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APPENDIX 4

CEMP

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED BALLINAGREE WIND FARM

CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN

Prepared for: Ballinagree Wind DAC

Ballinagree
Wind farm

Date: January 2022

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1. INTRODUCTION

1.1 General Introduction and Purpose

This document is the Construction and Environmental Management Plan (CEMP) for the proposed Ballinagree Wind Farm and has been prepared by Fehily Timoney and Company (FT) on behalf of Ballinagree Wind DAC.

The CEMP will be updated prior to construction to take account of any relevant conditions attached to the planning permission and will be implemented for the duration of the construction phase of the project. The CEMP will be a live document and will be subject to ongoing review through regular environmental auditing and site inspections and updated as required. For the avoidance of doubt, all measures stipulated in this CEMP will be implemented in full.

The CEMP sets out the key construction and environmental management issues associated with the proposed project and will be developed further at the post-planning and construction stages by the client and on the appointment of the main contractor to the project.

The CEMP should be read in conjunction with the EIAR. In the case of any ambiguity or contradiction between this CEMP and the EIAR, the EIAR shall take precedence.

This CEMP sets out the key environmental management issues associated with the construction, operation and decommissioning of the proposed project, to ensure that during these phases of the development, the environment is protected and impacts on the environment are minimised.

The document is divided into six sections:

Section 1: *Introduction* provides an overview of the existing site and the proposed project

Section 2: *Existing Site Environmental Conditions* provides details of the main existing geotechnical, hydrological, ecological and archaeological conditions onsite. These conditions are to be considered by the contractor in the construction, operation and decommissioning of this proposed project.

Section 3: *Overview of Construction Works*, this section provides an overview of the construction works proposed, including drainage and sediment controls to be installed.

Section 4: *Environmental Management Plan (EMP)*, this section outlines the main requirements of the EMP and outlines operational controls for the protection of the environment including soil management, habitat and species, site drainage control, archaeology, construction traffic, site reinstatement and decommissioning, waste management.

Section 5: *Safety & Health Management Plan,* this section defines the work practices, procedures and management responsibilities relating to the management of safety and health during the design, construction and operation of the Ballinagree Wind Farm.

Section 6: *Emergency Response Plan* contains predetermined guidelines and procedures to ensure the safety, health and welfare of everybody involved in the project and to protect the environment during the construction phase of Ballinagree Wind Farm.

1.2 The Applicant

The applicant for the proposed project is Ballinagree Wind DAC.

1.3 The Project

The proposed project is comprised of the following key elements:

- The wind farm site (also referred to in this CEMP as 'the Site');
- The grid connection;
- The turbine delivery route (also referred to in this CEMP as 'the TDR');
- Biodiversity enhancement and management plan lands (also referred to in this CEMP as 'the BEMP lands').

A detailed description of the proposed project is contained in Chapter 3 of the EIAR. A detailed description of the proposed construction works is outlined in Section 3.

An overview of the proposed project is shown in Figure 1-1.

The wind farm site includes the wind turbines, internal access tracks, hard standings, meteorological masts, recreational amenity infrastructure and associated signage, onsite substation, internal electrical and communications cabling, temporary construction compound, drainage infrastructure, borrow pits and all associated works related to the construction of the wind farm. Refer to Figure 1-2 for the general arrangement of the Site.

The grid connection which comprises a 110 kV underground cable and is shown in Figure 1-4. The Construction Methodology report provides a detailed description of the proposed grid connection infrastructure and construction methodologies associated with same. It is located in Appendix 3.3 of the EIAR.

The Turbine Delivery Route is described in Section 2.1.2 and shown in Figure 1-3.

A Biodiversity Enhancement and Management Plan is located Appendix 3.4 of the EIAR. The BEMP lands are identified in Figure 1-5.

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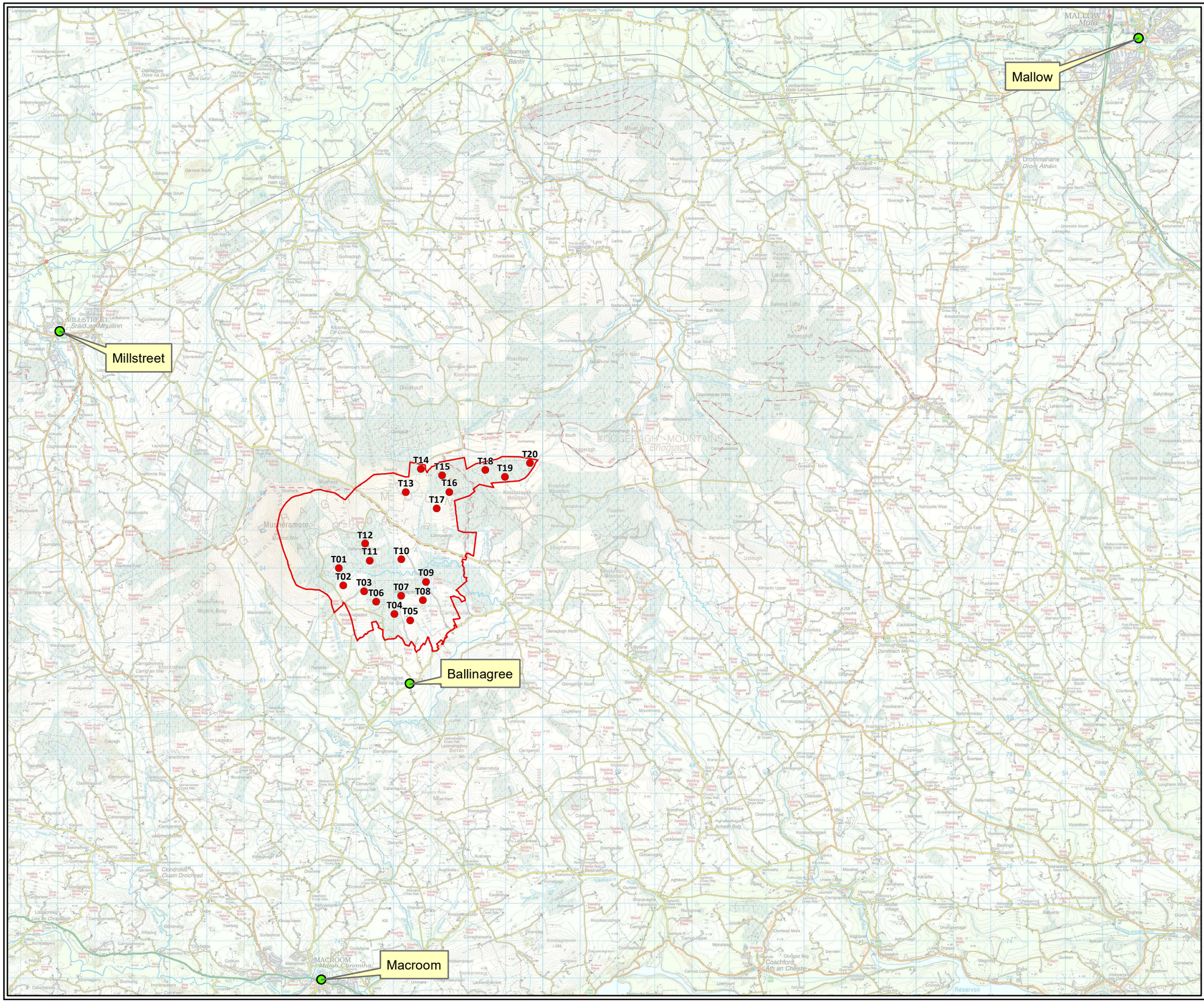

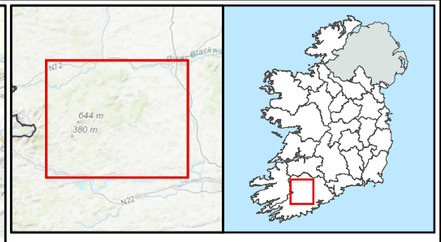

Legend

- Wind Farm Site
- Proposed Turbine Layout

TITLE:	Site Location and Project Overview		
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FIGURE NO:	1.1		
CLIENT:	Coillte and Ørsted		
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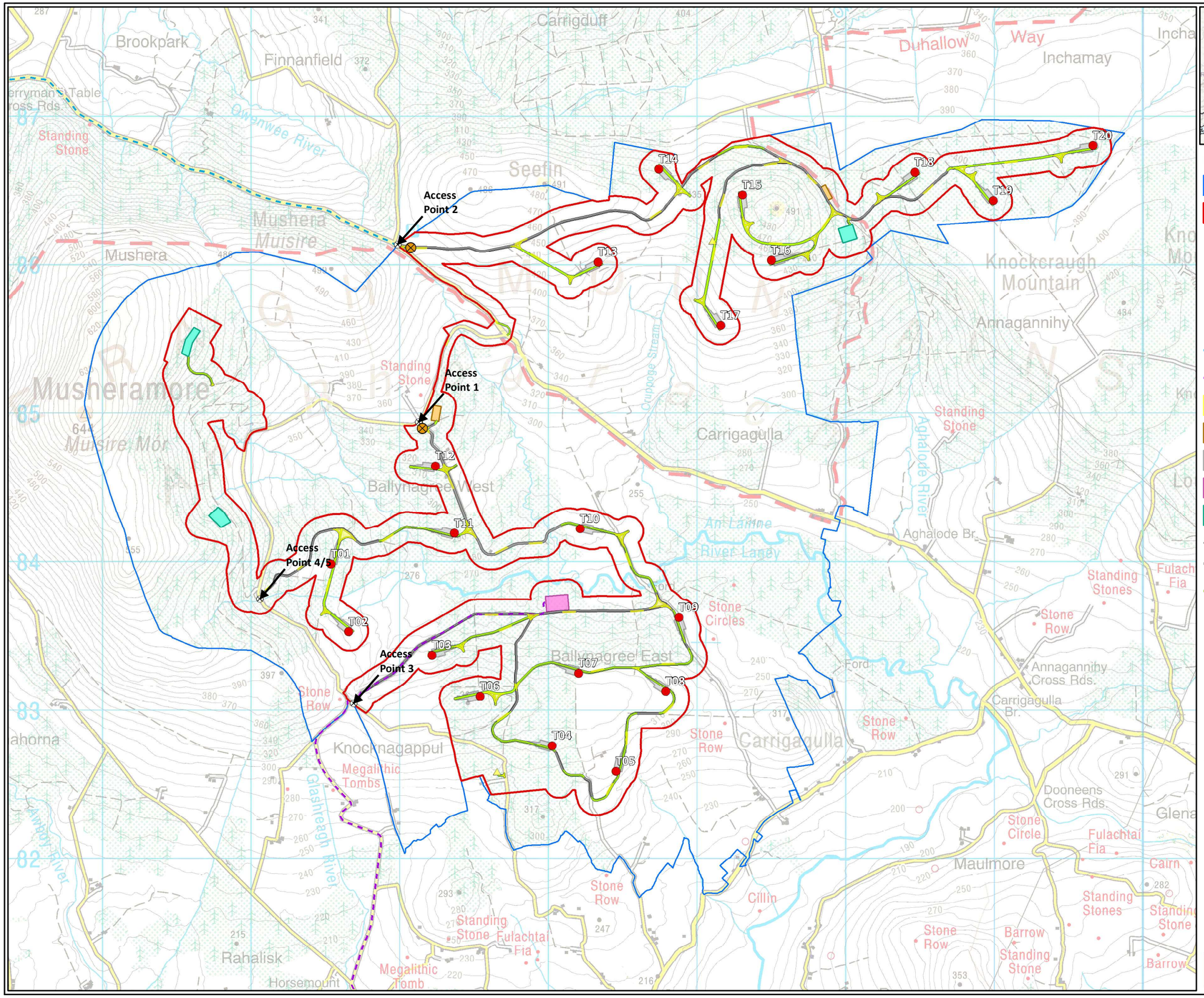

Legend

- Wind Farm Site
- Development Boundary
- Proposed Turbine Layout
- Met Mast
- Access Points
- Wheel Wash
- Turbine Delivery Route
- Grid Connection
- Turning Heads and Passing Bays
- Construction Compound
- Turbine Hardstanding Area
- Substation Compound
- Proposed Borrow Pits

Access Tracks:

- Existing Track Upgrade
- New Access Track

TITLE:	Wind Farm Site		
PROJECT:	Ballinagree Wind Farm		
FIGURE NO:	1.2		
CLIENT:	Coillte and Ørsted		
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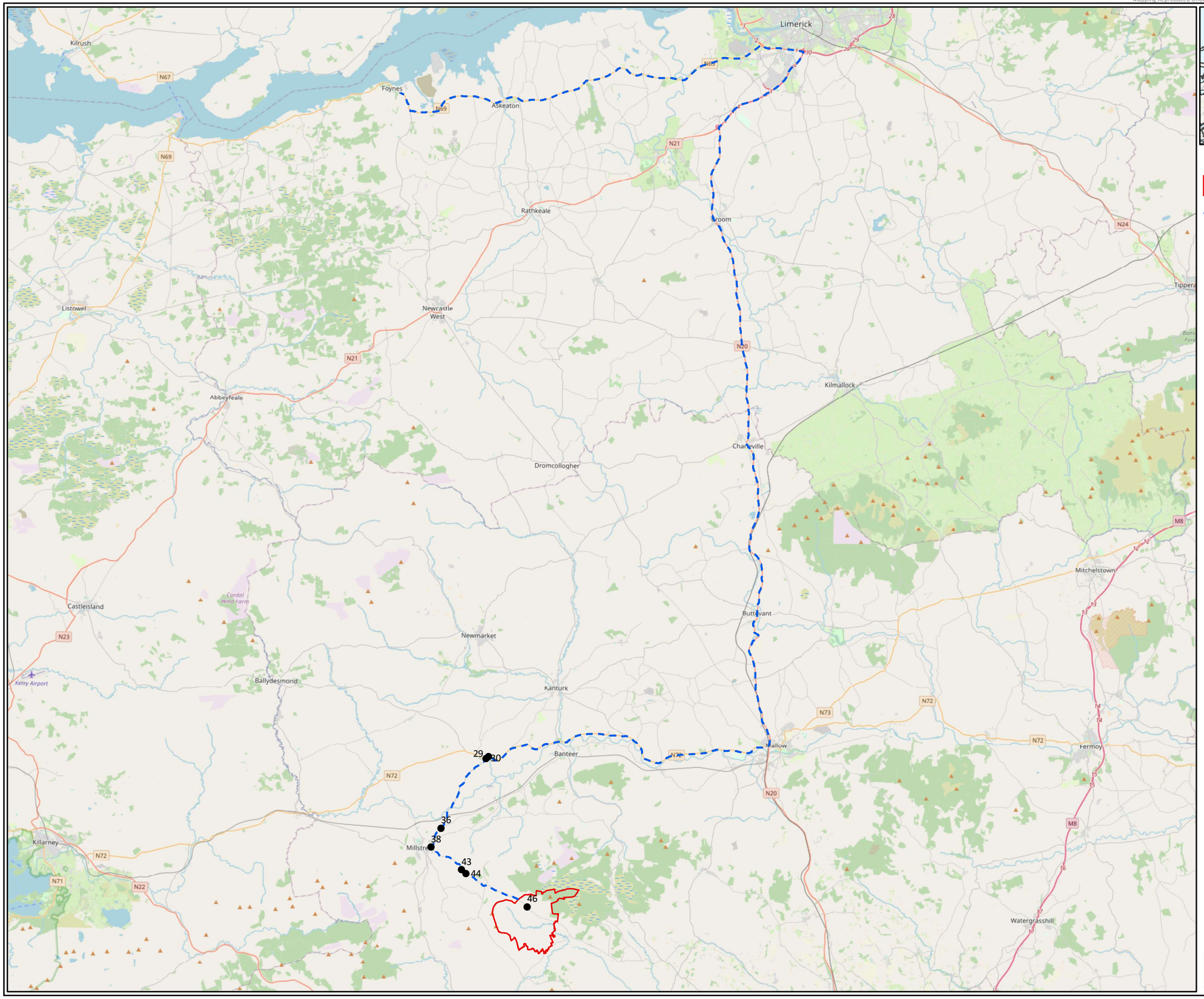

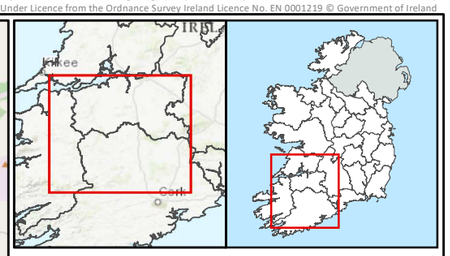

Legend

- Wind Farm Site
- Turbine Delivery Route
- TDR Nodes

TITLE:	Turbine Delivery Route		
PROJECT:	Ballinagree Wind Farm		
FIGURE NO:	1.3		
CLIENT:	Coillte and Ørsted		
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Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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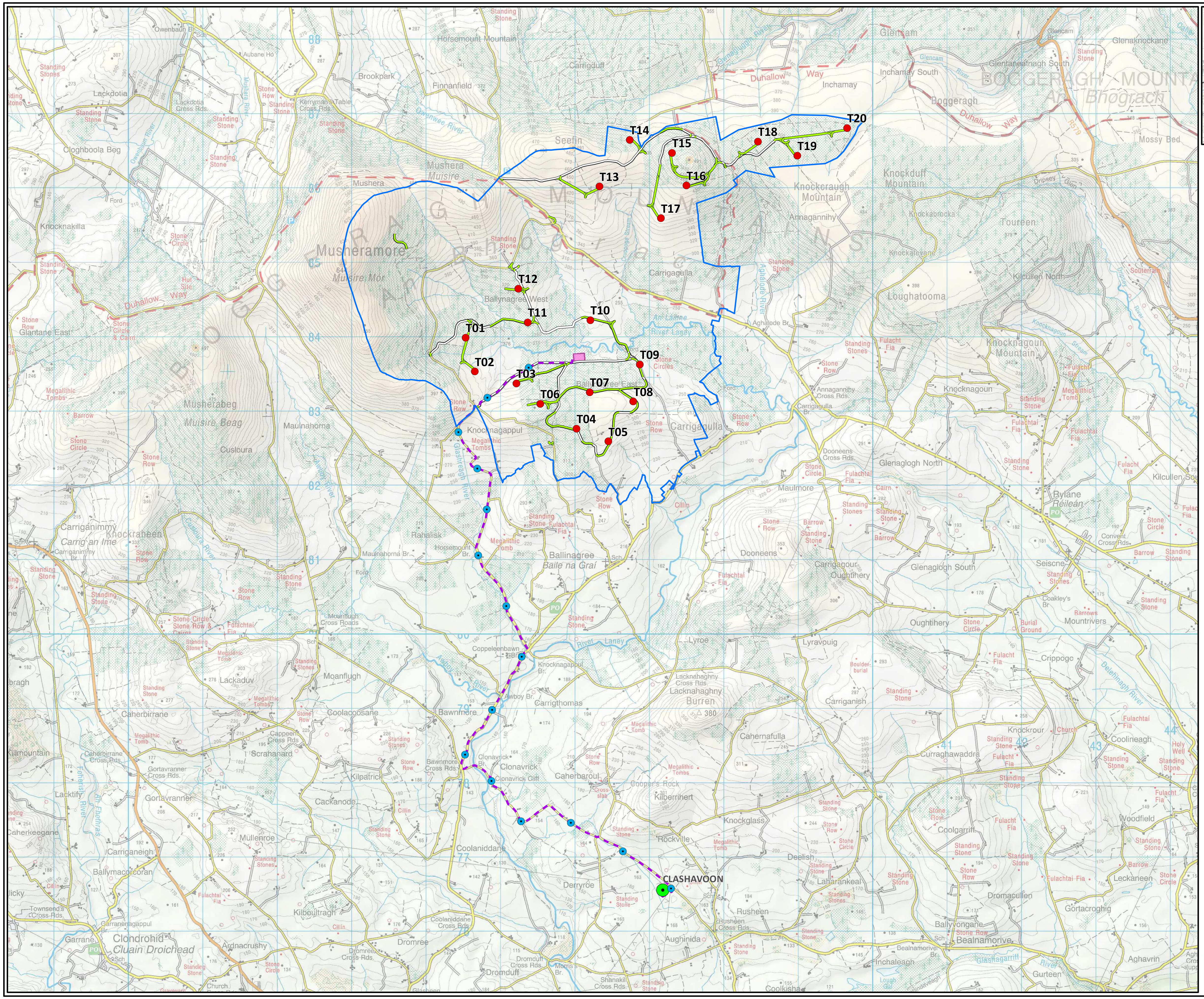

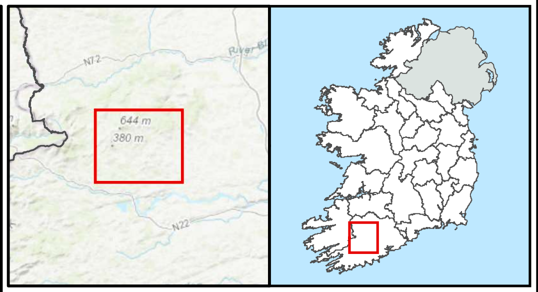

Legend

- Wind Farm Site
- Proposed Turbine Layout
- Joint Bays
- 220kV Substation
- Grid Connection
- Substation Compound

Access Tracks:

- Existing Track Upgrade
- New Access Track

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TITLE:	
Grid Connection	
PROJECT:	
Ballinagree Wind Farm	
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Legend

- Wind Farm Site
- BEMP Lands

TITLE:	BEMP Lands
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SCALE:	1:40000
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2. EXISTING SITE ENVIRONMENT

2.1 Existing Environment Description

2.1.1 Wind Farm Site

The proposed wind farm site is located within the jurisdiction of Cork County Council, approximately 35 km north west of Cork City. The project is located approximately 8km south east of Millstreet and approximately 10 km north of Macroom.

The Wind Farm Site is located in a rural area approximately 8km southeast of Millstreet. Settlement in the area is made up of one-off rural housing and farmyards generally located along the road network of the area (Linear settlement pattern). The nearest settlement is the village of Ballinagree which is located approximately 1.5km to the south of the wind farm site.

The wind farm site encompasses a mixture of habitat types, with conifer plantation and pastures the main types of land cover present. Pockets of recently felled conifer woodland, heath, scrub and improved agricultural grassland are also present across the site. Pockets of upland peat bog is present in the northern part of the site.

Elevations within the wind farm site range from 200m to 490m approximately above ordinance datum. Slopes within the site range from 0% to approximately 20% grade.

Access to the site is primarily via the existing local road L2578 'Butter Road' from the direction of Millstreet to the North West. HGVs shall approach the site via this road.

Ballinagree Wind Farm shall involve the use of 5 no. existing forestry and agricultural entrances as access points with the public road. The locations of these access points are shown on Figure 1-2.

The access points which have been selected with consideration for safety of public road users and construction staff and to ensure they can be constructed to comply with the design requirements of Cork County Council and TII.

A detailed description of the existing site environment can be found in Chapter 3 of the EIAR.

The layout of the proposed wind farm site is shown on Figure 1-2.

2.1.2 Turbine Delivery Route

Large components associated with the wind farm construction will be transported to site via the identified turbine delivery route (TDR).

The TDR and location of temporary accommodation works are shown in Figure 1-3.

In some cases, accommodation works are required along the turbine delivery route such as hedge or tree cutting, relocation of powerlines/poles, lampposts, signage and local road widening. All accommodation works will be carried out in advance of the turbine deliveries in agreement with the landowner and local authority and subject to a road opening license as required.

Further information on the proposed turbine delivery route and transport routes to the wind farm site can be found in Chapter 13 of the EIAR.

2.1.3 Grid Connection

The grid connection route (GCR) will consist entirely of underground 110kV cable and will connect the on-site substation to the existing 110/220kV substation at Clashavoon. The GCR will be ca. 11.37 km in length, with 9.35 km to be constructed primarily within the existing road corridor. The proposed GCR arrangement is illustrated in Figure 1-4. The 110kV grid connection cable will follow public roads and shall feature horizontal directional drilling (HDD) at 4 no. locations to cross existing watercourses.

Further details of the proposed grid connection can be found in Section 3.1.4.

2.1.4 Biodiversity Enhancement and Management Plan Lands

A Biodiversity Enhancement and Management Plan is located Appendix 3.4 of the EIAR and comprises agricultural and forestry lands. The BEMP lands are identified in Figure 1-5.

2.2 Biodiversity

The dominant habitats present within the proposed wind farm site are largely modified habitats including mature, semi-mature and young 1st and 2nd rotation commercial conifer plantation WD4, improved agricultural grassland GA1, semi-natural to semi-improved wet grassland GS4 and buildings and artificial surfaces BL3 (forestry tracks, local roads).

For the vast majority of the route the grid cable will be buried beneath the road surface and as such the dominant habitat along the proposed grid connection route is buildings and artificial surfaces BL3. Travelling southerly the adjacent road verge are generally comprised of narrow grassy verge (wet grassland GS4, dry-humid acid grassland GS3 and/or occasional dry grassy verge GS2) with bramble and Willow scrub WS1, hedgerow WL1 or occasional treeline WL2. The dominant adjacent land-use is improved agricultural grassland GA1 or occasionally conifer plantation WD4.

2.2.1 Sites of International and National Importance

There are no European sites geographically overlapping with the Site, grid connection and BEMP. The Turbine Delivery Route will be along existing roads which run close to the following European sites:

- Lower River Shannon SAC (002165)
- Barrigone SAC (000432)
- Curraghchase Woods SAC (000174)
- Askeaton Fen Complex SAC (002279)
- River Shannon and River Fergus Estuaries SPA (004077)

However, there are no works proposed at these locations for the purpose of turbine delivery and as such the movement of delivery vehicles along the road will have no effects on the European sites.

Only two Natura 2000 sites are located within 5km of the study area and GCR. These are Mullaghanish to Musheramore Mts. SPA (004612) and Blackwater River SAC (002170).

The Boggeragh Mountains NHA (002447) overlaps the northern part of the wind farm study area.

2.2.2 Invasive Species

High impact invasive plant species, Japanese Knotweed *Fallopia japonica* was recorded within a farmland holding towards the centre/east of the study area and just off-site to the south of the study area. The Knotweed stands were not in the construction footprint of the windfarm, along the GCR or at POIs requiring work along the TDR. No Third Schedule Invasive Species were recorded within the proposed BEMP lands.

Japanese Knotweed is also present in the wider environment and is present along roadsides in the wider area. Rhododendron *Rhododendron ponticum* is also occasionally present within conifer plantation WD4 towards the centre of the study area and to the south.

2.3 Land, Soils and Geology

The land use across the site is predominantly made up of agricultural lands and mature forest.

The subsoils across the site comprise glacial till derived from Devonian sandstones, bedrock outcrop or sub-crop, blanket peat and alluvium.

The southern portion of the proposed development site is characterised by elevated lands with typical elevations of between 323m to 430m AOD with steep to moderate slopes to the west of the site boundary. Slopes within the proposed development and at proposed infrastructure locations generally range from 2 to 16 degrees.

The northern portion of the proposed development includes turbine locations T13 to T20. It comprises of elevated lands sloping relatively steeply to the south (ranging from 2 to 16 degrees).

Slopes at proposed turbine locations in this portion of the development range from gentle (2 degrees) to moderate. There is a maximum slope angle of 16 degrees at turbine T16. Slopes at the proposed borrow pits BP01 and BP02 (western area of the site) are considered moderate to steep with slopes of 14 and 16 degrees, respectively.

Based on the GSI aquifer vulnerability mapping, overburden deposits are generally between 3 and 10m deep in the central portion of the site; generally, 3 to 5m deep in the north and east of the site; and <3m deep in the west south and a portion of the north of the site.

From a review of the GSI Landslide Susceptibility database, the proposed development and proposed infrastructure locations are generally located within areas of 'Low' to 'Moderately High' susceptibility. The mid-section and north-eastern most area of the site is classed as 'Low' with a strip of the southern-most area and the northern area class as 'Moderately High'. The western-most part of the site where the borrow-pits are located is classed as 'Moderately High'.

There was no evidence of active or historical slope instability observed across the site during the site walkover. There are no historical records of landslide activity within or close to the site, according to the GSI database. The GSI information is based on a national dataset and has been superseded following a more recent walkover and study of the area. The site walkover and ground investigations including trial pits and boreholes, peat probing and shear vane testing were all carried out across the site along with a detailed slope stability assessment that resulted in the Factor of Safety across the site to be above the minimum recommended 1.3 limit, indicating a low risk of slope instability.
Detailed information on land, soils and geology is provided in Chapter 9 of EIAR.

2.4 Hydrology & Water Quality

The wind farm site is located within two hydrometric areas (catchment) of the Irish River Network System. These are Lee, Cork Harbour and Youghal Bay (ID 19) and Blackwater (Munster) (ID 18) catchments. The average annual rainfall for the period 1981-2010 in the area of the wind farm site is 1,720 mm.

The wind farm site is situated within three sub-catchments as defined by the WFD.

These waterbodies are known as:

- Sullane_SC_020 (19_7)
- Blackwater (Munster)_SC_050 (18_4)
- Blackwater (Munster)_SC_070 (18_7).

Turbines T1, T2, T3, T6, T7, T8, T9, T10, T11, T12, T13, T16 and T17 are within Laney_010 sub-basin. Turbines T4 and T5 are within Laney_020. Turbines T14, T15 and T18 are within Nad_010 and turbines T19 and T20 are within Glen (Banteer)_010 sub-basin.

The cable route between the proposed on-site 110 kV substation at Knockacullata and proposed on-site 110 kV substation at Lackendarragh North is within four waterbodies (river sub-basins) catchments as defined by the WFD. These are:

- Bride (Blackwater)_010 - IE_SW_18B050050,
- Ross (Killavullen)_010 – IE_SW_18R020500,
- Bride (Blackwater)_020 – IE_SW_18B050320,
- Blackwater (Munster)_180 – IE_SW_18B022100 sub-basin.

The national flood hazard mapping (www.floodmaps.ie), does not indicate any record of historical flooding within the wind farm site boundary. There is a recurring flood incident recorded under the name “Annagannihy North to Musheera Co. Cork Recurring” located at the unnamed stream approximately 650m northeast of turbine T10.

OPW flood data and existing hydrological features recorded within the site area shown on Figure 2-1 and Figure 2-2.

WFD water quality status and river waterbody risk within the study area is provided in Table 2-1:

Table 2-1: WFD River Status and River Waterbody Risk

Waterbody	Waterbody	River Status	Waterbody Risk
Wind Farm			
Laney River	IE_SW_19L010100	High	Not at Risk
West Ballynagree	IE_SW_19L010100	High	Not at Risk
Knocknagappul 19	IE_SW_19L010100	High	Not at Risk
Carrigagulla	IE_SW_19L010100	High	Not at Risk
Nadanuller Beg	IE_SW_18N010400	High	Not at Risk
Glen (Banteer)	IE_SW_18G040600	High	Not at Risk
Unnamed tributaries of Laney River	IE_SW_19L010100	High	Not at Risk
Unnamed tributaries of Nadanuller Beg	IE_SW_19L010100	High	Not at Risk
Grid Connection			
Bealick	IE_SW_119L010500	Good	At Risk
Kilberrihert 19	IE_SW_119L010400	High	Not at Risk
Coolaniddane	IE_SW_119L010400	High	Not at Risk
Caherbaroul	IE_SW_119L010400	High	Not at Risk
Clonavrick	IE_SW_119L010400	High	Not at Risk
Laney	IE_SW_119L010400	High	Not at Risk
Awboy	IE_SW_19A030200	Good	At Risk
Carrigthomas	IE_SW_19L010400	High	Not at Risk

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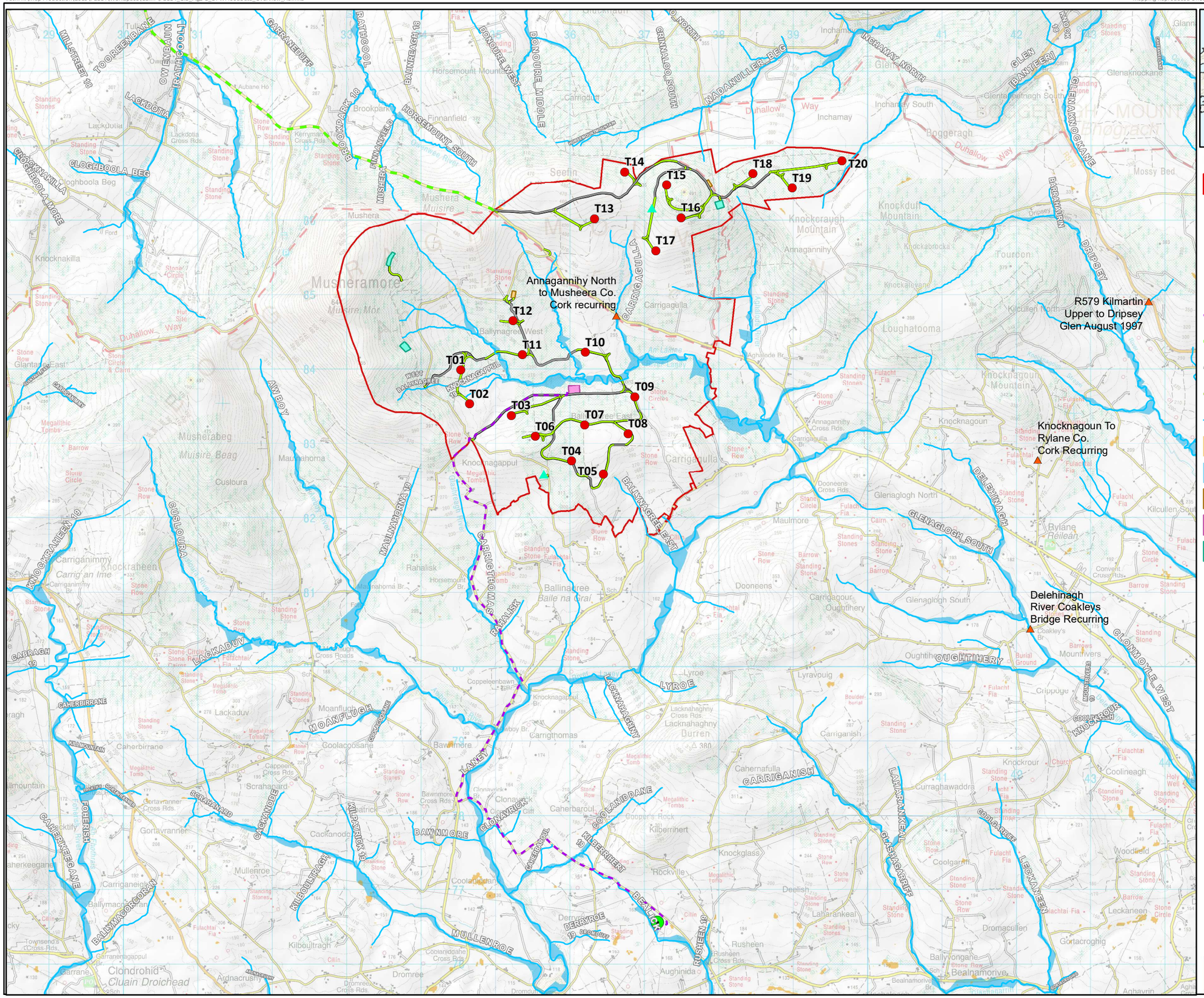

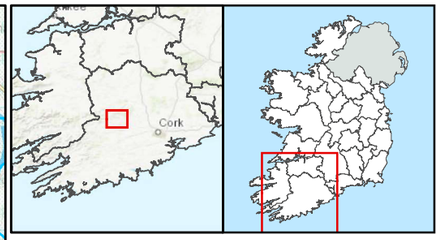

Legend

- Proposed Wind Farm Site
- Proposed Turbine Layout
- OPW Historic Flood Points
- Substations (110-220kV)
- Met Mast
- Grid Connection
- Turbine Delivery Route
- Existing Track Upgrade
- New Access Track
- Rivers
- PFRA 1% AEP Pluvial Flood Extent
- PFRA 1% AEP Fluvial Flood Extent
- Temporary Construction Compound
- Substation Compound
- Proposed Borrow Pits

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TITLE:	OPW Flood Data		
PROJECT:	Ballinagree Wind Farm		
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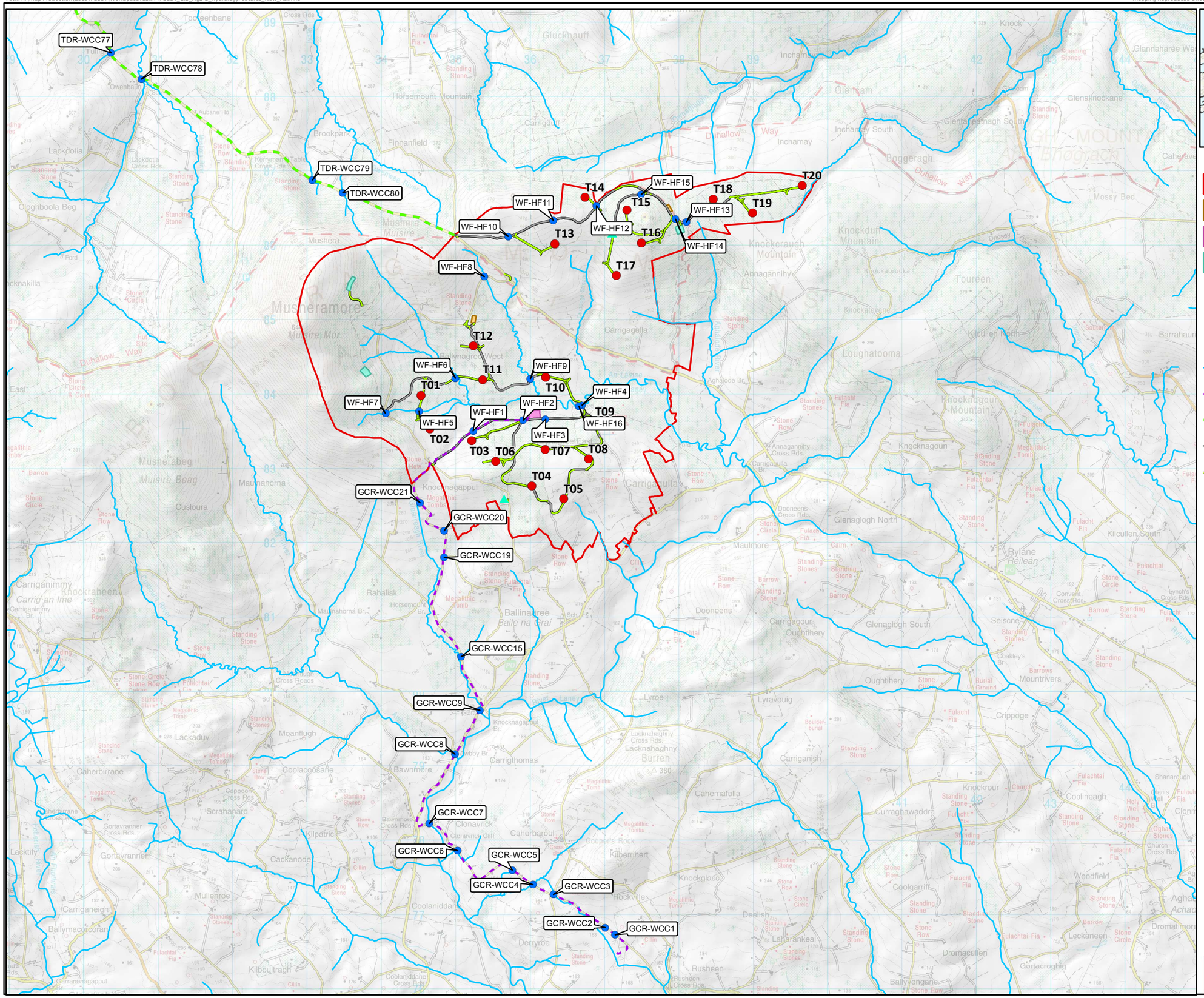

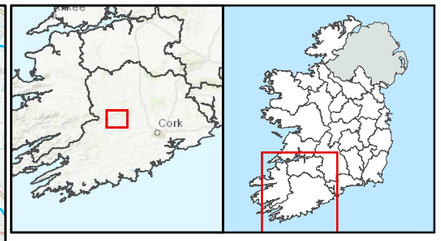

Legend

- Proposed Wind Farm Site
- Temporary Construction Compound
- Substation Compound
- Proposed Borrow Pits
- Proposed Turbine Layout
- Met Mast
- Hydrological Features New
- Rivers
- Grid Connection
- Turbine Delivery Route
- Existing Track Upgrade
- New Access Track

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PROJECT:	Ballinagree Wind Farm		
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2.5 Archaeological, Architectural and Cultural Heritage

There are 14 known archaeological sites located within the wind farm site boundary of the wind farm site.

The locations of the extant archaeological monuments within private lands adjacent to the grid connection route were inspected from the roadsides. There is a stone row (CO049-019----) located within the section of the main wind farm in Knockagappul. It is located c. 50m from the roadside and no potential unrecorded archaeological features were noted within the margins of the road. A wedge tomb further to the south (CO049-067----) is located within a garden of a private house. It is not visible from the roadside to the east but its recorded position is not close to the road margin.

The turbine delivery route will use the existing road network between Foynes and the wind farm site. An inspection was undertaken of the hardstand area within a pasture field in the Drishane Castle demesne, which will accommodate a staging area for the transfer of turbine blades. The staging area comprises a large, level, grass field which was in use as sheep grazing land at the time of survey. It is bounded at south by a section of the random rubble estate wall which borders the public road. The southeast exit from the staging area will be via an existing cul-de-sac road that extends to Drishane cemetery to the north. This burial ground includes a modern southern extension to the earlier graveyard which is recorded archaeological site (RMP CO039-077002-). The partially levelled remains of a ruinous church are on the north side of the graveyard (RMP CO039-077002-).

For further information on archaeology, architectural and cultural heritage of the project, refer to Chapter 14 of the EIAR.

3. OVERVIEW OF CONSTRUCTION WORKS

3.1 Description of the Proposed Project

3.1.1 Wind Farm Site

The Wind Farm Site layout is shown in Figure 1-2.

The proposed wind farm will consist of 20 no. wind turbines , 2no. meteorological masts, and 1 no. substation compound along with ancillary civil and electrical infrastructure. Walking trails will be provided for community use.

Further details can be found in Chapter 3 of the EIAR.

3.1.2 Grid Connection

3.1.2.1 Grid Connection Cable Route

The grid connection route (GCR) will consist entirely of underground 110 kV cable and will connect the on-site substation to the existing 110/220 kV substation at Clashavoon. The GCR will be approximately 11 km in length, with approximately 9 km to be constructed primarily within the existing road corridor. The proposed Grid Connection Route arrangement is illustrated in Figure 1-4. The 110 kV grid connection cable will follow public roads and shall feature horizontal directional drilling (HDD) at 4 no. locations to cross existing watercourses.

Connection works to Clashavoon substation will involve the installation of ducting, joint bays, drainage and ancillary infrastructure and the subsequent running of cables along the existing road network. This will require delivery of plant and construction materials, followed by excavation, laying of cables and subsequent reinstatement of trenches.

It is expected that full road closures will be put in place to facilitate cabling works in combination with lane closures, partial road closures and stop/go systems. This will enable the works to be completed as quickly and as safely as possible, with minimal disruption time for residents of the area. These works shall be undertaken on a rolling basis with short sections closed for short periods before moving onto the next section.

The grid connection is located within the Sullane_SC_020 sub-catchment in its entirety.

The majority of the proposed grid connection route is underlain by Till derived from Devonian Sandstones with limited areas of bedrock sub-crop or outcrop and alluvium indicated along the proposed route.

3.1.3 Turbine Delivery Route

The proposed turbine delivery route is presented in Figure 1-3.

Large components associated with the wind farm construction will be transported to site via the identified turbine delivery route (TDR). The proposed access route to site is as follows:

- Loads will depart the Port of Foynes and turn left onto the N69 towards Limerick;
- Loads will travel onto the M7 and turn onto the N21;
- Loads will turn onto the N20 and travel south through the towns of Charleville and Buttevant;
- Loads will turn right onto the N72 at Mallow and travel west;
- Loads will turn onto the R583 towards Millstreet;
- Loads will turn left onto the L2758 before entering Millstreet;
- Loads will travel South-East along the L2758 to the proposed wind farm site.

Key elements of the temporary accommodation works for the delivery of turbines are summarised in Table 3-1below. The general location of accommodation works are shown in Figure 1-3 and identified as 'Points of Interest (POIs)'. The location and nature of proposed temporary accommodation works are described in further detail in Table 3.1.

Table 3-1: TDR Temporary Accommodation Works

TDR Node Reference Number (POI__)	Location	Summary Description of Proposed Temporary Accommodation Works
2	Foynes Port Access Road/N69	Temporary removal of street furniture. Overrun of splitter island. Overrun and oversail of public road verge. Placement of temporary load bearing surface. Tree and vegetation trimming.
6	N69 West of Toreen	Trimming of tree canopy
7	N69 Toreen	Trimming of tree canopy
9	N69 Clarina Roundabout	Temporary removal of street furniture. Overrun and oversail of northern edge of roundabout island. Placement of temporary load bearing surface. Removal of trees and vegetation.
10	N69/N18 Dock Road West Roundabout	Temporary removal of street furniture. Overrun and oversail of northern edge of roundabout island. Placement of temporary load bearing surface. Removal of trees and vegetation.
11	N69/N18 Dock Road East Roundabout	Temporary removal of street furniture. Overrun and oversail of public road verge. Placement of temporary load bearing surface.
19	N20 Ballybeg bends	Public road verge oversail. Temporary removal of street furniture. Removal of trees and vegetation.
20	N20 Kilcloosha bends	Public road verge oversail. Removal of vegetation.
23	N20/R883 Roundabout, Mallow	Overrun and oversail through roundabout island. Ground reprofiling and placement of temporary load bearing surface. Removal of trees and vegetation.
24	N20/N72 Roundabout Mallow	Overrun and oversail through roundabout and footpaths. Placement of temporary load bearing surface. Temporary removal of street furniture. Removal of tree.
26	N72 Dromcummer Beg	Vegetation trimming. Temporary removal of street furniture.
27	N72 Coolclough Bends	Temporary removal of street furniture. Relocation of telegraph pole. Removal of vegetation.
28	N72 Dromagh	Trimming of trees and vegetation.
29	N72 Dromtarriff Bends	Trimming of trees and vegetation. Removal of hedgerow. Temporary removal of street furniture. Oversail into third party lands. Placement of temporary load bearing surface.

TDR Node Reference Number (POI__)	Location	Summary Description of Proposed Temporary Accommodation Works
30	N72/R583 Junction	Removal of trees and vegetation. Temporary removal of street furniture and wall.
31	R583 Killetragh	Trimming of trees and vegetation.
32	R583 Minehill	Overrun and oversail of public road verge. Placement of temporary load bearing surface. Trimming and removal of trees and vegetation.
36	R583 Drishane Castle	Construction of a temporary staging area comprising aggregate hard standing and associated access track to and from the public road R583 in the grounds of Drishane Castle. Removal of masonry wall to facilitate temporary access from public road R583. Overrun and oversail of public road verge. Placement of temporary load bearing surface. Relocation of telegraph pole. Trimming of trees and vegetation.
37	R583 Right Bend Entering Millstreet	Relocation of utility poles and overhead lines.
38	R583/L1123 Junction	Relocation of utility poles and overhead lines. Removal of walls. Temporary removal of street furniture. Placement of load bearing surface on third party land. Overrun and oversail of public road footpaths. Suspension of parking.
40	L1123 Left bend south of Millstreet	Relocation of utility poles and overhead lines. Overrun and oversail of public road verge. Placement of temporary load bearing surface. Suspension of parking.
41	Tulig road right bend	Relocation of utility poles and overhead lines. Trimming of vegetation.
42	Tulig Road left/ right bend	Trimming of trees and vegetation. Relocation of utility poles and overhead lines.
43	River Owenbawn Left Bend	Removal of trees and vegetation. Relocation of utility poles and overhead lines. Removal of wall.
44	Auhane West of Tullig	Ground reprofiling and placement of load bearing surface on third party land. Relocation of utility poles and overhead lines. Temporary removal of street furniture. Removal of hedge.
46	Temporary widening of existing junction between Butter Road (L1123/L2758) and unnamed local road on approach to main site entrance.	Ground reprofiling and placement of load bearing surface on third party land. Removal of hedge.
47	Local Road on approach to main site entrance	Placement of temporary load bearing surface to roadside verges.

A detailed route selection report has been completed by Pell Frischmann Consulting Engineers. It describes the accommodation works in greater detail. It is included in the EIAR as Appendix 13.2

POIs which require significant works are shown in detail in the 0400 series planning drawings.

The main street of Millstreet will not be used as part of the TDR with the exception of the delivery of wind turbine tower sections to the wind farm site, which will need to approach the junction between the R583 and L1123 from the west to avoid impacting third party property.

This is due to the turning radius of the vehicles used to transport the tower sections which is greater than that of the lifting trailers used to transport the wind turbine blades. For this reason, a left-hand turn at the junction between the R583 and L1123 Butter Road on the main TDR route is not possible for the tower loads, and it is necessary to approach this junction from the west. After the loads have passed through Millstreet, the tower sections shall be decoupled from their clamp trailers at Claratlea and laid on the public road, while keeping a lane open for through traffic. The decoupled clamp trailers shall continue west and carry out a 180 degree turn at an existing Coillte forestry access at Rathduane which has sufficient space to facilitate the manoeuvre before returning to pick up the tower sections at Claratlea. The loaded vehicles shall then return through Millstreet and turn right onto the L1123 Butter Road, rejoining the main TDR route to the wind farm site. A detailed description of the proposed manoeuvre can be found in Appendix 13.3 of the EIAR in the form of a Method Statement for Turning Tower Sections which has been prepared by Pell Frischmann Consulting Engineers and includes swept path drawings. An overview of the turning manoeuvre is shown in Figure 3.1 below.

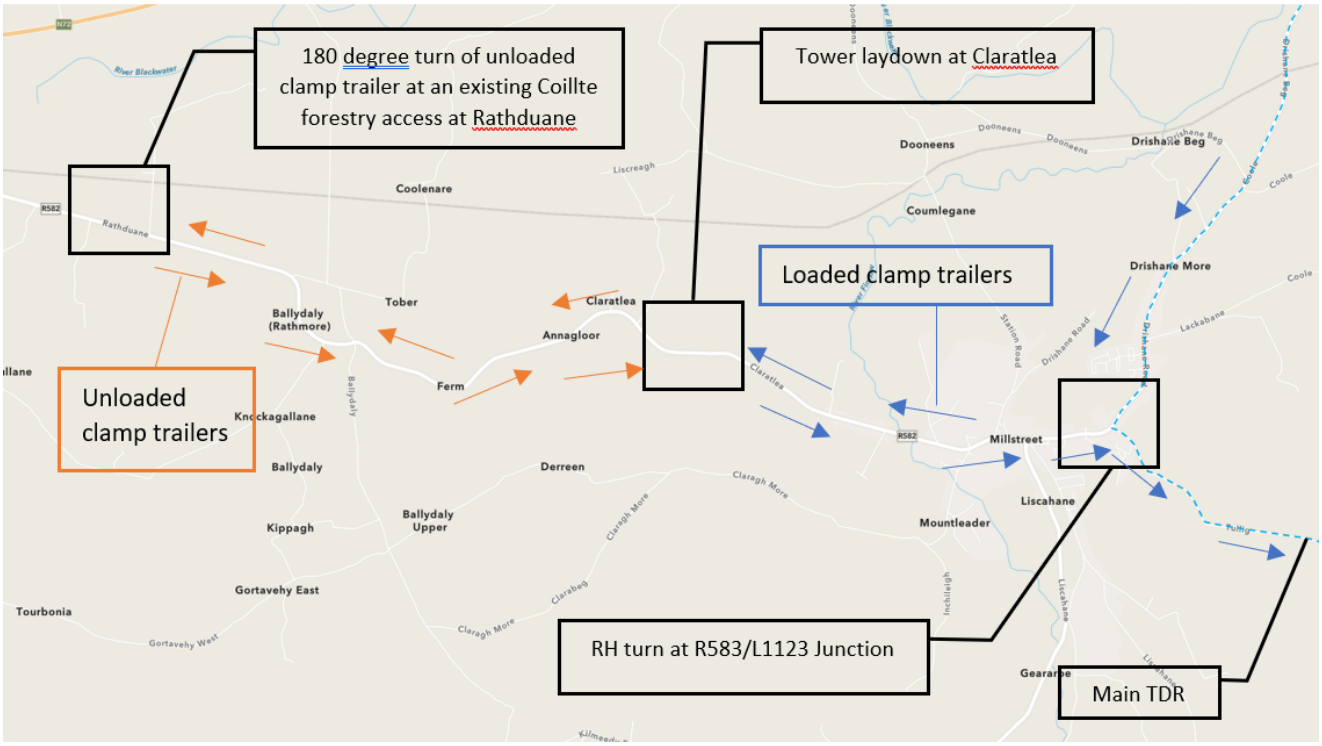


Figure 3-1: Turbine Tower Turning Summary

3.2 Construction Period

It is expected that the construction phase, including civil, electrical and grid works, and turbine assembly will take between approximately 18 - 24 months.

The proposed construction programme upon which assessments in the EIAR have been based is presented in Figure 3-2 below.

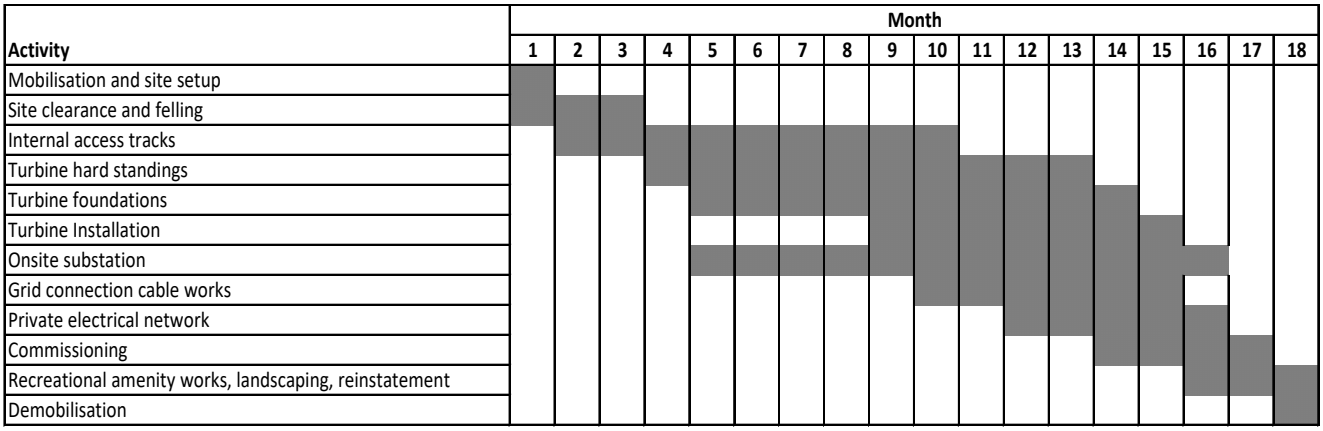


Figure 3-2: Proposed Construction Programme

3.3 Overview of the Construction Sequence

The construction of a wind farm project is a major infrastructural project. The construction of this project will involve many inter-related, inter-dependent and overlapping elements of a complex nature.

The following section outlines the construction methodology for the proposed project. Upon mobilisation for the construction of the development, peat excavation (where required), upgrading of existing site tracks, felling and the provision of new site tracks will precede all other activities. Drainage infrastructure will be constructed in parallel with the track construction. This will be followed by the construction of the turbine foundations and the provision of the hardstanding areas. In parallel with these works the on-site electrical works; sub-station and internal cable network are constructed. The proposed grid connection cable route works will commence following the completion of the proposed on-site wind farm works.

3.3.1 Overview of the Construction Methodology

Method statements are presented below for the key elements of the construction process. The contractor for the main construction works will, following appointment, take ownership, expand upon and generally develop these method statements appropriately for the construction stage.

The proposed construction methodology is summarised under the following headings:

- Site Entrances
- Temporary Site Compounds
- Felling
- Concrete Washout and Wheel Washing
- New Site Access Tracks
- Upgrade of Existing Internal Access Tracks
- Drainage and Watercourse Crossings
- Internal Wind Farm Cable Works
- Borrow Pit Construction
- Crane Hardstands

- Turbine Foundations
- Substation Compound
- Electrical Works
- Turbine Erection
- Grid Connection Cabling Works
- TDR Temporary Accommodation Works

3.3.1.1 Site Entrances

Ballinagree Wind Farm will use five existing forestry and agricultural entrances. The locations of these access points are shown on Figure 1-2.

The access points have been selected with consideration for safety of public road users and construction staff and to ensure they can be constructed to comply with the requirements of both Cork County Council and TII design requirements for direct accesses. Each of the access points are described in detail in Chapter 3 and Chapter 13 of the EIAR.

Site entrance designs and minimum visibility splays to be provided for the construction and operation of the proposed wind farm are shown in 0101-Series planning application drawings.

Site entrances will be constructed using the same methodology as the construction of the wind farm tracks as described in section 3.3.1.5.

The proposed trail head car park is shown on planning drawing P2114-0300-0017

Access Point 1: This is the main site entrance for the southern part of the site and shall also act as the main site entrance for the overall wind farm. An existing Coillte forestry access shall be upgraded to facilitate the delivery of turbine components. All turbine components accessing the southern part of the site shall use this entrance for the installation of turbines T1 to T13. This access point shall also be used for all construction and operation vehicles and shall be used by both HGV's and LGV's. This access point shall also act as the main entrance to the recreational amenity trail head at the location of the southern temporary compound during the operational phase of the project. This access is already regularly used by HGV's associated with agricultural and forestry activities and will continue to be used during the construction and operation phases of the project.

Figure 3-3: Access Point 1

Access Point 2: This is the main site entrance for the northern part of the site. An existing agricultural and forestry access shall be upgraded to facilitate the delivery of turbine components. All turbine components accessing the northern part of the site shall use this entrance for the installation of turbines T14 to T20. This access point shall be used for construction and operation by both HGV's and LGV's. This access is already regularly used by HGV's associated with agricultural and forestry activities and will continue to be used for these activities during the construction and operation phases of the proposed project. This access has also been used in the past to facilitate the construction of the existing Boggeragh Wind Farm.

Figure 3-4: Access Point 2

Access Point 3: This is an existing agricultural and forestry access which provides access to the southern part of the site. This access point will be used for operational access by LGV's only. The proposed grid connection export cable shall exit this site through this access point. This access is already regularly used by HGV's associated with agricultural activities.

Figure 3-5: Access Point 3

Access Point 4: This is an existing Coillte forestry access which will be used during the construction phase by LGV's and HGV's. This access point will form part of a public road crossing point with Access Point 5 for construction traffic travelling to and from the proposed borrow pits in the west of the site only. This access is already regularly used by HGV's associated with agricultural and forestry activities.

Figure 3-6: Access Point 4

Access Point 5: This is an existing Coillte forestry access which will be used during the construction phase by both LGV's and HGV's. This access point will form part of a public road crossing point with Access Point 4 for construction traffic travelling to and from the proposed borrow pits in the west of the site only. This access is already regularly used by HGV's associated with agricultural and forestry activities.

Figure 3-7: Access Point 5

3.3.1.2 Temporary Site Compounds

During the construction phase, it will be necessary to provide temporary facilities for construction personnel. The location of the temporary site compounds are shown on Figure 1-2.

Ballinagree will have 2no. temporary compounds; one located near the main entrance to the southern part of the site which will include welfare facilities and offices and will act as the primary construction site compound, and a second, smaller compound in the northern part of the site as shown in Figure 1-2.

Temporary compounds shall be aggregate hard standings surrounded by security fencing, located as shown on the accompanying drawings. On completion of the construction phase, the temporary compounds will be dismantled, the hardstanding will be left in situ and covered over with soil which will be allowed to revegetate naturally. Part of the southern compound will be kept as a carpark for the recreation trail.

Facilities to be provided in the temporary site compounds will include the following:

- site offices, of Portacabin type construction
- portaloos
- bottled water for potable supply
- a water tanker to supply water used for other purposes
- canteen facilities
- storage areas
- employee parking
- bunded fuel storage
- contractor lock-up facility
- diesel generator
- waste management areas

The temporary compound for the northern cluster is shown on planning drawing P2114-0300-0015. The temporary compound for the southern cluster is shown on planning drawing P2114-0300-0016.

3.3.1.3 Felling

Much of the proposed wind farm site comprises commercial coniferous forestry. 10 no. turbines are located within forestry and consequently tree felling will be required as part of the project. Permanent felling of approximately 70 ha of coniferous forestry is required within and around the wind farm infrastructure to accommodate the construction of some turbines, hardstands, crane pads, access tracks and the proposed onsite substation. The felling area proposed is the minimum necessary to construct the proposed project and also to comply with any environmental mitigation (bats in particular). In addition to the wind farm infrastructure felling described above, 18 ha of coniferous forestry is being felled as part of the proposed BEMP measures. The total amount of felling proposed for the project therefore is 88 hectares. In advance of other construction works, clearance felling will commence on site and is expected to take up to 3 months.

To ensure a tree clearance method that reduces the potential for sediment and nutrient runoff, the construction methodology will follow the specifications set out in the Forest Service Forestry and Water Quality Guidelines (2000) and Forest Harvesting and Environmental Guidelines (2000).

In this regard, before any felling works commence on site all personnel, particularly machine operators, will be made aware of the following and will have copies of relevant documentation, including:

- The felling plan, surface water management, construction management, emergency plans and any contingency plans;
- Environmental issues relating to the site;
- The outer perimeter of all buffer and exclusion zones;
- All health & safety issues relating to the site.

The proposed tree felling around proposed 'infrastructure' will be limited to:

- 20m wide corridors for new and upgraded access tracks;
- Outer footprint of turbine hardstandings including an additional 10m offset from same;
- Outer footprint of temporary compounds;
- Outer footprint of onsite substation compound;
- 6m corridor for buried cables in private lands;
- 101.3m radius around each turbine tower located in forestry for bat impact mitigation;
- 25m radius around the footprint of on-site meteorological masts.

3.3.1.4 Concrete Washout Area and Wheel Washing

All concrete will be delivered to site via ready-mix trucks from a local supplier.

Concrete washout will be carried out in a dedicated area of the temporary compound or at a designated washout pit on site. Only the washing of chutes will be permitted. Every concrete truck delivering concrete to the site must use the concrete washout facility prior to leaving the site. Chutes will be washed out at the designated area with a settlement pond provided to receive all run-off. Wheel wash details are shown on planning drawing P2114-0300-0024. Settlement pond details are shown on planning drawings P2114-0501-0006 and P2114-0501-0007.

The concrete wash-out area will be constructed as follows:

- The topsoil and subsoil, if necessary, will be stripped out and placed adjacent to the temporary compound area.
- An impermeable membrane will be installed directly onto the subsoil, and/or subsoil, to form the impermeable concrete wash-out settlement lagoon.
- A designated truck wash-down concrete apron shall be constructed next to this settlement lagoon.
- Impermeable lined drains will direct the wash-out flow to the wash-out settlement lagoon.
- The residual liquids and solids will be disposed of off-site at an appropriate licenced waste facility.

Upon completion of the project the concrete wash-out areas and settlement lagoons will be decommissioned by removing the impermeable membrane and backfilling the area with the material arising during excavation. The removed material will be recovered or disposed of off-site at an appropriate facility.

Wheel wash facilities will be located near site entrances 1 and 2 as shown on Figure 1-2to reduce construction traffic fouling public roads. Each wheel wash will come with an additional water tank which will be filled regularly. These units will be self-contained and will filter the waste for ease of disposal. Silt will be removed from each unit and from site by a licensed contractor.

3.3.1.5 New Site Access Tracks

All site tracks will be designed taking account of the loadings required by the turbine manufacturer and will consist of a compacted stone structure. Suitable granular fill material for the sub-base of the track will be sourced from the borrow pits within the site. Suitable class 6 structural fill will be imported from a licensed quarry as required to meet the requirements of the detailed design. Class 6F2 and clause 804 granular material for track base course and running surface will be imported from a licensed quarry.

The majority of access tracks on the site will be constructed using traditional founded track construction and best practice construction methods from suitable load bearing strata. This system will consist of either one or two layers of stone depending on the load bearing capacity of the base layer. Where the underlying layer is mineral subsoil, two layers of stone are used; a stone capping layer and running layer.

In areas where the load bearing layer is rock, the capping layer is omitted, and the running layer is installed directly onto the rock surface. Drainage runs and associated settlement ponds will be installed.

Track construction details are as follows:

- Establish alignment of the new site tracks from the construction drawings and mark out the centrelines with ranging rods or timber posts.
- The access tracks will be of single-track design with an overall width of 5m. There will be some local widening on the bends, junctions and around Turbine Foundations for the safe passage of large vehicles. All bends have been designed to suit the requirements of the delivery vehicles.
- All machinery shall work within designated construction areas indicated on the contract drawings.
- All access for construction vehicles within the site shall follow the proposed internal access tracks as shown in Figure 1-2.

- Topsoil/subsoil will be stripped back to required levels. Excavated material will be placed along the side of sections of the tracks and dressed to blend in with surrounding landscaping and partially obscure sight of the track.
- The soil will be excavated down to a suitable formation layer of either firm subsoil or rock.
- The formation will be prepared to receive the geotextile membrane.
- Well-graded granular fill will be spread and compacted in layers to provide a homogeneous running surface. The thickness of layers and amount of compaction required will be decided by the Site Manager based on the characteristics of the material and the compaction plant to be used.
- Batters will have a slope of between 1:1 and 1:5 (depending on depth and type of material) and will be left as cut to re-vegetate naturally with local species.

2.75 km of floating road construction will be adopted in the northern part of the site where peat depths are greatest. In this instance, geogrid will be placed directly on the existing ground surface and aggregate will be placed and compacted in lifts on top with additional layers of geogrid placed at specified depths where necessary. A layer of compacted Cl 804 material will be placed on top to provide a suitable running surface.

3.3.1.6 Upgrade of Existing Internal Access Tracks

Figure 1-2 illustrates the internal access tracks within the Wind Farm Site.

An extensive network of agricultural and forestry access tracks exists within the site. 11.8km of these existing access tracks will be upgraded for the proposed project.

All access tracks will be widened to 5 m wide along straight sections and wider at bends as required. The tracks will be finished with a well graded aggregate. The drainage system will be installed adjacent to the internal access tracks. Existing drainage infrastructure will be maintained and upgraded where necessary.

Access track formation will consist of a minimum 500mm hardcore on geo-textile membrane.

Existing track upgrades shall follow the same outline methodology as for new access tracks.

Refer to 300 series planning drawings for typical track dimensions.

3.3.1.7 Temporary Tracks

Temporary aluminium access trackway will be used to provide short term access to areas of the site not served by the proposed aggregate tracks during the construction and commissioning phase. This solution is commonly used to provide temporary road access to outdoor events and is designed to be installed quickly in modular sections with minimal impact to existing ground. It is primarily used for ground protection and to prevent the creation of excess mud from site vehicles.

A Temporary Aluminium Access Trackway is shown below in Figure 3-8.

Figure 3-8: Temporary Aluminium Access Trackway

3.3.1.8 Internal Wind Farm Cabling Works

The specification for cable trenches will vary slightly depending on cable voltage, location and existing land use. Typical cable trench construction details are presented in 0300-Series planning application drawings.

All electrical and fibre-optic cabling on site between the wind turbines and the substation building will be buried in trenches approximately 0.6m wide by 1m deep located within or directly adjacent to the internal tracks.

The following describes the construction methodology for cable installation works inside the wind farm site. Some cables will be buried directly and some will be ducted. Direct buried cables will be used in non-load bearing areas and ducts will be used in load bearing areas.

For direct buried cables, the following outline methodology shall apply:

- All environmental mitigation measures will be implemented locally in advance of the works, in accordance with environmental management plan outlined in Section 4 of this CEMP.
- The line of the cable trench will run beside the site access tracks until it exits to the public road.
- The ground will be excavated using a mechanical digger. The top layer of soil will be removed and placed to one side. It will be used for landscaping the top of the backfilled cable trench following the laying of the cables. The remaining subsoil, excavated to the required depth, will be placed separately and used as backfill for the trench.
- Safe ladder access/egress to trenches will be provided into the trench.
- The cables will be laid directly onto a bed of suitable material, free from sharp stones and debris*.
- A suitable material will be placed over the top of the cables to protect them during backfilling*.
- Warning tape and plates will be installed by hand in accordance with the trench design and ESBN specifications and the engineer's design.
- On completion, the ground will be reinstated, and marker posts will be positioned at agreed centres to the side of the trench highlighting the presence of cables below.
- Trenches will vary in width depending on the number of cables in the circuit. Where there is more than one set of cables they will be separated as per cable manufacturers and ESB/ EirGrid requirements.

Where ducting is required within the wind farm site (i.e. for areas where cables will be laid under access tracks or other loaded surfaces), suitable ducting will be required to protect the cables. In this scenario, tasks marked by an asterisk (*) in the above methodology will be replaced by the following steps:

- Ducts will be placed into the trench manually, having been delivered to road side embankment/verge by tractor and pipe trailer and then offloaded by hand.
- Approved bedding material will be used to surround the ducts. It will be delivered straight from a concrete truck or by skid steer along the route.
- Approved fill material will be compacted above and below the power cable ducting as per the engineer's design.
- Exposed duct ends will be capped.
- A 12mm Draw rope will be blown through the ducting at later date.
- Small jointing pits will be located along the route of the trench which will be left open until jointing takes place. A protective handrail/ barrier will be placed around each pit for health and safety reasons.
- Once the cables are joined and sealed the jointing container will be removed and the cables at the joint-bay locations will be back-filled in the same manner as the rest of the cable trench.
- The cables will connect the turbines to the substation. Ducts will be cast into each turbine foundation to provide access for the cables Likewise, at the substation, ducts will be cast through the building foundation to provide access for the cables.
- There are no existing buried services expected within the site however the appointed contractor will be responsible for carrying out pre-construction surveys ahead of construction.
- Prior to commencement of the works, records of services such as watermains, sewers, gas mains and other power cables will be obtained from the relevant service providers. Cable detection tools, ground penetrating radar and slit trenches will be used, as appropriate, to find the exact locations of existing services. The final locations of the cable trenches will be selected to minimise conflicts with other services.
- Trenches where ducts are laid will be back filled every evening. During excavation works signage will be erected at each location warning of the dangers.

3.3.1.9 Drainage and Watercourse Crossings

A surface water management plan has been prepared. It can be found in Appendix 10.2 of the EIAR. it contains methodology for drainage, water quality management and silt control. The measures contained within the plan will be applied when constructing the watercourse crossings.

Drainage design and details can be found on the 0501 series planning drawings.

Watercourse crossings details can be found on the 0300 series planning drawings.

Watercourse crossings can generally be classified as follows:

- Existing structures (bridges or culverts) that need to be crossed by infrastructure (access tracks or cables) associated with the proposed project, without a need to modify the existing structure;
- Installation of new structures to facilitate the crossing of existing watercourses by infrastructure associated with the proposed project;

- Existing structures that need to be either replaced or upgraded to facilitate the crossing of existing watercourses by infrastructure associated with the proposed project;
- Crossing of existing open streams or drains by cable ducts.

The methodology/sequence of works associated with the proposed watercourse crossing methods are described below.

Construction Methodology for Instream Works and Temporary Stream Diversions

The following methodology shall be applied at all locations where instream works are required.

- Instream works shall only take place during the period July to September (as required by IFI for instream works). However, as stated above, all instream works shall take place in written agreement with the IFI;
- Operation of machinery in-stream should be kept to an absolute minimum. All construction machinery operating in-stream should be mechanically sound to avoid leaks of oils, hydraulic fluid, etc. Machinery should be checked prior to commencement of in-stream works.
- Before contact with water is made, any equipment or machinery that will be used in the water, including Personal Protective Equipment (e.g. footwear, gloves), will be sprayed and cleaned with a 1% solution of Virkon® Aquatic (or other proprietary disinfectant);
- Upon completion of the work or moving the equipment or machinery from the water, these will be visually inspected for any possible sources of contamination and any attached plant or animal material or debris will be removed. The equipment and machinery will be further sprayed and cleaned with a 1% solution of Virkon® Aquatic (or other proprietary disinfectant);
- If temporary diversion channels are necessary as part of the instream works, they should provide for fish passage, be non-eroding, and be of similar width to the natural stream channel. The channel diversion should be compliant with the following measures:
    - Diversion of water to and from temporary channels should only take place during the period July to September (as required by IFI for instream works) and in accordance with the IFI;
    - Consultation with the NPWS should also be carried out as species protected under the Wildlife Act, EU Habitats Directive and the EU Freshwater Fish Directive occur within the river water bodies affected by the instream works;
    - The works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;
    - A minimum 10 meter vegetative buffer zone will be maintained between disturbed areas and the water body. There will be no storage of material/equipment, excavated material or overnight parking of machinery inside the 10m buffer zone;
    - Double silt fencing will be placed upslope of the buffer zone on each side of the water body. The silt fencing will have removable "gates" as required to allow access of excavator while maintaining ease of replacement overnight or during periods of heavy rainfall. The silt fencing will be extended at least 10m upstream and downstream of the crossing location;
    - Bog mats will be used underneath the excavator inside the 10 meter vegetative buffer zone to prevent soil erosion and potential water quality impacts from localised surface water runoff;
    - Temporary storage of excavated overburden from the diversion channel will be undertaken outside of the 10m buffer on flat ground or within a local hollow. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the water body;

- The water body dam (in the stream to be diverted) will be made of sand (clean) bags, cobbles or clean well-graded coarse gravel fill. Poorly sorted material will not be used as it would be a potential source of fine sediment (the dam will be installed once the diversion channel is in place);
- The banks and bottom of the diversion channel will be lined with impermeable geotextile to prevent erosion and surface water quality impacts. A layer of clean course gravel will be placed over the geotextile on the bed of the channel to keep it in place;
- An energy dissipater (such as clean rock fill or splash plates) will be placed on the water body bed and opposing bank of the receiving water body downstream of the diversion channel. This will prevent scouring and erosion of the water body bed and bank at the outfall during diversion;
- Water body bed trench excavation works will commence once stream flow is fully diverted from the crossing excavation area;
- Temporary storage of excavated material from the crossing trench will be undertaken separately to the material from the diversion channel. All storage areas will be outside the 10m buffer zone. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the water body;
- Sediment laden water from trench dewatering will be discharged onto a well vegetated, dry, flat area at least 50m from a water body via a straw bale dewatering structure or geotextile filter bag. The outfall will also be surrounding by silt fencing;
- In addition, the suitability of the discharge area shall be confirmed by the site geotechnical engineer so as not to pose an increased risk to slope stability with consideration for ongoing activities both upslope and downslope of the proposed location and shall be sited to avoid areas of deep peat;
- If there is no suitable area for discharge onto ground, settlement ponds will be used where necessary and will be put in place prior to commencement of preparation works;
- Any water from trench dewatering will not be discharged directly to a water body;
- Clay bunds will be placed within the trench backfill on either side of the water body to prevent the trench acting as a drain towards the stream, thus preventing potential water quality impacts;
- Upon completion of the in-stream works, the stream crossing will be restored to its original configuration and stabilised to prevent bank erosion by means of timber stakes, timber planks and geotextiles as required (Project Design Measure);
- The diversion channel will be backfilled and reinstated to its original level and rock armour will be placed at the stream banks where the inflow and outflow of the diversion channel previously existed;
- The ground surface along the reinstated diversion channel will be re-seeded at the soonest opportunity to prevent soil erosion;
- The silt fencing on either side of the stream buffer will be left in place and maintained until the disturbed ground has re-vegetated;
- Operation of machinery and use of equipment within the 10m buffer will be kept to a minimum to avoid any unnecessary disturbance;
- Disturbance of bankside soils and stream sediments will be restricted to the minimum required for the cable laying process to avoid unnecessary impact on the stream morphology;
- There will be no batching or storage of cement allowed at the stream crossing;

- There will be no refuelling allowed within 100m of the stream crossing;
- All plant will be checked for purpose of use prior to mobilisation at the stream crossing;
- Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted; and
- Once construction of the crossing is completed, reconnection to the existing water body can be made and this should only occur within the approved operational window for in-stream works.

Construction Methodology for Watercourse Crossings in the Wind Farm Site

Minor Watercourses and Drain Crossings (Access Tracks)

It is expected that all minor watercourse and drain crossings within the site will be crossed using piped culverts. Piped culverts will only be used over very short stretches i.e. at track crossings. Pipe culverts will be sized to take the 1 in 100-year flood flow with a 20% allowance for Climate Change. Concrete or HDPE pipes may be used depending on the size of the watercourse to be crossed.

The Wind Farm Site layout does not cross any significant stream within the site boundary. Minor drains such as manmade agricultural and forest drains will be crossed using 450mm diameter pipes.

Where cross drains are to be provided to convey the drainage across the track at regular intervals, the sizes of these cross drains are 300 mm diameter pipes.

Silt Protection Controls (SPCs) are proposed at the location of the drain crossings. SPCs will consist of a minimum of silt traps containing filter stone and filter material staked across the width of the swales and upstream of the outfall to any watercourse.

Pipe culverts will be installed in accordance with the design shown in Figure 3-9 below.

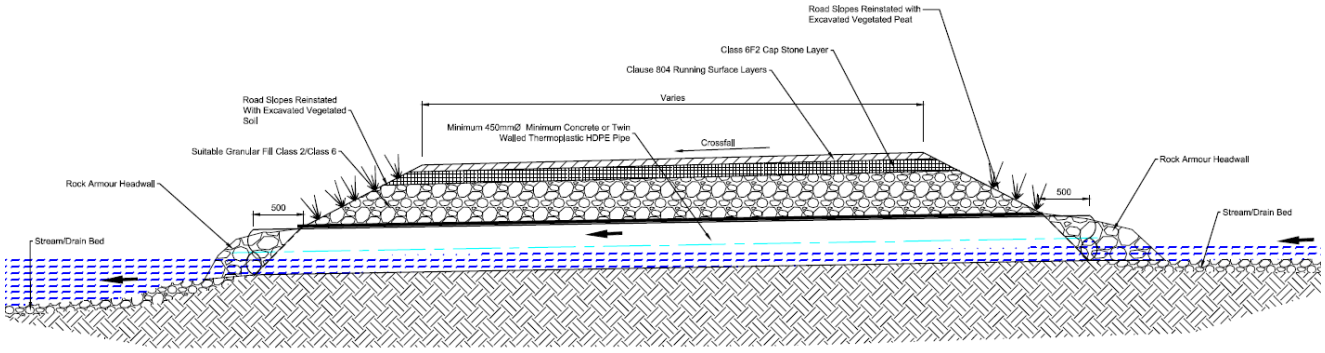


Figure 3-9: Piped Culvert Crossing Long Section

For a minor watercourse/drain crossing using a piped culvert, the following methodology will be used.

- The access track construction will finish at least 2.5m from the nearside bank of the minor watercourse/drain.
- Use of weather forecasts will be made, and works will be planned when a dry spell of weather is forecasted;
- Work will not be undertaken during periods of high rainfall. This will minimise the risk of entrainment of suspended sediment in surface water runoff and transport via this pathway to surface water bodies;

- Where there is a requirement to disturb either the bed or bank as a result of the construction/replacement works, the watercourse will be dammed upstream and diverted prior to work commencing;
- A temporary berm (i.e. sandbags and/or rectangular straw bales) will placed along the edge of the track/road to prevent loose material being dislodged or washed into the water body;
- All environmental mitigation measures will be implemented locally in advance of the works, in accordance with the environmental management plan outlined in Section 4. Instream works and temporary diversions where required shall be carried out in accordance with the measures outlined in Section 3.3.9.1.
- The bed of the channel in which the culvert will be laid will be prepared using a mechanical digger and hand tools to the required levels in accordance with the design.
- A bedding layer will be laid in the base of the minor watercourse/drain using Class 6 aggregate material and blinding to the desired levels in accordance with the design.
- The pipe is laid in one lift or in sections using an excavator in accordance with an approved lift plan.
- Bedding material is placed and compacted around the pipe to the desired levels in accordance with the design.
- Suitable bedding material in the form of clean round gravel between 10-100mm diameter, shall be laid in the base of the pipe in accordance with the recommendations set out in *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Watercourses from* Inland Fisheries Ireland.
- The pipe is covered using compacted Class 6N fill material in accordance with the design up to the levels required by the access track sub formation.
- Rock armour headwalls will be constructed where necessary to protect pipe ends and the base of slope embankments on either side of the track.
- For small drain crossings, pipes of suitable diameter will be laid directly into the bed of the drain.

In some cases, where existing internal forest tracks need to be widened, it will be necessary to widen, replace or extend existing pipe drains. In such cases, the above measures shall also be employed.

Minor Watercourses and Drain Crossings (Cable Trenching)

For a minor watercourse/drain crossing, the following methodology will be used.

- The cable trench construction will finish at least 2.5m from the nearside bank of the minor watercourse/drain.
- Use of weather forecasts will be made, and works will be planned when a dry spell of weather is forecasted;
- Work will not be undertaken during periods of high rainfall. This will minimise the risk of entrainment of suspended sediment in surface water runoff and transport via this pathway to surface water bodies;
- Where there is a requirement to disturb either the bed or bank as a result of the construction/replacement works, the watercourse will be dammed upstream and diverted prior to work commencing;
- A temporary berm (i.e. sandbags and/or rectangular straw bales) will placed along the edge of the track/road to prevent loose material being dislodged or washed into the water body;

- All environmental mitigation measures will be implemented locally in advance of the works, in accordance with the environmental management plan outlined in Section 4. Instream works and temporary diversions where required shall be carried out in accordance with the measures outlined in Section 3.3.9.1.
- The bed of the watercourse will be prepared using a mechanical digger and hand tools to the required levels in accordance with the design along the alignment of the cable route.
- Once the trench has been excavated, a bedding layer of sand will be installed and compacted.
- PVC ducts will be installed on top of the compacted base layer material in the trench.
- Once the ducts have been installed, couplers will be fitted and capped to prevent any dirt etc. entering the unjointed open end of the duct. In poor ground conditions, the open end of the duct will be shimmed up off the bed of the trench to prevent any possible ingress of water and dirt into the duct. The shims will be removed once the next length of duct has been joined to the duct system.
- The as-built location of the installed ducts will be surveyed and recorded using a total station/GPS before the trench is backfilled to ensure recording of exact location of the ducts, and hence the operational electricity cable. These co-ordinates will be plotted on as-built record drawings for the operational phase.
- When ducts have been installed in the correct position on the trench base layer, sand will be carefully installed in the trench around the ducts so as not to displace the duct and compacted.
- A red cable protection strip will be installed above duct surround layer of material.
- A layer of excavated material will be installed on top of the duct surround material to the correct level.
- Yellow marker warning tape will be installed for the full width of the trench.
- The bed of the watercourse, stream banks and agricultural land will be reinstated as per their original condition.

Box Culvert Construction Methodology

Box culverts have been used at stream crossings where pipes would not be sufficient.

Culverts will be sized to take the 1 in 100 year flood flow with a 20% allowance for Climate Change.

The construction methodology for the box culvert will be the same as a piped culvert with the only difference being a box being used instead of a pipe.

Clear Span Bridge Construction Methodology

Clear Span bridge construction will be required as part of the wind farm internal access track construction (WF-HF4) as shown on drawing P2114-0300-0018. Sufficient free-board will be allowed for in the proposed bridge design to allow for 1 in 100-year fluvial flood conditions with a 20% allowance for Climate Change.

In order that flood flows will not be obstructed, the stream crossings will be sized to convey a 1 in 100-year flood flow with a 20% allowance for Climate Change.

The construction methodology is detailed as follows:

- Excavation near river banks is required to install and secure pre-cast concrete abutments.
- Abutments will be set back 2.5m from 1% AEP flood height (100-year event).
- Dry working conditions at these sites will be maintained by retaining the existing bank and using a short section of sand bags in a cofferdam style formation on the stream side of the working area. The sandbag screen will prevent any soil from excavations from falling into stream.
- On alternate sides of the stream, within the sequenced sandbag screen set-ups, the abutment base will be excavated to rock or competent stratum with a mechanical excavator.
- The foundations and abutments will be pre-cast concrete sections. They will be lifted into place on the base. The area around the abutments up to access road level will be infilled with a structural fill.
- Once each abutment is in place and secured with structural fill, the pre-cast concrete deck will be laid down on the abutments, anchored and a thin screed of concrete will be poured on top.
- When the concrete deck is connected to the abutments, the filling and compaction of the road will be completed.
- Ducts for the later pulling of power and communication cables for the wind farm will be pre-cast into the bridge deck sections.
- Construction of the water crossing will be scheduled to align with fisheries seasonal restrictions.
- The access road on the approach to 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, including check-dams and /or silt traps, along the proposed road will be installed in advance of the works along with the first layer of road construction.
- All earthworks adjacent to the crossing locations will be carried out so as to prevent soil entering the watercourse.
- Safe access over the stream for this installation will be via a steel walkway & handrail which will span the stream.

Construction methodology for Watercourse crossings along the Grid Connection

The grid connection cable route contains 3 No. bridge watercourse crossings and one large culvert crossing which will be completed using horizontal directional drilling (HDD).

A number of other minor watercourses crossing locations have been noted along the cable route, i.e. culverts, pipe drains and minor field drains. Crossing of these existing culverts will be as per undercrossing or overcrossing methods, depending on the depth of the culvert or using open trenching.

Standard Trench Crossings of Existing Culverts or Services

For the crossing of buried pipe drains, culverts or services, if encountered, the following options for construction may be used:

- Piped Culvert Crossings – Where sufficient cover is available, the cable ducts will be laid above the culvert with a minimum separation distance, 300mm to be agreed with the local authority and Eirgrid within the parameters assessed in the EIAR.
- Piped Culvert Crossings - Where sufficient cover is not available, the cable ducts will be laid under the culvert with a minimum separation distance, 300mm to be agreed with the local authority and Eirgrid within the parameters assessed in the EIAR.

When crossing existing culverts or buried services, the following methodology will be employed:

- The general method of trench construction will follow the procedure outlined above for Installation of cable ducting.
- The service infrastructure shall be located and marked by an engineer in accordance with the Code of Practice for Avoiding Danger from Underground Services, Health and Safety Authority 2005.
- All services will be safeguarded and protected in accordance with the asset owner's specifications.
- Within 500 mm of the existing service, hand digging will be employed to expose it.
- Cable ducts shall pass over or under the existing service, depending on the depth of the service and other constraints. Figure 3-12 shows design details for ducts passing in flatbed formation above existing culverts and buried services.
- A minimum separation distance of 300mm shall be maintained between the cable ducts and the existing service.
- Existing services within the trench shall be left in the same condition as they were found. Any issues shall be reported to the asset owner immediately.

Piped Culvert Crossings – Ducting Under Culvert

Where the culvert consists of a socketed concrete or sealed plastic pipe with insufficient cover over the culvert to accommodate the cable trench, a trench will then be excavated beneath the culvert and cable ducts will be installed in a trefoil arrangement under the sealed pipe.

This method of crossing is illustrated in Figure 3-10below. If these duct installation methods cannot be achieved or utilized, the ducts will be installed by alternative means as set out in the following sections.

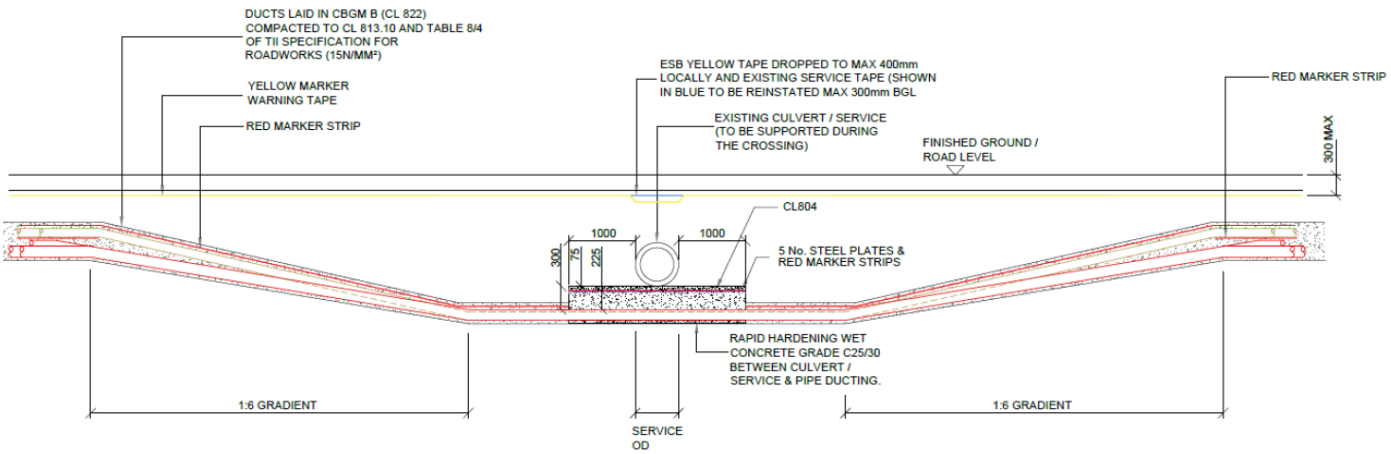


Figure 3-10: 110kV Cable Duct Undercrossing Method

Piped Culvert Crossing – Ducting Over Culvert

Where sufficient cover exists above the culvert, the trench will be excavated above the culvert and the ducts will be installed in the trefoil arrangement passing over the sealed pipe where no contact will be made with the watercourses. This method of duct installation is further detailed in Figure 3-11.

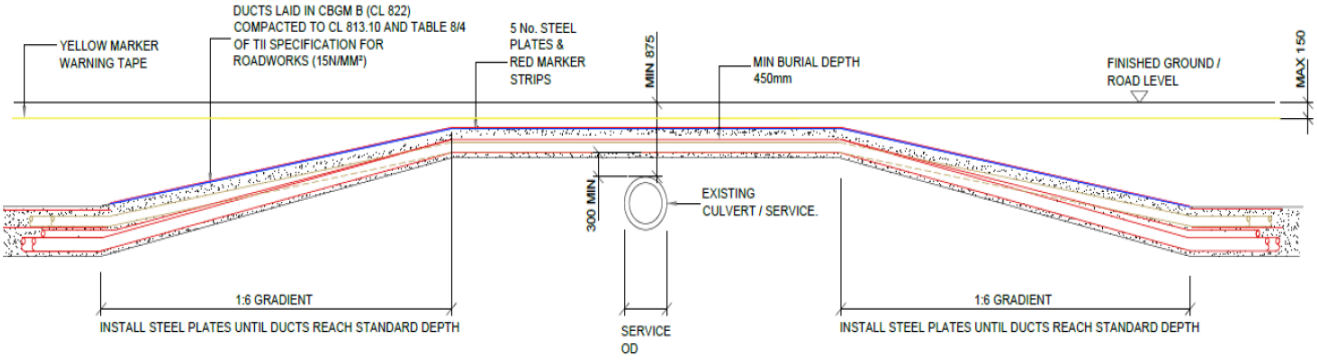


Figure 3-11: 110kV Cable Duct Overcrossing Method

Where cable ducts are to be installed over an existing culvert with insufficient cover, the ducts will be laid in a much shallower trench the depth of which will be determined by the location of the top of the culvert. The ducts will be laid in a flatbed formation over the existing service. They will be encased in a reinforced concrete surround in accordance with Eirgrid's specifications.

After the crossing over the culvert has been achieved, the ducts will be laid in a trefoil arrangement again within a standard trench. This will be done gradually to comply with minimum duct and cable design bend requirements. In transition sections between trefoil and flat formation, the base of the trench shall be graded to eliminate stepping and minimum bedding and surround material will be maintained throughout.

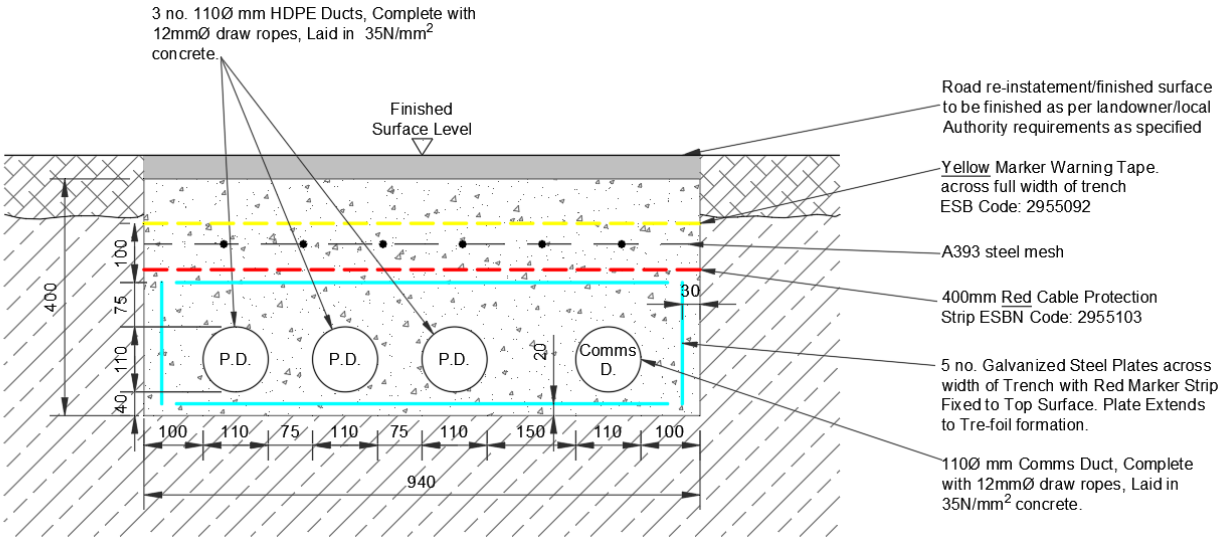


Figure 3-12: Flatbed Formation Detail

For further information refer to 110kV Underground Cable Construction Methodology report in Appendix 3.3 of the EIAR.

Inland Fisheries Ireland have published guidelines relating to construction works along water bodies entitled 'Requirements for the Protection of Fisheries Habitats during Construction and Development Works at River Sites", and these guidelines will be adhered to during the construction of the development.

For further details please refer to the Construction Methodology for the Ballinagree Windfarm 110kV Underground Cable Report in Appendix 3.3 of the EIAR.

Sections of trenching and ducting will involve instream works at numerous culvert crossing locations in order to install cabling. To facilitate the works, these watercourses will be dammed and the water diverted over or around the works using either a flume pipe or a diversion channel. Following the completion of works at the watercourse, the dam will be removed and the watercourse reinstated.

The following methodology describes instream works using a standard Dam and Flume diversion method:

- Where temporary fluming or flow diversion are in situ, in a watercourse frequented by salmon or trout, (at least medium sensitivity) all fish within the designated area will be subject to fish rescue and translocation downstream by a fisheries biologist.
- The flume pipe(s) will be set out on the bed of the existing stream.
- A dam will be constructed using sand bags and suitable clay material around the flume pipe(s) and across the stream so that all the flows are diverted through the pipe(s).
- Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream trenching location prior to construction, to minimise silt loss.
- The ducting installation works will be carried out in the dry stream bed and under/around the flume pipe(s). If required, a temporary sump will be established and used to collect any additional water. This water will be removed by pumping to a percolation area if the soil is not saturated, otherwise a settlement tank will be used to remove any solids from the de-watering.
- Refer to Section 3.3.1.9.1 for further details with respect to the suitable siting of discharge areas.
- Following the completion of works, the stream bed will be reinstated with original or similar material and the spawning gravels replaced under the supervision of an aquatic ecologist.
- Once the stream bed is appropriately re-instated the dam and the flume pipe(s) will be removed thus restoring the stream to its original condition.

Section 3.3.1.9.1 contains the methodology to be adopted to carry out instream works using a standard Dam and Divert diversion method:

Replacement of Existing Culverts

The grid connection route extends approximately 11.37 km mainly along local roads (9.35km) and an unpaved forestry access road. There are nineteen known culverts along the route. Of these culverts, most appear to be either concrete pipe, HDPE twinwall pipe or stone construction, seventeen of which are on the public road. Where there is insufficient cover over the culvert, it will be necessary to trench under the culvert. It should be again noted that the EirGrid preferred method of crossing third party services/culverts is undercrossing. For stone culverts there is a high probability that the culvert would collapse sending stream water into the trench.

To avoid this occurring, stone culverts with insufficient cover will be identified and replaced prior to trenching works. The following approach will be taken:

- Works will be supervised by the Ecological Clerk of Works and / or the project aquatic ecologist who will liaise with IFI and National Parks and Wildlife Service (NPWS) prior to works commencing. The ECoW will also monitor surface water quality downstream of the works in accordance with the surface water monitoring programme and will have the authority to cease any works should the monitoring identify unacceptable water quality conditions.
- Any works within watercourses that provide fish habitat (indicated in the EIAR at least of "Medium" sensitivity), will be avoided between Oct 1st and April 30th as per IFI guidelines.
- All plant and equipment will be serviced and cleaned before entry to site to limit risk of oil spillage and for biosecurity.
- Works will be carried out in dry weather with low flows in the streams with forecast for dry weather for the duration of the works – approximately 2 days.
- Machinery used will stay on the public road; machinery will not be permitted to enter the stream channel.
- The road edge adjacent to the watercourse will be lined with sandbags and silt fences (multiple fences recommended) as appropriate to prevent runoff from the trenching works reaching the stream. The design of these multiple features shall also allow for the safe removal of accumulated silt away from the channel, particularly through staged removal of the most contaminated upper fence before the lower ones, and the removal of the final fence only when it is clear of any silt
- Clean sandbags will be used to dam flows on the upstream side of the culvert. Sandbags will be placed by hand at a suitable location to take advantage of any natural pool but set back from the works to permit unhindered excavation of the existing culvert.
- A second sandbag dam will be placed on the downstream side of the culvert to prevent backflow into the works and contain any groundwater seepage that is likely to be turbid.
- Sandbagging requires careful attention to detail if it is to be effective. All bags must be laid neck uppermost and seams aligned. Bags must not be overfilled or they will not tamp together or will burst with ease. Additional bags will be filled ready to raise the freeboard of dams.
- Flume placement for temporary flow diversion or permanent replacement of culverts will follow guidelines issued by IFI and CIRIA to ensure that fish passage is not impeded.
- If topography permits, the water will be piped over the road by gravity flow, otherwise, it will be pumped. Discharge will be via break tank or similar approved storage onto a splash-plate or rip-rap (gabion basket) to dissipate energy and avoid scour or erosion of the stream bend or banks. The pump will be fitted with a screen, so fish are not drawn into the pump intake.
- The use of pump sumps will be considered within the dammed area. These will be lined to prevent scouring. The intention is to intercept clean groundwater ingress and pump it out rather than allowing it to get silted in the works area by segregating off areas.
- Any spoil generated will be removed to a designated safe area clear of the flood plain. Some of this spoil will be saturated and will require bunding and sheeting over.
- If bank material needs to be removed it will be stored separately and reinstated accordingly.

- The ducting will be advanced past the culvert. The existing culvert will be excavated 'in the dry'. A new culvert, sized for a 100-year rainstorm event, will be installed with appropriate gradient, headworks and outfall. A precast concrete culvert, concrete pipe or HPDE pipe will be used. Culverts will be embedded to at least 300mm below the existing stream bed to ensure backwatering. Culverts will avoid a significant change in gradient (i.e. >3%). After embedding, replacement culverts will be filled with clean washed gravels and cobbles to replace lost habitat and facilitate fish movement.
- Dry stone headworks will be placed at the culvert intake and discharge. The stream bed adjacent to the works will be reinstated at the direction of the project aquatic ecologist.
- The ECoW will determine the quality of any water trapped between the two dams – visual inspection and turbidity meter. If this water is clean it will be left in situ. If it is not clean, it will be removed from the works area prior to removal of the dams. If required, dewatering of the works area prior to dam removal will be undertaken by pumping from the stream bed to a suitable percolation area as described in Section 3.3.1.9.1.
- The upstream dam will then be removed to permit flow though the new culvert. This will be done in phases, so a large volume of water isn't released at once. The downstream dam will be removed in a similar manner.

Horizontal Directional Drilling

Horizontal Directional Drilling (HDD) will be employed at 4 no. locations along the proposed grid connection route as shown on the site layout plans.

The depth of the bore shall be at least 3m below the level of the public road and stream bed. A survey of buried services within the public road will be carried out by the contractor prior to commencement to confirm the conditions predicted in the EIAR. The council will be made aware in advance of the operation and invited to oversee the activity.

The locations of the launch and reception pits are positioned to ensure the bore is at such depth as not to conflict with the drainage or surface of the road or associated infrastructure.

The operation shall take place from one side of the watercourse. It will be carried out by an experienced HDD specialist. Each crossing is expected to take place in a single day under one mobilisation.

In the case of HDD operations within the public road corridor, the works shall be carried out under a road closure and road opening license in accordance with measures described in the Traffic Management Plan.

A pilot hole for the HDD will be bored as per the agreed alignment. It shall be tracked and controlled using a transmitter in the drill head. By tracking the depth, position and pitch of the drill head the operator can accurately steer the line of the drilling operation. The drilling operation is lubricated using Clear Bore™ or similar. When the pilot hole has been drilled to the correct profile, its diameter is increased if necessary, to match the external diameter of the cable duct. The flexible plastic ducting is then pulled through the pre-drilled hole and sealed at each end until required for cable installation.

HDD will be carried out using Vermeer D36 x 50 Directional Drill, or similar plant. The launch and reception pits will be approximately 0.55 m wide, 2.5 m long and 1.5 m deep. The pits will be excavated with a suitably sized excavator and shall employ the same mitigation measures outlined herein for trenching and joint bay excavations.

The drilling rig will be securely anchored to the ground by means of anchor pins which will be attached to the front of the machine. The drill head will then be secured to the first drill rod and the operator shall commence to drill into the launch pit to a suitable angle. This will enable the excavation to obtain the depths and pitch required to the line and level of the required profile. Drilling of the pilot bore shall continue with the addition of 3.0 m long drill rods, mechanically loaded and connected into position.

During the drilling process, a mixture of a natural, inert and fully biodegradable drilling fluid such as Clear Bore™ (environmentally friendly product (not toxic to aquatic organisms)) and water is pumped through the centre of the drill rods to the reamer head. This mixture is forced into the void and enables the annulus which has been created to support the surrounding sub soil and thus prevent collapse of the reamed length. Depending on the prevalent ground conditions, it may be necessary to repeat the drilling process by incrementally increasing the size of the reamers.

The use of a natural, inert and biodegradable drilling fluid such as Clear Bore™ is intended to avoid any adverse effects arising from the use of other, traditional polymer-based drilling fluids. It will be used sparingly as part of the drilling operations. It will be appropriately stored prior to use and deployed in the required amounts to avoid surplus. Should any excess drilling fluid accumulate in the reception or drilling pits, it will be contained and removed from the site in the same manner as other subsoil materials associated with the drilling process to an approved disposal site. Backfilling of launch & reception pits will be conducted in accordance with the normal specification for backfilling excavated trenches and joint bays.

Minimum environmental protection measures to be implemented on site shall include the following:

- A site-specific drilling design, risk assessment and method statement shall be prepared by the contractor prior to the works.
- CLEARBORE shall be used rather than Bentonite as a drilling fluid as it is biodegradable.
- HDD operations to be limited to daylight hours and conditions when low levels of rainfall are forecast.
- The depth of the bore shall be at least 3m below the bed of the watercourse.
- Visual inspection to take place at all times along the bore path of the alignment.
- A field response plan to minimize loss of returns of drilling fluid and actions to restore returns shall be provided.
- No refuelling will take place within 50m of the watercourse or any sensitive habitats.
- Pre-construction verification surveys shall take place at drilling sites to confirm the presence of any sensitive species.
- A qualified environmental monitor or ecological clerk of works (ECoW) will be onsite for the duration of the drilling operation.

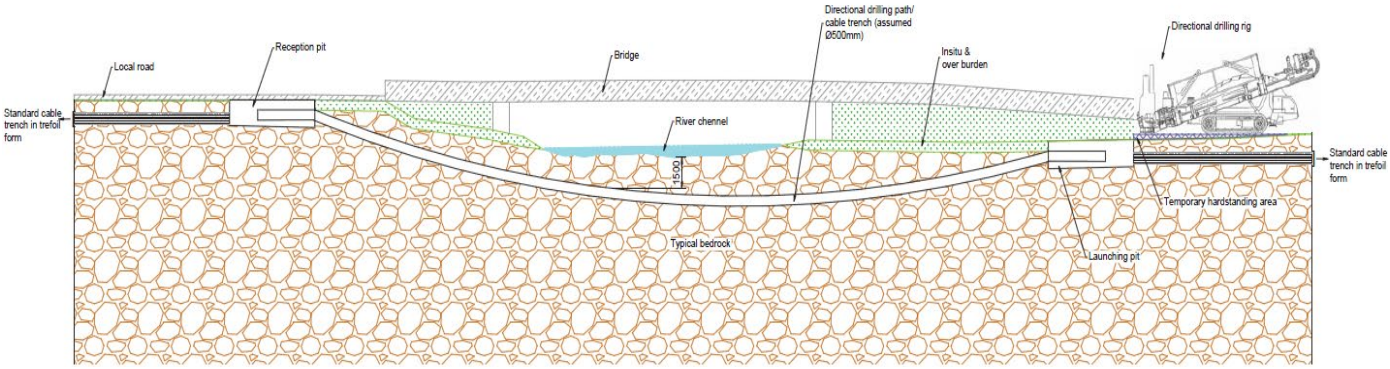


Figure 3-13: HDD Activity Profile

For further information on HDD works refer to 110kV Underground Cable Construction Methodology report in Appendix 3.3 of the EIAR. Further detail on HDD crossing design can be found in accompanying planning application drawings.

Construction Methodology for Watercourse Crossings along the Turbine Delivery Route

On the turbine delivery route, one watercourse crossing is to be modified. This is an existing bridge (WF-HF8 as shown in Figure 3-14 and Figure 2-2). This will be replaced by a new clear span bridge.

Figure 3-14: Existing Stone Bridge Crossing (WF-HF8)

Sufficient free-board will be allowed for in the proposed bridge design to allow for 1 in 100-year fluvial flood conditions plus 20% for Climate Change.

The works will include the removal of an existing stone bridge and associated abutments, construction of concrete bridge supports which will be built from the public road and lifting of the assembled bridge structure into place. The bridge components will be delivered to site on standard HGVs. Disturbance of the stream bed shall be avoided where possible.

The construction methodology is as follows:

- All environmental mitigation measures will be implemented locally in advance of the works, in accordance with the environmental management plan outlined in Section 4.
- A temporary road closure will be put in place for the duration of the works (refer to Section 4.3.8 for TMP measures).
- Use of weather forecasts will be made, and works will be planned when a dry spell of weather is forecasted;
- Work will not be undertaken during periods of high rainfall. This will minimise the risk of entrainment of suspended sediment in surface water runoff and transport via this pathway to surface water bodies;

All environmental mitigation measures will be implemented locally in advance of the works, in accordance with the environmental management plan outlined in Section 4. Instream works shall be carried out in accordance with the measures outlined in Section 3.3.9.1.

- Bank protection will be installed as necessary to ensure that disturbance to the existing stream banks are minimised during construction.
- Following excavation of the existing road surface, the existing stone bridge will be removed by a mechanical digger and taken from the works area by dumper truck. The excavated material shall be taken for disposal to a licensed waste facility in accordance with the waste management plan.
- Excavation near river banks is required to install and secure pre-cast concrete abutments meaning that dry instream working conditions will need to be established.
- The extent of the excavation for bridge supports will be marked out and will include an allowance for trimming the sides of the excavation to provide a safe working area and slope batter.
- The excavated material will be stored within the site at designated locations per the Soil Management Plan.
- Abutments will be set back 2.5m from 1% AEP flood height (100-year event). Dry working conditions at these sites will be maintained by retaining the existing bank and using a short section of sand bag cofferdam. Only part of the stream will be isolated at any one time. This will isolate flow either side of the channel in sequence, to allow dry working conditions while each abutment is installed. The required working area is relatively small for each abutment and the cofferdam set-up allows continuous flow during the short construction period.
- Strong polyethylene bags filled with clean sand will be used and will be wrapped between geotextile to create watertight conditions.
- Once complete, water retained by the cofferdam will be discharged onto a well vegetated, dry, flat area at least 50m from a water body via a straw bale dewatering structure or geotextile filter bag. The outfall will also be surrounding by silt fencing; If there is no suitable area for discharge onto ground, settlement ponds will be used where necessary and will be put in place prior to commencement of preparation works;
- On alternate sides of the stream, within the sequenced cofferdam set-ups, the base for the abutments will be excavated to rock or competent stratum with a mechanical excavator.
- The foundations and abutments will be constructed using a single pre-cast concrete section and will be lifted into place on the base. The area around the abutments up to road level will be infilled with a suitable structural fill.
- Once each abutment is in place and secured with structural fill, the pre-cast concrete deck will be laid down on the abutments, anchored and a thin screed of concrete will be poured on top. Ducts for the later pulling of power and communication cables for the wind farm will be pre-cast into the bridge deck sections.
- When the concrete deck is connected to the abutments, the filling and compaction of the road will be completed.
- The road leading to and from the crossing will be profiled using suitable imported roadbase material in accordance with TII standards.
- The road surface will be reinstated to its previous condition.
- Cables will be pulled through the bridge deck following completion of the bridge structure.

3.3.1.10 Borrow Pit Construction

3 no. onsite borrow pits will be used to source suitable fill material for the construction of the various tracks, turbine bases and hardstanding areas. The location of the proposed borrow pits is shown on Figure 1-2.

The borrow pits will be developed as follows:

- All environmental mitigation measures will be implemented locally in advance of the works, in accordance with the environmental management plan outlined in Section 4 of this CEMP.
- The access tracks will be prepared to the borrow pit locations in line with the methodology described in Section 3.3.1.4.
- The extent of the works areas shall be accurately delineated using stakes and rope to prevent works being carried out outside the agreed areas.
- Stock proof fencing shall be installed around the borrow pit in advance of any works taking place.
- A bespoke method statement shall be drawn up by the contractor for the main construction works shortly before the works take place.
- After drainage and temporary dewatering infrastructure has been put in place, the main excavation works will commence by stripping the topsoil material.
- Topsoil will be stockpiled to be used for reinstatement of the borrow pit and used for local landscaping of the wind farm site.
- Excavation works will be carried out by the following means at the borrow pit:
    - Conventional excavators (using buckets) to excavate and load dumper trucks
    - Rippers mounted on conventional excavators to 'rip' the rock where appropriate
    - Rock breakers (where required)
- Excavated material will be processed by mechanical crusher and screened as necessary.
- Excavated rock will be loaded onto dumper trucks and transported to the required area for tipping and placement e.g. when building the access tracks.
- When the borrow pits have been exploited, they shall be closed and reinstated using surplus mineral soil or rock excavated from elsewhere on the site as described in accordance with an approved project reinstatement plan.
- The borrow pit, once reinstated, shall be covered with topsoil and allowed to re-vegetate naturally. However, appropriate measures will be taken if it is found that natural re-vegetation is too slow or if the area is being taken over by inappropriate species.
- Noise, dust and site drainage mitigation measures shall be implemented as described in the environmental management plan in Section 4 of this CEMP.

To monitor groundwater during the construction phase groundwater monitoring wells will be installed between areas of deeper excavations and sensitive groundwater receptors. The wells will be used to monitoring groundwater levels and quality to assess any potential impacts during the construction works.

The borrow pits are shown on planning drawings P2114-0300-0006, P2114-0300-0007 and P2114-0300-0008.

3.3.1.11 Turbine Hardstands

All crane pads and associated splays will be designed taking account of the loadings provided by the turbine manufacturer. They will consist of a compacted stone structure in accordance with the detailed engineering designs and employer's requirements.

All crane pads will be formed from a suitably stiff layer of subsoil or rock. The finished crane pad surface will provide a minimum bearing capacity of 260kN/m^2.

Crane pad and associated splay formation will consist of either 1 or 2 layers of suitable fill material depending on the properties of the underlying load bearing layer. Where the underlying layer is soft soil, 2 layers of suitable fill formation are used and the stone capping layer. In areas where the load bearing layer is rock, the capping layer is omitted, and the running layer is installed directly onto the rock surface. It is not likely this will be the case at this site. The crane pads are approximately 40m x 75m and have a maximum cross and longitudinal fall tolerance of 2%.

The crane hardstands will be constructed using a typical excavation method.

The excavation method can be summarised as follows:

Excavation Method:

All environmental mitigation measures will be implemented locally in advance of the works, in accordance with the measures outlined in the environmental management plan in Section 4 of this CEMP.

- Establish alignment of the hardstands from the construction drawings and mark out the corners with ranging rods or timber posts.
- Drainage runs and associated settlement ponds will be installed.
- The excavated material will be stored close to the hardstand or taken back to the borrow pit. Topsoil and subsoil stockpiles will be formed, and the side compacted to prevent silt run off during heavy rain or airborne dust during dry periods.
- Batters to have a slope of between 1:1 and 1:5 (depending on depth and type of material) and will be left as cut to re-vegetate naturally with local species.

3.3.1.12 Turbine Foundations

The wind turbine foundations will be constructed using standard reinforced concrete construction techniques and will be designed as either:

- Submerged foundation design.
- Non-Submerged Foundation design.

Turbine foundations will be designed to Eurocode Standards. Foundation loads will be provided by the wind turbine supplier, and factors of safety will be applied to these in accordance with European design regulations. The turbine will be anchored to the foundation as per the turbine manufacturer's guidelines which will be incorporated in the civil foundation design. The shape and size of the foundation can vary in size and shape to approximately 25m in diameter.

The turbine foundations will be constructed as follows:

Standard Excavated Reinforced Concrete Base:

a) The extent of the excavation will be marked out and will include an allowance for trimming the sides of the excavation to provide a safe working area and slope batter.

b) The excavated material will be stored at agreed locations close to the base. Topsoil and subsoil stockpiles will be formed, and the side compacted to prevent silt run off during heavy rain or air bourn dust during dry periods. The subsoil material will be used as backfill and the topsoil will be used for landscaping around the finished turbine post construction.

c) No material will be removed from site and storage areas will be stripped of vegetation prior to stockpiling in line with best working practises.

d) Around the perimeter of the foundation formation a shallow drain will be formed to catch ground water entering the excavation. The drain will direct the water to a sump if required where it will be pumped out to a settlement pond away from the excavation.

e) A layer of concrete blinding will be laid approximately 75mm thick directly on top of the newly exposed formation, tamped and finished with a screed board to leave a flat level surface. If required, geogrid and soil replacement will be laid according to the foundation design, followed by placement of the concrete blinding layer.

f) If soil replacement is required, the aggregate used must be tested and approved by the project geotechnical engineer.

g) High tensile steel reinforcement will be fixed in accordance with the designer's drawings & schedules. The foundation anchorage system will be installed, levelled and secured to the blinding using steel box section stools.

h) Ductwork will be installed as required, and formwork erected around the steel cage and propped from the backside as required.

i) The foundation anchorage system will be checked both for level and line prior to the concrete being installed in the base.

j) Concrete will be placed using a concrete pump and compacted using vibrating pokers to the levels and profile indicated on the construction drawings.

k) Upon completion of the concreting works the foundation base will be covered from the elements that could cause hydration cracking and/or delay setting in any way.

l) Steel shutters will be used to pour the upper plinth section.

m) The foundation will be backfilled with a cohesive material, where possible using the material arising during the excavation and landscaped using the top-soil set-aside during the excavation. The suitability of backfill material is to be approved by the project geotechnical engineer.

n) A gravel footpath will be formed from the access track to the turbine door and around the turbine for maintenance.

3.3.1.13 Substation Compound

The compound surrounding the substation will measure approximately 150 m x 105 m as shown in 0300-Series planning application drawings. The compound will include a substation control building and electrical components necessary to import the electricity generated from the wind farm to the existing Clashavoon substation.

The building's main function is to provide housing for switchgear, control equipment and monitoring equipment necessary for the proper functioning of the substation and wind farm. The building will be constructed by the following methodology:

- The area of the control buildings and compound will be marked out using ranging rods or wooden posts and the vegetable soil stripped and removed to the nearby storage area for later use in landscaping. No material will be removed from site and storage areas will be stripped of vegetation prior to stockpiling in line with best working practises.
- Drainage runs and associated settlement ponds will be installed
- The dimensions of the Building and Compound area will be set to meet the requirements of EirGrid and the necessary equipment to safely and efficiently operate the wind farm.
- The foundations will be excavated down to the level indicated by the designer and concreted.
- The blockwork 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 blockwork will then be raised to wall plate level and the gables & internal partition walls formed. Scaffold will be erected around the outside of the building for this operation.
- The concrete roof slabs will be lifted into position using an adequately sized mobile crane.
- The wooden 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 remainder of the substation compound will be brought up to the agreed formation and approved stone imported and graded to the correct level as per the detail design.

Equipment plinths will be marked out, excavated and constructed using in-situ reinforced concrete or pre-cast concrete. Provision will be made in each plinth for earth connection.

Following the construction of the equipment plinths an earth mat will be installed throughout the compound. This will be connected to each plinth and the buildings as per the electrical earth protection design.

3.3.1.14 Electrical Works

Substation Fit Out and Switchgear Installation

The substations will have a domestic electrical system including lights, sockets, fire alarm and intruder alarm. The high voltage switchgear for the wind farm is installed through the following method.

- The switchboard units are delivered to site on a truck and unloaded using a forklift, front end loader or HIAB crane.
- Suitable task specific RAMS and lifting plans will be in place prior to the commencement of all works.
- The switchgear will be unloaded on to a concrete plinth directly outside the substation building.
- The units will be moved inside the substation building using a hand driven forklift and positioned over the internal trench supports, prepared previously.

- The switchgear is then secured as per manufacturer's instructions, typically by bolting directly to steel support bars over the trench.
- The building is fitted out with small light and power and ancillary wind farm control equipment such as SCADA computer, remote telemetry units, metering etc.
- All equipment and fittings are then connected, wired tested and commissioned in accordance with the Electrical Contractor's commissioning plan.

Transformers

- The turbine transformers will be placed directly onto the turbine foundation upon delivery to site, prior to the installation of the turbine towers.
- The transformers will be of the sealed type and will be inspected for any damage prior to offloading. It is likely that the units will be installed using a small mobile all-terrain crane and will be tested, commissioned and energised by suitably trained and authorised persons.
- The accessible sections of the transformer will be protected within an enclosure which shall be locked at all times and displaying appropriate warning signs.
- Transformers and ancillary plinth-mounted equipment required in the substation compound will be delivered to site and unloaded directly in place by HIAB crane or similar.
- Suitable task specific RAMS and lifting plans will be in place prior to the commencement of all works

3.3.1.15 Turbine Erection

Once the turbine components arrive on site they will be placed on the hardstand and lay down areas prior to assembly. The towers will be delivered in sections and each blade will be delivered in a separate delivery. Once there is a suitable weather window the turbine will be assembled.

It is anticipated that each turbine will take approximately 3 to 4 days to erect (depending on the weather), requiring two cranes. Finally, the turbines will be commissioned and tested.

Turbine installation works will be carried out in accordance to a site specific lift plan.

3.3.1.16 Grid Connection Cabling Works

The following describes the outline construction methodology for cable installation works along the grid connection route between the wind farm onsite substation and the Clashavoon substation.

The proposed grid connection route is shown on Figure 1-4 and described in Section 2.1.3.

- Agreement will be sought from local authorities with respect to the location of trenches on roads to ensure no damage is caused to storm-water drains, water-mains or other services. All drain and culverts affected by the works are to be re-instated to the satisfaction of the Local Authorities. Particular care will be taken in order to minimise disruption to local residents and public road users.
- The location of the cable route will be set out by GPS (RTK enabled) equipment in accordance with the design drawings prepared for the site.

- Prior to any construction works commencing, a pre-commencement road survey will be carried out on the public roads in the vicinity of the works. The area where excavations are planned will be surveyed with a cable-avoiding scanning tool, by a person trained in Location of Underground Services. Location equipment to be calibrated within the previous 12 months.
- All environmental mitigation measures will be implemented locally in advance of the works, in accordance with the measures outlined in Section 4 of this CEMP.
- Traffic management measures will be implemented prior to works commencing accordance with the construction stage TMP and measures outlined in Section 4 of this CEMP.
- Overhead lines will be identified and overhead clearance limiting measures will be put in place at the start of each day. Machinery will also include automatic limiters to safeguard against interaction with overhead lines.
- Underground services may be encountered during the trenching works the locations and depth of these underground services the locating of these services will include the reviewing of service drawings, investigations along the trenching route, and consultation with the various service providers.
- All environmental buffer zones shall be identified and set out prior to construction works advancing. Where necessary a stock proof timber post and wire fence shall be erected to establish these areas and thus prevent the entry of contractor's plant within these buffers during construction works. It is noted that given the presence of large sections of the cable route on public roads, extensive adherence to buffer zones is unlikely.
- The cable infrastructure will follow the existing road infrastructure where possible as shown on accompanying planning application drawings and Figure 1.4. Cables will be laid underground using standard trenches, with pre-excavation drainage works in place prior to trench excavation.
- In areas where the cable trench route runs within a public road carriageway, temporary reinstatement of the road surface will be carried out at the end of the working day to allow safe re-opening of the road for public traffic. See below for sequence of works for temporary road reinstatement.
- A 360-degree excavator will first remove the top layer from the route along the roadside. It will be loaded onto a haulage truck. The material will be recycled. The excavation of trench will commence. A trained spotter will be used to assist machine operators while reversing or when their visibility becomes restricted.
- Trench to be dug to agreed drawing specifications. All plant and stored material will be kept a safe distance back from the trench edges.
- No open trench will be left unattended. Pedestrian barriers will be erected to prevent unintentional entry occurring by the open trench. Cones and/or barriers will be used on rural roads to maintain a safety zone in proximity to the trench.
- Safe ladder access/egress to trenches will be provided into the trench.
- Ducts will be placed into trench manually, having been delivered to the roadside embankment/verge areas by tractor and pipe trailer and then offloaded by hand.
- Approved bedding material will be used to surround the ducts and delivered straight from a concrete truck.
- Approved fill material will be compacted at the base, again above the power cable ducting as per the engineer's design.
- Warning tape and plates will be installed by hand in accordance with the trench design and Eirgrid specifications.

- Backfill materials will be delivered to the site in tipper trucks and offloaded at agreed designated set down areas where it will be either loaded into site dumpers or a stoning cart then brought to the trench area that requires being backfilled. Main material deliveries such as ducting and pre-cast joint bay sections will be to the temporary site compound and moved to the work area as required.
- Backfill materials will be compacted using suitable compaction equipment to prevent future settlement as per NRA Specification for Roadworks Series 600 – Earthworks, 2013.
- Hand digging will be used when within 500mm of any known existing services.
- Trenches where ducts are laid will be back filled every evening. During excavation works signage will be erected local to the works warning of the dangers. Traffic safety barriers will also be erected along the works area.
- Exposed duct ends will be capped.
- Spoil will be disposed of at a licenced facility
- Unauthorised access will be monitored and prevented.
- A 12mm draw rope will be blown through the ducting at a later date.
- The trench and the working strip will be reinstated to the satisfaction of the local authority and TII standards for public roads.
- Where the trench strip passes through agricultural land, the surface will be reinstated to the area's pre-existing condition.

Typical trench details for the grid connection cable are shown on planning drawing P2114-0300-0014.

Installation of Joint Bays and Link Box Chambers

- Setting out and location of services will be carried out in the same manner as for trench excavations.
- Traffic management to be set up as per the construction stage traffic management plan.
- A tracked excavator will be used for the excavation of the joint bay pits in accordance with detailed design drawings.
- A Tractor/dump trailer and/or tipper truck shall be used to remove excavated spoil from the work area. Spoil shall be removed to a licensed waste facility.
- A watchman will be used to assist machine operators while reversing or when their visibility is restricted.
- Where joint bays are located, the excavation shall be adequately protected with fencing with signage erected, warning of deep excavation.
- Safe ladder access/egress to excavation shall be in place. The ladder will be footed at the base and tied at the top.
- Base materials will be placed by the excavator from a truck and placed in the base of the excavation.
- Precast chamber sections will arrive on site via articulated lorries accompanied by a crane truck. The crane truck will load each unit separately from the articulated truck.
- The precast units will be transported to site and a flatbed trailer and a truck mounted crane will lift the section into position.
- A lift plan /DJSP will be required for all Joint Bay installations.
- When the joint bays are in place, the sections will be back filled using approved fill material. The road surface will be reinstated using cold tar/surface dressing.
- Unauthorised access will be monitored and prevented.

Typical details for Joint Bays and Link Box Chambers are shown on planning drawings P2114-0300-0011, P2114-0300-0012 and P2114-0300-0013.

Figure 3-15: Typical Installation and Temporary Reinstatement of Joint Bay

Watercourse Crossings

Methodologies associated with watercourse crossings along the proposed grid connection route are detailed in Section 3.3.1.9.

Temporary Reinstatement of Excavations

- Hot works permit to be issued for the area of works for the area to be reinstated.
- A grader (if required), Roller and mini-patch planer will be delivered to site by low-loader. A 2 - in - 1 Tar - and Chipper or patch sprayer will be driven to site.
- A mini patch planer will be attached to a skid steer and will plane a fresh cut line along the verge of the trench.
- The trench fill material will be graded to shape the trench to match the existing camber of the carriageway and compacted using a drum roller.
- The Tar - and - Chipper will make first pass, of one metre wide.
- Once the bitumen emulsion and chips have been dispensed from the 2- in 1 Tar and chipper and the drivers cab is clear of the area, the roller will follow and compact the chips into the emulsion.

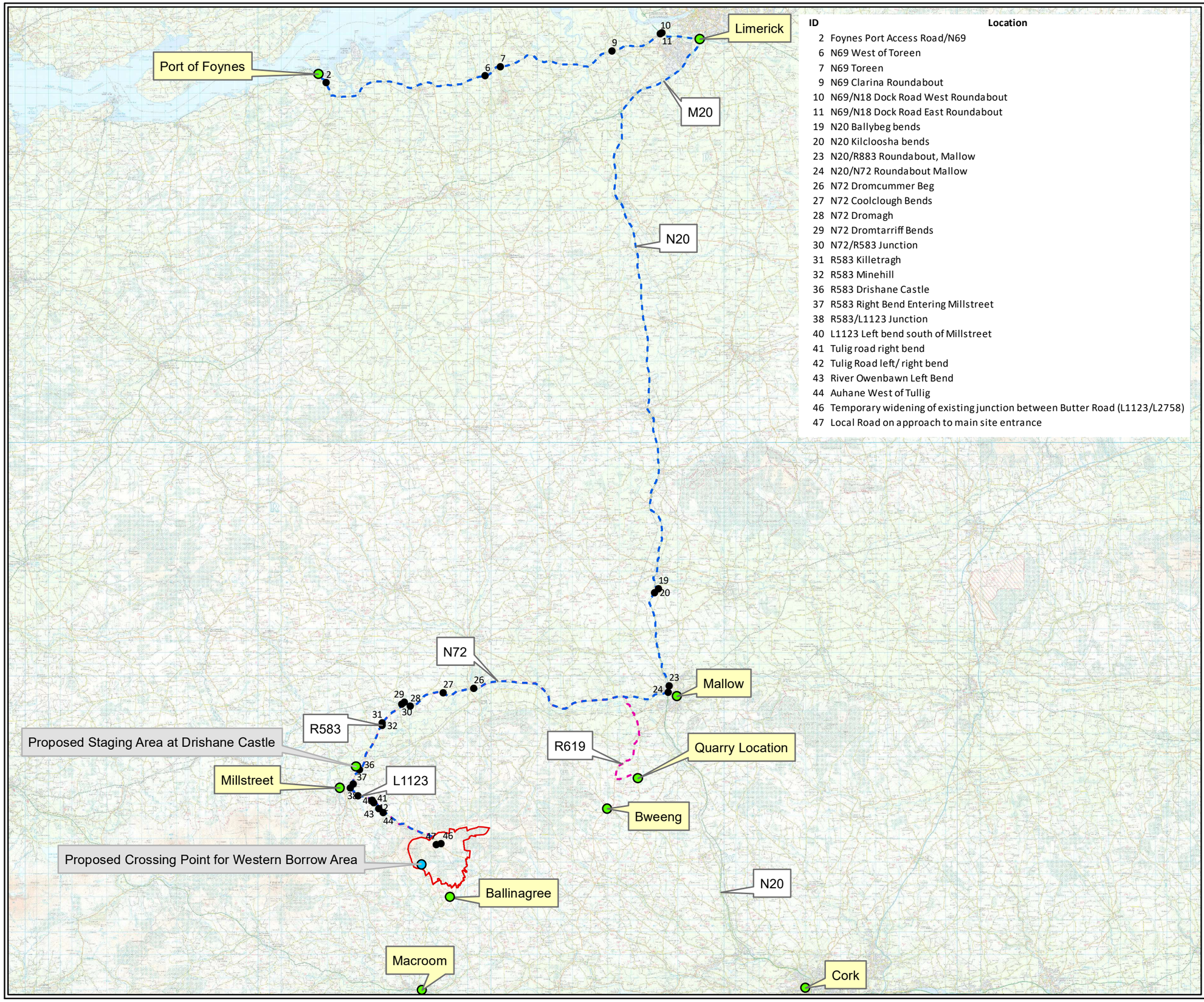
- If the 2 - in - 1 - Tar - and - Chipper is not being used, a towable emulsion sprayer will be used. This involves the towable sprayer being towed by a pickup truck, and an operative spraying the trench area by means of a lance from the unit.
- The emulsion is heated up to 70°C.The operator will wear protective overalls, heat resistant gloves and eye protection.
- The emulsion is sprayed out to cover the existing trench fill where a follow up crew will spread surface dressing chips over the sprayed area at a safe distance of 5m from the lance.
- Compaction will then take place by a drum roller.
- Both the 2 - in - 1 - Tar - and - Chipper and towable sprayer will have internal diesel burners, with no exposed naked flame.
- Delay set macadam may also be required on busier roads, 75mm of delay set macadam shall be placed within the trench at the end of each working day, by means of skid steer and trench reinstatement bucket and compacted.

Figure 3-16: Towable Sprayer for Temporary Reinstatement

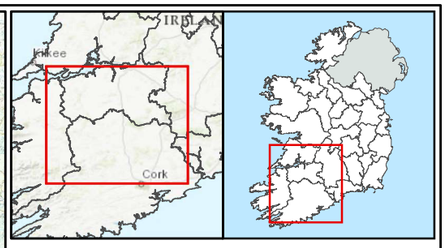
3.4 Construction Working Hours

The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall generally be restricted to between 07:00 - 19:00 hours Monday to Friday and 07:00 - 13:00 hours on Saturdays.

It should be noted that it will be necessary to commence turbine base concrete pours earlier due to time constraints incurred by the concrete curing process. Foundation pours will likely extend beyond normal working hours also. Turbine component deliveries will be caried out at night. Consultation will be carried out with the local community in advance of out of hours working. Additional emergency works may also be required outside of normal working hours as quoted above which will be notified to the planning authority. Work on Sundays or public holidays will only be conducted in exceptional circumstances and subject to prior consultation and notification insofar as possible with the local community.



ID	Location
2	Foynes Port Access Road/N69
6	N69 West of Toreen
7	N69 Toreen
9	N69 Clarina Roundabout
10	N69/N18 Dock Road West Roundabout
11	N69/N18 Dock Road East Roundabout
19	N20 Ballybeg bends
20	N20 Kilcloosha bends
23	N20/R883 Roundabout, Mallow
24	N20/N72 Roundabout Mallow
26	N72 Dromcummer Beg
27	N72 Coolclough Bends
28	N72 Dromagh
29	N72 Dromtarriff Bends
30	N72/R583 Junction
31	R583 Killetragh
32	R583 Minehill
36	R583 Drishane Castle
37	R583 Right Bend Entering Millstreet
38	R583/L1123 Junction
40	L1123 Left bend south of Millstreet
41	Tulig road right bend
42	Tulig Road left/ right bend
43	River Owenbawn Left Bend
44	Auhane West of Tullig
46	Temporary widening of existing junction between Butter Road (L1123/L2758)
47	Local Road on approach to main site entrance



Legend

- Proposed Wind Farm Site
- Proposed Haul Route
- Proposed Turbine Delivery Route (TDR)
- TDR Nodes

N
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0 5 10 20 Kilometers

TITLE:	Transport Routes		
PROJECT:	Ballinagree Wind Farm		
FIGURE NO:	3.17		
CLIENT:	Coillte and Ørsted		
SCALE:	1:320000	**REVISION:**	0
DATE:	05/01/2022	**PAGE SIZE:**	A3

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4. ENVIRONMENTAL MANAGEMENT PLAN

4.1 Introduction

This plan should be read in conjunction with the EIAR.

This Environmental Management Plan (EMP) defines the work practices, environmental management procedures and management responsibilities relating to the construction of the proposed Ballinagree Wind Farm.

This EMP describes how the Contractor for the main construction works will implement a site Environmental Management System (EMS) on this project to meet the specified contractual, regulatory and statutory requirements and identified mitigation measures. This plan will be further developed and expanded following the grant of planning permission and appointment of the Contractor for the main construction works. Please note that some items in this plan can only be finalised with appropriate input from the Contractor who will carry out the main construction works and once the planning conditions are known. It is the Contractor's responsibility to implement an effective environmental management system to ensure that environmental requirements for the construction of this project are met.

All site personnel will be required to be familiar with the environmental management plan's requirements as related to their role on site. The plan describes the project organisation, sets out the environmental procedures that will be adopted on site and outlines the key performance indicators for the site.

- The EMP is a controlled document and will be reviewed and revised as necessary.
- A copy of the EMP will be located on the site H&S notice board.
- All employees, suppliers and contractors whose work activities cause/could cause impacts on the environment will be made aware of the EMP and its contents.

This section includes the mitigation measures to be employed by the contractor and client during the construction, operation and decommissioning of the proposed project as per the EIAR and NIS.

4.2 Project Obligations

In the construction of the proposed Ballinagree Wind Farm there are a number of environmental management obligations on the developer and the contractor. As well as statutory obligations, there are several specific obligations set out in the EIAR and NIS. The final CEMP which will be produced by the main contractor following appointment will incorporate these obligations. The contractor and all of its sub-contractors will be fully aware of and in compliance with these environmental obligations.

4.2.1 EIA/NIS Obligations

The EIAR and NIS identified mitigation measures that will be put in place to mitigate the potential environmental impacts arising from construction of the project. Measures identified in the EIAR and NIS are detailed in this CEMP and listed in the Schedule of Mitigation Measures in Appendix 3.2 of the EIAR. The CEMP should be read in conjunction with the EIAR and NIS. In the case of any ambiguity or contradiction between this CEMP and the EIAR and NIS, the EIAR and NIS shall take precedence.

4.2.2 Planning Permission Obligations

All planning conditions associated with the project's planning permission shall be adhered to. All pre-commencement planning conditions shall be discharged fully by the project owner prior to site start.

4.2.3 Felling Licence

Felling of coniferous forestry is required within and around the wind farm infrastructure to accommodate the construction of some turbine foundations, hard stands, crane pads, access tracks and substation. 10 no. turbines are located within forestry and consequently tree felling will be required as part of the project.

The estimated maximum area of coniferous tree felling required is ca. 88ha, which will be subject to license approval from the Forest Service prior to construction.

Tree felling will be the subject of a Felling Licence from the Forest Service and will be in accordance with the conditions of such a licence. A Felling Licence will be in place prior to any felling works commencing on site. To ensure a tree clearance method that reduces the potential for sediment and nutrient runoff, the construction methodology will follow the specifications set out in the Forest Service Forestry and Water Quality Guidelines (2000) and Forest Harvesting and Environmental Guidelines (2000).

Before any harvesting works commence on site all personnel, particularly machine operators, will be made aware of the following and will have copies of relevant documentation, including:

- The felling plan, surface water management, construction management, emergency plans and any contingency plans;
- Environmental issues relating to the site;
- The outer perimeter of all buffer and exclusion zones;
- All health & safety issues relating to the site.

4.2.4 Other Obligations

The developer and/or contractor for the main construction works will liaise directly with the County Council and An Garda Síochána in relation to securing any necessary permits to allow the works to take place including for example (non-exhaustive list):

1. Commencement notice
2. Special Permits in relation to oversized vehicles on public roads
3. Temporary Road Closures (if required)
4. Road Opening Licence.

The developer will also liaise closely with the local residents, especially homeowners and landowners along the local access routes in relation to works and all reasonable steps will be taken to minimise the impact of the development on such persons. A traffic management plan is included in section 4.3.8.

4.3 Environmental Management Programme

4.3.1 Air Quality

Construction stage mitigation measures to minimise dust and emissions are as follows:

- Construction vehicles and machinery will be serviced and in good working order;
- Receptors which receive dusting and soiling on the haul routes, entering the site; and dwellings directly adjacent to the grid connection route that experience dust soiling, where appropriate, and with the agreement of the landowner, will have the facades of their dwelling cleaned if required should soiling have taken place;
- Ensure all vehicles switch off engines when stationary – no idling vehicles; and
- Exhaust emissions from vehicles operating within the site, including trucks, excavators, diesel generators or other plant equipment, will be minimised through regular servicing of machinery.

4.3.1.1 Dust Management Plan

Introduction

This Dust Management Plan (DMP) outlines the sources of dust during the works, identifies measures to minimise dust during the works and the complaints procedure for dust.

4.3.1.1.1 Dust generation and control

4.3.1.1.1.1 Dust generation

The proposed works associated with the proposed project that have the potential to cause dust include:

- Site clearance activities including felling of forestry
- Soil excavations
- Movement of dump trucks containing soils/subsoils within the site
- Stockpiling of soils.

4.3.1.1.1.2 Dust control

The following dust control measures will be put in place during construction and decommissioning works:

- The internal access roads will be constructed prior to the commencement of other major construction activities. These roads will be finished with high quality graded aggregate;
- A water bowser will be available to spray work areas and haul roads, especially during periods of excavations works coinciding with dry periods of weather, in order to suppress dust migration from the site;
- All loads which could cause a dust nuisance will be covered to minimise the potential for fugitive emissions during transport;

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- The access and egress of construction vehicles will be controlled to designated locations, along defined routes, with all vehicles required to comply with onsite speed limits, which shall be reduced in periods of dry, windy weather;
- Wheel washing facilities will be provided at the two main entrance/exit points of the proposed project site.

Complaints Procedure

At the main site entrance, the contact details for the site will be available so that local residents are encouraged to contact the site in the event of an off-site dust impact.

The contractor on site will need to be immediately informed of the incident so that fugitive dust complaints can be substantiated.

In all instances, a complaint will be logged by the environmental manager and each complaint will be assigned a discrete complaint number in the Environmental Log.

The environmental manager will maintain the complaints register and any complaints received will be investigated and the dust suppression methods employed will be reviewed. Suitable remedial action will be undertaken as necessary.

4.3.2 Noise and Vibration

The predicted noise levels from on-site activity from the proposed project is below the noise limits in BS 5228-1:2009+A1:2014. Nonetheless, several mitigation measures will be employed to minimise any potential impacts from the proposed project.

The noise impact for construction works traffic will be mitigated by generally restricting movements along access routes to the standard working hours and exclude Sundays and public holidays, unless specifically agreed otherwise. For example, during turbine erection, an extension to the working day may be required but this would be necessary only on a relatively small number of occasions. It will be ensured that vehicles on local roads do not wait outside residential properties with their engines idling during turbine deliveries. Local residents and the local authority will be consulted in advance of any activities likely to occur outside of normal working hours.

Consultation with the local community is important in minimising the impacts and therefore construction will be undertaken in consultation with the local authority as well as the residents being informed of construction activities through the Community Liaison Officer.

The construction works on site will be carried out in accordance with the guidance set out in BS 5228:2009+A1:2014. Proper maintenance of plant will be employed to minimise the noise produced by any site operations.

All vehicles and mechanical plant will be fitted with effective exhaust silencers. Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use.

The hours of construction activity will be as described in section 3.4.

The on-site construction noise levels will be below the relevant noise limit of 65 dB $L_{Aeq,1hr}$ for operations exceeding one month, and therefore construction noise impacts are not considered to be significant. However, there is potential for temporary elevated noise levels due to the grid connection works. However, the impact of these works at any particular receptor will be for a short duration (i.e. typically less than 3 days). Where the works at elevated noise levels are required over an extended period at a given location, a temporary barrier or screen will be used to reduce noise levels below the noise limit where required. The noise impact will also be minimised by limiting the number of plant items operating simultaneously where reasonably practicable.

4.3.3 Biodiversity / Flora and Fauna Management

Objectives

The primary objectives of biodiversity / flora and fauna management over the construction, operation and decommissioning phases of the project are as follows:

- Promote the conservation of habitats on site through the establishment of management and/or mitigation;
- Provide management and mitigation for aquatic habitats and water quality;
- Provide management and mitigation for avifauna;
- Provide management and mitigation for bats and terrestrial mammals;
- Monitor the usage of the wind farm site by birds post construction;
- Monitor for any collision by birds at the wind farm site post construction;
- Monitor for any collision by bats at the wind farm site post construction.

For mitigation measures associated with the protection of terrestrial ecology please refer to Appendix 3.2 of the EIAR – Schedule of Mitigation Measures.

For mitigation measures associated with the protection of aquatic ecology please refer to Appendix 3.2 of the EIAR – Schedule of Mitigation Measures.

In addition to the above mitigation measures from the EIAR, the mitigation measures from the Natura Impact Statement (NIS) carried out for the project shall also be adopted. For mitigation measures associated with the NIS please refer to Appendix 3.2 of the EIAR – Schedule of Mitigation Measures.

4.3.4 Soil Management Plan

All excavated material will be re-used within the site where possible, minimising the need for removal of any materials for off-site disposal. This will minimise the amount of construction traffic on local roads. This will in turn lead to the reduction of noise and dust associated with construction traffic.

There are 3 no. proposed borrow pits within the site that will provide general fill for construction. Where aggregate (structural fill) of a suitable quality required for construction cannot be sourced from the onsite borrow pits it shall be imported from a licensed quarry.

Daily Preparation during the Implementation of the Soil Management Plan

The Geotechnical Engineer appointed by the contractor should conduct regular meetings with the Construction Management Team to discuss the phasing of soil management as the work progresses.

Particular regard will be taken of daily weather conditions and long-range forecasts. The Geotechnical Engineer should have the authority to suspend the works if weather conditions are deemed too extreme for the effective protection of earthworks, excavations and slope stability.

Construction Stage Mitigation Measures

Earthworks

The project will be constructed in a phased manner within a 18-24 month period, as described in Chapter 3, to reduce the potential impacts of the project on the Land, Soils and Geology. Phased construction reduces the amount of open, exposed excavations at any one time. Given that the works comprises a significant proportion of excavation and earthworks, suitably qualified and experienced geotechnical personnel will be required on site to supervise the works.

One of the primary mitigation measures employed at the preliminary design stage was the avoidance of volumes of excavated overburden deposits to be exported off site. All excavated overburden will be retained on-site.

This will include:

- Use of suitable site won material (bedrock) as general fill in the construction of access tracks, hardstands and in reinstatement around turbine foundations.
- Overburden will be re-used on site in the form of landscaping and for reinstatement purposes at the proposed borrow pit.

Overburden deposits excavated during the course of the works will be temporarily stored in a level area adjacent to the construction phase excavations prior to reuse.

Some temporary stockpiles (not exceeding 2m in height) of material will be necessary adjacent to the excavation areas prior to reinstatement. No long-term stockpiles of material will remain after construction. No surplus/waste soil or rock will be removed from the proposed project site. Temporary stockpiles should be shaped and sealed to prevent the ingress of water from rainfall.

To mitigate against the compaction of soil at the site, prior to the commencement of any earthworks, the work corridor will be pegged, and machinery will stay within this corridor so that peatland/soils outside the work area are not damaged. Excavations will then be carried out from access tracks as they are constructed in order to reduce the compaction of soft ground.

To mitigate against erosion of the exposed soil or rock, all excavations will be constructed and backfilled as quickly as possible. Excavations will stop during or prior to heavy rainfall events (>10mm/hour). To mitigate against possible contamination of the exposed soils and bedrock, refuelling of machinery and plant will only occur at designated refuelling areas.

Soil excavated from trenches along the proposed grid connection route will be taken to a licenced facility for disposal or recycling where required. If feasible, the upper layers of tarmac and asphalt will be excavated separately to the lower engineered fill layers. The tarmac/asphalt layers will be taken to a licenced facility for disposal or recycling.

All temporary cuts/excavations will be carried out such that they are stable or adequately supported. Gravel fill will be used to provide additional support to temporary cuts/excavations where appropriate. Unstable temporary cuts/excavations will not be left unsupported. Where appropriate and necessary, temporary cuts and excavations will be protected against the ingress of water or erosion.

Excavations in Peat for Turbine Bases, Hardstandings and Infrastructure Foundations

The works require that turbine bases are to be founded on competent founding strata which will require excavation through peat and mineral soil.

Similarly, crane hardstandings, construction compounds, substation platforms and met mast foundations are to be founded on competent mineral soil and/or rock which will also require excavation through peat and mineral soil. Excavations for the borrow pits will also require the removal of peat and non-peat mineral soil overlying the rock.

The following measures shall be implemented to minimise any adverse impact on peat stability.

- All excavations within peat are to be adequately supported or peat slopes are to be battered to a safe slope inclination typically of 1 (v): 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker peat are encountered then slacker slopes will be required.
- Excavations shall be kept reasonably free from water at all times. Water should be prevented from being impounded within excavations by either using drainage channels cut into the excavation face or by pumping.
- Where water is channelled or pumped from an excavation then this water is to be fed into an established watercourse or drainage ditch following suitable treatment.

Measures for spills

- Fuels, lubricants and hydraulic fluids for equipment used on the construction site will be carefully handled to avoid spillage.
- Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of;
- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling; and
- Appropriate spill control equipment, such as oil soakage pads, will be kept within the construction area and in each item of plant to deal with any accidental spillage.

A Surface Water Management Plan (SWMP) can be found in Appendix 10.2 of the EIAR which contains further details on requirements for spill management.

Slope Stability

With regard to slope stability issues, detailed design and construction phase best practice will be implemented as follows:

- The works will be supervised by a suitably qualified and experienced geotechnical engineer or engineering geologist, and hydrologist or drainage engineer.
- Drainage infrastructure will be put in place in advance of excavations. Drains will divert surface water and groundwater away from excavations into the existing and proposed surface drainage network. Uncontrolled, direct and concentrated discharges of water onto the ground surface will not occur .
- Loading or stockpiling of materials on the surface of soft ground will not occur . Loading or stockpiling on other deposits will not be undertaken without first establishing the adequacy of the ground to support loads by an appropriately qualified geotechnical engineer experienced in construction within upland conditions. No stockpiling of material shall take place on steep slopes.
- Turbines located in areas adjacent to peat deposits will incorporate drainage measures such that surface water will be drained away from the peat and will not be allowed to collect adjacent to the peat mass.
- Excavation will be carried out from access roads or hardstanding areas to avoid tracking of construction plant across areas of soft ground/peat. Temporary access tracks as described in section 3.3.1.7 will be used where this is not possible.
- An assessment of the stability at proposed infrastructure locations has been carried out as part of the EIAR based on worst case conditions. A further assessment will be undertaken at detailed design stage by a suitably qualified and experienced geotechnical engineer prior to the commencement of all excavations to confirm the findings of this assessment.
- Blasting of rock will not be permitted.
- Excavations which could have the potential to undermine the up-slope component of an existing slope will be sufficiently supported to resist lateral slippage. Careful attention will be given to the existing drainage.
- Earthworks will not be commenced when heavy or sustained rainfall is forecast. A rainfall gauge will be installed on site to provide a record of rainfall intensity. An inspection of site stability, excavations and drainage by the Geotechnical Engineer will be carried out on site regularly.
- An emergency plan is included Section 6 outlining the action plan which would be implemented in the unlikely event of a landslide/slope failure. Should a landslide/slope failure occur or if signs of instability/ground movement are observed, work will cease immediately.

Borrow Pits

Three number locations have been identified as potential borrow pits. The peat depth within the development footprint of the borrow pits is less than 0.5m.

Upon removal of the rock and gravel from the borrow pits, it is proposed to reinstate the borrow pits using excavated peat and spoil. The excavated rock and gravel from the borrow pits will be used in the construction of the infrastructure elements (turbine bases, roads, etc.) at the wind farm. The contractor excavating the rock will be required to develop the borrow pits in a way which will allow the excavated peat and spoil to be placed safely. It is proposed to construct cells within the borrow pits 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 pits.

The borrow pits shall be constructed as follows:

(1) The rock within the proposed borrow pit footprints will be removed by breaking based on ground investigation carried out at the proposed borrow pits.

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

(3) Depending on the depth and type of rock present in the borrow pits it may be possible to excavate the rock from the borrow pits whilst leaving in place upstands/segments of intact rock which will help to retain the placed peat and spoil. The upstands/segments of intact rock will essentially act as engineered rock buttresses within the borrow pits.

(4) Slopes within the excavated rock formed around the perimeter of the borrow pits will be formed at stable inclinations to suit local in-situ rock conditions. Exposed sections of the rock slopes will be left with irregular faces and declivities to promote re-vegetation and provide a naturalistic appearance.

(5) The stability of the rock faces within the borrow pits will be inspected by an experienced geotechnical engineer upon excavation to ensure stability during construction works and in the long term. This inspection will allow unfavourable rock conditions to be identified and suitable mitigation measures to be applied such as removal of loose rock.

(6) Where it is not possible to leave upstands/segments of intact rock in place it may be necessary to construct rock buttresses founded on in-situ rock within the borrow pits. The rock buttresses should be constructed of rock fill from the borrow pit excavation. The founding stratum for each rock buttress should be inspected and approved by a competent person.

(7) It may be necessary to construct the rock buttresses within the borrow pits in stages as infilling of peat and spoil behind the buttresses progress. The buttress should be constructed of selected rock fill and placed and compacted in suitable layers to form a buttress of sufficient stability to retain the placed peat and spoil, as necessary.

(8) Infilling of the peat and spoil should commence at the back edge of the borrow pit and progress towards the borrow pit entrance/rock buttress. The contractor excavating the rock will be required to develop the borrow pits in a way which will allow the excavated peat and spoil to be reinstated safely.

(9) A number of rock buttresses to form cells with the borrow pits may be required to ensure access for trucks and excavators can be achieved.

(10) The rock buttresses should be wide enough to allow construction traffic access for tipping and grading during the placement of the excavated peat and spoil. The side slopes of the rock buttress should be constructed between 45 to 60 degrees.

(11) The height of the rock buttresses constructed should be greater than the height of the reinstated peat and spoil to prevent any surface peat and spoil run-off. Buttresses up to 5m in height are likely to be required.

(12) The use of temporary access ramps and long reach excavators during the placement of the excavated peat and spoil is likely to be required.

(13) The surface of the placed peat and spoil will be shaped to allow efficient run-off of surface water from the placed arisings.

(14) A layer of geogrid to strengthen the surface of the placed peat and spoil within the borrow pits may be required.

(15) An interceptor drain will also be installed upslope of the borrow pit. This drain will divert any surface water away from the borrow pit and hence prevent water from ponding and lodging during construction and also when reinstated.

(16) Control of groundwater within the borrow pits will be required and measures will be determined as part of the ground investigation programme. A temporary pump and suitable outfall locations will to be required during construction.

(17) A settlement pond will be required at the lower side/outfall location of the borrow pits.

(18) Where possible, the acrotelm shall be placed with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the peat and spoil within the borrow pits.

(19) Supervision by a geotechnical engineer or appropriately competent person is recommended for the works.

(20) All the above mentioned general guidelines and requirements will be confirmed by the designer prior to construction. A detailed construction methodology for the borrow pits should be compiled prior to construction.

General Recommendations for Good Construction Practice

To minimise the risk of construction activity causing potential peat instability it is recommended that the Construction Method Statements (CMS) for the project will also take into account, but not be limited, to the general recommendations below, together with the specific recommendations above.

(1) Avoidance of uncontrolled concentrated water discharge onto peat slopes identified as being unsuitable for such discharge. All water discharged from excavations during work shall be piped over areas specifically assessed as being unsuitable and hence directly into suitable drainage lines.

(2) Avoidance of unstable excavations. All excavations shall be suitably supported to prevent collapse and development of tension cracks.

(3) Avoidance of placing fill and excavations in the vicinity of steeper peat slopes, that is at the crest or toe of the slope.

(4) Installation and regular monitoring of geotechnical instrumentation, as appropriate, during construction in areas of possible poor ground, such as deeper peat deposits.

(5) Site reporting procedures to ensure that working practices are suitable for the encountered ground conditions. Ground conditions to be regularly assessed by suitably experienced geotechnical engineer.

(6) Regular briefing of all site staff (e.g. toolbox talks) to provide feedback on construction and ground performance and to promote reporting of any observed change in ground conditions.

(7) Routine inspection of wind farm site by Contractor to include an assessment of ground stability conditions (e.g. cracking, disrupted surface, closed-up drains) and drainage conditions (e.g. blocked drains, absence of water in previously flowing drains, springs, etc).

4.3.5 Surface Water Management Plan

A Surface Water Management Plan (SWMP) can be found in Appendix 10.2 of the EIAR. The Surface Water Management Plan (SWMP) should be read in conjunction with the EIAR and shall be finalised in accordance with this plan following the appointment of the contractor for the main construction works. It contains methodology for drainage, water quality management and silt control. The measures contained within the plan will be applied when working near water.

4.3.6 Archaeological Management Plan

Wind Farm Site
The extensive forestry plantations, including tree stumps and root systems within recently felled areas, within planted sections of the wind farm site will preclude advance archaeological site investigations such as geophysical survey and test trenching. A systematic advance programme of archaeological field-walking surveys will be undertaken within these areas following pre-construction tree felling to confirm that they do not contain any visible surface traces of potential unrecorded archaeological or architectural heritage sites. Archaeological monitoring of ground excavation works during the construction phase will then be carried out in these areas under license by the National Monument Service.

The turbines, hardstands and associated new access tracks located within improved green field areas will be subject to a pre-construction geophysical survey followed by targeted archaeological test trenching. This will include the investigation of a potential section of a relict field boundary noted in the interface between an area of marginal land and an improved section of pastureland located within the southern end of the T8 hardstand area. The programme of advance investigations will also include the completion of a boundary survey, to include a detailed photographic record, of the section of the drystone wall, which forms part of the Ballynagree East and Carrigagulla townland boundary, located within the northern end of the T5 hardstand.

The uneven and overgrown ground conditions within the upland open bog/heath areas in the northern end of the site are likely not suitable for pre-construction geophysical surveys. A pre-construction programme of linear archaeological test trenching will be carried out on the footprint of the three turbines (T13, 16 and 17) in these areas and along the routes of any associated new access tracks which will require ground excavation works during the construction phase.

A pre-construction archaeological wading and metal-detecting survey of proposed watercourse crossing points will be carried out under licence by the National Monuments Service.

Grid Connection
All ground works within undisturbed green field locations, including HDD areas, required as part of the grid connection will be subject to constant archaeological monitoring as will works within the environs of the Famine memorials at the crossroads in Killberrihert townland. An archaeological watching brief of other grid connection trench excavations within the public road will be carried out as part of the programme of licensed archaeological monitoring of the project and the extent of this supervision will be agreed in advance with the National Monuments Service as part of the license application process.

Turbine Delivery Route
The delivery of turbines to the wind farm site will require topsoil stripping within a green field area in the southern end of the Drishane Castle demesne lands in order to create a hardstand staging area. A pre-works geophysical survey followed by targeted archaeological test trenching will be carried out in advance of these ground works. Any ground works within other green field areas required to accommodate the turbine delivery route will be subject to archaeological monitoring.

Mitigation measure for Wind Farm Site, Grid Connection and Turbine Delivery Route
In the event that any sub-surface archaeological features are identified they will be recorded and cordoned off while the National Monuments Service are consulted to determine further appropriate mitigation measures, which may include preservation *in situ* (by avoidance) or preservation by record (archaeological excavation).

Monitoring of mitigation measures
There are a number of obligatory processes to be undertaken as part of archaeological license applications and these will allow for monitoring of the successful implementation of the archaeological mitigation measures. These include the submission of method statements detailing the proposed strategy for all site investigations will submitted for the approval of the National Monuments Service as part of the license application. These documents will clearly outline the proposed extent of works and outline the onsite and consultation processes to be enacted in the event that any unrecorded archaeological sites or features are identified. A report will be compiled on all site investigations to comply with the licensing process which will clearly present the results in written, drawn and photographic formats and copies will be submitted to Cork County Council, the National Monuments Service, the Planning Authority and the National Museum of Ireland.

4.3.7 Waste Management Plan

It will be the objective of the Developer in conjunction with appointed contractor to prevent, reduce, reuse and recover as much of the waste generated on site as practicable and to ensure the appropriate transport and disposal of residual waste off site. This is in line with the relevant National Waste Management Guidelines and the European Waste Management Hierarchy, as enshrined in the Waste Management Act 1996, as amended.

Any waste generated during the development construction phase will be collected, source separated and stored in dedicated receptacles at the temporary compound during construction.

This Construction Waste Management Plan has been prepared for the proposed Ballinagree Wind Farm in line with the ”Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects” (2006) as published by the Department of the Environment, Community and Local Government and supported by the Eastern-Midlands Region Waste Management Plan 2015-2021.

The Waste Management Plan shall be finalised in accordance with this plan following the appointment of the contractor for the main construction works. This plan should be read in conjunction with the EIAR.

Assignment of Responsible Personnel

It will be the responsibility of the contractor for the main construction works (when appointed) to nominate a suitable site representative such as a Project Manager, Site Manager or Site Engineer as Waste Manager who will have overall responsibility for the management of waste. The waste manager will have overall responsibility to instruct all site personnel including sub-contractors to comply with on-site requirements. They will ensure that at an operational level that each crew foreman is assigned direct responsibility.

Waste Generated

It is envisaged that the following categories of waste will be generated during the construction of the project:

- municipal solid waste (MSW) from the office and canteen
- construction and demolition waste
- waste oil/hydrocarbons
- paper/cardboard
- timber
- steel.

A fully authorised waste management contractor will be appointed prior to construction works commencing. This contractor will provide appropriate receptacles for the collection of the various waste streams and will ensure the regular emptying/and or collection of these receptacles.

Waste Minimisation/Reduction

All efforts will be made by site management to minimise the creation of waste throughout the project.

This will be done by:

- material ordering will be optimised to ensure only the necessary quantities of materials are delivered to site
- material storage areas will be of a suitable design and construction to adequately protect all sorted materials to ensure no unnecessary spoilage of materials occurs which would generate additional waste
- all plant will be serviced before arriving on site. This will reduce the risk of breakdown and the possible generation of waste oil/hydrocarbons on site
- all operators will be instructed in measures to cut back on the amount of wastage for trimming of materials etc. for example cutting of plywood, built into the amount ordered
- educating foremen and others to cut/use materials such as ply wisely for shutters etc.
- prefabrication of design elements will be used where suitable to eliminate waste generation on site
- where materials such as concrete are being ordered, great care will be practiced in the calculation of quantities to reduce wastage.

Waste Reuse

When possible, materials shall be re used onsite for other suitable purposes e.g.

- re-use of shuttering etc. where it is safe to do so
- re-use of rebar cut-offs where suitable
- re-use of excavated soil for screening, berms etc.
- re-use of excavated rock or stone – where possible will be used as suitable fill elsewhere on site for the new site tracks, the hardstanding areas and embankments where possible.

Waste Recycling & Recovery

In accordance with national waste policy, source separation of recyclable material will take place. Receptacles will be clearly labelled, signposted and stored in dedicated areas in the construction compound.

The following sourced segregated materials container will be made available on site the construction compound:

- timber
- ferrous metals
- aluminium
- dry mixed recyclables
- packaging waste
- food waste.

The materials will be transported off-site by a licensed contractor to a proposed recovery centre and these materials will be processed through various recovery operations. A list of nearby licensed waste management facilities is shown in Table 4-1.

Table 4-1: Nearby Waste Management Facilities

Facility	Type of wasted accepted
Kanturk Civic Amenity Site	Plastic, metals, oil, paper, cardboard, glass, electrical goods
Mallow Civic Amenity Centre	Plastic, metals, oil, paper, cardboard, glass, electrical goods, timber, green waste
Munster waste management	Domestic, commercial, industrial, agricultural
Codrum Recycle Centre	Plastic, metal, oil, paper, cardboard, glass, Electrical good

Waste Disposal

Residual waste generated on-site will require disposal. This waste will be deposited in dedicated receptacles and collected by the licensed waste management contractor and transported to an appropriate facility. All waste movements will be recorded, which records will be held by the waste manager on-site.

Contaminated Material

Any contaminated soils will be handled, removed and disposed of in accordance with statutory requirements for the handling, transportation and disposal of waste. In particular, the following measures will be implemented:

- Contaminated material will be left in-situ and covered, where possible until such time as WAC (Waste Acceptance Criteria) testing is undertaken in accordance with recommended standards and in-line with the acceptance criteria at a suitably licenced landfill or treatment facility. This will determine firstly the nature of the contamination and secondly the materials classification i.e. inert, non-hazardous or hazardous,
- If the material is deemed to be contaminated, consultation will take place with the respective local authority and/or EPA on the most appropriate measures. Such materials will be excavated, transported by a contractor with a valid waste collection permit and recovered/disposed of at an appropriate facility.

Waste Management Training

Copies of the project waste management plan will be made available to all relevant personnel on site. All site personnel and sub-contractors will be instructed about the objectives of the Waste Management Plan and informed of the responsibilities that fall upon them as a consequence of its provisions.

It will be the responsibility of the contractors appointed (Waste Manager) to ensure that all personnel are made aware of their responsibilities under the plan via a toolbox talk or otherwise.

4.3.8 Traffic Management Plan

This document is the Construction Traffic Management Plan (TMP) for the proposed Ballinagree Wind Farm, Co. Cork. The Construction Traffic Management Plan shall be finalised in accordance with this plan following the appointment of the contractor for the main construction works and the turbine supply contract.

Some items in this plan can only be finalised with appropriate input from the contractor who will be appointed to carry out and schedule the works. Furthermore, it is appropriate that the Project Supervisor Construction Stage (PSCS), when appointed, should have an active role in the preparation/review of the Traffic Management Plan.

This plan should be read in conjunction with Chapter 13 of the EIAR.

The contractor is required to prepare the necessary Site-Specific Traffic Management Plans prior to the construction works commencing in accordance with Chapter 8 of the Traffic Signs Manual 2019 and subject to load permits.

The contractor will be responsible for the implementation of all agreements between the developer and the County Council and local residents with the objective that the transportation needs for the proposed project will have a minimal impact on the road network and local communities.

As with any construction development project, the transport of materials onto the site will give rise to increased traffic and associated impacts. However due to the very nature of construction these impacts will be temporary.

Construction traffic will require regular access to the site at varying times throughout the construction phase. The aim of this TMP is to put in place procedures to manage traffic effectively on site and in the immediate vicinity of the proposed project, to ensure the continued movement of traffic on the public roads and to minimise disturbance during transportation of materials particularly oversize loads. The correct implementation of this TMP will ensure that appropriate procedures are in place to minimise any effects on the safety and movement of the general public.

Prior to the commencement of construction, the TMP will be reviewed by the main contractor (and any sub-contractors) and will be updated as necessary.

General Traffic Management Measures

General measures that shall be addressed in the TMP shall include:

Traffic Management Co-Ordinator – A dedicated Traffic Management Coordinator will be appointed for the duration of the project and this person will be the main point of contact for all matters relating to traffic management on the project.

Roads and Routes: The final TMP will clearly identify roads that will be used to access the project site and roads that are not to be used. Turbine component and quarry material deliveries shall use the N72, R583 and L2750/L1123 Butter Road as the primary haul route..

One-way Systems: as some of the local roads are relatively narrow, the roads authority may want to introduce a system of one-way construction traffic movements during the construction of the development. Any such one-way systems will be identified in the construction stage TMP in agreement with the roads authority.

Road Condition Survey: a pre-condition survey will be carried out on all public roads that will be used in connection with the development to record the condition of the public roads in advance of construction commencing. A post-construction survey will also be carried out after the works are completed. The specification and timing of the surveys will be agreed with the roads authority. Joint surveys shall be completed if the roads authority requests. Local sections of the TDR will be upgraded prior to construction starting.

Road Reinstatement: All roads will be reinstated expeditiously on completion of the construction works. Roads will be reinstated to their pre-works condition or better and to the satisfaction of the roads authority.

Site Inductions: All workers will receive a comprehensive site induction which will include a section on traffic management and clear guidance on the routes to be used/not used to access the site.

24-Hour Emergency Contact: a 24-hour emergency phone number will be maintained for the duration of the construction works and the number will be noted on temporary signage at each works area (for grid connection) and the site entrance for the wind farm site.

Traffic Management Guidance: all necessary temporary traffic management will be planned and executed in accordance with best practice, including Chapter 8 of the Traffic Signs Manual published by the Department of Transport in 2019.

Community Liaison: A project website will be in place for the duration of the project's construction phase which will include regular project programme status updates, contact details, facilities for community feedback/observations as well as a complaints procedure. A community liaison will be appointed by the contractor in advance of the commencement of the construction phase who will have responsibility for consulting with members of the public and act as a first point of contact for the project management team. Letter drops will be carried out to notify members of the public living near the proposed site and cable route to advise them of any particular upcoming traffic related matters e.g. temporary lane/road closure or delivery of turbine components.

Signage: Clear signage relating to the development, both temporary and permanent, will be provided for accessing the site.

Road Sweeping: Appropriate steps will be taken to prevent soil/dirt generated during the works from being transported on the public road. When, if necessary, a road sweeper will be used to maintain the public roads in a clean condition during the construction activities of the project.

Site Entrances: The entrances to the site will be secured when the site is not in use. When necessary, a flagman will be used to assist traffic movements at the site entrance or in other areas as required. For example, during turbine blade and tower deliveries.

Temporary Road Crossing Point: Site entrances from and to the wind farm and borrow pits will be secured and locked when not in use. Where required, the entrances will be controlled by flagmen to assist traffic movements. The proposed crossing point will be managed appropriately to allow the safe passage of construction vehicles in, out and across the public road Priority will be maintained for public traffic. A concrete apron will be provided on both sides of the crossing point during the construction phase, constructed 40mm below road level and overlaid with surface course material. This road is a very quiet public road with extremely low traffic volumes.

Abnormal Load Deliveries: Abnormal loads will require an abnormal load permit prior to delivery and will be delivered mostly at night time as agreed with local authority and An Garda Siochána.

Measures contained within the construction stage CEMP and TMP shall be discussed with Coillte forestry operators in advance of the works to ensure no conflicts occur with ongoing forestry activities.

Mitigation measures proposed for the grid connection works include:

Road Opening Licence: The road works associated with the grid connection cabling will be completed in line with the requirements of a road opening license as agreed with the local authority.

Route Proofing: In advance of the main grid connection works an assessment will be carried out to define the precise alignment of the cable route within the corridor which has been assessed.

This will include slit trenching with the aim of minimising the construction impacts and avoiding existing services in the road.

Maintaining Local Access: reasonable access to local houses, farms and businesses will be maintained at all times during any road closures associated with the grid connection works. The details of this will be agreed with the roads authority in advance of the grid connection works commencing.

Road Cleanliness: Appropriate steps will be taken to prevent soil/dirt generated during the works from being transported on the public road. Road sweeping vehicles will be used when necessary, to ensure that the public road network remains clean.

Temporary Trench Reinstatement: Trenches on public roads, once backfilled, will be temporarily reinstated to the satisfaction of the roads authority.

Surface Overlay after Trench Reinstatement: following temporary reinstatement of trenches on public roads, sections of the public roads will receive a full surface overlay. Details to be agreed with the roads authority At a minimum they will be reinstated to their pre-works condition or better and to the satisfaction of the roads authority.

Construction Plant and Vehicles

The typical construction plant and vehicles used as part of the construction of a wind farm are as follows (non-exhaustive):

- Hydraulic Excavators
- Dump Trucks
- General construction delivery vehicles (e.g. steel reinforcement bar, electrical components etc.)
- Concrete trucks and pumps
- Cranes of various lifting capacities (up to 1000 tonnes)
- Oversized articulated delivery vehicles (for turbine component transport)
- Site Jeeps (off-road 4x4 all purpose vehicles)
- Private vehicles of those employed on site for the construction phase.

It should be noted however that final selection of construction plant and vehicles may vary depending on suitability, availability, contractor's choice, etc.

Plant operators will be responsible for the upkeep and maintenance of construction plant and vehicles, ensuring good working order prior to use. Should emergency maintenance need to be carried out on site, this will be carried out at a designated area away from sensitive receptors and will ensure that a spill kit is nearby.

Construction commencement dates are yet to be confirmed at this stage; these will be made known to the Planning Authority by way of formal Commencement Notice.

Construction Compound

The locations of the construction compounds are shown on the site layout, Figure 1-2.

Consultation and Notification

An Garda Síochána

The Transport Management Plan shall be finalised following the appointment of the contractor for the main construction works.

The contractor will liaise directly with An Garda Síochána in relation to the plan. Any concerns/requirements they have will be incorporated in to the plan. This may include details in relation to the escorting of oversized loads.

The necessary permits (including approved route permits) will be applied for and obtained from An Garda Síochána.

Cork County Council

The contractor will liaise directly with the County Council in relation to the plan. Any concerns/requirements they have will be incorporated into the plan. The contractor will also liaise with Limerick County Council , as necessary, along the final turbine delivery route.

The necessary permits (including standard permits) will be applied for and obtained from the relevant local authorities.

Local Residents

The following measures will be used to communicate the necessary information to the households along the local road to be used as a haul road:

- Information signs will be erected in advance of the construction/transportation works.
- A flyer drop will be carried out to advise households along the local road leading to the site in relation to the programme of construction works and especially in relation to oversized load movements.
- Residents will be consulted with regarding the development of plans for the project.
- Contact details for a Liaison Officer will be provided so that any concerns can raised, logged and be easily channelled to the Developer to be dealt with.
- A project website will be in place for the duration of the project's construction phase which will include regular project programme status updates, contact details, facilities for community feedback/observations as well as a complaints procedure.

Complaints will be entered into the site complaints log and the relevant site environmental officer will arrange to meet with those affected. The situation will be acted upon immediately and reviewed by the Project Manager.

Key Personnel and Responsibility

Once prepared and agreed with the local County Council and An Garda Síochána the contractor will implement the project specific Traffic Management Plan (TMP).

Please note that some items in this plan can only be finalised with appropriate input from the contractor who will carry out and schedule the works. Furthermore, it is appropriate that the Project Supervisor Construction Stage (PSCS), when appointed, should have an active role in the preparation/review of the Traffic Management Plan.

Typically, the following members of the contractors' staff will have responsibility for adherence to the TMP as follows:

Traffic Management Coordinator

The Traffic Management Coordinator will be responsible for maintaining regular contact with An Garda Síochána, The local County Council, the statutory bodies and the client concerning traffic control, interference with services and co-ordination of crossings at roads, rivers and railways.

The Transport Officer will contact the relevant bodies in relation to develop method statements prior to the work taking place. The Transport Officer will be responsible for instructing the Construction Manager, Foreman and all other personnel on the information in the agreed method statement prior to the work commencing and ensuring that the method statement is adhered to.

The Transport Officer will be responsible for ensuring that the Traffic Management Plan will be implemented in full.

Safety Officer

The Safety Officer will be responsible for implementing all safety requirements detailed in the Project Safety Plan. Ensure that all operatives receive site safety induction prior to commencing work on site. They will ensure that all plant, particularly lifting equipment, on site has the relevant certification and are checked regularly by a competent person. The Safety Officer will carry out safety audits and checks on a regular basis and amend procedures where necessary.

Construction Manager

The Construction Manager will be responsible for overall supervision of the operations to ensure they are constructed in a safe and efficient manner. He will ensure that sufficient resources are available to meet the programme and that the necessary information is provided to the appropriate staff.

Foreman

The Foreman is responsible for ensuring that the crew carry out the work in accordance with the method statement and contract specifications and drawings using good working practices in a safe manner. He will supervise construction personnel ensuring their competence. He will check all plant and equipment on a regular basis ensuring it is maintained and in good working order.

Wind Turbine Generator Deliveries

A detailed turbine delivery route assessment has been carried out for the project which can be found in Appendix 13.2 of the EIAR.

The components of 20 no. wind turbines will be transported by road to the Wind Farm Site for on-site assembly, using the access route outlined in the Turbine Delivery Route Assessment Report.

Wind turbine component deliveries, cranes and all large plant associated with turbine installations will use the turbine delivery route.

The impact of the deliveries on traffic is mitigated by delivering components during off-peak or night-time deliveries.

Mitigation measures proposed for the turbine delivery route also include:

Programme of Deliveries: a programme of deliveries will be submitted to the roads authority in advance of deliveries of turbine components to the site. The programme will include details of the dates and times of each component delivery along with the route to be taken.

Turbine component deliveries will be carried out during off-peak times and will be done using a convoy and a specialist heavy haulage company.

Garda Escort: Turbine deliveries will be escorted by An Garda Siochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimised.

Reinstatement: Any area affected by the works to facilitate turbine delivery will be fully reinstated to its original condition.

Consultation: Consultation with the local residents and Cork County Council will be carried out in advance to manage turbine component deliveries.

The location of temporary accommodation works associated with turbine deliveries are shown in Figure 1-3. Swept path analysis drawings showing turbine component manoeuvres can be found in the Route Survey Report for the Turbine Delivery Route carried out by Pell Frischmann, October 2020 in Appendix 13.2 of the EIAR.

All turbine blades will be carried on a highly manoeuvrable superwing carrier to reduce the need for mitigation in constrained sections of the route.

It is proposed that the blade will be transferred to a Goldhofer blade lifting trailer at the temporary staging area at Drishane Castle, near Millstreet to the proposed wind farm site. This trailer has the ability to lift blades up to a maximum angle of 60 degrees, lifting blades over potential constraints and shortening the vehicle length.

The staging area shall consist of a hard standing off the public road at which turbine blades shall be transferred from the superwing carriers to the blade lifting trailers. The location of the Drishane Castle staging area is shown on Figure 3-17. The general arrangement of the temporary staging area is shown on planning drawings.

Two temporary access points to the staging area will be created from the public road at existing road junctions. These shall be controlled entrances and only used by turbine delivery vehicles, cranes and support vehicles associated with the delivery of turbine components.

Vehicles shall enter the eastern end of the staging area at an access point located at the junction between the R583 and L1116 where a break in the existing wall and hedgerow will facilitate the proposed temporary access and exit from the western end of the hard standing, making use of an existing junction between the R583 and L95831-1. The staging area will be fenced off from the public and closed when not in use and shall only be used when required during the delivery of wind turbine components in accordance with timings identified in the construction stage traffic management plan (TMP).

All overhead utilities and obstructions shall be removed at any locations that the blades are raised on the blade lifting trailer. The removal of overhead utilities will be either temporary disconnections or permanent re-routing. Such works will be carried out by the utility providers in advance of turbine delivery to site.

Any trenching and road reinstatement works associated with utility diversions will be subject to a road opening license and can be carried out in such a way as to ensure one lane of traffic will be open at all times. Such works will be carried out over a number of days.

However, if the permanent re-routing of overhead utilities is not possible, temporary disconnections of overhead lines will be required on several occasions to facilitate the delivery of turbine blades and will be carried out during the delivery of the components. Advance disconnection works will be required before the first turbine deliveries.

The schedule of turbine component deliveries will be determined by the turbine supplier. Temporary disconnections will be carried out during off peak times to facilitate convoys, with a duration of several hours between disconnection and re-connection of services on each occasion.

Towers will be carried in a 4+7 clamp adaptor style trailer, whereas loads such as the hub, nacelle housing and drive train will be carried on a six-axle step frame trailer.

The main street of Millstreet will not be used as part of the TDR with the exception of the delivery of wind turbine tower base sections to the wind farm site, which will need to approach the junction between the R583 and L1123 from the west to avoid impacting third party property.

Tower sections shall be carried by clamp trailer to a designated transfer area at Claratlea, west of Millstreet as identified in Figure 4-1 below. The tower sections will be lowered to the ground resting on timber sleepers or bog mats and the clamp trailers uncoupled. All works shall take place within the public road carriageway. The unloaded vehicles shall then turn at an existing Coillte Forestry Access at Rathduane identified in the Figure 4-2 below and return to collect the tower sections at Claratlea. The loads shall then travel east along the R583 and turn right onto the L1123 towards the wind farm site.

The manoeuvre will take place at night and can be carried out for up to 3no. turbine base tower sections in convoy. It is expected that the manoeuvre can be carried out in approximately hour per convoy and will be required to take place on up to 7no. separate occasions over a period of several months with the possibility of reducing the number of occasions if several convoys are transported together. The manoeuvre shall be carried out in accordance with a traffic management plan and under Garda escort.

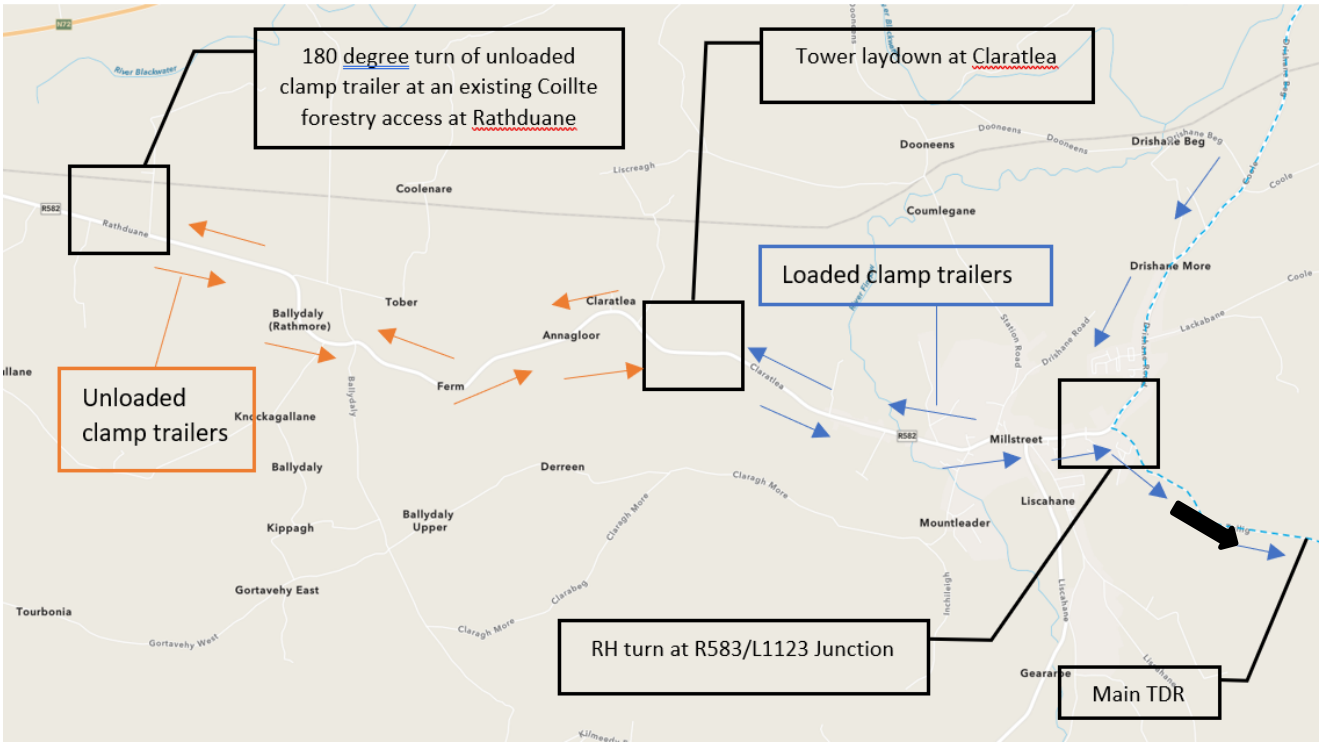

Figure 4-1: Tower Lay Down and Pick Up Locations

Restricted Public Road Use by Construction Traffic

The local authority may impose restrictions on the use of some local roads. These will be agreed in liaison with Cork County Council prior to construction, as well as specific signage requirements for construction works.

Some of the existing local roads are narrow, and to this effect, one-way delivery and access route systems may be employed to mitigate against unsuitable two-way construction traffic.

Using local roads is unavoidable, however, introducing a one-way system where necessary and restricting construction traffic access to a small number of roads will minimise disruption to the local community.

Materials will be delivered to site via the indicative haul routes shown in Figure 3-17.

Road Closures, Diversions and Safety Measures for Road Crossings

It is envisaged that road closures will be necessary for the carrying out portions of the cable trenching, with the majority of the proposed cable trenching taking place on existing local roads. The consent of Cork County Council will be required and the necessary road diversions together with the appropriate signage will be put in place. As there is a good network of local roads, it is anticipated that there are a number of options available for diverting traffic which will allow flexibility during this process of construction and maintain local access at all times during this element of the works.

It is proposed to maintain local access at all times during this element of the works. It is proposed that all access points (domestic, business, farm) are considered when finalising the temporary road closures and diversions. Diversion signage will also be included.

Safety measures for road users adjacent to deep excavations, such as temporary concrete barriers will be detailed for Trenchless Road Crossings in advance of construction and agreed with Cork County Council.

Figure 4-2 details proposed road works locations and diversions associated with the grid connection works.

Temporary signage and traffic management for works in rural single carriageway roads in accordance with Chapter 8 of the Traffic Signs Manual is shown in Figure 4-3 and Figure 4-4..

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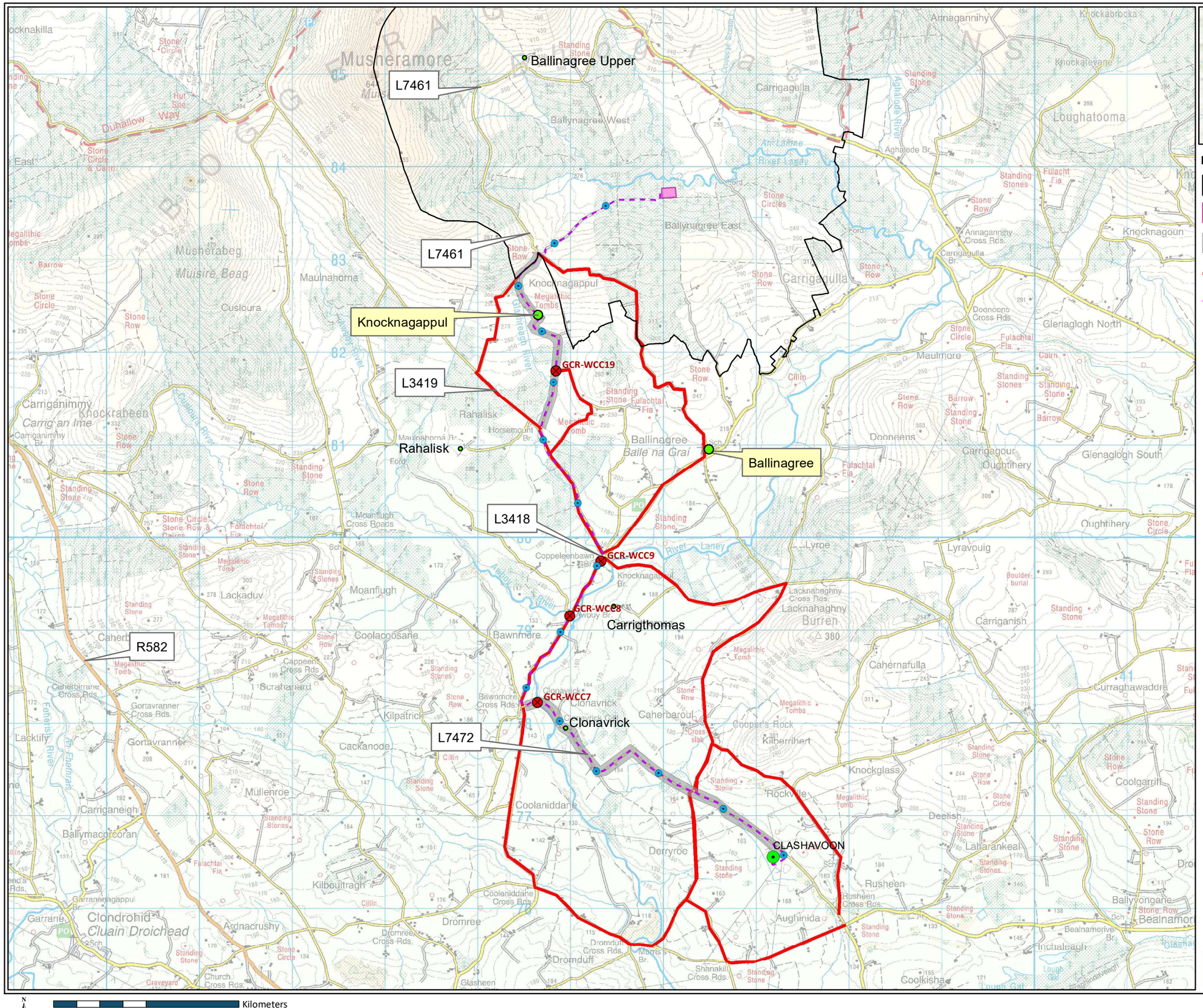

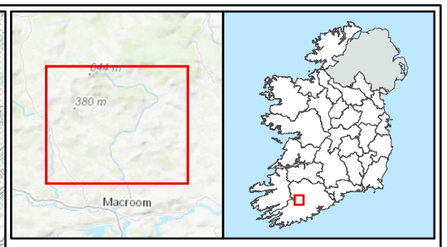

Legend

- Proposed Wind Farm Site
- Substation Compound
- Roads requiring temporary road closures during construction stage
- Diversion Route Option
- Proposed Grid Connection Route
- Clashavoon Substation (110-220kV)
- Joint Bay
- Location of horizontal directional drill

TITLE:	Temporary Road Closures and Diversion Routes		
PROJECT:	Ballinagree Wind Farm		
FIGURE NO:	4.2		
CLIENT:	Coillte and Ørsted		
SCALE:	1:40000	**REVISION:**	0
DATE:	10/01/2022	**PAGE SIZE:**	A3

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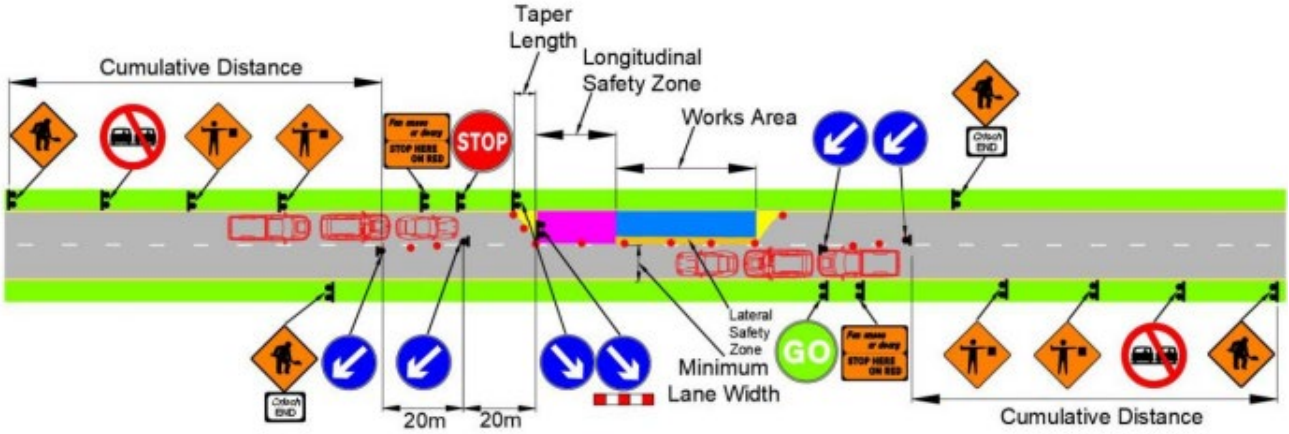

Figure 4-3: Stop and Go Traffic Control Signage for Single Carriageway Rural Road

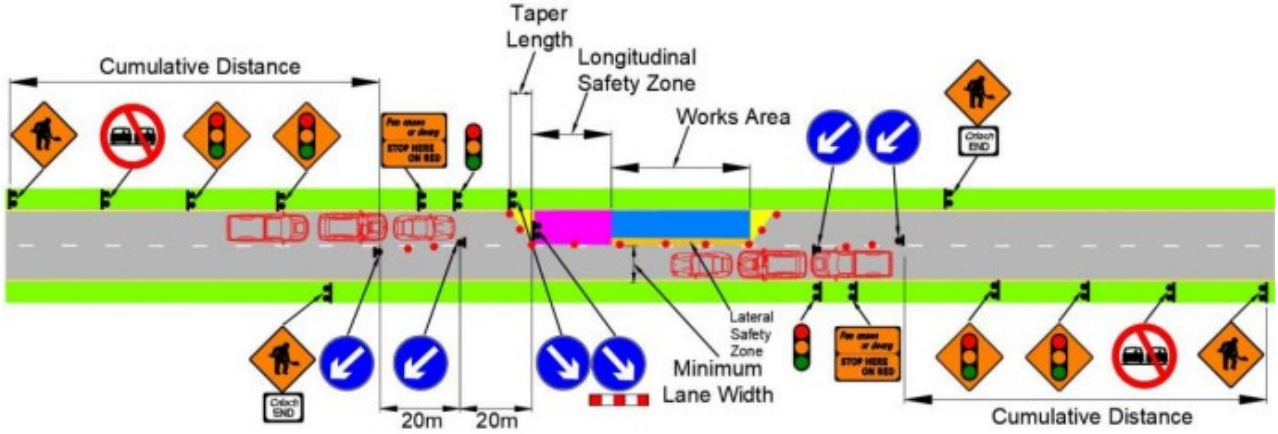

Figure 4-4: Temporary Traffic Signals Control for Works in Single Carriageway Rural Roads

3 no. borrow pits have been identified to provide site-won aggregate material for the construction of the wind farm roads and hard standings. The locations of the borrow pits are shown on Figure 1-2. As described in Chapter 13 of the EIAR, a public road crossing using existing Coillte forestry access points shall be used to facilitate the transport of aggregates from the two borrow pits located in the west of the site to the southern part of the wind farm site using Access Points 4 and 5.

A controlled crossing shall be implemented between Access Points 4 and 5 to facilitate the movement of HGVs across the public road to the wind farm site. The public road at this location experiences very low traffic volumes (AADT = 17 recorded in April 2021). It is also commonly used by walkers and cyclists due to its proximity to the Duhallow Way and would likely experience increased traffic during summer months from visitors to the area.

Access points will be secured and locked when not in use. The proposed crossing point will be managed appropriately to allow the safe passage of construction vehicles in, out and across the public road. Priority will be maintained for public traffic.

The crossing point/site access points should be highlighted to vulnerable road users. Exiting site traffic will be made aware of the possible presence of vulnerable road users.

Stop and Go discs will be used to control the crossing point See Figure 4-5for acceptable type in accordance with Chapter 8 of the Traffic Signs Manual. If it is required to stop both streams of traffic at the one time, then a disc displaying Stop on both sides shall be used.

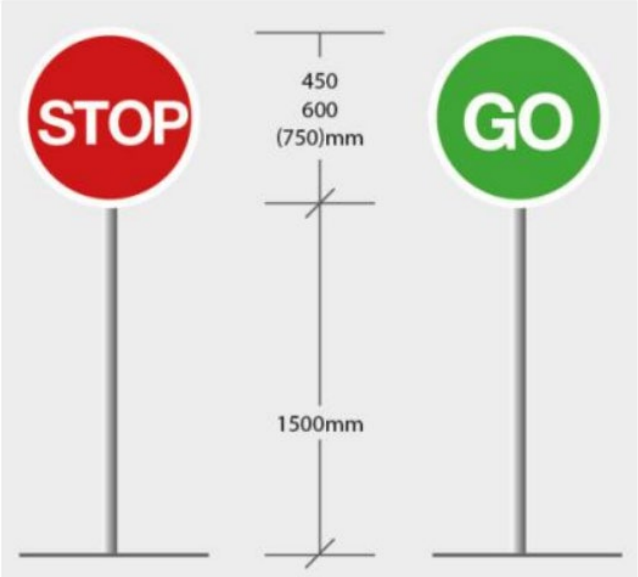

Figure 4-5: Acceptable Stop-Go Discs

At the site crossing point, a single operator may be used to control the traffic using a double-sided Stop disc. The operator, stops both flows of traffic to allow the construction vehicle to cross the public road and then leaves the carriageway and signals to the traffic to proceed.

A concrete apron will be provided on both sides of the crossing point during the construction phase, constructed 40mm below road level and overlaid with surface course material.

Road Cleaning

Public roads shall be kept free of mud, dust, spillages and debris from the construction site, construction plant or haulage vehicles. Any necessary measures shall be put in place at the site entry/exit points.

Carriageway/ Road Reinstatement

It is anticipated that the proposed haul routes will be capable of accommodating the construction traffic associated with the project. In the event that there are concerns around the structural capacity of a road on a proposed haul route, a structural survey shall be carried out to determine suitability of the existing roads to carry the loading. Where the structural survey indicates that a proposed haul route is not in a suitable condition, details of any upgrading works required shall be submitted to Cork County Council for approval. The developer shall upgrade the road or junction in advance of haulage operations.

A pre-condition survey of haul routes, consisting of a video survey and photographs shall be carried out and a copy submitted to Cork County Council.

Any damage caused to the road shall be repaired to its previous condition, to the satisfaction of Cork County Council. Any defects that appear during the haulage period shall be rectified by the project owner.

Traffic Management Measures for Potential Cumulative Impacts

The following existing and proposed developments have been identified as having the potential to create cumulative negative effects on the existing road network. Should activities associated with these developments coincide with the construction of Ballinagree Wind Farm, the Contractor should advise the local authority of these developments as part of the finalisation of the construction stage TMP so that they can be considered.

Table 4-2: Existing and Proposed Projects Assessed for Cumulative Impacts

Project	Existing/Permitted	Reason for Assessment
Existing forestry activities on the site and the surrounding forest blocks	Existing	Proximity to proposed wind farm site and sharing of haul routes.
Solar Farm at Carragraigue, Inchamay North and Crinnaloo South Co. Cork (Planning refs 165455, 186562)	Permitted	This type of development gives rise to construction traffic and its proximity to the proposed wind farm site and TDR has the potential for cumulative traffic and transport impacts. .
Extension to Substation to include Battery Storage at Bawnmore Wind Farm (Planning ref 185240)	Permitted	Type of development (which will give rise to construction traffic) Type of development and proximity to grid connection route.
Knockglass Solar Farm (Planning ref 155424)	Permitted	Type of development (which will give rise to construction traffic) and proximity to grid connection route.
Battery Storage Facility at Caherdowney, Millstreet, Co. Cork (Planning ref 185686)	Permitted	Type of development (which will give rise to construction traffic) and proximity to wind farm site and TDR.
Solar Farm at Cloghmacow, Crookstown, Co. Cork (Planning ref 196847)	Permitted	Type of development (which will give rise to construction traffic) and proximity to grid connection route.
Solar Farm at Berrings, Co. Cork (Planning ref 187280)	Permitted	Type of development (which will give rise to construction traffic) and proximity to grid connection route.
Solar Farm at Currabeha, Crookstown, Co. Cork (Planning ref 164783)	Permitted	Type of development (which will give rise to construction traffic) and proximity to grid connection route.

4.4 Environmental Management Team - Structure and Responsibility

A preliminary organisation chart is included in Figure 4-6. Revisions to the project organisation chart shall be controlled independently of this plan following the appointment of the Contractor for the main construction works.

The Contractor's Project Manager will be responsible for the delivery of all elements of the Environmental Management Plan.

The Contractor's Project Manager will retain all responsibility for issuing, changing and monitoring the Environmental Management Plan throughout.

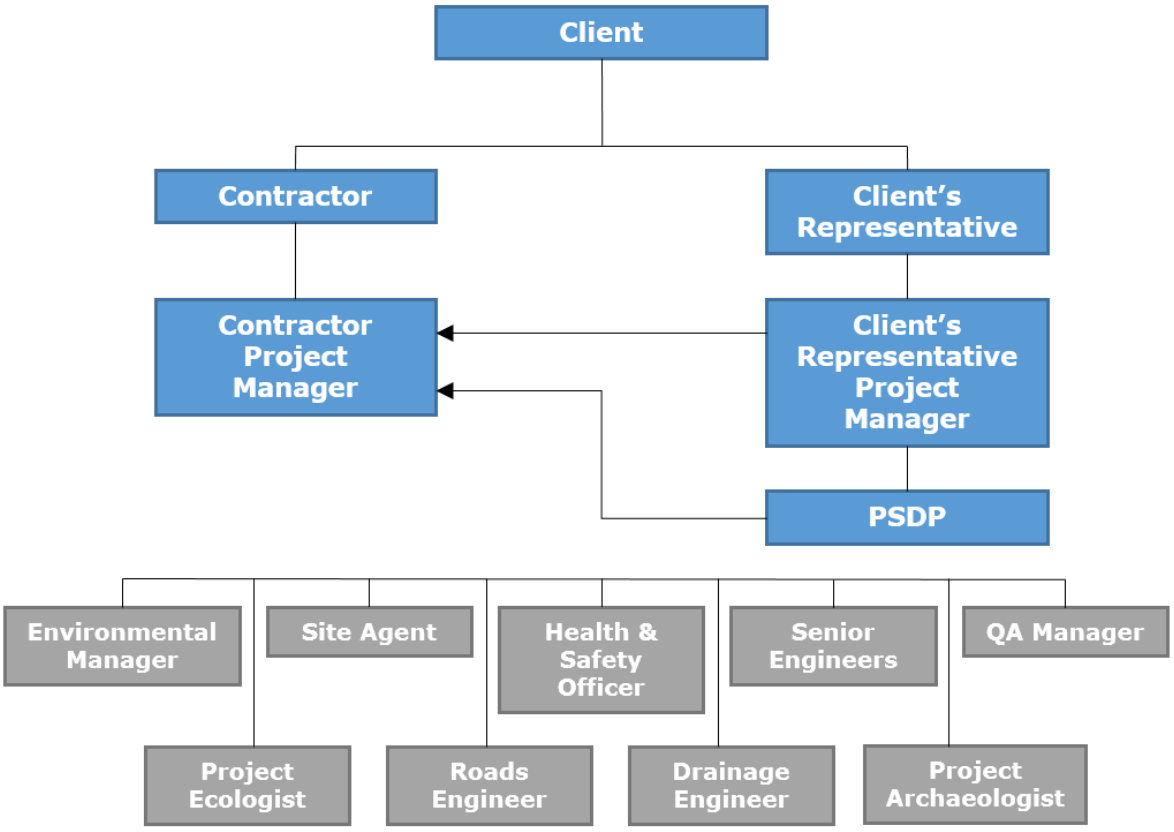

Figure 4-6: Project Management Team Organogram

4.5 Training, Awareness and Competence

All site personnel will receive environmental awareness information as part of their initial site briefing. The detail of the information should be tailored to the scope of their work on site.

The contractor for the main construction works may decide to conduct the environmental awareness training at the same time as Health and Safety Training (often referred to as Site Inductions).

This will ensure that personnel are familiar with the environmental aspects and impacts associated with their activities, the procedures in place to control these impacts and the consequences of departure from these procedures.

The CEMP will be available in the main site compound during the project. The environmental performance at the site is on the agenda of the monthly project management meetings for the project.

Elements of the CEMP will be discussed at these meetings including objectives and targets, the effectiveness of environmental procedures etc. Two-way communication will be encouraged by inviting all personnel to offer their comments on environmental performance at the site.

4.6 Environmental Policy

The contractor is responsible for preparing and maintaining an Environmental Policy for the site. The policy should be appropriate to the project, commit to continuous improvement and compliance with legal requirements and provide a framework for objectives and targets. This will be communicated to all site personnel and will be available on site notice boards.

4.7 Register of Environmental Aspects

The contractor is responsible for preparing and maintaining a *Register of Environmental Aspects* pertaining to the site. This register will identify the environmental aspects associated with activities onsite and determine which aspects have or can have a significant impact on the environment.

4.8 Register of Legislation

The contractor is responsible for preparing and maintaining a register of key environmental legislation pertaining to the site. This register will reference all current environmental legislation and will be inspected, reviewed and updated regularly to ensure compliance.

4.9 Objectives and Targets

Objectives and targets are required to be set to ensure that the project can be constructed and operated in full accordance with the EIAR, planning conditions and legislative requirements, with minimal impact on the environment.

Environmental objectives are the broad goals that the contractor must set in order to improve environmental performance. Environmental targets are set performance measurements (key performance indicators or KPI's) that must be met in order to realise a given objective.

4.10 Non-Conformance, Corrective and Preventative Action

Non-Conformance Notices will be issued where there is a situation where limits associated with activities on the project are exceeded, or there is an internal/external complaint associated with environmental performance.

Non-Conformance is the situation where essential components of the EMS are absent or dysfunctional, or where there is insufficient control of the activities and processes to the extent that the functionality of the EMS is compromised, in terms of the policy, objectives and management programmes. A Non-Conformance register should be controlled by the contractor.

The EMS and all its components must conform to the EMP. In the event of non-conformance with any of the above, the following must be undertaken:

- Assess cause of the non-compliance;
- Develop a plan for correction of the non-compliance;
- Determine preventive measures and ensure they are effective;
- Verify the effectiveness of the correction of the non-compliance;
- Ensure that any procedures affected by the corrective action taken are revised accordingly.

Responsibility must be designated for the investigation, correction, mitigation and prevention of non-conformance.

4.11 EMS Documentation

The Contractor is required to keep the following documentation in relation to the environmental management of the project (as a minimum):

- Construction Environmental Management Plan
- Register of Environmental Impacts
- Register of Planning Conditions
- Monitoring Records
- Minutes of Meetings
- Training Records
- Audit and Review Records.

All these documents and records are to be available for inspection in the site office. The documentation shall be to date and shall be reviewed on a regular basis with revisions controlled in accordance with the site quality plan.

4.12 Control of Documents

The Contractor will establish, implement and maintain a procedure to control CEMP documents and records so they are clearly identifiable, organised, current, easily located and revised when necessary.

5. SAFETY & HEALTH MANAGEMENT PLAN

5.1 Introduction

This Safety and Health Management Plan (SHMP) defines the work practices, procedures and management responsibilities relating to the management of health and safety during the design, construction and operation of the Ballinagree Wind Farm and shall be read in conjunction with the Preliminary Safety & Health Plan prepared for the project by the Project Supervisor for the Design Process. The Safety and Health Management Plan for the construction stage shall be finalised in accordance with this plan following the appointment of the contractor for the main construction works.

This SHMP describes how the contractor for the main construction works will implement a site safety management system (SMS) on this project to meet the specified contractual, regulatory and statutory requirements, environmental impact statement and natura impact statement mitigation measures and planning conditions. It is the contractor's responsibility to implement an effective safety management system to ensure that the developer's safety requirements for the construction of this project are met.

All site personnel will be required to be familiar with the requirements of the safety management plan as related to their role on site. The plan describes the project organisation and sets out the health and safety procedures that will be adopted on site.

- The Safety and Health Plan is a controlled document and will be reviewed and revised as necessary.
- A copy of the Safety and Health Plan will be located on/near the site H&S notice board.
- All employees, suppliers and contractors whose work activities cause/could cause impacts on the environment will be made aware of the SHMP and its contents.

5.2 Project Obligations

The construction of Ballinagree Wind Farm the will impose numerous safety management obligations on the developer, designer and contractor. As well as statutory obligations, there are several specific obligations set out in the EIAR and in the planning conditions for the proposed wind farm. These obligations are set out below. The contractor for the main construction works and all its sub-contractors are to ensure that they are fully aware of and in compliance with these safety obligations.

5.2.1 EIA Obligations

EIAR obligations are described in Section 4.2.1.

5.2.2 Planning Permission Obligations

Planning permission obligations will be fully outlined in the Contractor's CEMP.

5.2.3 Statutory Obligations

The Safety, Health and Welfare at Work Act 2005 (as amended) and the Safety, Health and Welfare at Work (Construction) Regulations 2013 (as amended) place a responsibility on the Developer as the "Client", the Designer, the Project Supervisors and the Contractor.

The Client must:

- Appoint a competent and adequately resourced Project Supervisor for the Design Phase (PSDP)
- Appoint a competent and adequately resourced Supervisor for the Construction Stage (PSCS)
- Be satisfied that each designer and contractor appointed has adequate training, knowledge, experience and resources for the work to be performed
- Co-operate with the project supervisor and supply necessary information
- Keep and make available the safety file for the completed structure
- Provide a copy of the safety and health plan prepared by the PSDP to every person tendering for the project
- Notify the Authority of the appointment of the PSDP.

Designers must:

- Identify any hazards that their design may present during construction and subsequent maintenance
- Eliminate the hazards or reduce the risk
- Communicate necessary control measures, design assumptions or remaining risks to the PSDP so they can be dealt with in the safety and health plan
- Co-operate with other designers and the PSDP or PSCP
- Take account of any existing safety and health plan or safety file
- Comply with directions issued by the PSDP or PSCS.

The PSDP must:

- Identify hazards arising from the design or from the technical, organisational, planning or time related aspects of the project
- Where possible, eliminate the hazards or reduce the risks
- Communicate necessary control measure, design assumptions or remaining risks to the PSCS so they can be dealt with in the safety and health plan
- Ensure that the work of designers is coordinated to ensure safety
- Organise co-operation between designers
- Prepare a written safety and health plan for any project and deliver it to the client prior to tender
- Prepare a safety file for the completed structure and give it to the client.

The PSCS must:

- Co-ordinate the identification of hazards, the elimination of the hazards or the reduction of risks during construction
- Develop the Safety and Health Plan initially prepared by the PSDP before construction commences
- Co-ordinate the implementation of the construction regulations by contractors
- Organise cooperation between contractors and the provision of information
- Co-ordinate the reporting of accidents to the Authority
- Notify the Authority before construction commences
- Provide information to the site safety representative
- Co-ordinate the checking of safe working procedures
- Co-ordinate measures to restrict entry on to the site
- Co-ordinate the provision and maintenance of welfare facilities
- Co-ordinate arrangements to ensure that craft, general construction workers and security workers have a Safety Awareness card, e.g. Safe Pass and a Construction Skills card where required
- Co-ordinate the appointment of a site safety representative where there are more than 20 persons on site
- Appoint a safety adviser where there are more than 100 on site
- Provide all necessary safety file information to the PSDP
- Monitor the compliance of contractors and others and take corrective action where necessary;
- Notify the Authority and the client of non-compliance with any written directions issued.

The Contractor must:

- Co-operate with the PSCS
- Promptly provide the PSCS with information required for the safety file
- Comply with directions of the project supervisors
- Report accidents to the Authority and to the PSCS where an employee cannot perform their normal work for more than 3 days
- Comply with site rules and the safety and health plan and ensure that your employees comply
- Identify hazards, eliminate the hazards or reduce risks during construction
- Facilitate the site safety representative
- Ensure that relevant workers have a safety awareness card and a construction skills card where required
- Provide workers with site specific induction
- Appoint a safety officer where there are more than 20 on site or 30 employed
- Consult workers with site specific induction
- Monitor compliance and take corrective action.

Consequently, at all stages of the project there are statutory requirements for the management of safety, health and welfare of all involved in or affected by the development. This CEMP and specifically the Safety and Health Management Plan address key construction management issues associated with the proposed wind farm. This plan will be developed further at the construction stage, on the appointment of the Contractor for the main construction works.

5.2.4 The Management of Health and Safety during the Design Process

Fehily Timoney & Company (FT) has been appointed Project Supervisor for the Design Process (to prepare the Environmental Impact Assessment Report and planning application for the proposed Ballinagree Wind Farm development). FT is competent to fulfil this role in accordance with the Safety, Health and Welfare at Work (Construction) Regulations, 2013. Health and safety are a major priority for FT and FT adopts health and safety practices that are an inherent part of a safe and sustainable business. FT's objective is to provide a safe and healthy work environment for all and to meet our duties to clients, contractors and members of the public.

It is FT's policy to comply fully with all health and safety legislation, in particular the Safety, Health and Welfare at Work Act, 2005, Safety, Health and Welfare at Work (General Application) Regulations 2007, and the Safety, Health and Welfare at Work (Construction) Regulations 2013.

FT has developed in-house procedures to ensure, so far as is reasonably practicable, that all projects:

- are designed to be capable of being constructed to be safe/ without risk to health;
- can be operated and maintained safely and without risk to health during use; and
- comply in all respects, as appropriate, with the relevant statutory enactments and instruments.

These procedures include effective risk management procedures involving the identification and evaluation of risks and the development of mitigation measures to eliminate (where possible) or reduce those risks during the life-cycle of the project. The FT team is committed to health and safety and shares responsibility for managing risk at all stages of a project.

All work by FT is undertaken in a competent and efficient manner taking account of the general principles of prevention to safeguard the safety, health and welfare of construction & maintenance workers and other third parties.

The FT procedures for the management of safety during the design process are outlined in the in-house procedure PP09 "Health and Safety Requirements in Design Projects" and is adhered to on all design projects.

The purpose of this procedure is to define the requirements for the management of health & safety during design projects, to ensure compliance with The Safety, Health and Welfare at Work (Construction) Regulations 2013 (as amended).

The procedure includes standard forms which are used to communicate health and safety considerations within the design team and also guidelines which develop the company's health and safety procedure and outline the company's responsibilities for health and safety during the design process.

The procedure addresses health and safety issues at all stages of a project, from the preliminary design through to commissioning and operation. By establishing a chain of responsibility each party is clear on their role and obligations from a health and safety perspective.

Risk assessments are carried out, at preliminary and detailed design stages by every discipline involved in the design. Each risk assessment is prepared by the designers and reviewed by the Health and Safety Facilitator for the project.

Risk assessments are used to identify hazards and assess risk at all stages during the life of the project including the construction & maintenance stages.

A Health and Safety Facilitator for the Design Process (HSF) is appointed on all projects where FT are the Project Supervisor for the Design Process (PSDP).

Health & Safety Facilitators are selected from the senior ranks of FT design staff to ensure they have the required knowledge, experience and training to carry out the role.

Meetings will be held between the HSF and relevant design personnel to collate all the risk assessments and other pertinent information and to discuss any issues relating to health and safety and ensure the constructability of the designs. The minutes of these meetings are circulated to the entire design team complete with actions allocated to the designers as appropriate. At such a meeting a "Construction Risk Analysis" form is completed which forms the basis for the Preliminary Safety & Health Plan. This document outlines the particular, significant and residual risks and in addition specific construction methods or sequences assumed during the design. Special requirements for maintenance envisaged at design stage are also included.

A Designers Safety File shall be kept and maintained during the design. All design criteria adopted, and safety & health information required for the Safety File shall be kept in this file which is maintained by the HSF and is the pre-cursor to the Safety File. The information required from the Contractor/ PSCS for inclusion in the Safety File is specified at tender stage in the Preliminary Safety and Health Plan.

This information from the PSCS & Contractor(s) and the Designers Safety File is used to compile the Safety File in the latter stages of a contract and formally issued to the Client on completion of the contract.

FT promotes a collaborative approach to health and safety on site where the Client, PSDP, Designers, Contractors and PSCS co-operate with each other and share information. Joint site safety audits and/or walk-downs are carried out as part of this collaboration and safety is monitored and addressed on site on an ongoing basis. The regular safety meetings are held to document this ongoing co-operation, get an over-view of works currently in hand onsite and about to commence and share information.

5.2.5 The Preliminary Safety and Health Plan

In accordance with the requirements of the Safety, Health & Welfare at Work (Construction) Regulations 2013 (as amended) a Preliminary Safety & Health Plan will be required as part of the design process. This plan will be further developed by the PSCS on appointment and maintained as a live document during construction and commissioning of the development.

The safety and health plan is required to include the following information:

- a general description of the project;
- details of other work activities taking place on site;
- works involving particular risks;
- the timescale for the project and the basis on which the time frame was established;

- conclusions drawn by designers and the PSDP having taken into account the General Principles of Prevention and any relevant Safety and Health Plan or Safety File;
- the location of electricity water and sewage connections so as to facilitate early establishment of welfare facilities.

In accordance with the PSDP's procedures the Preliminary Safety & Health Plan for the proposed Ballinagree Wind Farm development should include the following sections and subsections to ensure the PSCS is aware of the health and safety issues at tender stage and enable them to price accordingly:

Preamble:

1 General Project Information:
- 1.1 Title
- 1.2 Description of Project
- 1.3 Employer
- 1.4 Designers / Other Consultants
- 1.5 Project Supervisor Design Process
- 1.6 Drawings, Specifications and Other Documents
- 1.7 Intended Contract Commencement Date
- 1.8 Intended Contract Completion Date
- 1.9 Basis for Contract Duration
- 1.10 Restrictions on Working Hours
- 1.11 Notification of Project
- 1.12 Termination of the PSCS Appointment

2 The Existing Environment:
- 2.1 Site Location
- 2.2 Relevant Adjoining Land Uses
- 2.3 Site Restrictions
- 2.4 Restrictions on Access
- 2.5 Hazardous Area Classification
- 2.6 Existing Services
- 2.7 Ground Conditions
- 2.8 Existing Hazards
- 2.9 Liaison with Statutory Bodies

3 Other Work Activities:
- 3.1 Other Contracts Which May Affect Work
- 3.2 Occupation of Site
- 3.3 Building Activities
- 3.4 Other Work Activities
- 3.5 Emergency Procedures in Place on Site

4 Particular and Residual Risks:
- 4.1 Works Which Puts Persons at Work at risk
- 4.2 Work Which Puts Persons at Risk from Chemical or Biological Substances
- 4.3 Work with Ionising Radiation
- 4.4 Work near High Voltage Power Lines
- 4.5 Work Exposing Persons at Work to the Risk of Drowning
- 4.6 Work on Wells, Underground Earthworks and Tunnels
- 4.7 Work Carried Out by Divers at Work Having a System of Air Supply
- 4.8 Work Carried Out in a Caisson with a Compressed Air Atmosphere
- 4.9 Work Involving the Use of Explosives
- 4.10 Work Involving the Assembly or Dismantling of Heavy Prefabricated Components
- 4.11 Work Involving Hazardous Material
- 4.12 Residual Risks

5 Additional Information:
- 5.1 Existing Documents
- 5.2 Site Possession
- 5.3 Site Rules
- 5.4 Site Specific Safety Objectives
- 5.5 Phasing of Works
- 5.6 Permits / Authorisation Required
- 5.7 Maintenance
- 5.8 Continuing Liaison
- 5.9 Specific Recommendations

6 Information Required for Safety File:
- 6.1 Information Required for Safety File from PSCS

5.2.6 The Management of Health and Safety during the Construction Phase

The selection criteria for the Contractor for the works will be based on the ability to construct the works in a manner that will not endanger the safety, health and welfare of any parties and competence to fulfil the role of PSCS.

The contract will be awarded on the basis of assessment of the candidates against relevant health and safety criteria including experience of similar projects, knowledge of the construction processes involved and training of their management and staff who will be involved in carrying out the works.

5.2.7 The Construction Stage Safety and Health Plan

In accordance with the requirements of the Safety, Health & Welfare at Work (Construction) Regulations 2013 (as amended) the preliminary Safety & Health Plan prepared by the PSDP will be further developed by the PSCS before the commencement of the construction work and updated on a regular basis during the construction phase of the project.

The document will include the following sections and subsections to ensure the management of health and safety during the construction phase of the project:

1. Description of Project:
    - project description and programme details
    - details of client, PSDP and PSCS, designers
    - main contractor and other consultants
    - extent and location of existing records and plans
    - arrangements for communicating with Contractors, PSDP and others as appropriate

2. Communication and Management of the Work:
    - management structure and responsibilities
    - safety and health goals for the project and arrangements for monitoring and review of safety and health performance
    - arrangements for:
        - regular liaison between parties on site
        - consultation with the workforce
        - the exchange of design information between the Client, Designers, Project Supervisor for the Design Process, Project Supervisor Construction Stage and Contractors on site
        - handling design changes during the project
        - the selection and control of contractors
        - the exchange of safety and health information between contractors
        - security, site induction, and on-site training
        - welfare facilities and first aid
        - the production and approval of risk assessments and method statements
        - the reporting and investigation of accidents and other incidents (including near misses)
    - site rules
    - fire and emergency procedures

3. Arrangements for Controlling Significant Site Risks:
    - safety risks
        - services, including temporary electrical installations
        - preventing falls
        - work with or near fragile materials
        - control of lifting operations
        - dealing with services (water, electricity and gas)
        - the maintenance of plant and equipment
        - poor ground conditions
        - traffic routes and segregation of vehicles and pedestrians
        - storage of hazardous materials
        - dealing with existing unstable structures
        - accommodating adjacent land use
        - other significant safety risks

- Health risks:
    - removal of asbestos
    - dealing with contaminated land
    - manual handling
    - use of hazardous substances
    - reducing noise and vibration
    - other significant health risks

The construction stage safety and health plan will be maintained on site by the PSCS and will be communicated to all relevant parties on an ongoing basis through inductions, site safety meetings and tool box talks etc. as required.

6. EMERGENCY RESPONSE PLAN

6.1 Introduction

This chapter of the CEMP presents an Emergency Response Plan for the proposed project. The Emergency Response Plan shall be finalised in accordance with this plan following the appointment of the contractor for the main construction works and following detailed design development.

This Emergency Response Plan contains predetermined guidelines and procedures to ensure the safety, health and welfare of everybody involved in the project and to protect the environment during the construction phase of Ballinagree Wind Farm. This outlines the immediate response to an emergency situation and will be developed by the main construction works contractor and PSCS as part of their construction stage Safety and Health Plan.

An emergency is any disruptive or harmful event that endangers people, environment, property or assets. Emergencies can be small, as in a fire contained by employees using firefighting equipment or large, as in damage resulting from a storm.

In the context of the Ballinagree Wind Farm, examples of Emergency Response Plan emergency events are:

- medical emergency
- explosion
- overheated equipment
- chemical and fuel spill
- fire
- loss of power
- vehicle incidents
- land slippage

Example sources of emergency or disaster events are:

- unstable/inappropriate stockpiles on site
- faulty or incorrect use of equipment
- falls from height
- storm/adverse weather
- power failure
- fuel spill
- road failure
- serious vehicle collisions or overturning

6.2 Emergency Response Plan

An emergency response plan deals with the immediate physical effects of a disaster and outlines the initial response.

6.2.1 Emergency Response Liaison

The contractor/PSCS will designate an individual to serve as the Emergency Response Liaison for this project. The emergency response liaison will coordinate the emergency response for the duration of any emergency at or nearby the project site.

The local County Council, An Garda Síochána and the HSE Ambulance Co-ordinator will be provided with the construction programme and the onsite contact information from the Emergency Response Liaison prior to construction.

The Emergency Response Liaison will be immediately reachable at all times during project construction. The Liaison will coordinate with the above agencies to establish emergency procedures for access to and within the site in the event of an emergency.

6.2.2 Reporting Emergencies

In the event of fire, storm, flood, serious injury or other emergency, contact:

ALL ON SITE EMERGENCIES DIAL 999

6.2.3 Designated Responder

A map depicting turbine tower locations with the emergency meeting point will be furnished to the local County Council Fire Department and HSE ambulance co-ordinators.

Upon arrival on the scene, the senior EMS Officer will set up the incident command structure. The Emergency Response Liaison and all contractor's personnel will cooperate with directions of the incident commander and assist as directed.

The nearest emergency services, ambulance and Accident & Emergency (A&E) facilities are:

Service:	Contact Details:	
Accident & Emergency (A&E)	Cork University Hospital	(021) 4922000
Ambulance Service	Dial 112 or 999	
Fire Services	Dial 112 or 999	

Service:	Contact Details:	
Garda Station	Millstreet Garda Station	029 70002
District HQ:	Macroom Garda Station	026 20597
Divisional HQ:	Anglesea Street Garda Station	021 4522000

Each member of the contractor's site team who are First-Aid and Cardiopulmonary Resuscitation (CPR) trained personnel will be identifiable with a hard hat sticker indicating their training.

6.2.4 Emergency Alarm

The emergency alarm will be raised on site as soon as an emergency situation is detected, the alarm will be identified (contractor to check those that apply):

	Air Horn		Radio		Voice		Hand Signals		Siren

6.2.5 Emergency Reporting

In the event of an emergency the nearest supervisor with radio equipment/mobile phone will be notified. The degree of emergency will be reported to the Emergency Response Liaison who will contact the Emergency Services and request the appropriate emergency service.

6.2.6 Medical Protocol

In the event of a major medical emergency, the emergency centre (999) will be notified and an ambulance and emergency medical team will respond to the scene. All major medical cases require professional (ambulance) transportation. In the event of a minor medical case, the affected employee can be transported via company vehicle in the escort of a foreman or site engineer (with first aid training).

6.2.7 Emergency Response

Upon notification, the Emergency Response Liaison will respond to the emergency scene and manage emergency operations:

1. Assess hazards and make the area safe – If you cannot enter the area without risking your safety, don't do it, call the Emergency Services immediately and wait for them. If you think you can safely enter the area, look around the emergency scene for anything that can be dangerous or hazardous to you, the casualty, or anyone else at the scene. Bystanders can help with making the area safe. First aid kits will be available on site. Operators that have been first aid/CPR/AED trained will be listed on site and easily identifiable by a hard hat sticker.

2. Take charge of the situation – if you are the first-aid provider on the scene act fast. If someone is already in charge, briefly introduce yourself and see if that person needs any help. If there is any chance the casualty could have a head or spinal injury, tell them not to move.

3. Get Consent – always identify yourself as a first-aid provider and offer to help. Always ask for consent before touching a conscious adult casualty. Remember to protect yourself first by wearing gloves and eye protection.

4. Assess Responsiveness – is the casualty conscious or unconscious? Note their response while you are asking them for their consent. If they respond, continue with the primary survey, and if they don't respond, be aware that an unconscious casualty is or has the potential of being a breathing emergency.

5. Call out for help – this will attract bystanders. Help is always useful in an emergency situation. Someone can be called over to phone for medical help. Others can bring blankets if needed, get water, etc. a bystander can help with any of the following:

- Make the area safe.
- Find all the casualties.
- Find the first aid kit, or any useful medical supplies.
- Control the crowd.
- Call for medical help.
- Help give first aid, under your direction.
- Gather and protect the casualty's belongings.
- Take notes, gather information, be a witness.
- Reassure the casualty's relatives.
- Lead the ambulance attendants to the scene of the emergency.
- Notify Emergency Services as soon as you can. Either send a bystander or call yourself.

In the event of a major medical emergency the Emergency Response Liaison, as the person-in-charge of the emergency scene, will dispatch someone to the site access point nearest the emergency scene to direct and lead arriving outside responders to the emergency scene. The designated meeting point will be agreed prior to the commencement of construction. Emergency personnel will be met at this meeting point communicated by management during the 999 call. The emergency personnel escort will use the hazard lights on their vehicle, so they are easily identified.

6.2.8 Escape and Evacuation Procedure

Dependent upon the degree of the emergency and if safe to do so, employees will evacuate to the designated assembly area where the designated wardens shall account for all employees and determine if anyone still remains within the emergency scene.

Should a wild land fire or peat slippage occur, and the designated assembly area is compromised other locations will be designated as secondary assembly areas.

Wind turbines shall be fitted with fire suppression systems and will have emergency escape procedures in place for operational staff in the event of fire in a wind turbine.

6.2.9 Turbine Tower Rescue Procedure

In the event personnel are trapped or injured in an elevated turbine tower position the following protocol will be initiated:

1. The Emergency protocol will be initiated
2. Emergency Response Liaison will be notified
3. Tower Rescue Team will be activated and respond to the scene
4. Outside medical and Rescue Teams will be notified and respond to the scene.

Tower Rescue Procedure:

1. Upon learning of an emergency, the on-scene foreman shall assess the emergency and ascertain its degree, location and the extent of any injuries.
2. Upon confirming that an emergency exists the on-scene foreman notifies the Emergency Response Liaison and the project Office.
3. Upon notification of the emergency the Emergency Response Liaison shall notify senior project supervision and the local emergency centre (999) of the emergency.
4. The Emergency Response Liaison shall inform the dispatcher of the location, tower number, the degree of the emergency and the extent of injuries.

6.2.10 Prevention of Illness/Injury Due to Weather/Elements

1. All employees will have access to shelter and heat in the event of inclement weather.
2. Employees will have access to at least a litre of water at all times.
3. High wind warnings and weather forecast will be discussed every morning with the crews. Weather conditions and forecast will be monitored regularly by management.
4. No Employee will work alone. A buddy system will be used so employees can contact a supervisor in case of an emergency.

6.2.11 Environmental Emergency Procedure

An emergency preparedness and response procedure is required to prevent environmental pollution incidents. Emergency Silt Control and Spillage Response Procedures are included in Section 4.3.3 to 4.3.5 of this CEMP.

Suitable spill kits and absorbent material for dealing with oil spills will be maintained on site. In the event of pollution or potential risk of pollution the Local Authority should be informed immediately.

In the case of water pollution in addition to the Local Authority, Inland Fisheries Ireland should also be informed immediately.

6.2.12 Emergency Response Plan – Haul Routes

Emergency Response Procedure relating to transportation of plant, equipment and materials to site to be developed by the main contractor during the construction phase of the wind farm.

6.2.13 Emergency Events – Wind Turbines

Each wind turbine, incorporating the tower, blades, gearbox and ancillary equipment in the tower and nacelle is a machine under the European Machinery Directive [2006/42/EC]. The duties of designers and manufacturers of machinery are set out in the Machinery Directive, which has been transposed into national law by the 2008 European Communities (Machinery) Regulations [S.I.No.407/2008] (as amended). All wind turbines should be CE marked, which is in effect, a mark of assurance that the wind turbine complies with the essential health and safety requirements (EHSRs) of EU supply law. In all cases, the manufacturer or the manufacturer's authorised representative must compile information in a technical file confirming how the machine complies with these requirements. The commissioning of turbines and ancillaries must only be carried out by competent, trained and qualified personnel. The system of work for commissioning must be planned, organised, maintained and revised to ensure safety of personnel.

Potential emergency events associated with wind turbines include:

- Blade loss
- Fire
- Wind turbine toppling (due to foundation or tower failure);
- Wind turbine rotational failure in extreme wind conditions (due to control system or rotor break failure);

The primary mitigation against an emergency catastrophic event that may endanger the health and safety of the public is implemented at design stage through adequate siting of wind turbines which provide sufficient set back distances from occupied buildings and other infrastructure to avoid the risk of impact in the event of wind turbine collapse.

Peat slippage contingency measures have been included in Section 6.2.14 below in the unlikely event of landslide scenario.

6.2.14 Peat Slippage Contingency Measures

6.2.14.1 Excessive Movement

Where there is excessive movement or continuing peat movement recorded at a monitoring location or identified at any location within the site but no apparent signs of distress to the peat (e.g. cracking, surface rippling) then the following shall be carried out.

(1) All activities (if any) shall cease within the affected area.

(2) Increased monitoring at the location shall be carried out. The area will be monitored, as appropriate, until such time as movements have ceased.

(3) Re-commencement of activities shall only start following a cessation of movement and a review by an experienced geotechnical engineer.

6.2.14.2 Onset of Peat Slide

In the unlikely event where there is the onset or actual detachment of peat (e.g. cracking, surface rippling) then the following shall be carried out.

(1) On alert of a peat slide incident, all activities (if any) in the area will cease and all available resources will be diverted to assist in the required mitigation procedures.

(2) Action will be taken to prevent a peat slide reaching any watercourse. This will take the form of the construction of check barrages on land. Due to the terrain and the inability to predict locations it may not be possible to implement any on-land prevention measures, in this case a watercourse check barrage will be implemented.

(3) All relevant authorities should be notified if a peat slide event occurs on site.

(4) For localised peat slides that do not represent a risk to a watercourse and have essentially come to rest the area will be stabilised initially by rock infill, if required. The failed area and surrounding area will then be assessed by an experienced geotechnical engineer and stabilisation procedures implemented. The area will be monitored, as appropriate, until such time as movements have ceased.

6.2.14.3 Check Barrages

Whilst it is not anticipated from the analysis undertaken that a peat slide will occur on site, as a contingency a check barrage procedure is included below.

The check barrage procedure deals with preventing a peat slide from moving downstream within a watercourse.

As detailed above, it is preferable to first prevent a peat slide from reaching a watercourse by constructing check barrages on land. Failing this, the most effective method of preventing excessive peat slide debris from travelling downstream in a watercourse is the use of a check barrage. A check barrage comprises the placement of rock fill across a watercourse. The check barrage is a highly permeable construction that will allow the passage of water but will prevent peat debris from passing through. Rock fill should comprise well-graded coarse rock pieces from about 300mm up to typically 1000mm.

The size of the barrage will vary depending on the scale of the peat debris to be contained and the geometry of the watercourse at the barrage location. In general, due to the low speed of a peat slide there is generally little impact force and most of the lateral load is due to fluid pressure on the upslope face of the barrage.

Typically, the check barrage should fill the entire channel width of the watercourse up to a height of 3 to 4m with a crest width of typically 2m and side slopes of about 45 degrees depending on the geometry of the barrage location.

The check barrage procedure is as follows:

(1) Access to the check barrage location shall be along the existing access roads on the wind farm site and/or along public roads, where possible. When it is necessary to form the barrage then rock fill will be placed across the watercourse to effectively block the passage of peat debris.

(2) Operatives employed to carry out the construction of the check barrage would need to be inducted by means of a briefing by on-site supervisors as to the proposed location of the check barrage.

(3) The check barrage provides containment for peat debris in the highly unlikely event of a major peat slide. Further remedial measures, should they be required, will be assessed by the Contractor and the Project Geotechnical Engineer and carried out as soon as physically possible when the location and extent of the failure is established.

(4) Where a barrage was constructed as a precaution and no peat debris reached the watercourse then the barrage should be removed as soon as any measures to prevent further peat sliding is agreed with all parties.

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APPENDIX 5

Invasive Species Management Plan (ISMP)

4 Planning Phase Invasive Species Management Plan

4.1 Options for control and eradication of Invasive Species

The best available methods of control and eradication were compiled with reference to the NRA Guidelines (2010) and Fennell et al. (2018) and are summarised in this section of the report. It is recommended that a suitably experienced contractor is employed to undertake the invasive species eradication programme at the site. Methods of invasive species control are rapidly evolving, based on new research and the availability and use of chemical agents. It is important in the preparation of any invasive species management plan to highlight the need for the plan to be reviewed and adapted in the context of any changes that occur in guidance or legislation in the period between pre-planning surveys and the implementation of controls.

The approved contractor will finalise this management plan, based on contemporary experience and knowledge, and on the prevailing level of infestation of each invasive species. A pre-treatment survey will be carried out to ground-truth the extent of each invasive species and to confirm that the recommended approach herein remains appropriate. For example, manual control may only work for small, new infestations such as young Butterfly bush shrubs, but a combination of manual and chemical control may be required to ensure the complete eradication of more established shrubs. The specialist contractor will advise/finalise the best approach based on their knowledge of the species in question.

The successful eradication of invasive species from the development site may require some discussion and co-operation with neighbouring landholdings/landowners and as such the management plan will be discussed and (if possible) agreed with any relevant parties.

4.1.1 Management Options for Eradication of Invasive Species

Japanese Knotweed (*Fallopia japonica*) and Rhododendron (*Rhododendron pointicum*) were the only invasive plant species recorded within and outside of overall wind farm study area that are listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (*i.e.,* species of which it is an offense to disperse, spread or otherwise cause to grow in any place). Vector materials; soil and/or spoil taken from affected sites are also included under Regulations 49 and 50 for this species. While neither species was recorded within the construction footprint it is possible that these, or indeed other, invasive plant species could become established within the working area.

The developer will ensure through their appointed contractor that the Invasive Species Management plan is reviewed by suitably qualified and experienced specialist contractors ahead of any site mobilisation. Due to the high risk posed by this species, the location of Japanese Knotweed and Rhododendron stands will be clearly marked and cordoned off ahead of any site works. Any additional Third Schedule species present will also be recorded and mapped. The location and sensitivity of these locations will be covered in the initial induction with all site staff prior to construction works. All site staff will be made aware of the existence of this Management Plan and where it will be available for review on-site.

Where excavations or earth works associated with the construction phase are located within 7 metres of an identified Japanese knotweed stand, the excavation material will be treated as potentially contaminated material, by a licensed contractor to a suitably licensed waste facility. The potential for impacting upon any Rhododendron found within the planned working area will be assessed by a suitably qualified specialist. These locations will be marked and access to such areas will be restricted to necessary personnel (e.g., invasive species specialists). Excavations in these areas will be monitored by a suitably qualified ecologist with experience in invasive species control and management.

The specialist invasive species management contractor employed to undertake invasive plant eradication and removal will review and if necessary, update/amend the suggested management provided in this report. They will have responsibility for ensuring that the adopted approach follows the best contemporary guidance and is fully legally compliant.

Details of management options for invasive plant species noted during surveys of the wider area and which are therefore most likely to be encountered during the construction phase are provided in the following sections.

4.1.2 Management and Control Options for Japanese Knotweed

Management/Eradication options for Japanese Knotweed (after NRA 2010, Fennell *et al.* 2018) to include;

Management options for Japanese Knotweed (TBC by approved contractor) to include:	
Initial Site Staff Induction	An initial induction with all site staff will be undertaken prior to construction works starting, to inform them of the occurrence in the area of Japanese Knotweed, including issues caused by its spread, identification and site walkover of known location(s) – ensuring clearing of footwear, equipment etc. prior to leaving infested area – *i.e.,* **PLAN, CHECK, CLEAN & DRY** (Fennell *et al.* 2018) All site staff will be made aware of the existence of the Management Plan and where it will be available for review as required, the proposed management options appropriate for the site, and the name of the contractor appointed for invasive species management and removal where applicable.
Japanese Knotweed - Brief Description	Japanese Knotweed is a robust, herbaceous perennial with hollow, bamboo like stems which are green with red spots in summer before turning brown in winter. The plant has yellow/cream flowers in later June or August. Its leaves are arranged in a zig-zag pattern alongside shoots arising from the main stem (NRA 2010).
Pathways of spread	Only female plants have been recorded in Ireland and while seeds are sometimes produced, these are hybrid and rarely survive. Dispersal typically occurs through rhizome fragments, crown fragments, rhizomes, and in certain cases from the stem fragments, usually by being transported in soil by humans or to a lesser extent, through passive mechanical means such as in floodwaters. Dispersal is also achieved through vegetative reproduction from plant fragments (NRA 2010, Fennell *et al.* 2018).
Prevention	**Immediate action**: Minimise or avoid contact with plants and infested substrate. Fence off and mark clearly where possible. **Plan, Check, Clean and Dry** - Always clean footwear, clothing and equipment immediately on leaving the infested area.
Note:	It is a requirement of this plan that only personnel with sufficient training, experience and knowledge in the control of non-native invasive species should be employed to assist in the planning and implementation of control measures in relation to Japanese knotweed which should be undertaken with reference to the current guidance (e.g., UK Environment Agency's (n.d.) *Managing Japanese knotweed on development sites - the knotweed code of practice* (NRA 2010). **The primary objective of control should be total eradication** by targeting the underground rhizome and not simply the aerial parts*. It should be noted that none of the methods outlined below* ***guarantee*** *eradication.* **Any removal from site must be in line with current waste regulations.** The methodology used may depend upon whether immediate removal is required or if it is enough to control/eradicate the stands over a period of time. In the event that immediate removal is deemed necessary (*i.e.,* prevent the risk of spread during construction works at the site) then actions 1 to 5 below will be considered. In the event that immediate removal is not required (*i.e.,* there is no risk of spread during construction and it is considered feasible to eradicate over time) action 8; herbicide applications will be scheduled. For more information on determining the best approach to take see Fennell *et al.* 2018.
	Personnel Responsible: TBC on appointment of contractor **Date to Undertake:** TBC on appointment of contractor

Approved methodologies to be implemented for this site (to be reviewed and if necessary, amended by approved specialist contractor):	**Methods to be Undertaken:** TBC on appointment of contractor with reference to 1 to 7 below and in line with most current guidelines and regulations). At present **our recommended approach** favours Measure 1.	**Date to be Undertaken:** TBC on appointment of contractor – specialist invasive species management specialists to have reviewed and finalised management measures and any necessary work (e.g., pre-works survey and isolation of areas with invasive plants) carried out ahead of any other site mobilisation.

1. **Avoidance**	**Advantages:** No risk of indirect disturbance or consequent spread as a result of excavations works or works with machinery in the vicinity of the Japanese knotweed stand.	**Disadvantages:** Potential for inadvertent disturbance of Japanese knotweed populations in proximity to proposed works, associated with the movement, storage or operation of machinery or construction activity.
2. **Hand Excavation: small stands**	**Advantages:** Can be effective for newly established plants.	**Disadvantages:** As the rhizome becomes more established hand excavation becomes impractical.
3. **Physical cutting:**	**Advantages**: Long term can weaken the plant rhizome, but this would take many years to achieve eradication.	**Disadvantages:** Labour intensive. Not effective as new stems will continually regrow. Unlikely to result in lasting control. Due to the potential to spread from small rhizome fragments, disposal of material should be undertaken with due caution to prevent accidental spread of the plant.
4. **Excavation: larger stands**	Will achieve immediate results and with due care all rhizomes can be successfully removed	Can revive and regrow if any rhizome is overlooked. Process is expensive. Disposal of material should be undertaken with due caution to prevent accidental spread of the plant.
5. **Burial:**	Achieves immediate results without the need for landfill disposal	Contains rather than eradicates. Only suitable for certain sites. Location of burial site should be retained on land deeds to prevent risk of future disturbance. The number of years for material to become unviable is undocumented but has been suggested at 20 years
6. **Removal off-site:**	Achieves immediate removal and leaves no restrictions on site	Expensive and will result in the removal of viable site soil. Removal to approved licensed disposal facility only
7. **Chemical/Herbicide Treatment:**	Effective and efficient control can be achieved with the use of Glyphosate which is less labour intensive than methods outlined above. Requires ongoing/repeated treatments, which can have negative impact on the receiving environment and other non-target species. Treatment near a watercourse requires approval. Overdosing can lead to plant dormancy rather than eradication and as such care is required in applications. **NOTE: it is an offence to use Plant Protection Products in a manner other than specified on the label and in accordance with the product label and with Good Plant Protection Practice as prescribed in the EU - (Authorization, Placing on the Market, Use and Control of Plant Protection Products) Regulations, 2003 (S.I. No. 83 of 2003).**	

Foliage application	Glyphosate	Autumn is the most effective time for treatment	Ongoing/several treatments will be required. Up to 5 years has been required in instances where plants are well established.
Weed-wiping	Glyphosate	Effective in some cases.	Ongoing/several treatments will be required. Up to 5 years has been required in instances where plants are well established.
Stem injection	Glyphosate	Late summer to autumn is most effective time for treatment of stems	Only one or two treatments may be feasible as stems need to be of required thickness (greater than 8mm). Where regrowth occurs additional foliage application will be required.

Ongoing Monitoring and Evaluation Of success of eradication programme	Personnel Responsible: TBC on appointment of contractor	Dates to be undertaken by: TBC on appointment of contractor	Reporting To: TBC on appointment of contractor	Status / Are Additional Treatments Required (if so give dates): TBC on appointment of contractor

4.1.3 Management and Control Options for Rhododendron

Management/Eradication options for *Rhododendron ponticum* (after NRA 2010, Fennell *et al.* 2018) to include;

Management options for Rhododendron (TBC by approved contractor) to include:		
Initial Site Staff Induction	An initial induction with all site staff will be undertaken prior to construction works starting, to inform them of the occurrence in the area of Rhododendron, including issues caused by its spread, identification and site walkover of known location(s) – ensuring clearing of footwear, equipment etc. prior to leaving infested area – *i.e.,* **PLAN, CHECK, CLEAN & DRY** (Fennell *et al.* 2018) All site staff will be made aware of the existence of the Management Plan and where it will be available for review as required, the proposed management options appropriate for the site, and the name of the contractor appointed for invasive species management and removal where applicable.	
***Rhododendron ponticum* - Brief Description**	Rhododendron ponticum is an evergreen shallow-rooted shrub often reach 4-5m in height – even taller in some cases. The stems are light brown and woody and become trunk-like with age. Early summer prouces lilac, pink, or purple flowers. Seed pods disperse thousands of seed in late winter. Forms dense 'forest' spreading rapidly and shading the understorey.	
Pathways of spread	Primarily reproduces by seeds, distributed by wind, water, animals and in topsoil. Can also regenerate from small rhizome fragments and stem layering. Seeds are produced when the plant reaches maturity – 10-12 years.	
Prevention	**Immediate action**: Minimise or avoid contact with plants and infested substrate. Fence off and mark clearly where possible. **Plan, Check, Clean and Dry** - Always clean footwear, clothing and equipment immediately on leaving the infested area.	
Note:	It is a requirement of this plan that only personnel with sufficient training, experience and knowledge in the control of non-native invasive species should be employed to assist in the planning and implementation of control measures in relation to Rhododendron which should be undertaken with reference to the current guidance. **The primary objective of control should be total eradication** by targeting the underground rhizome and not simply the aerial parts. Labour intensive to remove but easier to achieve eradication than with (say) Japanese Knotweed. Young plants should be removed wherever possible before they reach maturity and can produce seed. **Any removal from site must be in line with current waste regulations.** The methodology used may depend upon whether immediate removal is required or if it is enough to control/eradicate the stands of Rhododendron over a period of time. For small shrubs or seedlings hand-pulling is effective but for medium and large shrubs the control options include mechanical flail cutting/mulching, excavation and herbicide application. For more information on determining the best approach to take see Fennell *et al.* 2018.	
	Personnel Responsible: TBC on appointment of contractor	**Date to Undertake:** TBC on appointment of contractor

Approved methodologies to be implemented for this site (to be reviewed and if necessary, amended by approved specialist contractor):	**Methods to be Undertaken:** TBC on appointment of contractor with reference to 1 to 3 below and in line with most current guidelines and regulations). At present **our <u>recommended approach</u>** favours Measure 1 for small shrubs and seedlings. For areas that can be disturbed Method 2 (& 3) is preferred and in areas that cannot be disturbed method 3 is the preferred control option.	**Date to be Undertaken:** TBC on appointment of contractor – specialist invasive species management specialists to have reviewed and finalised management measures and any necessary work (e.g., pre-works survey and isolation of areas with invasive plants) carried out ahead of any other site mobilisation.
1. **Manual – hand pulling, uprooting**	**Advantages:** Recently established plants can be easily uprooted. Small shrub bushes are shallow rooted and can be uprooted using a Lever and Mulch technique. The method has minimal effect on the environment and it effectively prevents flowering and seed dispersal.	**Disadvantages:** Labour intensive and plant material needs to be disposed of appropriately. Does not remove the seed bank or mature specimens. Can regrow from remaining root fragments.
2. **Physical cutting: flailing/mulching/excavation (specialised equipment)**	**Advantages**: Highly effective if carried out in conjunction with herbicide treatment to stumps and regrowth. Relatively quick. Works can be undertaken in the growing season (subject to other ecological constraints).	**Disadvantages:** Can be expensive and specialist work. Arisings need to be disposed of appropriately. Cut material can obscure stumps. Mulched roots can regrow if not treated with herbicide. Plant/leaf vegetation can be toxic and hostile for revegetation by native plants.
3. **Herbicide application**	**Advantages:** Cost effective. Foliar spray appropriate for seedlings and small/cut shrubs. Stem treatment effective on larger specimens. **NOTE: it is an offence to use Plant Protection Products in a manner other than specified on the label and in accordance with the product label and with Good Plant Protection Practice as prescribed in the EU - (Authorization, Placing on the Market, Use and Control of Plant Protection Products) Regulations, 2003 (S.I. No. 83 of 2003).**	**Disadvantages:** Can have a negative environmental effect and impact non-target species. Cut stump treatment has less potential for environmental impact.
Foliage application	Glyphosate with Topfilm or Mixture B	Best applied during the growing season.

Cut-stump	Glyphosate	Highly effective year round.	One treatment often sufficient.
Ongoing Monitoring and Evaluation of success of eradication programme	**Personnel Responsible:** TBC on appointment of contractor	**Dates to be undertaken by:** TBC on appointment of contractor	Where regrowth occurs additional intervention may be required.

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