which outlines the best practice procedures during the construction phase of the project. The WMP has been produced in line with the following guidance *'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects'* (EPA, 2021)[4].The WMP outlines the methods of waste prevention and minimisation by recycling, recovery and reuse at each stage of construction of the Proposed Project. Disposal of waste will be a last resort. The WMP has been prepared to outline the main objectives that are to be adhered to for the preparation of a more detailed WMP to be completed prior to the construction phase of the Proposed Project. The WMP will be in place throughout the construction and decommissioning phase of the Proposed Project and will be in line with all relevant legislation detailed in Section 3.9 in Appendix 4-3.

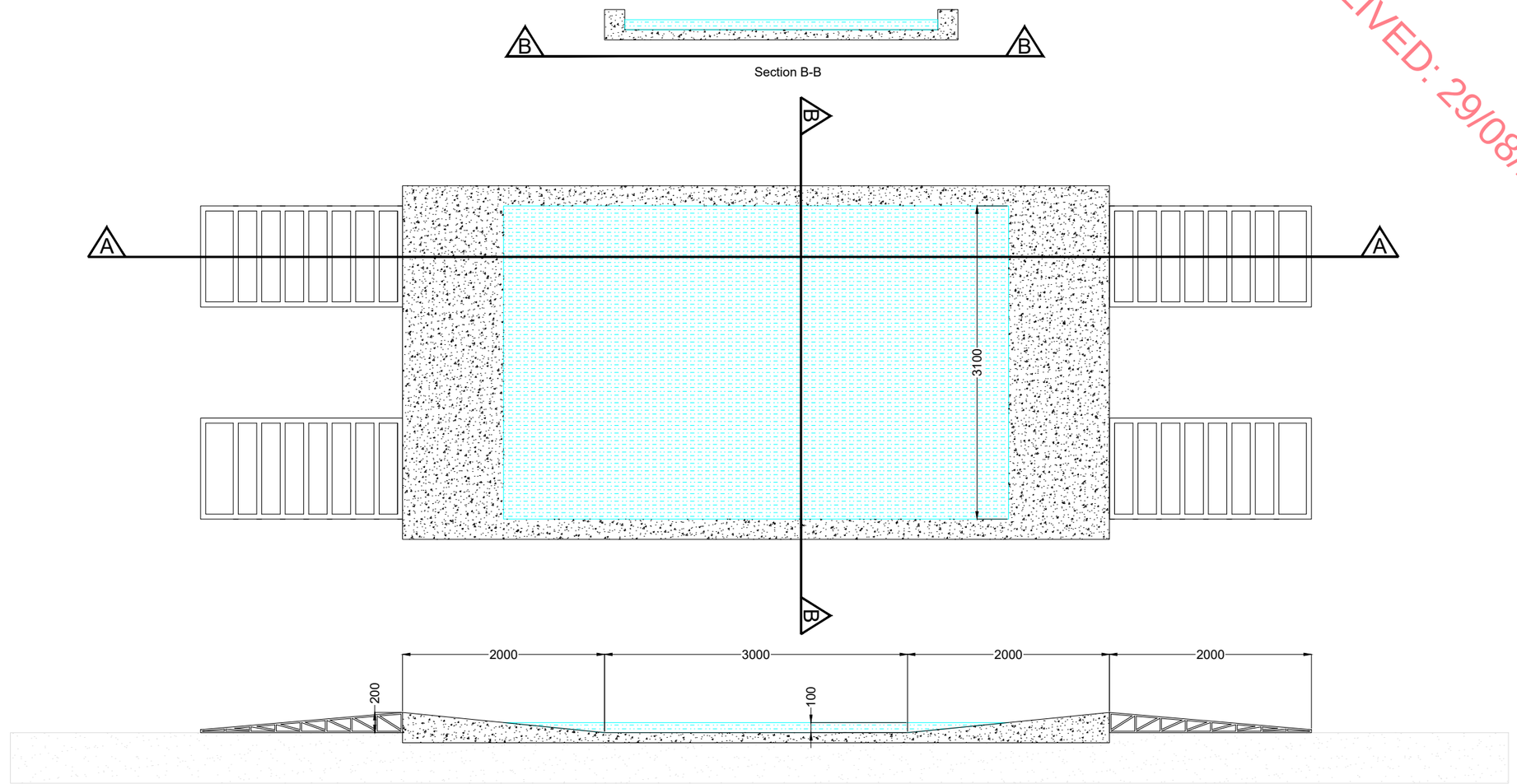
The Waste Management Act 1996 and its subsequent amendments provide for measures to improve performance in relation to waste management, recycling, and recovery. The Act also provides a regulatory framework for meeting higher environmental standards set out by other national and EU legislation.

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

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

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

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



Section A-A

NOTE:

- Wheel washes will be appropriately located at all entrances used during the construction of the wind farm

PROJECT TITLE: **Lackareagh Wind Farm, Co. Clare**			
DRAWING TITLE: **Wheel Wash Detail**			
PROJECT No.: **220245**		DRAWING No.: **Fig. 4-19**	SCALE: **1:50 @ A3**
DRAWN BY: **JOB**	CHECKED BY: **CJ**	DATE: **16.08.2024**	REVISION.: D01

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

4.5 Access and Transportation

4.5.1 Site Entrances

As can be seen in Figure 4-2, the L7080 Local Road bisects the Proposed Wind Farm site, with proposed infrastructure located both north and south of the local road. It is proposed to enter the Proposed Project site during both the construction and operational phases via a combination of existing agricultural site entrances and new site entrances off the L7080 ('the Gap Road'), as listed below:

- Entrance 1: Upgrade to existing agricultural entrance north off the L7080;
- Entrance 2: New site entrance south off the L7080;
- Entrance 3: North off L7080, and,
- Entrance 4: South off L7080.

The existing site entrance to be upgraded will be widened in order to facilitate the delivery of turbine components and movement of construction traffic. The Proposed Project site has been subject to detailed Autotrack assessment to identify the turning areas required, as described in Section 15.1 of the Traffic and Transport Assessment. Appropriate sightlines will be established to the north and south of the proposed site entrance for the safe access and egress of traffic. The proposed works will result in a permanent upgrade of this existing site access from the L7080 local road, which will also form the main site entrance to the Proposed Project during the operational phase.

Entrance 1 (as noted above) will provide access to T1, T2 and the permanent met mast to the northwest of the Proposed Wind Farm site. Entrance 2 (as noted above) will provide access to T6 and T7 to the south. Entrance 3 (as noted above) will provide access to T3, T4, the proposed onsite 38kV substation, BESS and borrow pit to the north/northeast. Entrance 4 provides access to T5 to the southeast. It is also worth noting that there is a proposed turning area and a temporary construction compound located directly alongside the L7080 in an area of open bare ground which will be accessed via a temporary site entrance off the L7080. These site entrances will remain in-situ during the operational phase of the Proposed Project in order to facilitate operational phase maintenance access. These junctions will be reduced and gated using a steel barrier or stock-proof fencing and will be constructed with appropriate sight lines (as detailed in Section 15.1 of this EIAR) in order to safely facilitate the egress and ingress of traffic.

These access and egress points are shown on the site layout drawings in Appendix 4-1. These junctions are also described in detail in Chapter 15, Section 15.1 of this EIAR. The location of the Proposed Project site access is shown in Figure 4-20.

A Traffic Management Plan is included as Appendix 15-2 to this EIAR. In the event planning permission is granted for the Proposed Project, the final Traffic Management Plan will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned.

4.5.2 Deliveries of Stone and Ready-Mix Concrete from Quarries

As outlined in Section 4.4.3, all stone material needed to construct the Proposed Project will be sourced onsite, as the proposed onsite borrow pit and the cut exercise have capacity to supply all of the project's stone and hardcore requirement. However, subject to the borrow pit being developed, minor quantities of specific stone or hardcore types may be required to be transported to the site, in order to facilitate the construction of the Proposed Project. These materials, along with ready-mix concrete, will be sourced from nearby appropriately licenced quarries as appropriate. Appendix 4-2 of this EIAR identifies the total quantity of stone requirements for the site as 31,630m^3, it has been assumed that 68%

of this total stone requirement, i.e., approximately 21,630m^3, will be imported from an existing, authorised quarry.

For the purposes of assessment within the EIAR, an existing, authorised quarry, located approximately 5km to the west of the Proposed Wind Farm site has been selected and is shown in Figure 4-22.

The proposed route for HGVs originates from StoneDirect.ie quarry near Broadford, Co. Clare and travels east along the L7004 Local Road for approximately 4km before turning left onto the L7080 for approximately 1km before entering the Proposed Project site.

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

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

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

4.5.3 Turbine Component Delivery Route

It is envisaged that the large wind turbine components will be delivered to the Proposed Project site from Foynes (Shannon) Port, via the N69 travelling east/northeast towards Limerick city for approximately 32km before turning right onto the N18 for approximately 3.7km east before merging with the M7 motorway and travelling generally northeast for approximately 20.5km. At this point, the delivery vehicles will exit the motorway and turn left onto the R494 for approximately 5.4km before crossing the River Shannon in Killaloe and travelling generally southwest on the R463 for 6.7km before turning right onto the R466. At this point, the turbine delivery vehicles that are delivering blades will offload the blades which will instead be placed onto blade adapter vehicles which have the capability of carrying the blades at an angle. From the blade transition area, the turbine delivery vehicles will travel northwest for 7.4km along the R466 before turning right onto the L3022-0 for approximately 1.5km before entering the Proposed Wind Farm site. The full turbine delivery route is shown on Figure 4-22(a/b).

4.5.3.1 Turbine Delivery Route Accommodation Areas

Road and junction widening are sometimes required along proposed turbine transport routes to accommodate the large vehicles used to transport turbine components to Proposed Project sites. The proposed transport route for the Proposed Project has been the subject of a route assessment to determine if any works are required along its length. Full details of the assessment are included as part of the traffic impact assessment set out in Section 15.1.8 of this EIAR and summarised below. There are sections on the route where the vertical alignment may require specialist transport vehicles. These sections will be further considered by the appointed transport company following turbine procurement process. Accommodation works will be required at various locations on the national and regional road network between the port of arrival in Foynes (Shannon) Co. Limerick and the Proposed Wind Farm site. These will be limited to temporary measures including temporary local road widening, overruns of roundabout island and temporary relocation of some signs and street furniture.

Location 1 – Port of Foynes / N69 junction

Appendix 15-3 – Collett Drawing No. 371606-070D0.1 – Tower

Appendix 15-3 – Collett Drawing No. 371606-070E0.1 – Blade – Super Wing Carrier

- Third party land will be required on both sides of the L-6188.
- Road widening is required on both sides of the N69.
- A boundary wall is to be removed.
- Street furniture is to be removed.
- Trees and vegetation are to be pruned.

Location 2 – Roundabout junction on N69, Ballbrown

Appendix 15-3 – Collett Drawing No. 371606-080D0.1 – Tower

Appendix 15-3 – Collett Drawing No. 371606-080E0.1 – Blade – Super Wing Carrier

- Oversail will occur on both sides of the exit roundabout island and nearside entry.
- Street furniture is to be removed.
- Existing area of overrun is to be utilised across the roundabout island

Location 3 – N18 junction 2 – Straight through

Appendix 15-3 – Collett Drawing No. 371606-100D0.1 – Tower

Appendix 15-3 – Collett Drawing No. 371606-100E0.1 – Blade – Super Wing Carrier

- Road widening is required on the nearside entry to the roundabout cut through road.
- Oversail will occur on both sides of the cut through road, entry and nearside exit.
- Vegetation is to be removed / pruned on the roundabout island.

Location 3 – N18 junction 2 – Right turn contra flow

Appendix 15-3 – Collett Drawing No. 371606-101D0.1 – Tower

Appendix 15-3 – Collett Drawing No. 371606-101E1.1 – Blade – Super Wing Carrier

- Road widening is required on the offside of the slip road entry.
- Oversail will occur on both sides of the road.
- Street furniture to be removed.
- Vegetation is to be pruned on the offside of the slip road.

Location 4 – M7 junction 27 near Applegreen Service Station

Appendix 15-3 – Collett Drawing No. 371606-110D0.1 – Tower

Appendix 15-3 – Collett Drawing No. 371606-110E0.1 – Blade – Super Wing Carrier

- Road widening is required on the roundabout island.
- Oversail will occur on both sides of the entry, exit and roundabout island.
- Roads signs to be removed.

Location 5 – Birdhill Roundabout, R494

Appendix 15-3 – Collett Drawing No. 371606-120D0.1 – Tower

Appendix 15-3 – Collett Drawing No. 371606-120E1.1 – Blade – Super Wing Carrier

- Road widening is required through the roundabout.

- Oversail will occur on both sides of the R494.
- Roads signs to be removed.

Location 6 – Proposed Roundabout and River Crossing, Ballina

Appendix 15-3 – Collett Drawing No. 371606-130D1.1 – Tower

Appendix 15-3 – Collett Drawing No. 371606-130E1.1 – Blade – Super Wing Carrier

Note – The blade vehicle will travel north through the roundabout and then reverse back onto the R496 before turning left onto the proposed new bridge.

- Road widening / over-run is required through the roundabout and on the entry splitter island on the R496 approach to roundabout.
- Oversail will occur on the R494 north and south of the roundabout, the R496, on the roundabout centre island and on all splitter islands.

Location 7 – Proposed Roundabout and River Crossing, Killaloe

Appendix 15-3 – Collett Drawing No. 371606-140D1.1 – Tower

Appendix 15-3 – Collett Drawing No. 371606-140E1.1 – Blade – Super Wing Carrier

- Third party land is required on the nearside of the entry to allow for oversail.
- Road widening is required at the roundabout centre island.
- Further oversail will occur on the offside of the entry and the exit and entry splitter islands.

Location 8 – Right Bend on R463, Knockadrohid

Appendix 15-3 – Collett Drawing No. 371606-150D1.1 – Tower

Appendix 15-3 – Collett Drawing No. 371606-150E0.1 – Blade – Super Wing Carrier

- Road widening is required on the northside of the R463.
- Oversail will occur on both sides of the road.
- Trees and vegetation are to be pruned.

Location 9 – O'Briensbridge Cross R463 / R466

Appendix 15-3 – Collett Drawing No. 371606-160C0.1 – Tower

Appendix 15-3 – Collett Drawing No. 371606-160E1.1 – Blade – Super Wing Carrier

Appendix 15-3 – Collett Drawing No. 371606-160C0.1 – Blade – Blade Adapter

Note: At this location the blade will be delivered on a standard Super Wing Carrier and transferred on to a blade adapter at a proposed blade transition area on the northern corner of the junction.

For the tower

- Road widening is required on the northside of the R466.
- Oversail will occur on the southside of the R463.
- Roads signs are to be removed.
- Trees and vegetation are to be pruned.

For the Blade arriving on Super Wing Carrier

- Third party land is required on the north side of the R463 to provide for the temporary transition zone.
- Boundary hedging / wall to be removed on northside of the R463.
- Oversail will occur on south side of R463.
- A telegraph pole on the northside of the R463 is to be removed.
- Overhead wires are to be removed from temporary transition zone.
- Trees and vegetation are to be pruned.

For the Blade leaving on Blade Adapter

- Third party land is required on the north side of the R463 to provide for the temporary transition zone.
- Overrun area is required on north side of R466.
- Oversail will occur at the northern corner and the southern side of the R466.
- Overhead wires are to be removed from temporary transition zone.
- Boundary hedging / wall to be removed on northside of the R466.
- Trees and vegetation are to be pruned.

Location 10 – Left bend on the R466 at junction with the L-3082, Bridgetown

For location 10 to 18 the assessment is based on the turning requirements of the blade being transported using the blade adapter with the blade lifted to 60°, and for the tower transporter, which has the greater turning envelope of the 2 vehicles.

Appendix 15-3 – Collett Drawing No. 371606-170C1.1 – Tower

Appendix 15-3 – Collett Drawing No. 371606-170C0.1 – Blade – Blade Adapter

For the blade on blade adapter

- Trim trees including overhangs.
- Overhead wires crossing the road are to be removed.

For the tower

- Trees and vegetation to be pruned.

Location 11 – Left bend on the R466 at junction with Riverdale, Bridgetown

Appendix 15-3 – Collett Drawing No. 371606-171D0.1 – Tower

Appendix 15-3 – Collett Drawing No. 371606-171C0.1 – Blade – Blade Adapter

For the blade on blade adapter

- Oversail will occur on both sides of the R466.
- Trim trees including overhangs.
- Overhead wires crossing the road are to be removed.

For the tower

- Oversail will occur on both sides of the R466.
- Trees are to be pruned.

Location 12 – Crossroads on R466 near Glenomeara

Appendix 15-3 – Collett Drawing No. 371606-173D1.1 – Tower

Appendix 15-3 – Collett Drawing No. 371606-173C1.1 – Blade – Blade Adapter

For the blade on blade adapter

- Trees to have overhanging branches cut.
- Hedgerows are to be pruned.

For the tower

- Hedgerows are to be pruned.

Location 13 – Right bend on R466 near Glenomeara

Appendix 15-3 – Collett Drawing No. 371606-174D1.1 – Tower

Appendix 15-3 – Collett Drawing No. 371606-174C1.1 – Blade – Blade Adapter

For the blade on blade adapter

- Hedgerows are to be pruned.
- Overhead wires crossing the road are to be removed.

For the tower

- Hedgerows are to be pruned.

Location 14 – Left bend on R466 at junction with L3022-8, Glenomeara

Appendix 15-3 – Collett Drawing No. 371606-180D0.1 – Tower

Appendix 15-3 – Collett Drawing No. 371606-180C1.1 – Blade – Blade Adapter

For the blade on blade adapter

- Road widening is required on north side of R466.
- Oversail will occur on eastern side of R466.
- A telegraph pole on the northside of the R466 is to be removed.
- Overhanging trees are to be cut.

For the tower

- Road widening is required on north side of R466.
- Oversail will occur on western side of R466.
- A telegraph pole on the northside of the R466 is to be removed.
- Vegetation is to be pruned.

Location 15 – Overhead HV Cables, Clonyconry

Appendix 15-3 – Collett Drawing No. 371606-185C01.1 – Blade – Blade Adapter

For the blade on blade adapter

- The blade will be lowered to a horizontal position to pass underneath the HV cables

Location 16 – R466 / L3022-0 junction

Appendix 15-3 – Collett Drawing No. 371606-190C1.1 – Tower

Appendix 15-3 – Collett Drawing No. 371606-190C1.1 – Blade – Blade Adapter (both drawings have same number)

For the blade on blade adapter

- Third party land is required on the north side of the R466 and the east side of the L3022-0.
- Boundary hedging / wall to be removed on northside of the R463.
- Oversail will occur on both sides of the R466.
- Street furniture is to be removed.
- Overhead wires crossing the junction are to be removed.
- Boundaries to be removed.
- Trees and vegetation are to be pruned.

For the tower

- As above

Location 17 – Crossroad junction, Kilbane

Appendix 15-3 – Collett Drawing No. 371606-200C1.1 – Tower

Appendix 15-3 – Collett Drawing No. 371606-200C1.1 – Blade – Blade Adapter (both drawings have same number)

For the blade on blade adapter

- Third party land is required on the west side of the north side of the L-3022-0.
- Road widening is required on both sides of road.
- Oversail will occur on both sides of the L-3022-0.
- Overhead wires crossing the road are to be removed.
- Street furniture is to be removed.
- Boundaries to be removed.
- Trees and vegetation are to be cut and pruned.

For the tower

- Third party land is required on the west side of the north side of the L-3022-0.
- Road widening is required on both sides of road.
- Oversail will occur on both sides of the L-3022-0.
- Street furniture is to be removed.
- Boundaries to be removed.
- Trees and vegetation are to be removed / pruned.

Location 18 – Right bend on L-7080 north of crossroads at Kilbane

Appendix 15-3 – Collett Drawing No. 371606-201C1.1 – Tower

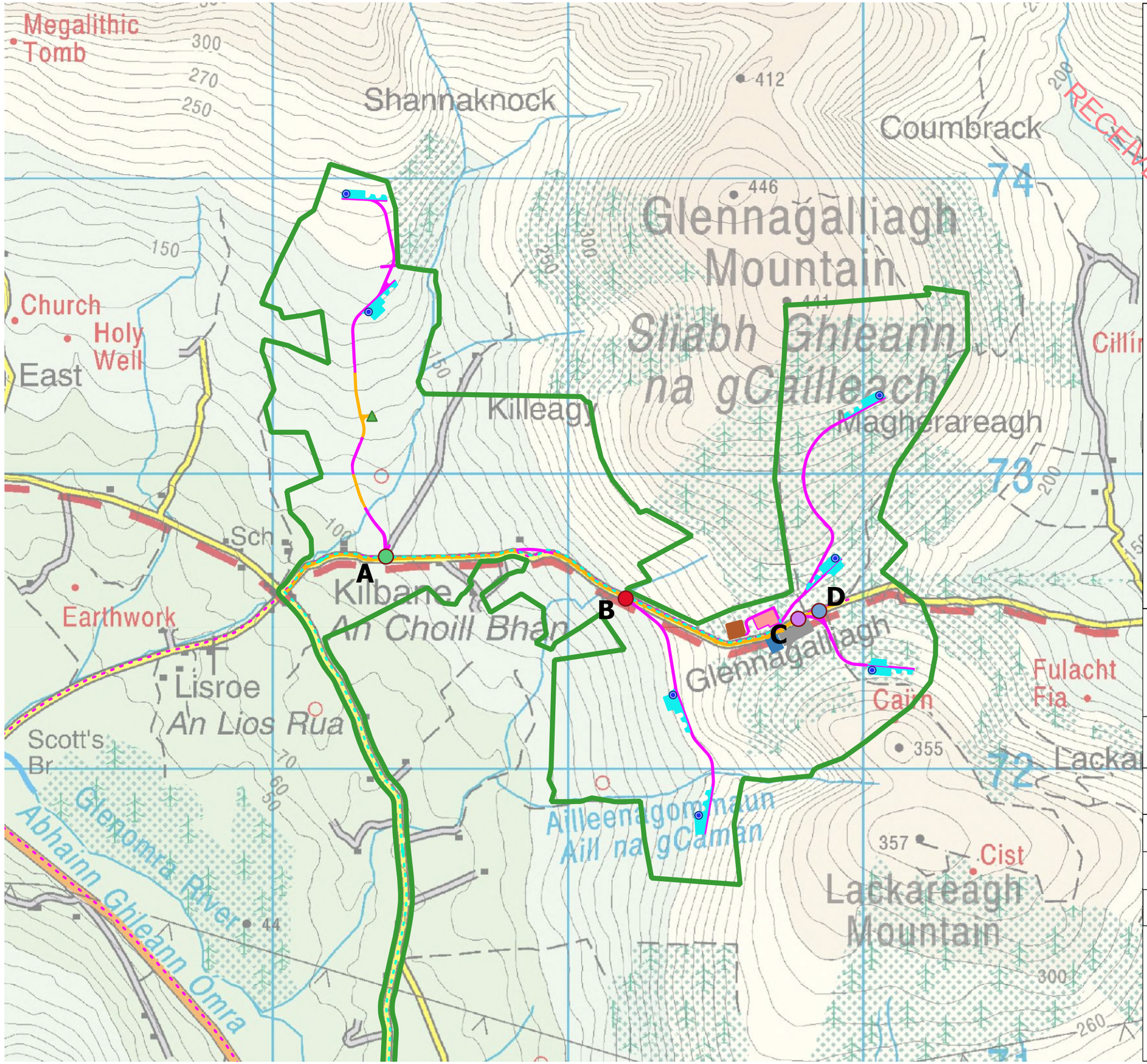
Appendix 15-3 – Collett Drawing No. 371606-201C1.1 – Blade – Blade Adapter (both drawings have same number)

For the blade on blade adapter

- Third party land is required on the south side of the L-7080.
- Road widening is required on both sides of road.
- Oversail will occur on both sides of the L-7080.
- Overhead wires crossing the road are to be removed.
- Trees and vegetation are to be removed and pruned.

For the tower

- Third party land is required on the south side of the L-7080.
- Road widening is required on both sides of road.
- Oversail will occur on both sides of the L-7080.
- A telegraph pole on the northside of the road to be removed.
- Trees and vegetation are to be removed and pruned.



Map Legend

- EIAR Site Boundary
- Proposed Turbine Layout
- Proposed Turbine Foundations
- Proposed Hardstand Area
- Proposed Met Mast
- Proposed New Roads
- Proposed Upgrades to Existing Roads
- Proposed Borrow Pit
- Proposed Storage Area
- Proposed Grid Connection Route
- Proposed Onsite 38kV Substation and Battery Storage Compound
- Temporary Construction Compound
- Proposed Passing Bays
- Turbine Delivery Route

SIte Access Junctions

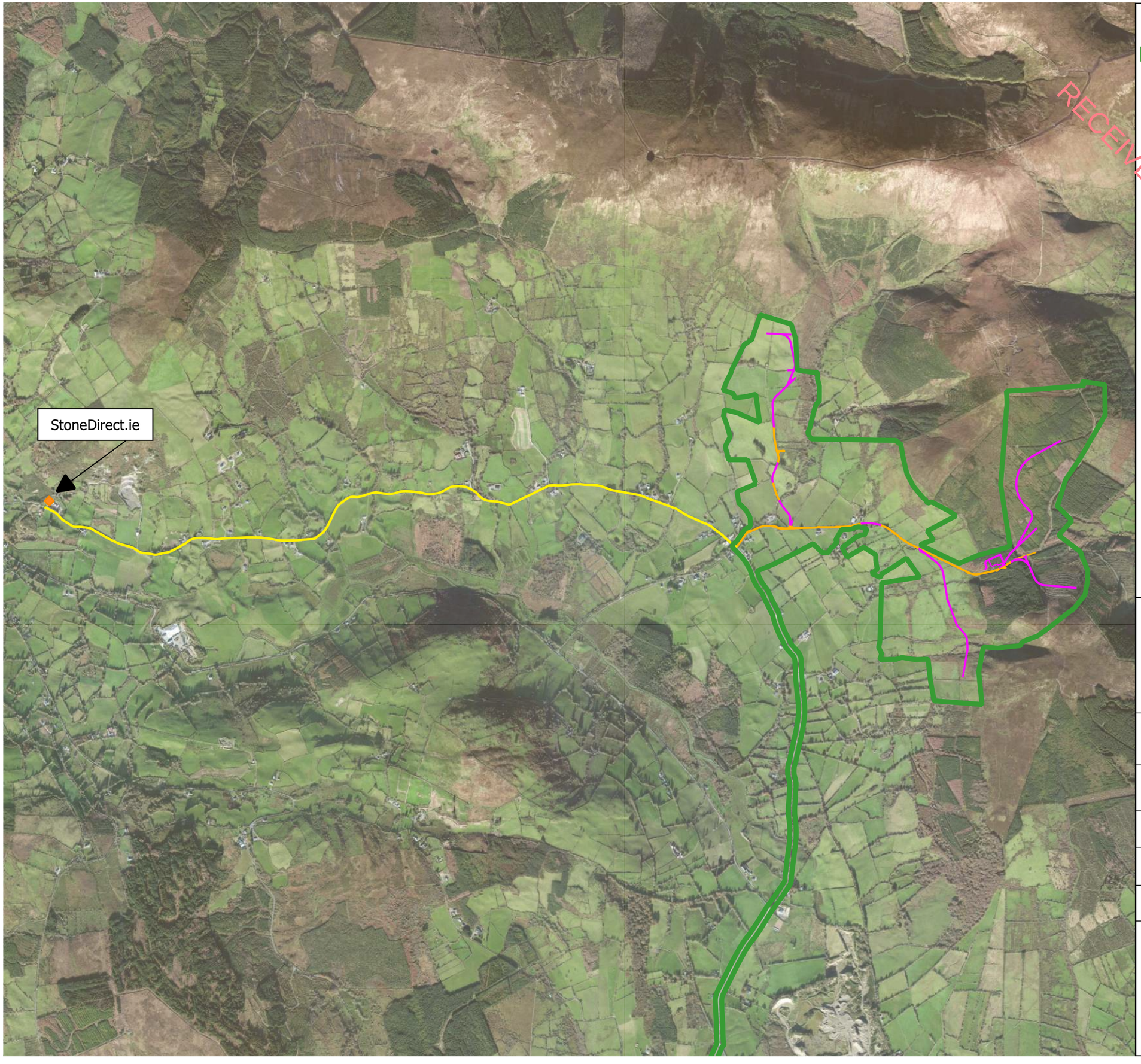
- Site Access Junction A
- Site Access Junction B
- Site Access Junction C
- Site Access Junction D

Drawing Title
Proposed Project Site Access Locations

Project Title
Lacakreagh Wind Farm, Co. Clare

Drawn By	Checked By
CF	NMcH
Project No. 220245	Drawing No. Figure 4-20
Scale 1:12,500	Date 2024-08-16

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: www.mkoireland.ie



Map Legend

- EIAR Site Boundary
- Proposed Upgrades to Existing Roads
- Proposed New roads
- Proposed Delivery Route of Stone and Ready Mix Concrete - Local Roads
- StoneDirect.ie

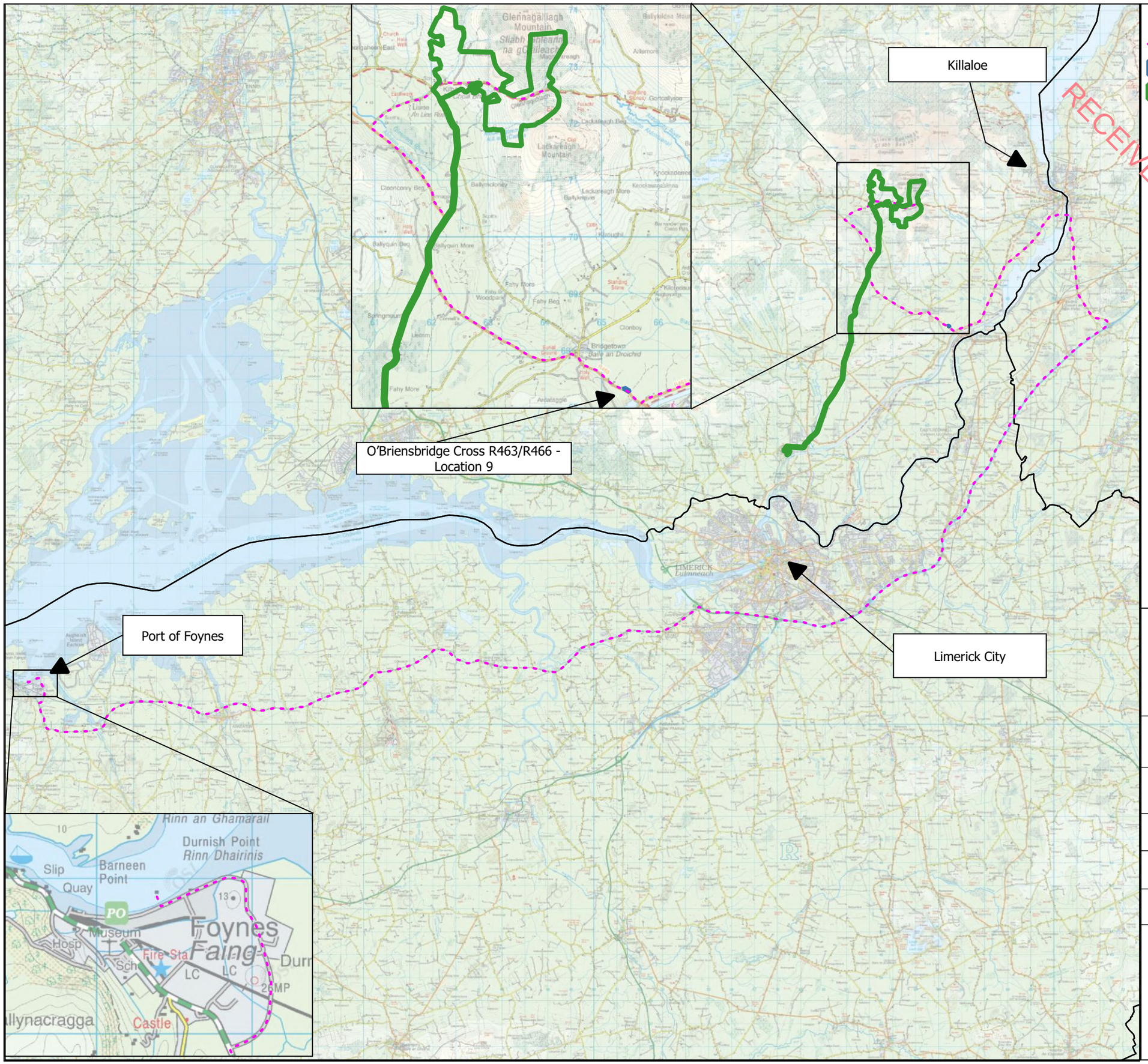
N

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

Project Title
Lackareagh Wind Farm, Co. Clare

Drawn By	Checked By
CF	NMcH
Project No.	**Drawing No.**
220245	Figure 4-21
Scale	**Date**
1:23,000	2024-08-14

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



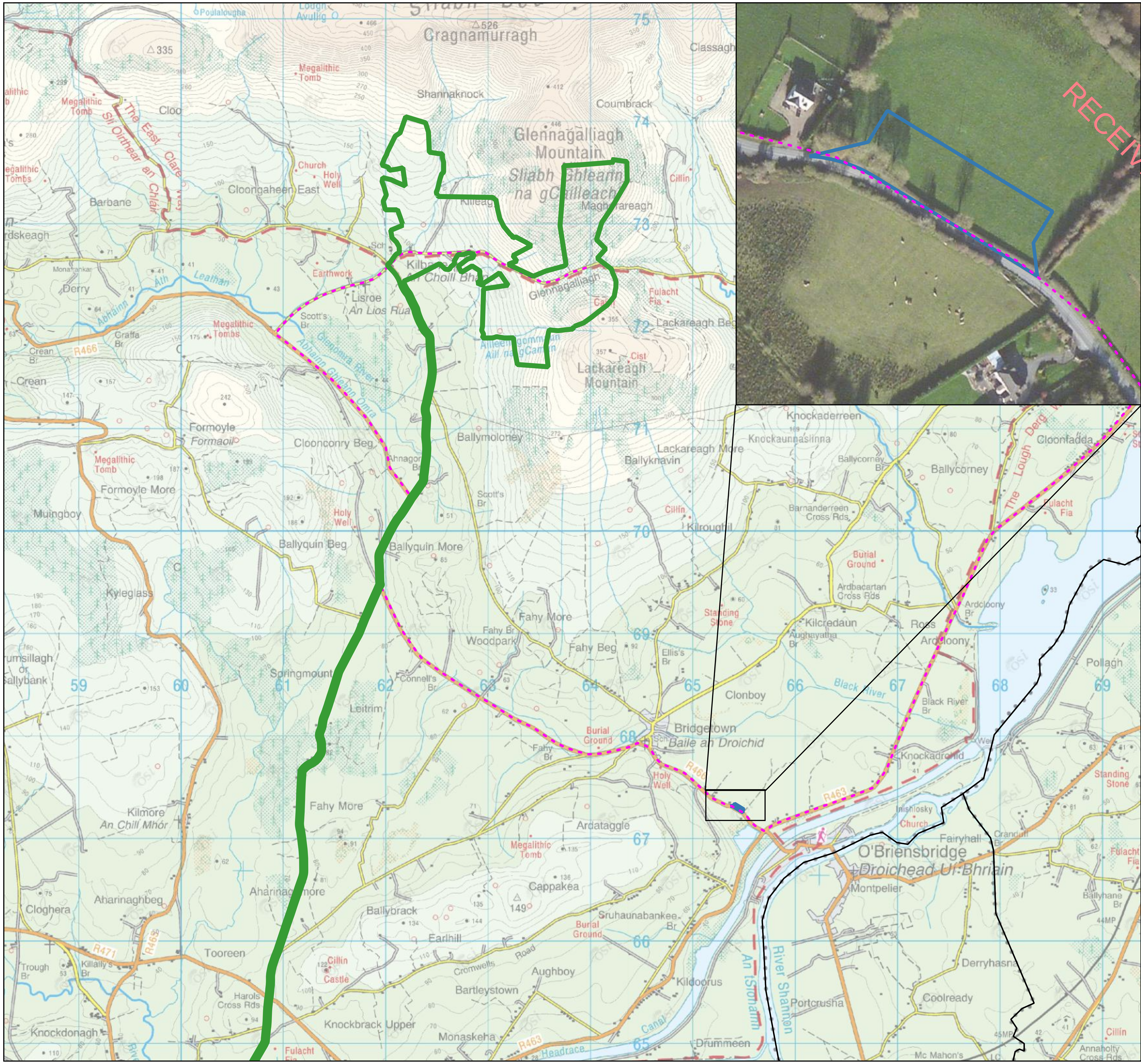
RECEIVED: 29/08/2024

Map Legend

- Proposed Turbine Delivery Route
- EDF Blade Transition Area
- EIAR Site Boundary

Drawing Title: Proposed Turbine Delivery Route	
Project Title: Lackareagh Wind Farm, Co.Clare	
Drawn By: CF	Checked By: NMcH
Project No.: 220245	Drawing No.: Figure 4-22a
Scale: 1:160,000	Date: 2024-08-14

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie



Map Legend

- Proposed Turbine Delivery Route
- EDF Blade Transition Area
- EIAR Site Boundary

Drawing Title	Turbine Transport Delivery Route Accommodation Areas
Project Title	Lackareagh Wind Farm, Co. Clare

Drawn By: CF	Checked By: CJ
Project No.: 220245	Drawing No.: Figure 4-22b
Scale: 1:36,000	Date: 2024-08-14

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: www.mkoireland.ie

4.5.4 Traffic Management

A turbine with the maximum blade length of 77.5 metres has been used in assessing the traffic impact of the Proposed Project. It is proposed to transport the turbine blades to the Proposed Project site along the final section of the route, using a blade adapter vehicle, which has the capability to carry the turbine blades at an angle, which allows for the movement of these turbine components around tighter bends and also allows for less vegetation removal. The blade adaptor for such a turbine blade would have a total vehicle length of 83.5 metres, including the blade which overhangs the back of the vehicle. The total length of the tower transporter is 49.5 metres with the axles located at the front and rear of the load with no overhang.

The vehicles used to transport the nacelles will be similar to the tower transporter. All other vehicles requiring access to the site of the Proposed Project site will be smaller than the design test vehicles. The turbine delivery vehicles have been modelled accurately in the Autotrack assessments for the Proposed Project site access junctions, as detailed in Section 15.1.5 of this EIAR.

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

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

Plate 4-4 Blade adaptor transport system

A detailed Traffic Management Plan (TMP) has been prepared as part of the traffic impact assessment set out in Chapter 15 of this EIAR and is included as Appendix 15-2. The deliveries of turbine components to the Proposed Project site may be made in convoys of three to four vehicles at a time, and at night when roads are quietest. Convoys will be accompanied by escorts at the front and rear operating a "stop and go" system. Although the turbine delivery vehicles are large, they will not prevent other road users or emergency vehicles passing, should the need arise. The delivery escort vehicles will

ensure the turbine transport is carried out in a safe and efficient manner with minimal delay or inconvenience for other road users.

It is not anticipated that any section of the public road network will be closed during transport of turbines, although there will be some delays to local traffic at pinch points. During these periods it may be necessary to operate local diversions for through traffic. All deliveries comprising abnormally large loads where required will be made outside the normal peak traffic periods, usually at night, to avoid disruption to work and school-related traffic.

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

4.5.4.1 Traffic Management of Other Construction Materials

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

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

4.6 Community Gain Proposal

4.6.1 Background

The Proposed Project has the potential to have significant benefits for the local economy, by means of job creation, landowner payments and commercial rate payments. The concept of directing benefits from wind farms to the local community is promoted by the National Economic and Social Council (NESC) and Wind Energy Ireland (WEI) among others. While it may be simpler and easier to put a total fund aside for a wider community area, EDF Renewables is endeavouring to develop new ways to direct increased gain towards the local community with particular focus on those living closest to the Proposed Project.

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

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

4.6.2 Renewable Energy Support Scheme

The Renewable Energy Support Scheme (RESS) Terms and Conditions, published by the Department of Communications, Climate Action and Environment in February 2020, make some high-level provisions for how this type of benefit fund will work. Any project which wants to avail of RESS must abide by these broad principles. These include the following:

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

4.6.3 Community Benefit Fund

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

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

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

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

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

4.7 Site Drainage

4.7.1 Introduction

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

The protection of the watercourses within and surrounding the site of the Proposed Project, and downstream catchments that they feed is of utmost importance in considering the most appropriate drainage proposals for the site of the Proposed Project. The Proposed Project's drainage design has therefore been proposed specifically with the intention of having no negative impact on the water quality of the site and its associated rivers and lakes, and consequently no impact on downstream catchments and ecological ecosystems. 1 no. man-made agricultural drain will be diverted as part of the Proposed Project, to facilitate the construction of T1 and its associated hardstand and foundation. Turbine locations and associated new roadways were originally selected to avoid natural watercourses, and existing roads are being used wherever possible. There will be no direct discharges to any natural watercourses, with all drainage waters being dispersed as overland flows. All discharges from the proposed works areas will be made over vegetation filters at an appropriate distance from natural watercourses. Buffer zones around the existing natural drainage features have been used to inform the layout of the Proposed Project.

4.7.2 Existing Drainage Features

The routes of any natural drainage features will not be altered as part of the Proposed Project. Turbine locations have been selected to avoid natural watercourses. It is proposed that 4 no. new watercourse crossings will be required to facilitate the renewable energy development infrastructure within the Proposed Wind Farm site.

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

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

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

4.7.3 Drainage Design Principles

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

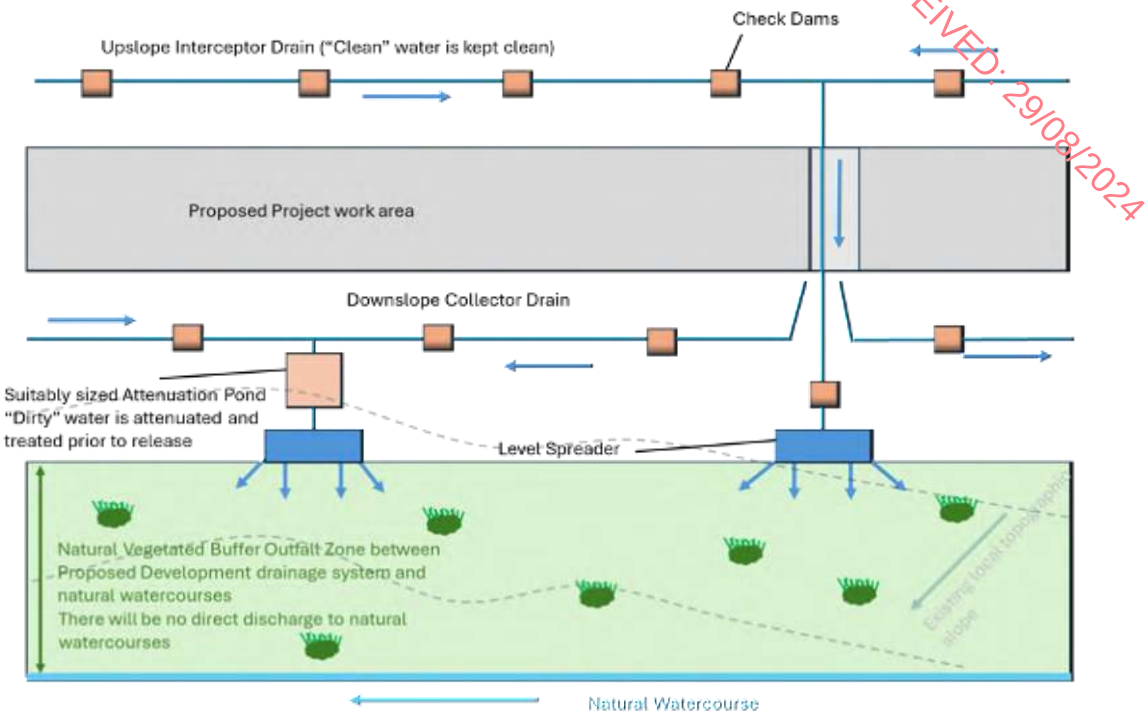
- Keep clean water clean by intercepting it where possible, upgradient of works areas, and divert it around the works areas for discharge as diffuse overland flow
- Collect potentially silt-laden runoff from works areas via downgradient collector drains and manage via series of avoidance, source, in-line,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

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

The drainage design is intended to maximise erosion control, which is more effective than having to control sediment during high rainfall. Such a system also requires less maintenance. The area of exposed ground will be minimised. The drainage measures will prevent runoff from entering the works areas of the site from adjacent ground, to minimise the volume of sediment-laden water that has to be managed. Discoloured run-off from any construction area will be isolated from natural clean run-off.

A schematic line drawing of the proposed drainage design is presented in Figure 4-23 below.

Figure 4-23 Proposed Project Drainage Management



4.7.4 Drainage Design

A drainage design for the Proposed Project, incorporating all principles and measures outlined in this drainage design description, has been prepared, and is included in Appendix 4-8 to this EIAR. The drainage design employs the various measures further described below and is cognisant of the following guidance documents:

- Forestry Commission (2004): Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh;
- Coillte (2009): Forest Operations & Water Protection Guidelines;
- Forest Services (Draft) Forestry and Freshwater Pearl Mussel Requirements – Site Assessment and Mitigation Measures;
- Forest Service (2000): Forestry and Water Quality Guidelines. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford;
- Forest Service, (2000): Code of Best Forest Practice – Ireland. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford;
- COFORD (2004): Forest Road Manual – Guidelines for the Design, Construction and Management of Forest Roads;
- MacCulloch (2006): Guidelines for risk management of peat slips on the construction of low volume low cost roads over peat (Frank MacCulloch Forestry Civil Engineering Forestry Commission, Scotland);
- National Roads Authority (2005): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Wind Farm Development Guidelines for Planning Authorities (September 1996);
- Eastern Regional Fisheries Board: Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites;
- Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Watercourses;
- Good Practice During Wind Farm Construction (Scottish Natural Heritage, 2010);
- PPG1 - General Guide to Prevention of Pollution (UK Guidance Note);

- PPG5 – Works or Maintenance in or Near Watercourses (UK Guidance Note);
- CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006); and,
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006.

4.7.4.1 Interceptor Drains

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

The interceptor drains will be installed in advance of any main construction works commencing. The material excavated to make the drain will be compacted on the downslope edge of the drain to form a diversion dike. On completion of the construction phase works, it is envisaged that the majority of the interceptor drains could be removed. At that stage, there will be no open excavations or large areas of exposed ground that are likely to give rise to large volumes of potentially silt-laden run off. Any areas in which works were carried out to construct roads, turbine bases or hardstands, will have been built up with large grade hardcore, which even when compacted in place, will retain sufficient void space to allow water to infiltrate the subsurface of these constructed areas. It is not anticipated that roadways or other installed site infrastructure will intercept ground-conveyed surface water runoff to any significant extent that would result in scouring or over-topping or spill over. Where the drains are to be removed, they will be backfilled with the material from the diversion dike. Interceptor drains may have to be retained in certain locations, for example where roadways are to be installed on slopes, to prevent the roadways acting of conduits for water that might infiltrate the roadway sub-base. In these cases, interceptor drains would be maintained in localised areas along the roadway with culverts under the roadway, which would allow the intercepted water to be discharged to vegetation filters downgradient of the roadway. Similarly, in localised hollows where water is likely to be funnelled at greater concentrations than on broader slopes, interceptor drains and culverts may be left in situ following construction. Figure 4-24 below shows an illustrative drawing of an interceptor drain.

The velocity of flow in the interceptor will be controlled by check dams (see Section 4.6.4.3 below), which will be installed at regular intervals along the drains to ensure flow in the channel is non-erosive. On steeper sections where erosion risks are greater, a geotextile membrane will be added to the channel.

Interceptor drains will be installed horizontally across slopes to run in parallel with the natural contour line of the slope. Intercepted water will travel along the interceptor drains to areas downgradient of works areas, where the drain will terminate at a level spreader (see Section 4.6.4.4 below). Across the entire length of the interceptor drains, the design elevation of the water surface along the route of the drains will not be lower than the design elevation of the water surface in the outlet at the level spreader.

4.7.4.2 Swales

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

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

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

4.7.4.3 Check Dams

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

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

The proposed check dams will be made up of straw bales or stone, or a combination of both depending on the size of the drainage swale it is being installed in. Where straw bales are to be used, they will be secured to the bottom of the drainage swale with stakes. Clean 4–6-inch stone will be built up on either side and over the straw bale to a maximum height of 600mm over the bottom of the interceptor drain. In smaller channels, a stone check dam will be installed and pressed down into place in the bottom of the drainage swale with the bucket of an excavator.

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

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

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

4.7.4.4 Level Spreaders

A level spreader will be constructed at the end of each interceptor drain to convert concentrated flows in the drain, into diffuse sheet flow on areas of vegetated ground. The levels spreaders will be located downgradient of any proposed works areas in locations where they are not likely to contribute further to water ingress to construction areas of the site.

The water carried in interceptor drains will not have come in contact with works areas of the site, and therefore should be free of silt and sediment. The level spreaders will distribute clean drainage water onto vegetated areas where the water will not be reconcentrated into a flow channel immediately below the point of discharge. The discharge point will be on level or only very gently sloping ground rather

than on a steep slope so as to prevent erosion. Figure 4-31, 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 4.6.4.5 below) will be used to transfer the water to a suitable location.

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

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

4.7.4.5 Piped Slope Drains

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

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

The rock apron at the outlet will consist of 6-inch stone to a depth equal to the diameter of the pipe, a length six times the diameter of the pipe. The width of the rock apron will be three times the diameter of the pipe where the pipe opens onto the apron and will fan out to six times the diameter of the pipe over its length. Figure 4-31, above, shows a diagrammatic example of a piped slope drain and rock apron.

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

Piped slope drains will be inspected weekly and following rainfall events. Inlet and outlets will be checked for sediment accumulation and blockages. Stake anchors or fill over the pipe will be checked for settlement, cracking and stability. Any seepage holes where pipe emerges from drain at the top of the pipe will be repaired promptly.

4.7.4.6 Vegetation Filters

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

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

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

4.7.4.7 Stilling Ponds (Settlement Ponds)

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

Stilling ponds will be excavated/constructed at each required location as two separate ponds in sequence, a primary pond and a secondary pond. The points at which water enters and exits the stilling ponds will be stabilised with rock aprons, which will trap sediment, dissipate the energy of the water flowing through the stilling pond system, and prevent erosion. The primary stilling pond will reduce the velocity of flows to less than 0.5 metres per second to allow settlement of silt to occur. Water will then pass from the primary pond to the secondary pond via another rock apron. The secondary stilling pond will reduce the velocity of flows to less than 0.3 metres per second. Water will flow out of the secondary stilling pond through a stone dam, partially wrapped in geo-textile membrane, which will control flow velocities and trap any sediment that has not settled out. Figure 4-24, below, shows an illustrative example of a stilling pond system.

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

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

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

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

4.7.4.8 Siltbuster

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

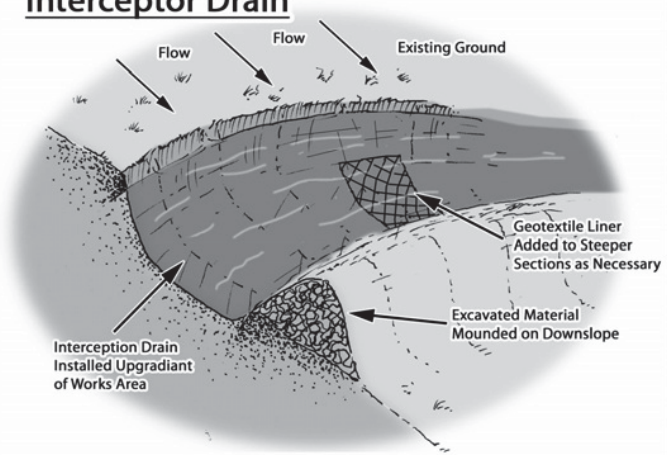
Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. The mobile units are specifically designed for use on construction sites.

The unit stills the incoming water/solids mix and routes it upwards between a set of inclined plates for separation. Fine particles settle onto the plates and slide down to the base for collection, whilst treated water flows to an outlet weir after passing below a scum board to retain any floating material. The inclined plates dramatically increase the effective settling area of the unit giving it a very small footprint on site and making it highly mobile. Figure 4-25 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.

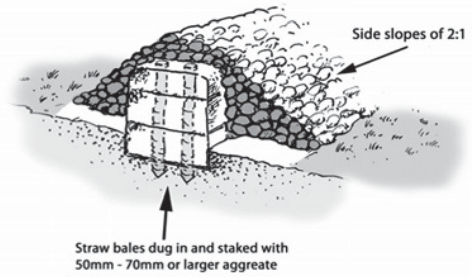
Drainage Design Measures

Interceptor Drain

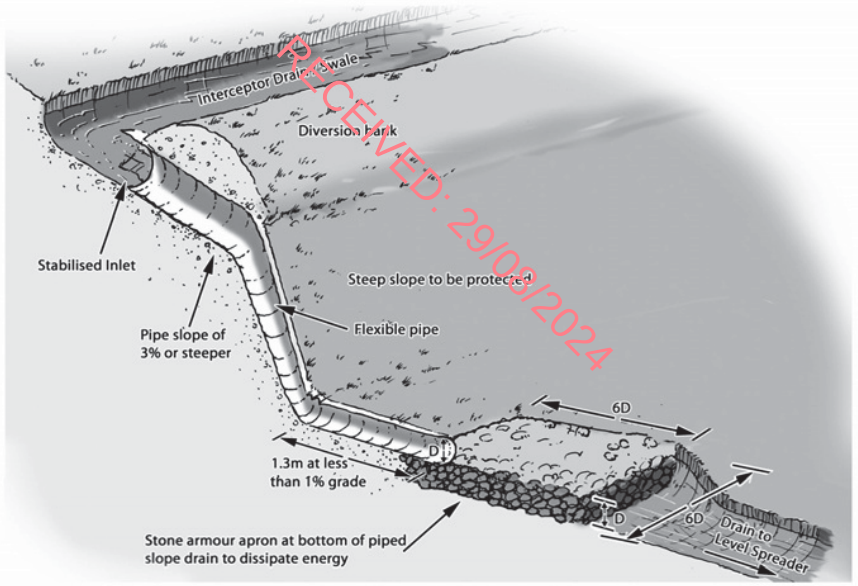


Check Dam (Stone Dam in Drain)

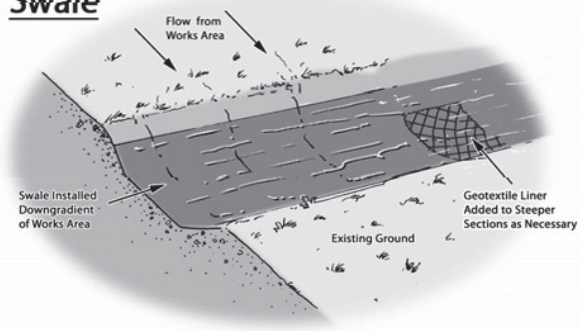
Check Dam
(Straw Bale & Stone Dam - Cross Section)



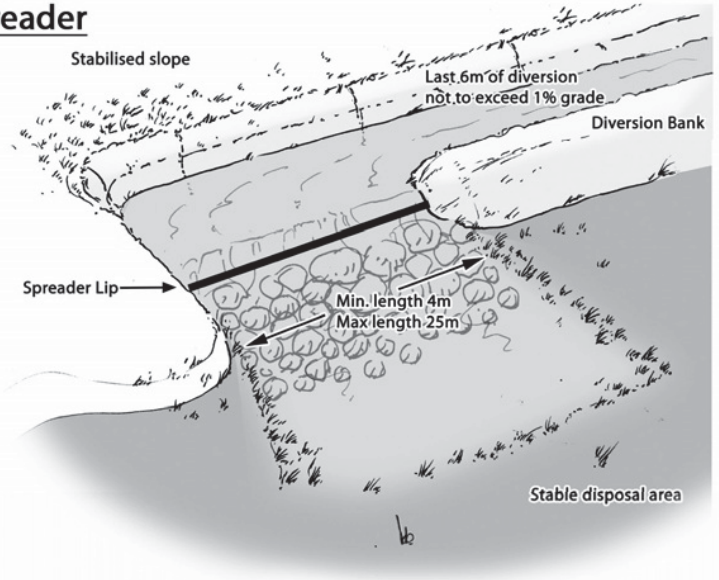
Slope Pipe Drain



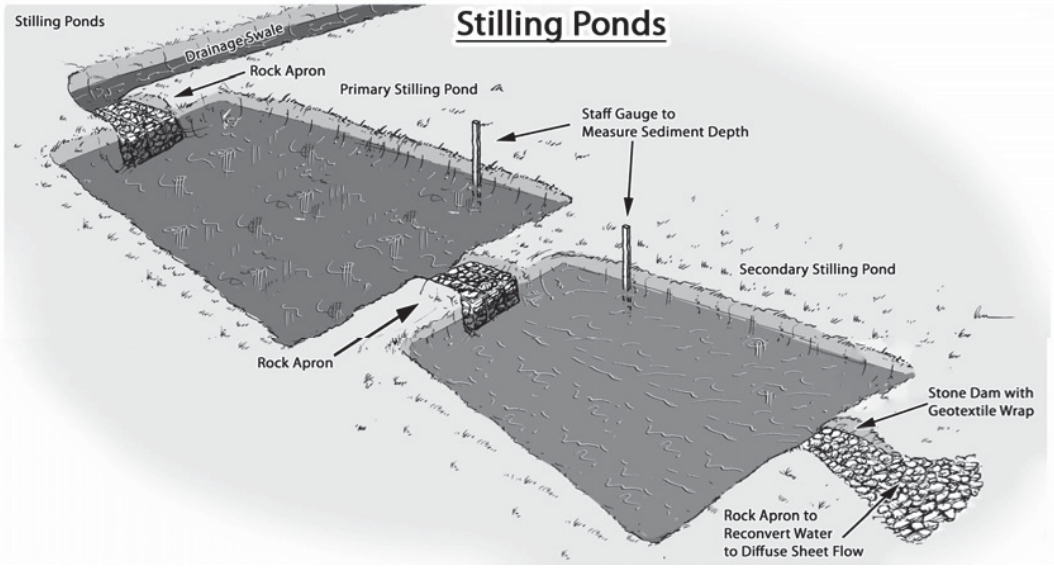
Swale



Level Spreader



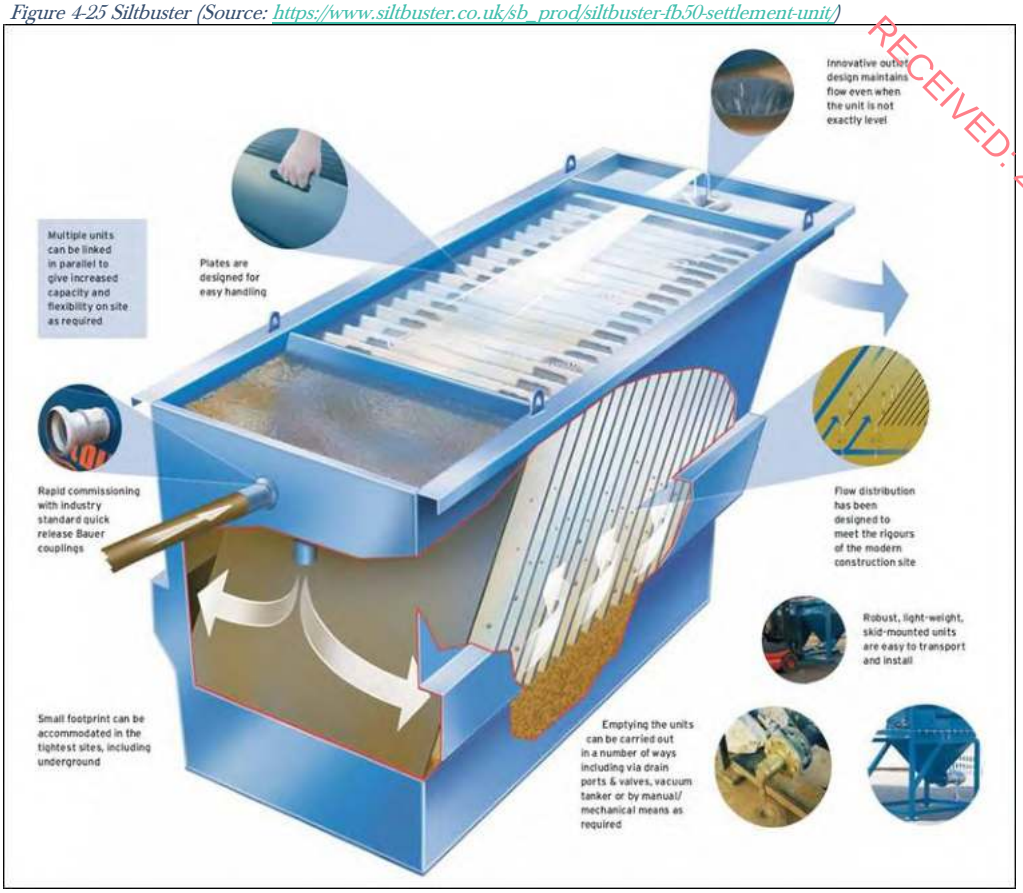
Stilling Ponds



Drawing Title: Drainage Design Measures	Drawing No.: Figure 4-24	Scale: NTS
Project Title: Lackareagh Wind Farm, Co. Clare - EIAR		Date: 31.07.2024
Drawn By: Ciarán Fitzgerald	Checked By: Niamh McHugh	Project No.: 220245

MKO Planning and Environmental Consultants Tuam Road, Galway Ireland, H91 VW84 +353 (0) 91 735611 email:info@mkoireland.ie Website: ww.mkoireland.ie

Figure 4-25 Siltbuster (Source: https://www.siltbuster.co.uk/sb_prod/siltbuster-fb50-settlement-unit/)



4.7.4.9 Silt Bags

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

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

The dewatering silt bag that will be used will be approximately 3 metres in width by 4.5 metres (see Plate 4-5 and Plate 4-6 below) in length and will be capable of trapping approximately four tonnes of silt. The dewatering silt bag, when full, will be removed from site by a waste contractor with the necessary waste collection permit, who will then transport the silt bag to an appropriate, fully licensed waste facility.

Plate 4-5 Silt bag with water being pumped through

Plate 4-6 Silt bag under inspection

4.7.4.10 Sedimats

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

4.7.4.11 Culverts

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

Some culverts may be installed to manage drainage waters from works areas of the Proposed Project, particularly where the waters have to be taken from one side of an existing roadway to the other for discharge. The size of culverts will be influenced by the depth of the track or road sub-base. In some cases, two or more smaller diameter culverts may be used where this depth is limited, though this will be avoided as they will have a higher associated risk of blockage than a single, larger pipe. In all cases, culverts will be oversized to allow mammals to pass through the culvert.

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

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

4.7.4.12 Silt Fences

Silt fences will be installed as an additional water protection measure around existing watercourses in certain locations, particularly where works are proposed within the 50-metre buffer zone of a stream or river which is inevitable where existing roads in proximity to watercourses are to be upgraded as part of the Proposed Project. These areas include around existing culverts, around the headwaters of watercourses, and the proposed locations are indicated on the drainage design drawings included in Appendix 4-8.

Silt fences will be installed as single, double or a series of triple silt fences, depending on the space available and the anticipated sediment loading. The silt fence designs follow the technical guidance

document '*Control of Water Pollution from Linear Construction Projects*' published by Construction Industry Research and Information Association (CIRIA, No. C648, 1996). Up to three silt fences may be deployed in series.

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

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

4.7.4.13 Hydrocarbon Interceptors

A hydrocarbon (or petrol) interceptor is a trap used to filter out hydrocarbons from surface water runoff. A suitably sized hydrocarbon interceptor will be installed wherever it is intended to store hydrocarbons and oils (i.e., construction compounds and substation compound) or where it is proposed to park vehicles during the construction and operational phases of the Proposed Project (i.e., construction compounds and substation compound).

4.7.4.14 Forestry Felling Drainage

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

Tree stumps will only be removed in areas around the Proposed Wind Farm footprint. During tree felling there is a potential to generate silts and sediments in surface water runoff due to tracking of machinery and disturbance of the ground surface etc, however mitigation is provided in Section 9.5.2.1 of Chapter 9 Water with regard surface water quality protection for this activity which is summarised below. Also, prior to the commencement of tree felling for subsequent road construction the following key temporary drainage measures will be installed:

- All existing dry forestry drains that intercept the proposed works area will be temporarily blocked down-gradient of the works using forestry check dams/silt traps;
- Clean water diversion drains will be installed upgradient of the works areas;
- Check dams/silt fence arrangements (silt traps) will be placed in all existing forestry drains that have surface water flows and also along existing forestry roadside drains; and,
- A double silt fence perimeter will be placed down-slope of works areas that are located inside the watercourse 50m buffer zone.

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

- Attend the site for the setup period when drainage protection works are being installed and be present on site during the remainder of the forestry keyhole felling works.
- Prior to the commencement of works, review and agreement of the positioning by the Operator of the required Aquatic Buffer Zones (ABZs), silt traps, silt fencing (see below), water crossings and onsite storage facilities for fuel, oil and chemicals (see further below).
- Be responsible for preparing and delivering the Environmental Tool Box Talk (TBT) to all relevant parties involved in site operations, prior to the commencement of the works.

- Conduct daily and weekly inspections of all water protection measures and visually assess their integrity and effectiveness in accordance with Section 3.4 (Monitoring and Recording) and Appendix 3 (Site Monitoring Form (Visual Inspections)) of the Forestry & Freshwater Pearl Mussel Requirements.
- Take representative photographs showing the progress of operation onsite, and the integrity and effectiveness of the water protection measures.
- Collect water samples for analysis by a 3rd party accredited laboratory, adhering to the following requirements:
- Surface water samples shall be collected upstream and downstream of the keyhole felling site at suitable sampling locations.
- Sampling shall be taken from the stream / riverbank, with no in-stream access permitted.
- The following minimum analytical suite shall be used: pH, EC, TSS, BOD, Total P, Ortho-P, Total N, and Ammonia.
- Review of operator's records for plant inspections, evidence of contamination and leaks, and drainage checks made after extreme weather conditions.
- Prepare and maintain a contingency plan.
- Suspend work where potential risk to water from siltation and pollution is identified, or where operational methods and mitigation measures are not specified or agreed.
- Prepare and maintain a Water Protection Measure Register. This document is to be updated weekly by the ECoW.

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

- All relevant measures, best practice methods and requirements set out Section 9.5.2.1 in Chapter 9 of the EIAR will be adhered to including Forestry & Water Quality Guidelines, Forest Harvesting & the Environment Guidelines and the Forest Protection Guidelines.
- The extent of all necessary tree felling will be identified and demarcated with markings on the ground in advance of any felling commencing.
- All roads and culverts will be inspected prior to any machinery being brought on site to commence the felling operation. No tracking of vehicles through watercourses will occur. Vehicles will only use existing road infrastructure and established watercourse crossings.
- Existing drains that drain an area to be felled towards surface watercourses will be blocked, and temporary silt traps will be constructed to ensure collection of all silt within felling areas. These temporary silt traps will be cleaned out and backfilled once felling works are complete. This ensures there is no residual collected silt remaining in blocked drains after felling works are completed. No direct discharge of such drains to watercourses will occur from within felling areas.
- New collector drains and sediment traps will be installed during ground preparation to intercept water upgradient of felling areas and divert it away. Collector drains will be excavated at an acute angle to the contour (0.3%-3% gradient), to minimise flow velocities.
- All silt traps will be sited outside of buffer zones and have no direct outflow into the aquatic zone. Machine access will be maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of away from all aquatic zones.
- All new collector drains will taper out before entering the aquatic buffer zone to ensures the discharging water gently fans out over the buffer zone before entering the aquatic zone.
- Machine combinations, such as mechanical harvesters or chainsaw felling will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance.
- Mechanised operations will be suspended during and immediately after heavy rainfall.

- Where brash is required to form brash mats, it is to be laid out at harvesting stage to prevent soil disturbance by machine movement.
- Brash which has not been pushed into the soil may be moved within the site to facilitate the creation of mats in more demanding locations.
- Felling of trees will be pointed directionally away from watercourses.
- Felling will be planned to minimise the number of machine passes in any one area.
- Extraction routes, and hence brash mats, will be aligned parallel to the ground contours where possible.
- Harvested timber will be stacked in dry areas, and outside any 50-metre watercourse buffer zone. Straw bales and check dams to be emplaced on the down gradient side of timber storage sites.
- Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but removing of natural debris deflectors will be avoided.

4.7.5 Cable Trench Drainage

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

To efficiently control drainage runoff from cable trench works areas, excavated material is stored on the upgradient side of the trench. Should any rainfall cause runoff from the excavated material, the material is contained in the downgradient cable trench. Excess subsoil is removed from the cable trench works area immediately upon excavation, and in the case of the Proposed Project, would be used for landscaping and reinstatements of other areas elsewhere on site or disposed off-site at an appropriate licensed soil recovery facility.

On steeper slopes, silt fences, as detailed in Section 4.7.4.12, above, will be installed temporarily downgradient of the cable trench works area, or on the downhill slope below where excavated material is being temporarily stored to control run-off.

4.7.6 Site and Drainage Management

4.7.6.1 Preparative Site Drainage Management

All materials and equipment necessary to implement the drainage measures outlined above, will be brought on-site in advance of any works commencing. An adequate number of straw bales, clean stone, terram, stakes, etc will be kept on site at all times to implement the drainage design measures as necessary. The drainage measures outlined in the above will be installed prior to, or at the same time as the works they are intended to drain.

4.7.6.2 Pre-emptive Site Drainage Management

The works programme for the groundworks part of the construction phase of the Proposed Project will also take account of weather forecasts, and predicted rainfall in particular, working under a schedule of works operation system (SOWOR) system as proposed in the planning application. Large excavations, large movements of overburden or large-scale overburden or soil stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

4.7.6.3 Reactive Site Drainage Management

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

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

4.7.7 Drainage Maintenance

A Surface Water Management Plan (SWMP) has been prepared for the Proposed Project (Appendix 4-4). It compiles the proposed surface water drainage control and treatment measures, set out in the EIAR, the drainage management and maintenance measures and the proposed surface water monitoring programme.

The SWMP also provides details in relation to the activity specific drainage control and mitigation measures including those measures to be implemented for the following:

- Keyhole Felling
- Peat and Spoil Repository Areas Drainage
- Cabling Trench Drainage
- Refuelling, Fuel and Hazardous Material Storage
- Cement Based Product Handling

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

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

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

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

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

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

4.7.8 Construction Phasing and Timing

It is estimated that the construction phase of the Proposed Project will take approximately 18-24 months from starting on site to the commissioning of the electrical system. In the interest of breeding birds, construction will not commence during the bird breeding season which runs from the 1st of March to the 31st of August inclusive. Construction may commence at any stage from September onwards to the end of February, so that construction activities are ongoing by the time the next breeding bird season comes around and can continue throughout the next breeding season.

4.7.9 Construction Sequencing

The construction phase can be broken down into three main phases, which overlap partially and will take approximately 18-24 months to complete 1) civil engineering works - 10 months, 2) electrical works including Proposed Grid Connection Route underground cabling works - 9-12 months, and 3) turbine erection and commissioning - 8 months. The main task items under each of the three phases are outlined below.

Civil Engineering Works:

- Upgrade works to L7080
- Clear and hardcore area for temporary site offices. Install same.
- Construct bunded area for oil storage.
- Construct new site roads and hard-standings and crane pads.
- Construct drainage ditches, culverts etc. integral to road construction.
- Excavate for turbine bases. Place blinding concrete to turbine bases. Fix reinforcing steel and anchorage system for tower section. Construct shuttering. Fix any ducts etc. to be cast in. Pour concrete bases. Cure concrete. Remove shutters after 1-2 days.
- Excavate trenches for site cables, lay cables and backfill. Provide ducts at road crossings.
- Backfill tower foundations and landscape with previously stored topsoil.
- Complete site works, reinstate site.
- Remove temporary site offices. Provide any gates, landscaping, signs etc. which may be required.

Electrical Works

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

Turbine and Meteorological Mast Erection

- Erect towers, nacelles and blades.

- Complete electrical installation.
- Grid connection.
- Install meteorological mast.
- Commission and test turbines.
- Complete site works, reinstate site.
- Remove temporary site offices. Provide any gates, landscaping, signs etc. which may be required.
- Return the L7080 back to 3m running width

The phasing and scheduling of the main construction task items are outlined in Table 4-5 below, where the 1st of January has been selected as an arbitrary start date for construction activities.

Table 4-5 Indicative Construction Schedule

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

4.7.10 Construction Phase Monitoring and Oversight

The requirement for a CEMP to be prepared in advance of any construction works commencing on any development site and submitted for agreement to the Planning Authority is now well-established. The proposed procedures for the implementation of the mitigation measures outlined in such a CEMP and their effectiveness and completion is typically audited by the ECoW on behalf of the Project Developer, in an objective manner. The basis for auditing is presented in Section 6 of the CEMP which effectively lists all mitigation measures prescribed in any of the planning documentation. The first assessment is a simply Yes/No question, has the mitigation measure been employed on-site or not? Following confirmation that the mitigation measure has been implemented, the effectiveness of the mitigation measures is the subject of regular review and audit during the full construction stage of the project. If some remedial actions are needed to improve the effectiveness of the mitigation measure, then these are notified to the site staff immediately during the audit site visit, and in writing by way of the circulation of the findings of the audit. Depending on the importance and urgency of rectifying the issue, the construction site manager is given a timeframe by when the remedial works need to be completed.

A CEMP has been prepared for the Proposed Project and is included in Appendix 4-3 of this EIAR. The CEMP includes details of drainage, spoil management, waste management etc, and describes how the above-mentioned audit will function and how the findings are presented.

In the event planning permission is granted for the Proposed Project, the CEMP will be updated prior to the commencement of the development, to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned and will be submitted to the Planning Authority for written approval.

The on-site construction staff will be responsible for implementing the mitigation measures specified in the EIAR and compiled in Section 6 of the CEMP. Their implementation will be overseen by the ECoW or supervising hydrogeologists, environmental scientists, ecologists or geotechnical engineers, depending on who is best placed to advise on the implementation. The system of auditing referred to above ensures that the mitigation measures are maintained for the duration of the construction phase, and into the operational phase where necessary.

4.8 Construction Methodologies

4.8.1 Keyhole Forestry Felling

As part of the Proposed Project, keyhole felling of forestry will be required within and around the development footprint to enable the construction of turbine bases, access roads and the other ancillary infrastructure. Felling is also required around turbine bases for the reduction of potential effects on bats (refer to Appendix 6-2 of this EIAR). A total of 13.8 hectares of forestry will be permanently felled within and around the footprint of the Proposed Wind Farm infrastructure in order to facilitate infrastructure construction and turbine erection.

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

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

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

- 'Forestry and Water Quality Guidelines' (Forest Service, 2000)
- 'Forestry Biodiversity Guidelines' (Forest Service, 2000)
- 'Forestry Protection Guidelines' (Forest Service, 2002)
- 'Forestry Harvesting and Environmental Guidelines' (Forest Service, 2000)

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

- The extent of all necessary forestry felling areas will be identified and demarcated with markings on the ground in advance of any felling commencing.
- All roads and culverts will be inspected by the ECoW and contractor prior to any machinery being brought on site to commence the felling operation.
- Existing drains that drain an area to be felled towards surface watercourses will be blocked, and temporary silt/sediment traps (i.e., check dam / silt fence) will be constructed to ensure collection of all silt within felling areas. These temporary silt traps will be cleaned out and backfilled once felling works are complete. This ensures there is no residual collected silt remaining in blocked drains after felling works are completed.
- New collector drains and sediment traps will be installed during ground preparation to intercept water upgradient of felling areas and divert it away. Collector drains will be excavated at an acute angle to the contour (0.3%-3% gradient), to minimise flow velocities.
- Sediment traps will be sited in drains downstream of felling areas. Machine access will be maintained to enable the accumulated sediment to be excavated.
- Sediment removed from traps will be carefully disposed of in the peat repository areas.
- Machine combinations (i.e., hand-held or mechanical) will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance; however, the general proposed machine combination will comprise a harvester and a low-ground pressure harvester with a 14-tonne bunk capacity.
- Trees will be cut manually inside the 50m construction watercourse buffer and using machinery to extract whole trees only;
- Brash mats will be put in place to support vehicles on soft ground, reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur.
- Brash mat renewal will take place when they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting.
- No tracking of vehicles through watercourses will occur. Vehicles will only use existing road infrastructure and established watercourse crossings.
- Brash which has not been pushed into the soil may be moved to facilitate the creation of mats elsewhere within the site.
- Extraction routes, and hence brash mats, will be aligned parallel to the ground contours where possible.
- Harvested timber will be stacked in dry areas, and outside any 50-metre watercourse buffer zone prior to removal off site to authorised sawmills.

4.8.2 Turbine Foundations

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

areas sloped sufficiently to ensure that slippage does not occur. Material excavated to create the working area will be stored locally for later reuse in backfilling the working area around the turbine foundation. The excavated material will be sealed using the back of the excavator bucket and surrounded by silt fences to ensure sediment-laden run-off does not occur.

The formation material will have to be approved by an engineer as meeting the turbine manufacturer's requirements. If the formation level is reached at a depth greater than the depth of the foundation, the ground level will have to be raised with clause 804 or similar hardcore material, compacted in 250 millimetres (mm) layers, with sufficient compacted effort (i.e., compacted with seven passes using 12 tonne roller). Drainage measures will be installed to protect the formation by forming an interceptor drain around the perimeter of the base which will outfall out at the lowest point level spreader or settlement pond.

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

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

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

Formwork to concrete bases will be propped/supported sufficiently so as to prevent failure. Concrete for bases will be poured using a concrete pump. Each base will be poured in three stages. Stage 1 will see the concrete being poured and vibrated in the centre of the anchor cage to bring the concrete up to the required level inside the cage. Stage 2 will see the centre of the steel foundation being poured and vibrated to the required level. Stage 3 will see the remaining concrete being poured around the steel foundation to bring it up to the required finished level. After a period of time when the concrete has set sufficiently the top surface of the concrete surface is to be finished with a power float.

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

4.8.3 Site Roads and Hardstand Areas

4.8.3.1 Construction Methodology for Site Roads

Construction of New Excavated Roads – Type A

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

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

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

Upgrade of Existing Access Roads or Tracks – Type B

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

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

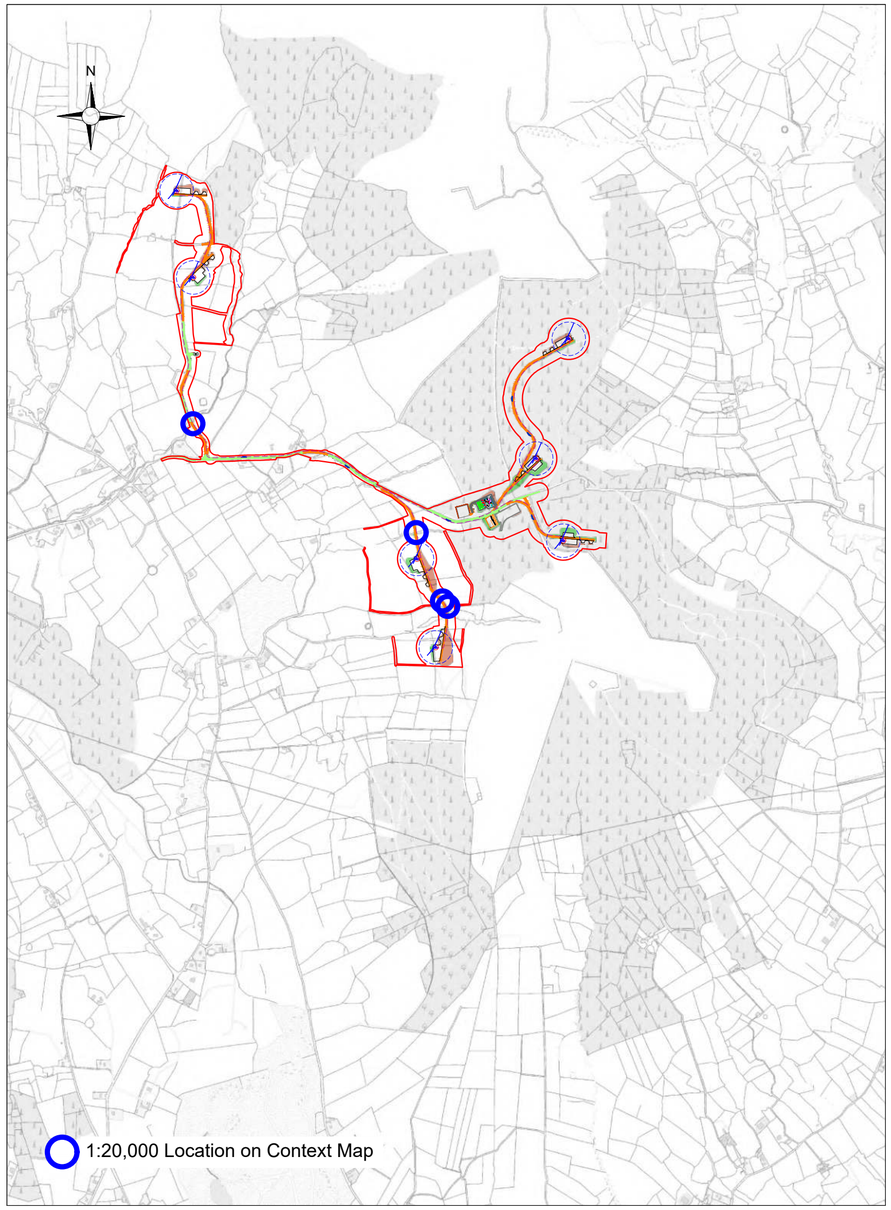
4.8.4 Proposed Clear-Span Watercourse Crossings

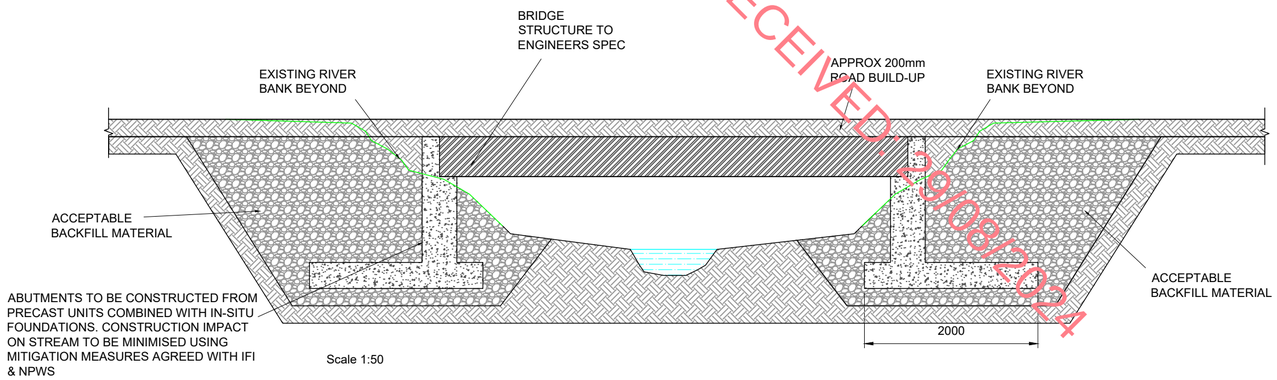
It is proposed to construct a clear-span watercourse crossing (via a clearspan bridge or bottomless box culvert) at 4 no. locations within the Proposed Wind Farm site. The locations of these crossings are shown on the layout drawings included in Appendix 4-1 of this EIAR; A standard design drawing of a

pre-cast concrete, clear span crossing is shown in Figure 4-26 below. A standard design of a pre-cast concrete, bottomless box culvert crossing is also shown in Figure 4-26 below.

- The access road on the approach either side of the watercourse will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of the watercourse crossing.
- All drainage measures along the proposed road will be installed in advance of the works.
- A foundation base will be excavated to rock or competent ground with a mechanical excavator with the foundation formed in-situ using a semi-dry concrete lean mix. The base will be excavated along the stream bank with no instream works required.
- Access to the opposite side of the watercourse for excavation and foundation installation will require the installation of a temporary pre-cast concrete or metal bridge across the watercourse to provide temporary access for the excavator. Plant and equipment will not be permitted to track across the watercourse.
- Once the foundation base has been completed, the pre-cast concrete box culvert will be installed using a crane which will be set up on the bank of the watercourse and will be lifted into place from the bank with no contact with the watercourse.
- Where the box culvert is installed in sections, the joints will be sealed to prevent granular material entering the watercourse,
- Once the crossing is in position stone backfill will be placed and compacted against the structure up to the required level above the foundations

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





Clear Span Watercourse Crossing

Bottomless Box Culvert Watercourse Crossing

PROJECT TITLE: **Lackareagh Wind Farm, Co. Clare**			
DRAWING TITLE: **Clear Span Watercourse Crossing**			
PROJECT No.: **220245**		DRAWING No.: **Fig 4-26**	SCALE: **1:50 @ A2**
DRAWN BY: **JOB**	CHECKED BY: **CJ**	DATE: **16.08.2024**	REVISION.: D01

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

4.8.5 Site Underground Electrical and Communication Cabling

The transformer in each turbine is connected to the onsite substation through a network of buried electrical cables. The ground is trenched using a mechanical excavator. The top layer of soil (or road surface) is removed and saved so that it is replaced on completion. The cables will be bedded with suitable material. The cables will be laid at a depth of approximately 1.2m below ground level; a suitable marking tape is installed between the cables and the surface (see Plate 4-7 below illustrating an example of a single cable trench). On completion, the ground will be reinstated as previously described above. The route of the cable will follow the access tracks as illustrated on the site layout drawings included as Appendix 4-1 of the EIAR. The cabling may be located on either side of the road and/or within the road footprint.

Plate 4-7 Standard Cable Trench View

4.8.6 Onsite Electricity Substation and Control Buildings

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

- The area of the onsite substation will be marked out using ranging rods or wooden posts and the soil and overburden stripped and removed to a nearby spoil management area for later use in landscaping. Any excess material will be sent to one of the on-site spoil management areas.
- The dimensions of the onsite substation area have been designed to meet the requirements of the ESB and the necessary equipment to safely and efficiently operate the Proposed Project;
- 1 no. control buildings will be built within the onsite substation compound;
- The foundations will be excavated down to the level indicated by the designer and appropriately shuttered reinforced concrete will be laid over it. An anti-bleeding admixture will be included in the concrete mix;
- The block work walls will be built up from the footings to DPC level and the floor slab constructed, having first located any ducts or trenches required by the follow on mechanical and electrical contractors;

- The block work will then be raised to wall plate level and the gables & internal partition walls formed. Scaffold will be erected around the outside of the building for this operation;
- The roof slabs will be lifted into position using an adequately sized mobile crane;
- The timber roof trusses will then be lifted into position using a telescopic load all or mobile crane depending on site conditions. The roof trusses will then be felted, battened, tiled and sealed against the weather.
- The electrical equipment will be installed and commissioned.
- Perimeter fencing will be erected.
- The construction and components of the substation are to ESB specifications.

4.8.7 Temporary Construction Compound

The temporary construction compound will be constructed as follows:

- The area to be used as the compound will be marked out at the corners using ranging rods or timber posts. Drainage runs and associated settlement ponds will be installed around the perimeter;
- The compound platform will be established using a similar technique as the construction of the substation platform as discussed in Section 4.7.6 above;
- A layer of geo-grid will be installed where deemed necessary by the designer and compacted layers of well graded granular material will be spread and lightly compacted to provide a hard area for site offices and storage containers;
- A limited amount of fuel will have to be stored on the Proposed Project site and for the Proposed Grid Connection Route in appropriately bunded containers and a bunded area for oil storage will be constructed within the compound.
- Areas within the compound will be constructed as site roads and used as vehicle hardstanding's during deliveries and for parking;
- A bunded containment area will be provided within the compound for the storage of lubricants, oils and site generators etc;
- A waste storage area will be provided within the compound;
- The compound will be fenced and secured with locked gates if necessary; and,
- Upon completion of the Proposed Project the temporary construction compound will be decommissioned and allowed to vegetate naturally.

4.8.8 Grid Connection Cabling Trench

4.8.8.1 Underground Cabling Trench

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

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

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

Methodology which is included as Appendix 4-5 of this EIAR. This Appendix includes for a Construction Methodology Report for the Proposed Grid Connection Route.

4.8.8.2 Existing Underground Services

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

4.8.8.3 Joint Bays

Joint bays are typically pre-cast concrete chambers where lengths of cable will be joined to form one continuous cable. The Construction Methodology provided by TLI (Appendix 4-5) states that the joint bays will be located at various points along the ducting route generally between 1000 to 1150 metres intervals or as otherwise required by ESB and electrical requirements. Joint Bays are typically 2.03m x 4.5m x 1.475m pre-cast concrete structures installed below finished ground level.

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

In association with Joint Bays, Communication Chambers are required at every joint bay location to facilitate communication links between the onsite 38kV substation and the existing Ardnacrusha 110kV substation. Earth Sheath Link Chambers are also required approximately every second joint bay along the Proposed Grid Connection Route. Communication Chambers will typically be pre-cast concrete structures with an access cover at finished surface level. The locations of the joint bays and chambers are shown in Appendix 4-9.

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

4.8.8.4 Underground Cable Watercourse/Culvert/Service Crossings

The Proposed Grid Connection Route will involve 3 No. bridge crossings, the crossing methodologies for which are described below. The crossing methodologies to be used to traverse these watercourses are cable strapping and Horizontal Direction Drilling (HDD). The construction methodologies for both of these approaches are outlined in Section 5 and 6 of the report included in Appendix 4-5 of the EIAR and an illustration of the same is shown in Figure 4-27 below.

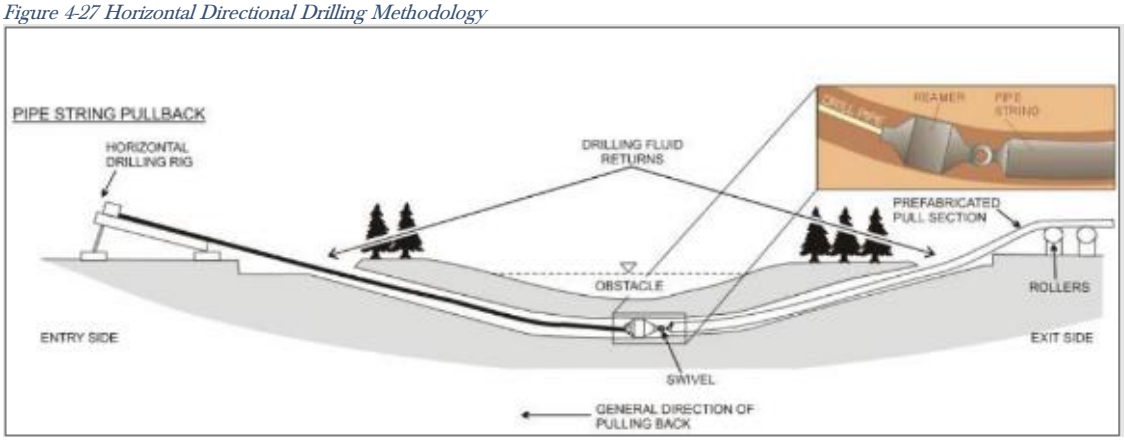
- **Bridge 1** - Stainless Steel Pipe Fixture. Bridge 1 is located along the L-3056 and traverses the River Blackwater. Further detail on the bridge strapping proposal are provided in Section 4.7.10 below.
- **Bridge 2** – Ducting in Trefoil within Bridge Deck: Bridge 2 is located along the L3022-8. This bridge has sufficient room to install the cable to ESBN specifications, so it is proposed that the cable will utilize the bridge deck to hold the ducts while remaining in trefoil formation
- **Bridge 3** – Horizontal Directional Drilling: Bridge 3 is located on the L-3022-8. Site visits showed that the bridge had insufficient room to install the cable to ESBN specifications. It was decided that Horizontal Direction Drilling (HDD) be utilised at this location

Crossing existing culverts will be implemented using open trenching with either an undercrossing or an overcrossing, depending on the depth of the culvert. The Proposed Grid Connection Route will include for 9 no. culvert/pipe crossing locations which will be crossed via a flat formation undercrossing. These culverts will remain in place and the ducting will be installed beneath / adjacent to these culverts to provide minimum separation distances in accordance with ESB and Úisce Éireann specification. Where the Proposed Grid Connection Route underground cabling intersects with existing watercourses, a detailed construction method statement will be prepared by the Contractor prior to the commencement of construction and is to be approved by the relevant Local Authority and relevant environmental agencies.

The bridge and culvert crossing locations are shown below in Figure 4-28, and in further detail in Appendix 4-9:

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 2003), and these guidelines will be adhered to during the construction of the Proposed Project.

Figure 4-27 Horizontal Directional Drilling Methodology



Map Legend

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

Bridge and Culvert Crossing Locations

- Bridge
- Culvert

Drawing Title
Grid Connection Cable Route Bridge and Culvert Crossing

Project Title
Lackareagh Wind Farm, Co,Clare

Drawn By	Checked By
CF	NMcH
Project No. 220245	Drawing No. Figure 4-28
Scale 1:45,000	Date 2024-08-16

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie

4.8.9 Cable Strapping Solution at the Blackwater Bridge

In order for the Proposed Grid Connection Route underground cable to traverse the Blackwater Bridge (Bridge 1) the most feasible option was deemed to be strapping the cable to the side of the bridge structure. This crossing methodology option is illustrated below in Figure 4-31. The option of strapping of the cable to the side of the Blackwater Bridge was deemed the most environmentally prudent and most efficient way to traverse the River Blackwater due to the presence of environmental constraints. These constraints include the fact that the Blackwater Bridge has insufficient room to install the cable to ESB specifications within the existing deck, making the bridge unsuitable to accommodate the ducts in the carriageway as a consequence. Furthermore, executing a horizontal directional drill (HDD) was determined to be difficult at this location given the curvature of the road, significant elevation change which would be required as part of construction, and the ecology of the area. Surveys in the vicinity of the bridge identified invasive species such as giant hog weed and ecological eDNA sampling identified the presence of lamprey in the Blackwater River,

Based on the above constraints, TLI Group advised it would not be possible to host the cable within the bridge deck, therefore it was identified that the option of a Bridge Strapping Solution would be the most appropriate option for crossing the watercourse in this particular instance, see Figure 4-29 below. The Blackwater Bridge is listed as a protected structure under the Record of Protected Structures, registered as RPS no. 650. Because of this, it was deemed necessary to discuss this proposal with a member of the Heritage Department of Clare County Council and a suitable qualified archaeologist. Further details of the discussions had with Clare County Council on this matter can be found in Chapter 2 and Chapter 14 of this EIAR.

Mark Murphy Consultancy was commissioned by TLI Group to undertake a principal inspection of the Blackwater Bridge in Co. Clare; this report is included as Appendix 4-6 to this EIAR. An assessment of the arch structure was carried out in accordance with the TII Stage 1 Assessment of Road Bridges and Structures and the methods outlined in the UK Highways Agency Design Manual for Roads and Bridges. The Principal Inspection Report concludes that the Blackwater Bridge is capable of carrying the infrastructure associated with the Proposed Grid Connection Route underground cabling from the onsite 38kV substation to the existing Ardnacrusha 110kV substation. The Principal Inspection Report is included as Appendix 4-6 to this EIAR.

The construction methodology of the bridge strapping solution is laid out below:

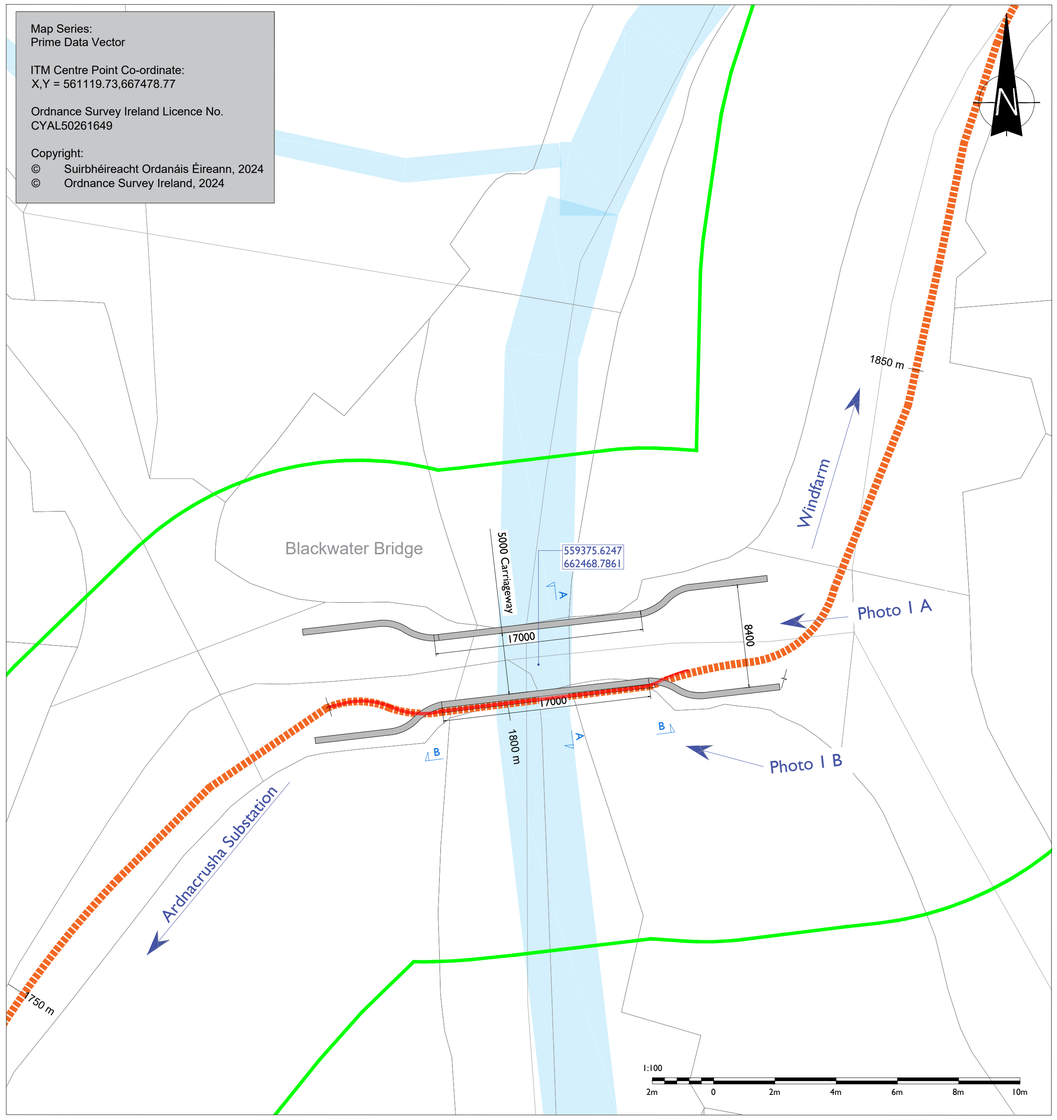
- In advance of the works to the existing structure, an underbridge access unit will be required to carry out the installation of a metal clad stainless steel berm supported by cleats/brackets at desired intervals to enclose ESB networks across the bridge
- Weather conditions will be considered when planning construction activities with the works to be undertaken during low flows in the river
- Ivy to be removed from the bridge (outside of bird nesting season)
- All works will be conducted by a suitably qualified contractor and supervised by a suitably qualified archaeologist;
- Prior notice of intent to begin construction works will be provided to Clare County Council Heritage Department;
- Proposed open trenching with ducts to be pre-installed prior to works commencing on bridge exterior. Ducts to be exposed at the periphery of the walled parapets, dug in beneath to allow for coupling;
- Hammer drill existing parapet exterior and fix hot drilled ‘L’ brackets at regular intervals.
- All brackets will be placed within the existing joints of the bridge in order to maintain the flagstones on the bridge and ensure the works are reversible;

- Metal-clad stainless steel beam with ESB HV stencilled to be laid across the aforementioned brackets once fixed. Galvanised straps will be used for reinforcement with anchored Hilti bolts;
- Install ESBN ducting as required within metal-clad beam and conjoin onto pre-installed ducting along bridge parapets;
- Installation of anti-climb guard either side of bridge to restrict unauthorised access;
- Maintain wall drainage and below-ground waterproofing;
- Permanent reinstatement of local road with surface dressing in accordance with local road engineer and County Council requirements;
- Remove any debris as required, and
- Bridge will be repointed by the contractor.

The proposed works will be carried out by employing accepted good work practices during construction, and environmental management measures. Mitigation measures as required by Clare County Council Heritage Department have also been incorporated into the construction methodology outlined above. The following good-practice measures will be supplemented by further specific environmental protection measures that will be included in method statements prepared for specific tasks during the works and will form part of the detailed CEMP to be developed based on Appendix 4-3 CEMP.

- Weather conditions will be considered when planning construction activities to minimise risk of run-off from site into surface watercourses;
- The contractor will ensure that all personnel working onsite are trained in pollution incident control response. A regular review of weather forecasts of heavy rainfall is required, and the contractor is required to prepare a contingency plan for before and after such events;
- The contractor will carry out visual examinations of local watercourses from the proposed works during the construction phase to ensure that sediment is not above baseline conditions. In the unlikely event of water quality concerns, the Environmental Manager and ECoW will be consulted;
- Excavations will be temporarily reinstated by minimal periods to avoid acting as a conduit for surface water flows;
- Only emergency breakdown maintenance will be carried out on site. Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures.

ISO A1 594mm x 841mm

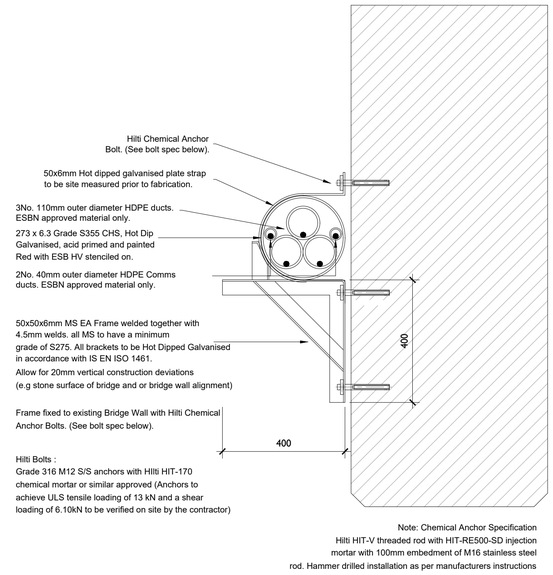


Plan View Bridge No.1

Scale : 1:100

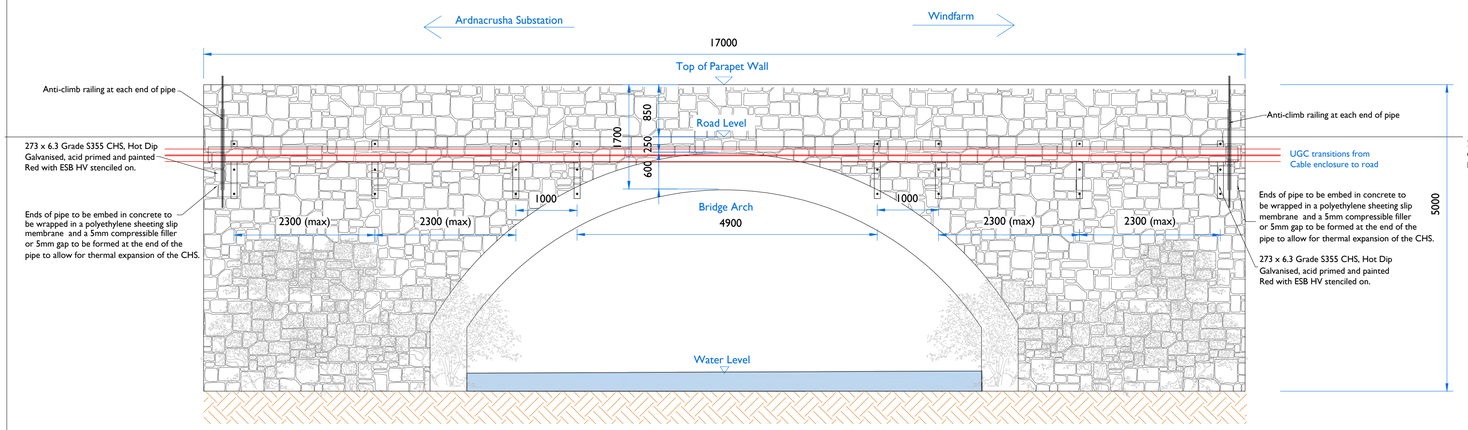
Photo No 1 A

Photo No 1 B



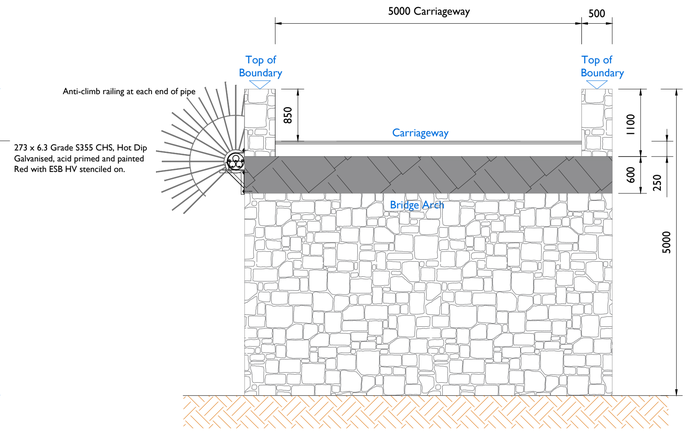
Typical Parapet Detail

Scale : 1:10



Section B-B

Scale : 1:50



Section A-A

Scale : 1:50

Project Management Initials: Designer: RR Checked: JvdP Approved: DB

tli GROUP

Head Office
Beenreigh,
Abbeydorney,
Tralee, Co. Kerry
Ireland
Tel: 00353 66 7135710

Regional Office
Basepoint Business Centre
Stroudley Road, Basingstoke,
Hampshire,
RG24 8UP, UK
Tel: 00 44 1256406664

PROJECT

Lackareagh Wind Farm
38kV Grid Connection

CLIENT

EDF renewables

CONSULTANTS

MKO

NOTES: -

- Principal bridge inspection surveys have been carried out and the proposals are subject to detailed design. Please refer to document BR286-01-Blackwater Br PI for details.
- Bridge crossing designs have been submitted to Clare Co. Council for review.
- Drawings are in compliance with ESBN specification requirements for shallow formation, bridge crossings, etc.

LEGEND: -

Proposed UGC Route (14.7km)

Existing Rivers & Streams

EIAR Boundary shown thus

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P3	13.08.24	Issued for EIAR
P2	23.01.24	Issued for Planning
P1	14.07.23	Issued for Planning

PROJECT NUMBER

05-909

SHEET TITLE

Bridge 1
Proposed Crossing Details

SHEET NUMBER

Figure 4-29

4.9 Operation

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

The wind turbines will be connected via fibre optic cable and data will be relayed from the wind turbines to a central control unit at the on-site substation. This will facilitate off-site remote monitoring of the wind farm. Each turbine will be monitored off-site by the appointed Operations and Maintenance contractor (typically the wind turbine manufacturer) and a wind farm operations management company. The monitoring of turbine output, performance, wind speeds, and responses to any key alarms will be monitored off-site by both parties 24-hours per day. Regular on-site visual inspections will also be carried out by the wind farm operations management company.

4.9.1 Maintenance

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

The electricity substation components as part of the Proposed Project will also require periodic maintenance.

Although the level of activity required for the maintenance of the Proposed Project is not significant, the impacts associated with traffic volumes for this period are assessed in Chapter 15.

4.9.2 Monitoring

Section 7 of the CEMP sets out a programme of monitoring required for the operational phase of the project. The CEMP should be consulted for detailed information on the monitoring requirements during the operational phase, however a brief summary of the key information is provided below:

- Monthly sampling of surface waters and laboratory analysis will be undertaken for six months during the operational phase.
- The drainage system will be monitored in the operational phase until such a time that all areas that have been reinstated become re-vegetated and the natural drainage regime has been restored.
- Post-construction bird monitoring which includes breeding bird surveys, winter roost surveys and corpse searching on the site to determine the level of fatalities for the site as a result of collisions with the installed turbines. These surveys will be completed in accordance with guidelines issued by the Scottish Natural Heritage (SNH, 2009)
- Post-construction bat monitoring will be undertaken for at least three years' post construction of the renewable energy development. The monitoring will also include corpse searching in the areas surrounding the turbines to gather data on any actual collisions.
- Post-construction linear habitat restoration monitoring following the main growing season (i.e., in September) in a given year for the first five years of growth
- Monitoring for shadow flicker at properties where any exceedance of the shadow flicker limit has been predicted as outlined in Chapter 5.

- Post turbine commissioning noise monitoring.

4.10 Decommissioning

The wind turbines proposed as part of the Proposed Project are expected to have a lifespan of approximately 35 years. Following the end of their useful life, the equipment may be replaced with a new technology, subject to planning permission being obtained, or the Proposed Project may be decommissioned fully.

Upon decommissioning of the Proposed Project, the wind turbines will be disassembled in reverse order to how they were erected. The turbine will likely be removed from site using the same transport methodology adopted for delivery to site initially. The turbine materials will be transferred to a suitable recycling or recovery facility.

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

All above ground turbine components would be separated and removed off-site for recycling, the quantities and types of which are outlined in the Decommissioning Plan (Appendix 4-7). Turbine foundations would remain in place underground and would be covered with earth and reseeded as appropriate. Leaving the turbine foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in unnecessary environment emissions such as noise, dust and/or vibration.

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

The underground electrical cabling route and onsite substation will remain in place as it will be under the ownership and control of the ESB and EirGrid.

A Decommissioning Plan has been prepared (Appendix 4-7) the detail of which will be agreed with the local authority prior to any decommissioning. The Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will agree with the competent authority at that time. The potential for effects during the decommissioning phase of the Proposed Project has been fully assessed in the EIAR.

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

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