Appendix 1

EIAR Chapter 2 - Description of Proposed Development

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DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED DERRYNADARRAGH WIND FARM, CO. KILDARE, OFFALY & LAOIS

Volume II - Main EIAR

Chapter 2 – Description of the Proposed Development

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2. DESCRIPTION OF THE DEVELOPMENT

2.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) describes the proposed location and components of the Proposed Development and provides details on the construction, operation and decommissioning of the Proposed Development in compliance with the EIA Directive ((Directive 2011/92 EU on the assessment of the effects of certain public and private projects on the environment (as amended)). This forms the basis of the assessments presented within the EIAR.

This chapter of the EIAR is supported by Figures in Volume IV, Planning Drawings accompanying the planning application and the following Appendix documents provided in Volume III:

- Appendix 2.1: Construction Environmental Management Plan (CEMP)
- Appendix 2.1B: Grid Connection Construction Methodology
- Appendix 2.2: Biodiversity Enhancement Management Plan (BEMP)
- Appendix 2.3 Turbine Delivery Route Assessment (TDR)
- Appendix 2.4: Amended Turbine Delivery Route Nodes
- Appendix 11.3: Peat and Spoil Management Plan
- Appendix 12.2: Surface Water Management Plan
- Appendix 14.1: Traffic Management Plan

Common terms and acronyms used throughout this EIAR can be found in Chapter 1 - Introduction.

The Proposed Development assessed in this EIAR comprises the following elements:

- The 'Proposed Wind Farm' (also referred to in this EIAR as the '**Site'**);
- The 'Proposed Grid Connection' (also referred to in this EIAR as the **'GC'**);
- The 'Turbine Delivery Route' (also referred to in this EIAR as the **'TDR'**);
- The 'Biodiversity Enhancement Management Plan Lands' (also referred to in this EIAR as the **'BEMP Lands'**).

An overview of the Site Location Plan is shown in Figure 2.1 of Volume IV, and the Proposed Site Layout (including BEMP lands) is shown in Figures 2.2a and 2.2b of Volume IV of this EIAR. The Proposed Grid Connection Route is set out within Figure 2.3, and the Proposed Turbine Delivery Route at Figure 2.4. .

2.2 Overview of the Proposed Development

The Proposed Development consists of a 9 no. turbine wind farm and associated infrastructure including internal access tracks, hard standings, onsite 110kV substation and associated grid connection infrastructure, electrical and communications cabling between turbines and on-site substation (medium voltage) and between on-site substation to Bracklone Substation (high voltage), temporary construction compounds, drainage infrastructure, amenity provision, biodiversity enhancement measures, temporary accommodations works along the Proposed Turbine Delivery Route and all associated works related to the construction of the Proposed Development.

On 8th September 2025, An Coimisiún Pleanála deemed the Proposed Development is eligible as Strategic Infrastructure Development (SID) by way of a notice served under section 37B(4)(a) of the Planning and Development Act 2000 as amended and the application is being made directly to The Commission (SID Pre-App case ref. ACP- 320137-24). The Commission are the competent authority for the purposes of the Environmental Impact Assessment (EIA).

A 10-year planning permission and 35-year operational life from the date of commissioning of the Proposed Wind Farm is being sought. This reflects the lifespan of modern-day turbines.

A permanent planning permission is being sought for the Grid Connection and onsite 110 kV substation as these will become an asset of the national grid under the management of EirGrid and will remain in place upon decommissioning of the Proposed Wind Farm.

Derrynadarragh Wind Farm has been designed in accordance with the current Section 28 Ministerial Guidelines (section 28 of the Planning and Development Act 2000, as amended), 'Wind Energy Guidelines 2006'. and has regard to the 'Draft Revised Wind Energy Development Guidelines' (draft WEGs) where its best practice. Should new Guidelines be adopted before this application is assessed by An Coimisiun Pleanála, the applicant would welcome the opportunity to demonstrate compliance with same. Presented hereunder are the elements of the Proposed Development for which development consent is being sought, and all other associated project components subject to EIA but for which development consent is not being sought within the current application.

2.2.1 Elements of the Proposed Development for which Development Consent is Being Sought

The Proposed Development for which consent is being sought will consist of the following:

- A 10-year permission and a 35-year operational life from the date of commissioning of the entire Wind Farm;
- Construction of 9 no. wind turbines – 4 no. turbines will have a tip height of 186m above existing ground level with a hub height of 105m and rotor diameter of 162m, and 5 no. turbines will have a tip height of 187m above existing ground level with a hub heigh of 106m and rotor diameter of 162m;
- Construction of permanent turbine foundations and crane pad hardstanding areas and associated drainage;
- Construction of 1 no. new main site entrance on Regional Road R419 to serve as construction and operation access, and upgrade works to 1 no. existing site entrance (Derrylea Road) to the south to service for construction only;
- Construction of 9,360m of new internal access tracks and associated drainage infrastructure;
- Upgrading of 550m of existing tracks and associated drainage infrastructure;
- All associated drainage and sediment control including interceptor drains, cross drains, sediment ponds and swales;
- Installation of 1 no. permanent single span bridge crossing Cushina River within the proposed Wind Farm site;

- All associated infrastructure, services and site works including excavation, earthworks, peat and spoil management;
- Creation of dedicated peat and spoil deposition areas for the management of peat and spoil within the site;
- Establishment of 3 no. temporary construction compounds, and associated ancillary infrastructure including parking;
- Establishment of 2 no. temporary wheel washing areas during construction only;
- Forestry felling of 6.01ha (60,100 m2) to facilitate construction and operation of the Proposed Development;
- Provision of recreational amenity area comprising 2 no. parking spaces and picnic table;
- Biodiversity enhancement measures within the site boundary;
- Construction of 1 no. IPP Substation and associated compound including:
    - Wind farm Control building with welfare facilities;
    - Electrical infrastructure;
    - Parking;
    - Security Fencing.
- Construction of 1 no. permanent onsite 110kV TSO electrical substation and associated compound including:
    - Welfare facilities;
    - TSO control building
    - Electrical infrastructure;
    - Parking;
    - Wastewater holding tank;
    - Rainwater harvesting tank;
    - Security fencing.
- Installation of medium voltage electrical and communication cabling underground between the proposed turbines and the proposed on-site TSO substation and associated ancillary works;
- Installation of 11.4km of permanent high voltage (110kV) and communication cabling underground, primarily within the public roads between the proposed on-site substation and the Bracklone Substation (within the townland of Bracklone in Co. Laois) and associated ancillary works. The proposed grid connection cable works will include trenching, laying of ducting, installing 15 no. joint bays and 7 no. watercourse crossings, pulling cables and the back filling of trenches and reinstatement works, within the townlands of Cushina in County Offaly; Aughrim and Derrylea in County Kildare, and Inchacooly, Coolnaferagh, Ullard or Controversyland, Clonanny, Lea, Loughmansland Glebe, and Bracklone in County Laois. The underground cabling will traverse the following roads: L70481 (Derrylea Road); L71764; L7050; L7051; L7176; L71761; R424; and R420 (Lea Road);
- Accommodation works required along the Proposed Turbine Delivery Route (TDR) to facilitate turbine component deliveries at the following seven locations:
    - Construction of load bearing surface, removal of vegetation and trees, and reprofiling of embankment on R420/R402 Junction within the townland of Ballina;
    - Construction of load bearing surface, removal of railing and planters, and reprofiling of road on R402 at junction to L2025 Ballinagar, within the townland of Ballinagar,;
    - Installation of 1 no. permanent single span bridge crossing Daingean River at R402/R400 Junction and Philipstown Bridge along Turbine Delivery Route, within the townlands of Esker Beg and Drumcaw or Mountlucas;
    - Construction of load bearing surface, removal of vegetation and trees, reprofiling on R400, within the townlands of Drumcaw or Mountlucas;
    - Construction of load bearing surface, removal of vegetation and trees, reprofiling on R400 at junction to L1013 Enaghan, within the townland of Enaghan;
    - Construction of load bearing surface on northeastern verge, removal of vegetation and trees, reprofiling on R400, within the townland of Moanvane;

- Construction of load bearing surface, removal of vegetation and trees, and reprofiling of embankment on R419 at junction to R400, within the townland of Cushina.

Certain minor accommodation works associated with the TDR, not specifically defined within the above description of development, including the provision of passing opportunities along the local road network are subject to and have been assessed through this EIA but for which planning consent is not being sought within the current application. These minor works to facilitate the delivery of turbine components and haulage to the Site are detailed further in Table 2.8 *'Turbine Delivery Route Accommodation Works'* and include hedge or tree trimming, temporary relocation of powerlines/poles, lampposts, signage and temporary local road widening. For these locations, works have been identified and assessed in the EIAR, however, permission for these works will be sought separately with the local Planning Authority through road opening license as necessary.

2.3 Proposed Development Location

These sections describe the lands which make up the Proposed Development.

The Proposed Development covers 3 no. County Council jurisdictions including; Kildare County Council, Offaly County Council, and Laois County Council. Permission is being sought for a period of 10 years, for development comprising the construction and operation of a wind farm and related works within the townlands of Kilbeggan South, Hallsfarm, Stonehouse Farm; Ballybought, Durrow Demesne, Aghancarnan, Gormagh, Acantha, Ballynasrah or Tinnycross, Ardan, Puttaghan, Cappancur, Cloncollog, Meelaghans, Annagharvey, Ballycollin, Ballina, Ballyknockan, Ballymooney, Ballycue, Ballinagar, Knockballyboy, Clonad, Townparks, Castlebarnagh Big, Killoneen, Killeen, Esker Beg, Ballycon, Drumcaw or Mountlucas, Derrycricket, Ballaghassaan, Walshisland, Bunnagappagh, Coolagary, Raheenakeeran, Enaghan, Moanvane, Cushina, Clonsast Lower, and Chevychase or Derrynadarragh in County Offaly; Aughrim and Derrylea in County Kildare; and Inchacooly, Coolnaferagh, Ullard or Controversyland, Clonanny, Lea, Loughmansland Glebe, and Bracklone in County Laois.

The Site comprises approximately 213.67 hectares of land, and is contained within the townlands of Cushina, Clonsast Lower, and Chevychase or Derrynadarragh in County Offaly, and Aughrin and Derrylea in County Kildare. It is located within both the jurisdictions of Kildare County Council and Offaly County Council, approximately 1.7km south of the village of Bracknagh, 5km northwest of Monasterevin, and approximately 6.5km northeast of Portarlington. The BEMP lands are wholly located within The Site in the townlands of Cushina, Aughrim, and Clonsast Lower.

The Proposed Grid Connection (GC) identified to supply power from the proposed development to the Irish National Electricity Grid will exit the site to the south and follow the public road to Bracklone Substation (currently under construction). It will comprise 11.4km of underground electrical cabling which will pass through the townlands of Cushina in County Offaly; Aughrim and Derrylea in County Kildare, and Inchacooly, Coolnaferagh, Ullard or Controversyland, Clonanny, Lea, Loughmansland Glebe, and Bracklone in County Laois. The underground cabling will traverse the following roads: L70481 (Derrylea Road); L71764; L7050; L7051; L7176; L71761; R424; and R420 (Lea Road).

The Turbine Delivery Route (TDR) runs from the port of entry of Galway from Lough Atalia Road, R339, crossing junction with R338, continuing on R339, R336, N6, onto the M6, exiting M6 at Junction 5 Tullamore, N52, R420, R402, R400, R419, onto the proposed new site entrance off the R419. The accommodation works, required along the TDR to facilitate turbine component deliveries, will be undertaken at 7 no. locations within the following townlands in County Offaly; Ballina, Ballinagar, Esker Beg, Drumcaw or Mountlucas, Enaghan, Moanvane, and Cushina. Further details of the TDR can be found in Chapter 14 - Traffic and Transport.

2.3.1 Wind Farm Development Boundary

The proposed application area (i.e. the redline boundary depicting the land to which the application relates) which comprises the Proposed Wind Farm site, Proposed Grid Connection and Proposed Turbine Delivery Nodes encompasses a total land area of 225.4ha (2.225km^2). The development footprint of the Proposed Wind Farm is 213.67ha, the Grid Connection comprises 9.06ha of land, and the Turbine Delivery Nodes amount to 2.68ha of land. Please refer to Figure 2.1 and the Site Location drawing (see Drawing No. P22-145-0100-0000) for the statutory redline boundary associated with this planning application. The blue line boundary depicted on the drawings clearly demonstrates the land under the control of the Applicant.

2.3.2 Study Area

The Wind Energy Development Guidelines, published by the Department of the Environment, Heritage and Local Government (DOEHLG) (2006/2019 draft revision) (WEDG), specify different radii for examining the zone of theoretical visibility of proposed wind farm projects (ZTV). The extent of this search area is influenced by turbine height, as follows:

- 15km radius for blade tips up to 100m.
- 20km radius for blade tips greater than 100m.
- 25km radius where landscapes of national and international importance exist.

In the case of the proposed Site, 4 no. turbines are proposed have a tip height of 186m above existing ground level (Turbine T2, T3, T6, T7) and 5 no. turbines have a tip height of 187m above existing ground level (T1, T4, T5, T8, T9), therefore the radius recommended within guidance is 20km from the outermost turbines of the scheme.

Impacts pertaining to other aspects of the Proposed development such as the grid connection route, and turbine delivery route, are localised to the immediate environment, and as such the consideration of impacts focuses on the immediate landscape context within approximately 500m.

2.3.3 Existing Land Use and Site Context

The Site is located in the jurisdictions of Kildare County Council, Offaly County Council, and Laois County Council, with the turbine array located approximately 1.7km south of Bracknagh, 5.24km north-west of Monastervin and 6.5km north-east of Portarlington. Land use within the site is mainly dominated by agriculture, with areas of turbary activities located outside of, but adjacent to, the site boundary to the centre and south (Derrylea Bog). Furthermore, there is an area of forestry land within the northern portion of the site.

The settlement patterns in the area consists of one-off rural housing fronting onto the road network in a linear rural settlement pattern. There are approximately 208 no. residential and commercial properties within 2km of the site. The closest property to a turbine (Eircode W34 CY63) is located c. 770 m distance from Turbine T01, and Eircode R32 KD79 is located c. 785 m distance from Turbine T06.Bracknagh village is the most proximate settlement located 2km to the north-east.

The Site is located within the lowland topography with predominantly flatlands. Red Hill (194m), Dunmurry Hill (234m) and Grange Hill (223m) are located within 10km to the east of the site. The site is located on the Derrylea Bog which is connected to Clonsast Bog to the north and Derryounce Bog to the west.

The Corrine Land Cover database for Ireland (based on interpretation of satellite imagery and national vector mapping data) identifies Quaternary deposits present at the site mostly comprise cut over raised peat. There are sections in the north and west of the site that are underlain by till derived from limestones, while the eastern section of the site is underlain by lake marl. The site is predominantly underlain by the Lucan Formation (dark limestone and shale) with a section in the north of the site underlain by the Ballyadams Formation (crinoidal wackestones/ packstone limestone).

The Site is located within the Barrow Catchment (ID 14) and the Barrow_SC_040 sub-catchment as defined by the WFD*. The waterbody in this sub-catchment that is crossing the proposed site is known as FIGILE_080 (EPA Name: Cushina 14). The main hydrology feature within the wind farm site is the Cushina River (FIGILE_080). A large area of the surface runoff drains into this river within FIGILE_080 sub-basin. The Cushina River runs in an easterly direction, and it is a tributary of the Figile River (FIGILE_080). The remaining of the site drains into Figile_070 sub-basin or directly into Figile River. In addition, there are no lakes or reservoirs within the wind farm site study area.*

The National Catchment Flood Risk Management (CFRAM) Programme has examined the flood risk, and possible mitigation measures to address flooding, in 300 communities throughout the country at potentially significant flood risk. These communities were identified through the Preliminary Flood Risk assessment (PFRA), which was a national screening assessment of flood risk. The communities recognized as being at a significant flood risk are called Areas for Further Assessment (AFA). For the AFAs a detailed hydraulic modelling has been carried out to produce indicative flood maps (CFRAM Maps). The subject site and the TDR watercourse crossing are within an AFA and therefore, flooding maps have been produced as part of the CFRAM mapping. The CFRAM Programme extends to the subject site and the TDR watercourse crossing showing that both locations are vulnerable to fluvial flooding. With regards to the wind farm site, the following turbine positions would be potentially affected by flooding – T04, T05, T08 and T09. Please refer to Chapter 12 – Flooding, Hydrology and Water Quality, Volume II of this EIAR, for further details on flooding at the site.

There is 1 no. European site designated for nature conservation within a 5km radius of the potential wind farm site, which is the River Barrow and River Nore Special Areas of Conservation (SAC) (Site code: 002162). The Grand Canal Proposed Natural Heritage Area (pNHA) (Site code: 002104) is located approx. 4km to east of subject site. The Site contains a number of habitats that are of ecological importance including treelines to the west of the site, woodland to the south-west and lowland rivers within the Cushina River. The proposed wind farm site also has designation for a number of fauna on site which include records of hare, a moderate-high value of Irish bat species, otter associated with the Cushina River and a number of identified badger setts within the site. The proposed site also has a number of river catchments located within the proposed site including the River Barrow Watercourse, River Figile Watercourse and the River Cushina Watercourse which are all dominated by coarse fish species.

Based on the National Monuments Service database map-viewer, 1 no. recorded monument is located outside but adjacent to the southern boundary of the Site within County Kildare, (a circular Enclosure Site Code KD021-009) approximately 0.148km from T01 on the south-eastern boundary. There are no recorded monuments within the proposed Site within County Offaly.

There are a number of sites in close proximity including a number of Record of Monuments and Places (RMPS) to the south. Within a wider 2km radius, there are approximately 13 no. RMP's. The most proximate recorded monuments are located approximate 800m south-east of the site in County Kildare, there are 5 RMP sites located in the townland of Derrylea approximately 800m south of the site (KD021-010: Enclosure, KD021-00805: Enclosure, KD021-00801: Enclosure, KD021-00804: Enclosure and KD021-00803: Enclosure). These 5 no. sites are linked small enclosures visible as cropmarks with no visible surface trace of the features.

There are several archaeological features located adjacent to the GC and TDR, including ringforts and enclosures. The GC will be contained within the public road corridor throughout its length, with the exception of the start and finish points where the cables will be terminated in the proposed network substation at Bracklone, and the proposed onsite substation which is located within the Site.

Through this planning application, consent is being sought for accommodation works required along the proposed TDR to facilitate turbine component deliveries at the following seven locations:

- Construction of load bearing surface, removal of vegetation and trees, and reprofiling of embankment on R420/R402 Junction within the townland of Ballina, Co. Offaly; **TDR Node 19**
- Construction of load bearing surface, removal of railing and planters, and reprofiling of road on R402 at junction to L2025 Ballinagar, within the townland of Ballinagar, Co. Offaly; **TDR Node 22**
- Installation of 1 no. permanent single span bridge crossing Daingean River at R402/R400 Junction and Philipstown Bridge along Turbine Delivery Route, within the townlands of Esker Beg and Drumcaw or Mountlucas, Co. Offaly; **TDR Node 29/30**
- Construction of load bearing surface, removal of vegetation and trees, reprofiling on R400, within the townlands of Drumcaw or Mountlucas, Co. Offaly; **TDR Node 32**

- Construction of load bearing surface, removal of vegetation and trees, reprofiling on R400 at junction to L1013 Enaghan, within the townland of Enaghan, Co. Offaly; **TDR Node 35/36**
- Construction of load bearing surface on northeastern verge, removal of vegetation and trees, reprofiling on R400, within the townland of Moanvane, Co. Offaly; **TDR Node 38**
- Construction of load bearing surface, removal of vegetation and trees, and reprofiling of embankment on R419 at junction to R400, within the townland of Cushina, Co. Offaly. **TDR Node 46/47**

Please refer to Chapter 14 – Traffic and Transportation, and the accompanying Appendix 2.3 Turbine Delivery Route Assessment, and Appendix 2.4 – Turbine Delivery Route Nodes at 5 no. locations (Volume III of this EIAR), for further details of the TDR node works for which planning permission is being sought.

2.3.4 Land Ownership

The Site is located on lands under third-party private ownership. These landowners have consented to the application for the Proposed Development. With the Letters of consent accompanying this planning application (see Appendix 2.6, Volume III of this EIAR).

The proposed GC is contained within public roads, with the exception of the start and end points where the proposed 110kV grid connection cable connects into both the onsite and network substations.

With regards to the TDR, accommodation works required to facilitate the delivery of large turbine components to the site shall be contained within the public road corridor and private lands as identified on planning application drawings, Appendix 2.3 – Turbine Delivery Route Assessment and Appendix 2.4 – Turbine Delivery Route Notes at 5 no. locations (Volume III of this EIAR). As previously noted, certain minor accommodation works associated with the TDR, not specifically defined within the above description of development, including the provision of passing opportunities along the local road network are subject to and have been assessed through this EIA but for which planning consent is not being sought within the current application. These minor works to facilitate the delivery of turbine components and haulage to the Site are detailed further in Table 2.8 *'Turbine Delivery Route Accommodation Works'* and include hedge or tree trimming, temporary relocation of powerlines/poles, lampposts, signage and temporary local road widening. Permission for these minor works will be carried out as necessary under a Road Opening Licence to be sought from Offaly County Council.

2.3.5 On-Site Wind Resource

The layout of the Proposed Wind Farm has been designed to minimise potential environmental impacts, while at the same time maximising the energy yields of the wind resource passing over the site. Available wind speed is a key factor in determining the economic viability of potential wind energy projects. The Sustainable Energy Authority of Ireland (SEAI) Wind Speed Atlas[1] displays onshore wind speeds at between 20 and 150 metres above ground level, based on 2013 data. The atlas identifies the site as having an average wind speed range within the Site of 8.6 m/s to 9.6 m/s at 150 m above ground level.

[1]https://www.seai.ie/technologies/seai-maps/wind-atlas-map/

2.3.6 Other Wind farms (within 20km of Site)

Operational/Permitted

There is a total of 5 no. permitted and operational wind farm developments located within 20 km of the proposed Derrynadarragh Wind Farm, as illustrated at Figure 2.5 (Volume IV). Table 2-1 illustrates the location of existing wind farms within 20 km of the Site. The closest operational wind farm is Cloncreen Wind Farm, Co. Offaly, located c.10.6km to the north of the site which has been in operation since 2022.

Table 2-1: Wind Energy Developments within 20 km of the Proposed Wind Farm Site

Wind Farm Name	Number of Turbines	Distance and Direction from Proposed Site	Status
Cloncreen Wind Farm	21	10.6km to the north of the site	Operational since 2022.
Mount Lucas Wind Farm	28	11.1km to the north of the site	Operational since 2015.
Cushaling Wind Farm	9	12km to the north-east of the site	Permitted since 2020 & construction started in 2022.
Moanvane Wind Farm	12	18.6km to the west of the site	Permitted since 2018 & construction started in 2022.
Yellow River Wind Farm	29	c.19km to the north of the site	Permitted since 2022 & construction began in 2022, with an expected completion date in 2025.
Dernacart Wind Farm	8	c.15km west of the site	High Court Ruled in favour of this development in June 2025. An Bord Pleanála (now An Coimisiún Pleanála) approved the development in January 2024 (Appeal Case Ref: 310312).
Clonarrow Wind Farm	4	c.12km to the north of the site	Currently in Planning and awaiting decision (Planning Ref: 2560189)
Ballydermott Wind Farm	47	c.7.7km to the south east of the site	Pre-Application Stage
Cushina Wind Farm	11	c.4.3km north west of the site	Pre-Application Stage

2.4 Proposed Development Infrastructure

2.4.1 Wind Farm

The Proposed Wind Farm will consist of 9 no. wind turbine generators (WTG's), 1 no. permanent onsite 110 kV electrical substation and associated infrastructure, dedicated peat and spoil deposition areas, 3 no. temporary construction compounds, along with ancillary civil, drainage and electrical infrastructure.

2.4.1.1 Wind Turbine Description

The proposed turbine model will be a conventional three-blade horizontal axis turbine. Schematic drawings of the turbine accompany the planning application. The plans and particulars are precise and provide specific dimensions for the turbine structures which have been used in this assessment and for which permission is being sought. The turbine specifications are as follows; 4 no. turbines (T2, T3, T6, T7) will have a tip height of 186m above existing ground level with a hub height of 105m and rotor diameter of 162m, and 5 no. turbines (T1, T4, T5, T8, T9) will have a tip height of 187m above existing ground level with a hub height of 106m and rotor diameter of 162m. Table 2-2 details the key dimensions for each turbine (including those with the 1m foundation plinth) relative to existing ground levels.

Table 2-2: Turbine Details (above ground level)

Turbine Number	Tip Height	Hub Height	Rotor Diameter
1	187m	106m	162m
2	186m	105m	162m
3	186m	105m	162m
4	187m	106m	162m
5	187m	106m	162m
6	186m	105m	162m
7	186m	105m	162m
8	187m	106m	162m
9	187m	106m	162m

2.4.1.2 Turbine Layout

The proposed wind farm layout reflects the outcome of the iterative engineering and environmental constraints assessments aimed at eliminating or minimising adverse effects on the environment. The layout has been designed to minimise the potential environmental effects of the wind farm while at the same time maximising the energy yield of the wind resource passing over the Site. Please refer to Figures 2.2a and 2.2b for the Proposed Site Layout (Volume IV of this EIAR) and Drawing No. P22-145-0100-0001.

The design rationale and evolution of the wind farm layout is described in Chapter 3 - Site Selection and Alternatives (Volume II of this EIAR).

Turbine location co-ordinates in Irish Transverse Mercator (ITM) are detailed in Table 2-3.

Table 2-3: Turbine Coordinates

Turbine Number	ITM Easting	ITM Northing
1	659937	714994
2	658662	716607
3	659623	716518
4	659622	715347
5	659128	716060
6	658384	715670
7	659268	715518
8	659680	715968
9	660136	715709

The turbines will have multiple painted coatings to protect against corrosion with a light grey non-reflective finish.

It is proposed to install lighting on the turbines in accordance with the Irish Aviation Authority (IAA) requirements for aviation visibility purposes. The lighting configuration and type will be in accordance with the International Civil Aviation Organisation (ICAO) obstacle light requirements. The assessment has been carried out on the basis of required aviation standards/specifications.

2.4.1.2.1 Turbine Tower and Foundation

Following detailed site investigations, it has been determined that the wind turbine foundations at Derrynadarragh will be standard shallow reinforced concrete foundations. The turbine foundation bases are circular in shape and will be 25 m in diameter and 3.6 m in depth.

The turbine foundations will be constructed using standard reinforced concrete construction techniques. Detailed construction methodologies for turbine foundations are provided in the CEMP in Appendix 2.1 of Volume II.

A section of reinforced concrete foundation called a plinth shall protrude above ground to which the turbine tower will be bolted.

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 standards:

- EN 1992-1-1: Eurocode 2: Design of concrete structures.
- BS EN 61400-1:2005: Wind Turbines Design Requirements.

The tower of the turbine is a conical steel tube, delivered to site in sections and bolted together using flanged connections.

Once the turbine components arrive on site they will be placed on the hardstanding 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.

The first (base) section is bolted to a steel frame, which is cast into the turbine concrete foundation. The upper sections of the tower are bolted to the lower ones in sequence. The base of the tower is approximately 5m in diameter, tapering to approximately 3m where it is attached to the nacelle. Access to the top platform in the tower is by a ladder or service lift. Access to the nacelle from the top platform is by ladder. Access to the transformer room in the nacelle is controlled with an interlock.

2.4.1.3 Turbine Blades and Hub/Nacelle

The turbine blades comprise fibreglass reinforced epoxy, carbon fibres and solid metal tip. The blades are 79.35m in length. The swept area of the blades is 20,612 m^2.

The turbines will have a cut in wind speed of 3 m/s and cut out speed of 25 m/s. Turbine rotor rotation is in a clockwise direction.

The dynamic operation range (the rate at which the blades rotate) of the turbines is approximately 12.1 revolutions per minute (rpm) which will be influenced by wind speed.

The cast iron hub supports the three blades and transfers the reaction loads to the nacelle which houses the generating components of the wind turbine including the generator and gearbox, electrical components and control unit. These convert the rotation of the blades to generator rotation.

A yaw mechanism turns the nacelle and blades into and out of the wind. A wind vane on the nacelle controls the yaw mechanism.

The blade bearings allow the blades to operate at varying pitch angles. Based on the prevailing wind conditions (determined by the wind vane), the blades are continuously positioned to optimise the pitch angle.

The turbines are equipped with an aerodynamic brake. Stopping the turbine is done by full feathering the three blades (individually turning each blade).

A glass fibre reinforced polyester hood covers the nacelle. The turbines are equipped with a Lightning Protection System (LPS) earthing and isolation to help protect the wind turbine against the physical damage caused by lightning strikes.

2.4.1.4 Turbine Installation

It is anticipated that each turbine will take approximately 3 to 5 days to erect (depending on weather) using two cranes.

2.4.1.5 Turbine Transformer and Wind Farm Power Output

The proposed wind turbines will feature a rotor diameter of 162 metres. Based on this rotor size, the Maximum Export Capacity (MEC) of each turbine is approximately 7.2 MW. The installed capacity has been fully assessed in the Air and Climate chapter (Chapter 7) with respect to emissions calculations, and in the Noise chapter (Chapter 8) with respect to maximum sound power level.

The turbine will have a transformer located within the tower. The turbine transformer will step up the voltage to either 20kV or 33kV to reduce the electrical loss on the cabling connector circuits that connect to the site substation via a network of underground medium voltage cable circuits to be located adjacent to the proposed site track network.

The Proposed Development will have a Maximum Export Capacity (MEC) of approximately 64.8 MW. This generation capacity has been used to calculate the power output of the proposed Wind Farm based on the following calculation:

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

where:

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

B = The capacity factor, which takes into account the intermittent nature of the wind, the availability of wind turbines and array losses etc. A capacity factor of 31 % is applied here[2]*.*

C = Rated capacity of the wind farm: 64.8 MW

The proposed wind farm has the potential to produce an estimated 175,971 MWh (megawatt hours) of electricity per year and 6,159 GWh of electricity over the 35-year lifetime of the Proposed Development.

The electricity produced by the proposed wind farm would be sufficient to supply 41,898 households using an average of 4.2 MWh of electricity per year each.[3]

2.4.1.6 Site Access, Internal Access Tracks, and Hard standings

2.4.1.6.1 Site Access Points

The Proposed Wind Farm will include a new site entrance along the R419 Regional Road to serve as construction and operation access to the proposed wind farm and onsite 110kV substation, an additional access from L-70481 will be used for construction on the south of the river Cushina, prior to completion of the bridge crossing.

The new site access has been selected with consideration for safety of public road users, construction staff and to ensure that it can be constructed to comply with the requirements of Offaly County Council, Kildare County Council, and TII design requirements for direct accesses.

During the construction phase, standard HGVs shall use the existing southern access, located within Co. Kildare, if transporting materials prior to the on-site bridge being constructed. Otherwise, all construction traffic shall use the main northern access, located in Co. Offaly.

All HGV traffic travelling to the site shall only be permitted to use approved transport routes and site access points as identified in the Traffic Management Plan (TMP) contained in the CEMP at Appendix 2.1 (Volume III of this EIAR).

The site access points are shown on Site Layout at Figures 2.2a and 2.2b (Volume IV of this EIAR) and Drawing No. P22-145-0100-0001.

[2] EirGrid in their All-Island Generation Capacity Statement (2017-2026) estimates a capacity factor of approximately 31% for onshore wind. The capacity factor applied for the proposed wind farm is greater than the EirGrid estimation as a result of improvements in turbine technology and the good wind flows at the site. The proposed turbine type allows for the use of fewer, taller turbines with an increased efficiency and in return greater economic benefit to the consumer.

[3] This figure is taken from the March 2017 Commission for Energy Regulation (CER) Review of Typical Consumption Figures Decision Paper and Commission for Regulation of Utilities Energy and Water Monitoring Report for 2021

2.4.1.6.2 Internal Access Tracks

The Proposed Wind Farm will include the construction of 9,360m of new internal access tracks and the upgrading of 550m of existing tracks and associated drainage infrastructure.

The proposed internal site track layout will permit access for vehicles during the construction phase, for maintenance during the operational phase and for vehicles to decommission the turbines at the end of the life of the Proposed Development.

Access tracks will be 5m wide along straight sections, wider junctions and turning areas, as shown on accompanying planning application drawings in accordance with wind turbine manufacturer requirements for the wind turbines of this size.

Internal wind farm access tracks shall be constructed by a combination of founded and floating methods as required. The locations of floated sections of access track have been determined by geotechnical walkovers and detailed site investigations with further detail included within Chapter 11 – Soils, Geology and Hydrogeology, Chapter 12 – Hydrology and Water Quality, and Appendix 12.1 – Site Specific Flood Risk Assessment.

The proportion of access track construction within the Site is as follows:

Total length of new founded access track: 7,260m;

Total length of upgraded existing agricultural track: 550m;

Total length of new floating access track: 2,100m.

Access track formation will consist of a minimum 500 mm compacted hardcore on geo-textile membrane with a capping layer of compacted granular stone (CL 804) to form a suitable running surface. The proposed construction methodology for newly constructed tracks is as follows:

Excavated soil will be placed along the side of sections of the tracks in suitable locations as identified in the Soil Management Plan (within the CEMP in Appendix 2.1) and where appropriate to blend in with surrounding landscaping and partially obscure visibility of the track during operation. Surplus spoil material shall be deposited in designated areas as identified in the Soil Management Plan.

The stone required for the construction of the internal access tracks will be sourced from licenced quarries in the vicinity of the Proposed Development. The location of licensed quarries and haulage routes are identified in Chapter 14: Traffic and Transportation and in Figure 14.2, Volume IV.

Further details on access track construction are provided in the CEMP in Appendix 2.1, Volume II.

Internal access track drawings are presented in 100-Series planning application drawings.

A drainage system will be installed adjacent to the internal access tracks, this is presented in 100-Series planning application drawings and detailed within the Surface Water Management Plan (within the CEMP in Appendix 2.1). Existing drainage infrastructure will be maintained and upgraded where necessary. Existing drainage channels will be upgraded to the same standard as the proposed drainage infrastructure in accordance with the drainage design and Surface Water Management Plan (within the CEMP in Appendix 2.1).

Drainage infrastructure will be constructed in parallel with the access track construction.

Drainage ditches will be formed, within the excavated width and along the sides of the internal access tracks.

2.4.1.6.3 Hardstanding and Laydown Areas

Each wind turbine will have an associated turbine hardstanding and laydown area adjacent to the foundation to accommodate the delivery and temporary storage of the turbine components prior to their erection and to support the cranes during erection.

Once the turbine components arrive on site they will be placed on the hardstanding 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.

A turbine hardstanding area consists of a main crane pad hardstanding of 88 m x 30 m (2,640 m2) with a number of additional smaller hardstanding's that act as ancillary crane pads and set down and assembly areas, located as shown on the accompanying planning drawings. This area will accommodate a main crane and an assist crane during the assembly of the turbine, as well as during occasional maintenance periods during operation. It will also facilitate parking for operation and maintenance staff.

2.4.1.7 Watercourse Crossings Within the Site

Within the Wind Farm Site there are 36 no. drain crossings and 1 no. watercourse crossing, as set out in Table 2-4 below. For further details on drain and watercourse crossings please refer to Chapter 12, Volume II of the EIAR.

It is proposed to install 1 no. clear span bridge crossing where the internal wind farm access track crosses the Cushina River. Please refer to Planning Drawing No. P22-145-0300-0001.

Other drain crossings within the wind farm site comprise bottomless box culverts and pipe culverts where the proposed wind farm access track crosses minor streams and land drains. Details of these are shown in Table 2-4. For more information and illustrations of proposed single span bridge crossings, box culverts and piped culverts, see Chapter 12, located in Volume II of the EIAR.

With regards to the Grid Connection, there will be 7 no. crossing points comprising 6 no. watercourse crossings and one dry stone arch bridge crossing at a disused canal. There will be 6no. Horizontal Directional Drilling (HDD) and 1 no. flat formation crossing within the road above an existing culvert.

It is proposed to cross the GC cable on the Barrow River (BARROW_090) where there is an existing bridge (reference WCC-GCR2 of Table 2-4).

The proposed crossing designs have been designed in accordance with Inland Fisheries Ireland (IFI) requirements for salmonid watercourses as included in their 2016 'Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters' and TII 2008 'Guidelines for the Crossing of Watercourses During the Construction of Road Schemes'. Details of proposed crossing structures are presented in 0500-Series planning application drawings.

Table 2-4: Drain and Watercourse Crossings

	Feature ID	Element of Project	X (ITM)	Y (ITM)	WFD Waterbody (Yes/No)	Existing Culvert/ Structure	Proposed Crossing Method
1	WCC-WF1	Wind Farm	659082	716063	No	No	Pipe Culvert
2	WCC-WF2	Wind Farm	659031	715998	No	No	Pipe Culvert
3	WCC-WF3	Wind Farm	659513	716003	No	Yes	Box Culvert
4	WCC-WF4	Wind Farm	659862	715831	No	No	Pipe Culvert
5	WCC-WF5	Wind Farm	660099	715739	No	No	Box Culvert
6	WCC-WF6	Wind Farm	659533	716372	No	No	Box Culvert
7	WCC-WF7	Wind Farm	659129	716789	No	No	Pipe Culvert
8	WCC-WF8	Wind Farm	659294	716786	No	No	Box Culvert
9	WCC-WF9	Wind Farm	658817	716702	No	No	Pipe Culvert
10	WCC-WF10	Wind Farm	658347	715857	Yes	No	Bridge
11	WCC-WF11	Wind Farm	658504	716006	No	No	Pipe Culvert
12	WCC-WF12	Wind Farm	658237	716098	No	No	Pipe Culvert
13	WCC-WF13	Wind Farm	658183	716296	No	No	Box Culvert
14	WCC-WF14	Wind Farm	658088	716388	No	No	Box Culvert
15	WCC-WF15	Wind Farm	657968	716432	No	No	Pipe Culvert
16	WCC-WF16	Wind Farm	658001	716418	No	No	Pipe Culvert
17	WCC-WF17	Wind Farm	657885	716466	No	No	Box Culvert
18	WCC-WF18	Wind Farm	657749	716523	No	No	Pipe Culvert
19	WCC-WF19	Wind Farm	657807	716496	No	No	Pipe Culvert

	Feature ID	Element of Project	X (ITM)	Y (ITM)	WFD Waterbody (Yes/No)	Existing Culvert/ Structure	Proposed Crossing Method
20	WCC-WF20	Wind Farm	657621	716718	No	No	Box Culvert
21	WCC-WF21	Wind Farm	657438	716792	No	No	Pipe Culvert
22	WCC-WF22	Wind Farm	656792	716839	No	No	Pipe Culvert
23	WCC-WF23	Wind Farm	658985	715592	No	Yes	Pipe Culvert
24	WCC-WF24	Wind Farm	658813	715638	No	No	Pipe Culvert
25	WCC-WF25	Wind Farm	659330	715481	No	No	Box Culvert
26	WCC-WF26	Wind Farm	658725	715865	No	No	Pipe Culvert
27	WCC-WF27	Wind Farm	656919	716853	No	No	Pipe Culvert
28	WCC-WF28	Wind Farm	656944	716857	No	No	Pipe Culvert
29	WCC-WF29	Wind Farm	657033	716864	No	No	Pipe Culvert
30	WCC-WF30	Wind Farm	657269	716819	No	No	Pipe Culvert
31	WCC-WF31	Wind Farm	658180	716261	No	No	Box Culvert
32	WCC-WF32	Wind Farm	659337	716089	No	No	Box Culvert
33	WCC-WF33	Wind Farm	659634	716590	No	No	Pipe Culvert
34	WCC-WF34	Wind Farm	659359	716765	No	No	Box Culvert
35	WCC-WF35	Wind Farm	659036	716783	No	No	Pipe Culvert
36	WCC-WF36	Wind Farm	659719	715314	No	No	Pipe Culvert
37	WCC-GCR1	GC	659966	713535	No	Yes	HDD
38	WCC-GCR2	GC	660546	712416	Yes	Yes	HDD
39	WCC-GCR3	GC	660321	711962	No	Yes	Crossing Over

	Feature ID	Element of Project	X (ITM)	Y (ITM)	WFD Waterbody (Yes/No)	Existing Culvert/ Structure	Proposed Crossing Method
40	WCC-GCR4	GC	659745	711434	No	Yes	HDD
41	WCC-GCR5	GC	658244	711382	No	Yes	HDD
42	WCC-GCR6	GC	658769	711330	No	Yes	HDD
43	WCC-GCR7	GC	659917	714781	No	Yes	HDD
44	WCC-TDR5	TDR	652594	727645	Yes	Yes	Bridge

Clear Span Bridge Details and Construction Methodology

The abutments for the bridge will be founded on reinforced concrete pad footings. An excavator will be used to reach the subgrade on which the concrete pads will be founded. The excavations will be set back 2.5 m from the banks of the River. Based on site investigations the approach embankments to the bridge structure can be founded directly on existing stratum.

Dewatering of the excavations as per the Surface Water Management Plan will likely be required through sump pump or alternative means until completion of the footings. A layer of Class 6N2 fill will be laid as a regulating layer on top of the subgrade. A 75mm thick blinding concrete will be placed over the full extent of the rectangular foundation to produce a clean flat surface for the wet structural foundation concrete. The reinforcement cage for the pad footing will be fixed and tied with bars protruding vertically for subsequent concrete pours. Formwork will be placed around the perimeter of the footing ensuring sufficient concrete cover to the reinforcement. Approximately 18m^3 of concrete will be required for each abutment bank seat pad and will be delivered to site by ready mix trucks. The concrete will be placed in the formwork using a hopper or concrete pump and vibratory poker used to remove air bubbles.

Once the pad footing has achieved sufficient strength, the reinforcement for the abutment upstands will be cut, tied and fixed into position. A vertical formwork will be placed around the perimeter of the abutment wall. Each abutment upstand will require approximately 13m^3 of concrete which will be placed using a hopper or concrete pump. A vibratory poker will be used to remove any air pockets. Once the formwork has been removed and the concrete has cured, a waterproofing membrane will be applied to the concrete. At the top of the upstands, seatings for the precast deck beams will be prepared at the correct levels.

The bridge deck will be set above the 1% AEP flood height (100-year event) and will be made up of precast concrete beams with a clear span of c. 15m. The beams will be precast off site and delivered to site on a flatbed truck. A crane will be used to lift the beams into position onto the seatings formed on top of the abutment upstands. Side forms for the edge parapet beams will be secured and reinforcement for the deck slab and parapet edge beams will be cut, tied and fixed into position with bars protruding vertically from the edge beams for subsequent concrete pours for the concrete parapets. The bridge deck slab and edge beams will be concreted to the finished level. Once the deck slab has reached sufficient strength the abutment walls will be backfilled with a granular fill to access track formation level.

The bridge deck parapets will be constructed from reinforced concrete. Reinforcement for the parapets will be fixed to lap with the starter bars from the edge beams. Vertical formwork will be erected and secured in place. An in situ pour will be carried out to cast the parapets to the design height and vibratory poker used. Once the parapets have reached sufficient strength the formwork will be stripped. The deck surfacing is to be formed using an ST1 concrete mix. This will be placed on top of the deck slab with a minimum thickness of 100 mm and with a crossfall from the centre of the deck to the parapet to allow water to drain.

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, and will not be undertaken during a period of flooding.

Vehicular access to the crossing location shall be available from both sides of the watercourse.

The access track 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 access track will be installed in advance of the works along with the first layer of access track construction.

All earthworks adjacent to the crossing locations will be carried out so as to prevent soil entering the watercourse and will be in accordance with the Soil Management Plan.

Further details on hydrology and drainage are contained in Chapter 12 - Hydrology and Water Quality, Surface Water Management Plan (SWMP) which is contained in the in Appendix 12.2, and on accompanying planning application drawings.

Bottomless Culvert and Piped Culvert Construction Methodology

Culverts will be made of precast units which will be sized specific to the hydraulic capacity required relative to the characteristics of the watercourse to be crossed. The crossing angle for the culverts will be set out in relation to access track alignment and the existing watercourse channel. The project engineer will determine the required gradient of the culvert in line with the proposed drainage design and mitigation measures set out in the SWMP. Standard details for piped and bottomless culverts are provided in the 0100 and 0500-Series planning application drawings.

The access track on the approach to the channel will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of the culvert crossings.

The culverts will be installed on-line (i.e. within the existing channel) and the works will be carried out under dry conditions in accordance with IFI (2016) '*Guidelines on protection of fisheries during construction works in and adjacent to waters*'. The watercourse flow will be diverted by over pumping or by fluming the flow as appropriate in order to facilitate construction of the culvert in dry conditions. The installation of the culvert will take place in low flow conditions. Mitigation for the protection of sensitive biological receptors when fluming/over pumping are presented in Chapter 9 – Biodiversity.

For piped culvert, the bed of the watercourse will be taken down to the desired levels to create a suitable platform for laying the culvert. The pipe culvert will be lifted into place with excavator with a lifting mechanism / crane and will have an invert level 500 mm below the existing watercourse bed level. The embedded section will be allowed to fill naturally.

For bottomless box culvert, the base will be excavated to rock or competent ground with a mechanical excavator with the foundation formed in-situ using a semi-dry concrete lean mix foundation and concrete panels. The base will be excavated along the stream bank with no instream works required. The bottom plate of the culvert will be bolted to the foundation on both sides of the watercourse. The top section of the culvert will be bolted together and lifted into position and bolted to the two bottom sections. Once the culvert is in position stone backfill will be placed and compacted against the culvert up to the required level above the foundations. A concrete beam will then be shuttered, fixed and poured along the two shoulders of the culvert. When the concrete beams are cured the filling and compaction of the access track will be completed.

Minor Stream / Drain Crossing Construction Methodology

All other minor streams or drains within the Site (which are not identified as Rivers by the EPA in their reporting under the Water Framework Directive) which are crossed by the wind farm infrastructure will be collected by interceptor drains and carried under the access track by cross drains. Further details on the locations of such cross drains are provided in the Surface Water Management Plan in Appendix D of the CEMP, and in the Drainage Drawings presented in 0100 and 0500-Series planning application drawings. The cross drains will be buried in the sub-base of the access track at the necessary invert level to ensure ponding or pooling doesn't occur above or below the cross drain and water can continue to flow as necessary.

For a minor stream/drain crossing the following will be employed:

- The access track construction will finish at least 10m from the nearside bank of the minor stream/drain.
- All environmental mitigation measures, described in detail in Chapter 12 - Hydrology and Water Quality and Chapter 9 - Biodiversity, will be implemented locally in advance of the works, in accordance with the measures outlined in the Surface Water Management Plan (SWMP) in the CEMP in Appendix D.
- The pipe is laid in one lift or in sections using a lifting mechanism attached to an excavator.
- Rock armour headwalls will be constructed where necessary to protect pipe ends and the base of slope embankments on either side of the track.

Instream works will only take place during the period July to September (as required by IFI for instream works).

Operation of machinery in-stream will be kept to an absolute minimum. All construction machinery operating in-stream will be mechanically sound to avoid leaks of oils, hydraulic fluid, etc. Machinery will be checked prior to commencement of in-stream works.

2.4.1.8 Construction of Peat /Spoil Deposition Areas

Civil engineering assessment of the proposed development indicates the requirement for approximately96,303m^3 (58,900 m^3 of Peat, and 37,403 m^3 of Spoil) of excavated peat and spoil volumes calculated for the Site. Further details are provided in the Peat and Soil Management Plan and Chapter 11 – Soils, Geology and Hydrogeology.

For the construction phase of the Proposed Development the activities that will generate peat and spoil are as follows:

(1) Upgrade of existing access tracks (excavate and replace) including temporary widening of local road to facilitate deliver of turbine components

(2) Construction of new excavated roads through peat

(3) Construction of floating roads over peat (will not generate peat and spoil but the methodology for construction is included for completeness)

(4) Excavation and placement of arisings

(5) Excavations in peat for turbine bases, hardstands and other infrastructure foundations

(6) Excavations in peat for underground cables

A total of 7 no. peat and spoil deposition areas are proposed as part of the proposed development, further details are provided within the Peat and Soil Management Plan at Appendix 11.2 of Chapter 11 – Soils, Geology and Hydrogeology.

The location and design of each of the peat and spoil deposition areas are shown on the 0100 series planning drawings.

The construction of the peat and spoil deposition areas shall follow the methodology provided in the CEMP in Appendix 2.1 (Volume III of this EIAR).

Spoil and Overburden Management

The proposed project will involve the removal of topsoil, peat and overburden for the construction of turbine foundations, hardstands, substation, temporary construction compounds, cable route and access roads.

Aggregate for construction of these access roads and hardstands will be imported to the Site.

Estimated volumes of overburden (topsoil and spoil) and bedrock to be removed are shown in Table 2-5 below. Excavated soil will be placed in designated spoil deposition areas, be used for reinstatement and landscaping works around the Site, as well as being side cast alongside the access roads. It is not intended or expected that any of the excavated material cannot be reused.

Please refer to the Peat and Soil Management Plan enclosed at Appendix 11.4 of Volume III, and Chapter 11 – Land, Soils, Geology and Hydrogeology, Volume II.

Table 2-5: Estimated excavation volumes

Infrastructure Element [1]	Proposed Dimensions	Peat Volume (m^3) [2]	Spoil (non-peat) Volume (m^3) [2]	Comment
9 no. Turbines and Hardstands	27m diameter excavation footprint (25m wide base with 1m of working space around the perimeter of the base) for turbine foundation with 80 x 33.5m hardstand area.	30,449	18,921	Hardstanding area and foundation footprint
Access Roads	Assumed 5m running surface with 6m wide development footprint.	13,776	9,184	
Substation	Hardstanding area of 140 x 85m.	2,881	2,881	
Temporary Construction Compounds (x3)	Footprint of 40 x 45 for TCC1 and 70 x 40m for both TCC2 and TCC3	5,244	6,417	
Turbine Delivery Route	Dimensions are variable across the TDR for accommodation works. Peat will be extracted down to suitable bearing stratum.	3,100		
GCR	The route will run through 9.1 km of existing public road, 0.3km in existing tracks and 2km in new access tracks on the wind farm site. The trench will be 1.35m deep and 0.60m wide along with 15 joint bays of 6.5mx 2.5m wide. Peat will be extracted down to suitable bearing stratum.	3,450		Details provided by Danu. The Peat depths along the GCR road and tracks were determined following a Ground penetration radar survey of the Grid Connection Route.

Infrastructure Element [1]	Proposed Dimensions	Peat Volume (m^3) [2]	Spoil (non-peat) Volume (m^3) [2]	Comment
	Total =	**58,900m^3**	**37,403m^3**	**Total peat and spoil = 96,303m^3**
Note 1 – A bulking factor of 15 and 10% has been applied to the excavated peat and non-peat soils respectively. This allows for expected increase in volume upon excavation and to allow for a variation in ground conditions across the Site. Note 2 – Soil volumes given in this table are indicative and for information purposes only, and subject to detailed estimates				

2.4.1.9 On-Site Electrical Cabling

Electricity generated from wind turbines will be collected at medium voltage (33KV) by an internal circuit of buried cables. This circuit will be terminated at the proposed onsite substation. The internal collector circuit cable routes are shown on the 0100 series planning application drawings and will follow the alignment of the internal access tracks.

The electricity will be transmitted as a three-phase power supply so there will be three individual conductors (or individual cables) in each cable circuit. The three conductors will each be laid in separate ducts which will usually be laid in a trefoil formation but may also be laid in a flat formation where conditions require it, such as where the ducts need to cross an existing structure or culvert. In such cases, cable ducts will be cast into the structures to allow the power cables to cross the watercourses under the access tracks.

With a trefoil formation, the internal cable trench width will be 600 mm, and with a flat formation, the trench width will be 1200 mm. The depth of cover to the ducts carrying the cables will be 900 mm to the top of the upper ducts. The depth of trench for the cables will be 1200 mm. The diameter of the ducting will be selected to suit the range of cross-sectional areas of electrical cables and is likely to fall between 100 mm and 200 mm diameter.

Internal cable trench section types associated with on-site electrical cabling are presented in the accompanying 0100 series planning application drawings.

Further details on cable trench construction methodologies can be found in the CEMP (Appendix 2.1, Volume III).

2.4.1.10 Felled Forestry

Permanent felling of approximately 6.01 ha of forestry is required within the Site to accommodate the construction of the wind farm infrastructure, and as part of environmental mitigation measures for bat species. 4 no. turbines (T2, T3, T6 and T7) are located within, or next to, forestry.

It should be noted that the clear-felling of trees in the State requires a felling licence. The Forest Service of the Department of Agriculture, Food & the Marine is Ireland's national forest authority and is responsible for all forest licensing which is governed by the Forestry Act 2014 as amended and the Forestry Regulations 2017 (S.I. No. 191 of 2017). A felling licence will include the provision of relevant replant lands (afforestation area) to be planted in lieu of the proposed tree felling on the Site. The associated afforestation of alternative lands equivalent in area to those lands being permanently clear-felled is also subject to licensing ('afforestation licensing').

The area of trees to be felled will be the minimum required to accommodate the Proposed Development. However, for the purpose of the EIAR the area for felling has been identified as the maximum area that could conceivably be required to construct the Proposed Development.

The felling will be the subject of a Felling Licence Application to the Forest Service prior to construction as per the Forest Service's policy on granting felling licenses for wind farm developments. The Forest Service Policy requires that a copy of the planning permission for the wind farm be submitted with a felling license application therefore the felling license cannot be applied for until planning permission is received for the Proposed Development. The proposed replant lands, which will be subject to an afforestation licence, will not be located on lands that are hydrologically linked to the Site.

The Applicant commits to not commencing tree removal on site to accommodate the Proposed Development until both felling and afforestation licences are in place and this ensures the afforested lands are identified, assessed and licensed appropriately by the relevant consenting authority.

Prior to construction confirmatory surveys will be undertaken by suitably qualified person prior to the initiation of works at the Wind Farm Site. The survey will aim to identify nests or roosts. The removal of woody vegetation hedgerows and forestry will be undertaken in full compliance with Section 40 of the Wildlife Act 1976 – 2022 and will commence outside the bird nesting season 1st of March to 31st of August inclusive.

Approximately 0.9km of hedgerow/scrub, Treelines will be permanently removed within and around the footprint of the Proposed Project to facilitate some elements of infrastructure and new access roads, sections along the Transport and delivery route. Removal of this combined length hedgerow/treeline is also required to achieve the required buffer distance for the protection of bats, from the turbines to the canopy of the nearest habitat feature, as recommended by the Natural England (2014) and NatureScot (2021). It is proposed to plant 1.2km of new hedgerow to offset this potential loss and to provide additional habitat connectivity within the Site. Overall, the proposed replanting will result in a net gain within the Site.

2.4.2 Grid Connection

2.4.2.1 On-Site Electrical Substation

It is proposed to construct a 110 kV electricity substation within the Site as shown in Figures 2.2a and 2.2b (Volume IV of this EIAR), and 0100 series planning drawings. The proposed substation is located in the townland of Cushina, County Offaly. Access to the substation will be from the R419 through internal wind farm site access tracks. Upon decommissioning of the Proposed Wind Farm, the 110kV substation within Cushina townland will remain part of the national grid infrastructure.

Plate 2-1: Grid Connection Route

The footprint of the proposed on-site (TSO) 110kV substation compound measures approximately 5,250m2 in area and will include 1 no. control building [18m x 25m and 7.4m high] and the electrical substation components necessary to consolidate the electrical energy generated by each wind turbine and export that electricity from the on-site 110kV substation to the national grid. The proposed layout and elevations of the proposed on-site 110kV substation are presented on drawing references DANU-DAR-SK004, and DANU-DAR-SK005.

The building will include staff welfare facilities for the operational phase. Due the nature of the Proposed Development and the low frequency use, drinking water will be provided via bottled supply if needed. Toilet facilities will include a low-flush toilet and low-flow wash basin, with minimal water demand. This water will be sourced through a rainwater harvesting system from the building roofs, eliminating the need for a potable water supply. Wastewater from the welfare facilities will not be treated on-site. Instead, it will be collected in a sealed underground storage tank and removed periodically by a licensed waste collector to an approved wastewater treatment facility. This approach is widely accepted for wind farm developments and has been endorsed by multiple Planning Authorities and An Coimisiún Pleanála. The storage tank will be equipped with an automated alarm system to provide advance notice when emptying is required. Full specifications of the alarm system will be submitted to the Planning Authority prior to the commencement of site works. The alarm will be integrated into the site's remote monitoring system, which continuously tracks data from turbines, wind measurement devices, and the substation 24 hours a day, 7 days a week. Only waste collectors with valid permits under the Waste Management (Collection Permit) Regulations, 2007 (as amended) will be authorised to transport wastewater from the site.

The substation compound will also contain external electrical and ancillary infrastructure in the form of the following:

- Cable sealing ends;
- Surge arrestors;
- Cable disconnectors;
- Post insulators;
- Circuit breakers;
- Current and voltage transformers;
- Steel gantries and cable chairs;
- Power transformers;
- Power quality compensation equipment;
- Concrete plinths and bunds;
- External lighting;
- Lightening protection masts;
- Security cameras;
- Palisade fencing and gates.

The on-site 110kV substation compound will include steel palisade fencing of 2.6 metre high as required by ESB, and internal fences will also segregate different areas within the main substation. Please see Drawing Ref: DANU-DAR-SK006 for fencing details.

Lightning protection and telecommunications masts will represent the tallest structures in the compound and will not exceed 18 m in height.

2.4.2.2 Access to Grid Connection Infrastructure

The Proposed Wind Farm will be connected to the existing electricity network by means of the following new grid connection infrastructure:

1. 1 no. new permanent 110kV substation compound (1 no. EirGrid control building with welfare facilities, 1 no. wind farm control building with welfare facilities, all associated electrical plant and apparatus, security fencing, underground cabling, wastewater holding tank, site drainage and all ancillary works) in the townland of Cushina (Coolstown By), County Offaly.

2. Grid connection works joining the new Transmission System Operator (TSO) 110KV Substation to the existing [110KV] GIS Bracklone Substation. The grid connection will require 11.4km of underground 110kV electrical cabling and the route will pass through the townlands of Cushina in County Offaly; Derrylea, and Inchacooly in County Kildare, and Coolnaferagh, Ullard or Controversyland, Clonanny, Lea, Loughmansland Glebe, and Bracklone in County Laois. Works for the grid connection will involve trenching, laying of ducting, installing 15 no. joint bays and 7 no. watercourse crossings, pulling cables and the back filling of trenches and reinstatement works. The route which will run through 9.1 km of existing public road, 0.3km in existing tracks and 2km in new access tracks on the wind farm site.

If planning consent is granted, construction of the grid connection will be undertaken by a statutory undertaker having a right or interest to provide services in connection with the Proposed Wind Farm.

The grid connection route was chosen following consultation with EirGrid and a survey of potential route and connection options. Further information on the alternatives considered can be found in Chapter 3 – Site Selection and Alternatives. The grid connection route was selected because it minimises disruption to existing utility services in Portarlington. The Grid point of connection at Bracklone 110KV substation was identified based on the anticipated available capacity. EirGrid will carry out a high-level technical assessment to confirm the suitability of this connection point before issuing a formal connection offer.

2.4.2.3 IPP Wind Farm Control Building

The wind farm control building and associated compound will be situated adjacent to the 110 kV substation compound. The wind farm control building will measure approximately 20 metres by 6 metres, with a height of 7 metres. Layouts of the control buildings are illustrated in Drawings DANU-DAR-SK002 and DANU-DAR-SK003.

The building will include staff welfare facilities for the operational phase. Due the nature of the Proposed Development and the low frequency use, drinking water will be provided via bottled supply if needed. Toilet facilities will include a low-flush toilet and low-flow wash basin, with minimal water demand. This water will be sourced through a rainwater harvesting system from the building roofs, eliminating the need for a potable water supply. Wastewater from the welfare facilities will not be treated on-site. Instead, it will be collected in a sealed underground storage tank and removed periodically by a licensed waste collector to an approved wastewater treatment facility. This approach is widely accepted for wind farm developments and has been endorsed by multiple Planning Authorities and An Coimisiun Pleanála. The storage tank will be equipped with an automated alarm system to provide advance notice when emptying is required. Full specifications of the alarm system will be submitted to the Planning Authority prior to the commencement of site works. The alarm will be integrated into the site's remote monitoring system, which continuously tracks data from turbines, wind measurement devices, and the substation 24 hours a day, 7 days a week. Only waste collectors with valid permits under the Waste Management (Collection Permit) Regulations, 2007 (as amended) will be authorised to transport wastewater from the site.

2.4.2.4 Site Tracks containing 110 kV Cable Installation

A total of 2000 metres of site tracks will be constructed to accommodate the cable ducts and 110 kV cables. Where peat is present on site, it will be excavated down to a suitable bearing stratum. The area will then be backfilled with appropriate material to the existing ground level, ensuring a stable foundation for the cable infrastructure. Marker posts will be installed along the route to indicate the location of the underground cable. The position of the 110 kV cable within the site is illustrated in the 0103 series planning drawings.

2.4.2.5 Trenching and reinstatement of existing road network

A trench of 1.35m deep and 0.60m wide will be excavated in existing roads to accommodate the underground grid cable. Part of the existing road sits on peat, and therefore to ensure that there is a suitable bearing stratum for the grid cable, the peat will be extracted along the existing road network. It is anticipated that quantity of peat will be extracted and stored on site see Chapter 11 – Soils, Geology, and Hydrogeology, and the Peat and Soils Management Plan (Appendix 11.3, Volume III of this EIAR) for details on Peat storage. A ground penetration radar survey was carried out to determine the depth of peat within the existing road along the grid connection route. The road will be reinstated in accordance with the Guidelines for Managing Openings in Public Roads and to a standard agreed with the County Councils. Road opening licences supported by a detailed Traffic Management Plan (TMP) will be secured prior to works and will be followed to maintain public access along the route during the trenching and reinstatement works. See the TMP for further detail and CEMP for detailed construction methodology.

2.4.2.6 Cable Ducts

Five cable ducts of which the three will be electrical cables, and the other two being communications cables, and copper cables, respectively see Planning drawing DAR-D002.1 Cable Trench In Road Details for details. The ducts will be laid on bedding sand. These will then be surrounded by cement bound material, red cable protection strips, yellow warning tape and steel protective plates, where required. The trench will then be backfilled and reinstated.

110kV cables will be pulled from truck or trailer mounted cable reels through the ductwork from the Proposed Development new 110kV substation to existing Bracklone GIS substation.

2.4.2.7 Joint Bays

There are 15 no. Joint bays along the grid connection route, see 0103 series planning drawings. Joint bays will be to EirGrid standard specifications (6m x 2.5m) and will consist of 3 no. pre-cast concrete chambers with ducting. Once the cables have been jointed and commissioned, the entry and exit points and joint bay chamber will be filled with sand and a concrete cover fitted on top.

A manhole type cover will be fitted over the start and end points of the grid connection cable route and over the link bay chambers. Over-ground identification marker posts and marker plates will be installed along the grid connection route. The manhole covers and marker plates/posts will be the only surface expression of the underground cabling when works are completed. All joint bays will be located outside of the Flood zone as per CFRAM 1:1000 flood model.

2.4.2.8 Grid Connection Crossings

Outside of the wind farm Site there will be 7 no. crossing points comprising 6 no. watercourse crossings and 1 dry stone arch bridge crossing at disused canal. There will be 6 no. number Horizontal Directional Drilling (HDD) and one crossing and one flat formation crossing within the road above an existing culvert. HDD involves construction of a launch and retrieval pit either side of a crossing and cable conduits are then drilled from the launch pit to the retrieval pit. All pits will be outside of Flood zone as per CFRAM 1:1000 flood model and will maintain a buffer of 50 m outside of the River Barrow SAC. See Grid Connection CEMP (Appendix 2.1B, Volume III of this EIAR) for detailed construction methodology along grid route.

2.4.3 Turbine Delivery Route

There are several ports that have proven capability to accept and store large wind turbine components. These ports include Waterford, Cork, Foynes, Galway and Dublin. Transportation of wind turbine components from these ports to the national motorway network has been demonstrated. The facilities within the ports and access to and from the ports is continually being upgraded as part of general improvements and as anticipated in the due to be released National Ports Policy. It is on this basis that it is not foreseen that this project will require any material change to the port or to the access to the national motorway network should the project be consented and enter the construction phase.

A Delivery Route Selection and Assessment was carried out by Pell Frischmann Consulting to identify the optimum delivery route to site, and is presented within Chapter 3 – Site Selection and Alternatives and Appendix 2.3 and 2.4 in Volume III of this EIAR. The proposed turbine delivery route is presented at Plate 2-2, and included at Figure 2.4 (Volume IV of this EIAR).

For the purpose of this EIAR, the following transport route has been selected and assessed to facilitate turbine delivery to the Site:

- The Turbine components will be delivered to the Galway Port and travel to the M6.
- At Junction 5, depart the M6 and continue south on the N52.
- Depart the N52 to the east of Tullamore and turn left onto the R420, eastbound.
- Turn left onto the R402 northbound.

- Continue north and then east on the R402 through Ballinager and Daingean.
- Turn right from the R402 onto the R400 travelling south.
- Remain on the R400 until reaching R419.
- Turn left from to join the R419 then proceed northeast towards the site entrance.

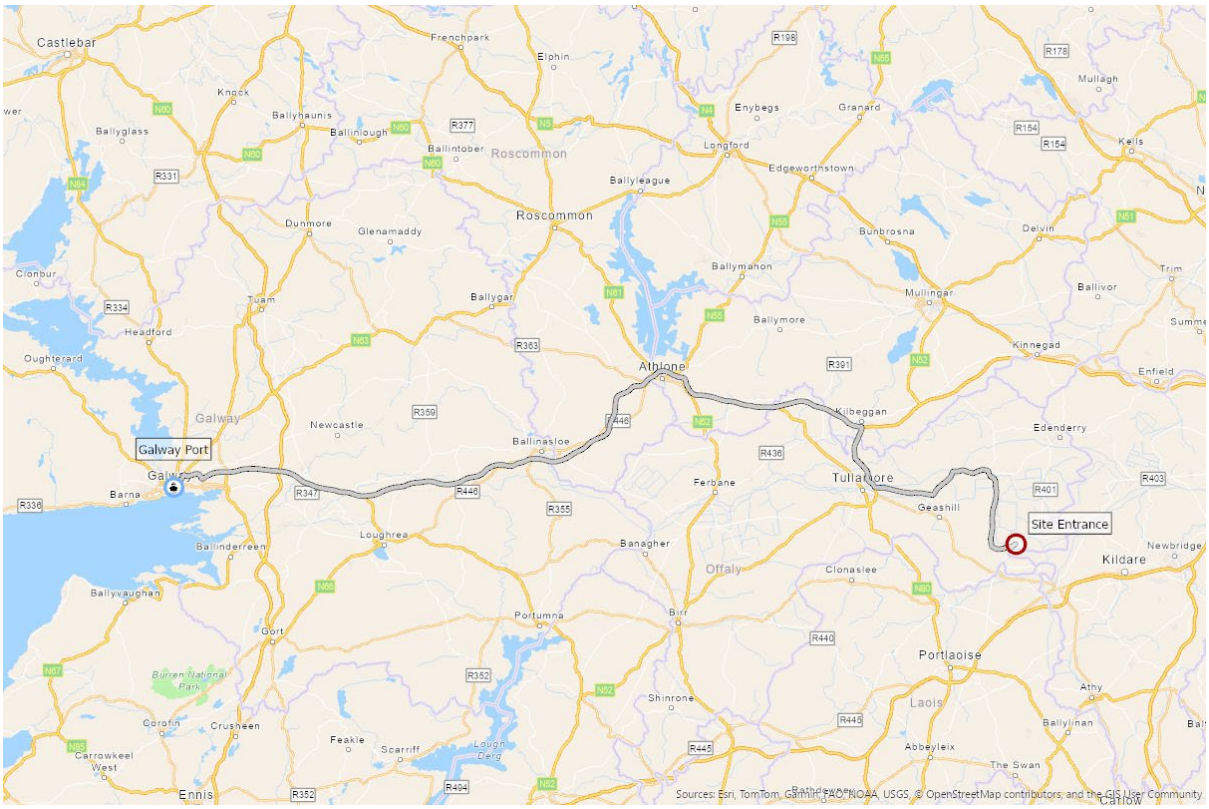

Plate 2-2: Turbine Delivery Route (Galway Port to Site)

Accommodation works will be required at selected locations along the TDR to facilitate the delivery of large components to the site. This will include some temporary hardcore surfacing at roundabouts or areas of over sail, and overhead utilities and obstructions will need to be removed at several locations to provide adequate overhead clearance. The removal of overhead utilities will be by either temporary disconnections or permanent re-routing. Such works will be carried out by the utility providers in advance of turbine delivery to site. Most of the accommodation works associated with the TDR will be fully reinstated following the construction stage, except for the permanent Bridge Crossing at Philipstown Bridge (see Node 29/30 within Table 2-6).

Key elements of the accommodation works along the TDR for the delivery of turbines are summarised in Table 2-6. Works within private lands at TDR Nodes 19, 22, 29/30, 32, 35/36, 38, 46/47, are included within the planning application red line boundary. All other works are within the public road corridor.

Key elements of all accommodation works for the delivery of turbines are summarised in Chapter 14. Their details are also contained in the Pell Frischmann Route Survey Review (RSR) in Appendix 2.3, and the Dara Energy Ltd. Turbine Delivery Route Nodes at 5 no. locations Report in Appendix 2.4, EIAR Volume III.

Table 2-6: TDR Accommodation Works

TDR Node Reference	Location	Details	Summary Description of Proposed Temporary Accommodation Works
13	M6 Slip Road / N52 Roundabout	Loads will take the third exit at the roundabout to join the N52 southbound, undertaking a contraflow manoeuvre.	Installation of Load Bearing Surface on southern verge of entry arm and the central reservation.
19	R420 / R402 Junction	Loads will turn left using the option area identified by the client.	Installation of Load Bearing Surface on the inside of the left turn.
22	R402 St Joseph's National School	Loads will turn right at the junction to head east, remaining on the R402	Installation of Load Bearing Surface on the western footway/verge, the northern footway/verge and the traffic island.
25	Daingean Main Street / Edenderry Road	Loads will continue through Daingean on the R402	Installation of Load Bearing Surface in the northern footway.
29/30	R402 / R400 Junction & River Philipstown Bridge	Loads will turn right prior to the junction, through the field and rejoin the R400.	Construction of new access bridge bypassing R402/R400 Junction.
31	R400 North of Drumcaw Or Mountlucas	Loads will head south-east on the R400 through a left bend.	Installation of Load Bearing Surface on the southern verge.
32	R400 East of Mountlucas	Loads will continue on the R400 southbound.	Installation of Load Bearing Surface on the western verge.
33	R400 South-east of Mountlucas	Loads will continue on the R400 southbound.	Installation of Load Bearing Surface on the eastern verges.
34	R400 Northeast of Brackagh	Loads will continue on the R400 southbound.	Trimming of vegetation and trees on both verges.
35/36	R400 South of Enaghan	Loads will drive over a bridge, then continue straight at the junction through the field and rejoin the R400 following the right bend.	Construction of new offline track to bypass bend onR400.
38	R400 East of Moanvane	Loads will continue on the R400 heading south-east through a left bend.	Installation of Load Bearing Surface on the northeastern verge.
46/47	R400 / R419 Junction	Loads will head east on the R400 through two right bends then turn left onto the R419 at the junction heading northeast.	Installation of Load Bearing Surface on the south-eastern verge.

Further details and assessment of these works are provided in Chapter 14 - Traffic and Transportation and Appendix 14.1 – Traffic Management Plan (Volume III of this EIAR).

Temporary accommodation works will only be required during the operational phase in the unlikely event of a major turbine component replacement. The temporary accommodation works will not be required for the decommissioning phase as turbine components can be broken up on site and removed using standard HGVs.

2.4.3.1 Overhead Utilities and Obstructions

Along the route, several overhead utilities and obstructions will need to be removed to ensure a minimum overhead clearance. This will involve either temporary disconnection and re-routing of the utilities. These works will be carried out by the relevant utility providers prior to the delivery of the turbines to the site.

2.4.3.2 Overhanging Branch Trimming

At various points along the R400 as identified in the transport route assessment Appendix 2.3, hedge and tree trimming will be necessary to achieve the required clearance. A trial run will be conducted to reconfirm identified locations. All vegetation management activities will be scheduled outside of the bird breeding season.

The works described above are assessed in the EIAR and the NIS for the proposed Project. Further to pre-application discussions with Offaly County Council, a Traffic Management Plan has been prepared as part of this EIAR and included in Appendix 14.1 – Traffic Management Plan (Volume III of this EIAR).

2.4.4 Biodiversity Enhancements

Wetland Surveys have been commissioned to prepare a Biodiversity Enhancement Management Plan (BEMP) as part of the Proposed Development. All lands identified for biodiversity enhancement fall within the red line boundary of the application site – refer to letters of consent from landowners.

Appendix 2.2 – Biodiversity Enhancement Management Plan (BEMP) in Volume III of the EIAR provides an overview of the important habitats and species within the site and collates all relevant information on the proposed enhancement, management and monitoring measures in relation to biodiversity within the site, aiming to promote a multi-faceted approach to creating a landscape-scale framework for maximum BNG within the site over the lifetime of the Proposed Wind Farm (35 years)

The following are proposed as part of the biodiversity management of the site, for further details please see Appendix 2.2 – Biodiversity Enhancement Management Plan (BEMP) in Volume III of the EIAR.

2.4.4.1 In-Ditch Wetlands

The Cushina River, which flows through the Derrynadarragh Wind Farm site, is hydrologically connected to the River Barrow and River Nore SAC. Baseline surveys identified poor water quality in the field drains running into the Cushina, particularly those located north of the river due to Peat Harvesting North of the Site.

Objective: Water Quality and Biodiversity Enhancement

To address this, the Biodiversity Enhancement Management Plan proposes the installation of in-ditch wetlands within the main drainage channels discharging from the north into the Cushina River. These in-ditch wetlands are designed to intercept and retain sediment by slowing the flow of water allowing excess sediment to fall out of the water column thereby improving water quality before it reaches the river. This measure also contributes to the ecological integrity of the site and supports aquatic biodiversity, including amphibians, dragonflies, and foraging bats.

Each in-ditch wetland will be constructed along a minimum 10-metre section of drain. The design includes widening the ditch and grading one bank to create shelves of varying depths and will be in line with best practice. These shelves and graded banks allow for different depths of water which will support the establishment of a variety of wetland vegetation along the bank and provide microhabitats for aquatic species. Water depths will range from approximately 50 cm to 75 cm to allow for sediment settling and habitat diversity enhancement.

To slow water flow and enhance sediment retention, small barriers will be installed within the drains. These may include earth bunds with outlet pipes or wooden dams, designed to accommodate storm flows while maintaining wetland function. The location of each wetland will be carefully selected to avoid proximity to turbine bat buffer zones and peat soils.

Stockproof fencing will be installed along both banks of each wetland to prevent livestock access, which can cause erosion and inhibit vegetation growth. Fencing will be set back at least 1.5 metres from the top of the drain to allow for riparian vegetation development. This measure will also contribute to water quality improvement and habitat protection.

In total, approximately 60–100 metres of in-ditch wetland habitat will be created. This enhancement is expected to yield measurable improvements in water quality, support biodiversity, and contribute positively to the overall ecological condition of the site.

Maintenance will be required throughout the lifetime of these in-ditch wetlands to remove the sediment as it accumulates.

2.4.4.2 Riparian Woodland Creation and Protection

A key biodiversity enhancement measure proposed for the Derrynadarragh Wind Farm is the creation and protection of riparian woodland along the Cushina River. This initiative targets a 2.7-hectare area of scrub and grassland habitat located on the northern bank of the river, within the eastern portion of the site. The area currently supports early successional scrub vegetation and is accessible to livestock, which has impeded natural woodland regeneration.

The proposed measure involves the installation of stockproof fencing approximately 30 metres back from the riverbank, effectively excluding cattle and other large herbivores from the riparian zone. This exclusion is expected to facilitate the natural succession of scrub to native woodland, enhancing structural and species diversity over time. The fencing will also protect active Badger setts and Otter spraint sites identified during ecological surveys, thereby improving habitat quality for these species.

The riparian woodland creation will contribute to improved water quality in the Cushina River by stabilising the riverbank and promoting the development of riparian vegetation.

The fencing will be constructed using wooden posts and three strands of barbed wire, allowing for the movement of small mammals while preventing livestock access. The measure will also support pollinators and invertebrates that rely on dead wood and understory vegetation, contributing to broader ecosystem resilience.

2.4.4.3 Prevent livestock access to field drains and Cushina River.

A Water Quality Enhancement measure proposed for the Derrynadarragh Wind Farm is the removal of access by livestock to the Cushina River and drains that running into the Cushina River, as the river and drains are currently accessible by livestock.

Within the Site, we will repair or install new fencing with suitable fencing to prevent livestock access:

- to the main drains flowing into the Cushina River;
- to the Cushina River
- to the Riverbanks.

Fencing will be timber posts with 3 strands of barbed wire all fencing will be installed at least 1.5m back from the top of the bank.

New water troughs with solar pumps will be installed to provide alternative water source for livestock where necessary.

2.4.4.4 Bog woodland habitat to prevent stock access

Proposing to fence off 2.6ha bog woodland habitat to prevent livestock access. This will allow recovery of the ground and field layers of the woodland and should encourage natural regeneration of this native habitat.

2.4.5 Amenity Area

The Proposed development will incorporate an amenity area to enhance community access and recreational opportunities along the bog road (L70481). This space will include two parking spaces integrated with the existing landscape. Informational signage will promote environmental awareness and local heritage, with seating and will allow for rest and appreciation of the natural surroundings.

To ensure the amenity area remains a positive community asset, a monitoring strategy will be implemented to discourage and prevent antisocial behaviour. This will include regular site inspections, collaboration with local authorities, and the installation of discreet measures such as signage and rubbish collection as needed.

2.5 Construction

2.5.1 Construction Activities

In the event that An Coimisiún Pleanála, decides to grant planning permission for the Proposed Development, tree felling, upgrading of existing site tracks and the provision of new site tracks will precede all other activities. Drainage infrastructure will be constructed in parallel with the access track construction. This will be followed by the construction of the turbine hardstanding areas and foundations.

In parallel with these works the on-site electrical works i.e., the sub-station and internal cable network as well as off-site connection works to the national grid will be completed. Construction methodologies are provided in the CEMP (Appendix 2.1) and the Grid Connection CEMP (Appendix 2.1B).

2.5.2 Construction Programme

The construction of the Proposed Development in its entirety is expected to take 24 months. The proposed construction programme upon which assessments in the EIAR have been based is presented hereunder.

Table 2-6: Construction Programme

Activity	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mobilisation and Site Setup																								
Site Clearance and Felling																								
Internal Access Tracks																								
Crane Hardstandings																								
Turbine Foundations																								
TDR Accommodation Works																								
Turbine Installation																								
Onsite Substation																								
Private Electrical Network																								
Grid Connection Works																								
Testing and Commissioning																								
Landscape and Demobilisation																								

2.5.3 Hours of Construction

The hours of construction activity for the Proposed Development will be limited to avoid unsociable hours as per Section 8.5 (d) of the code of practice for BS 5228: Part 1: 1997. Construction operations will generally be restricted to between 07:00 hours and 19:00 Monday to Friday, and 08:00 hours and 14:00 hours on Saturday. It should be noted that it may be necessary to commence turbine base concrete pours earlier due to time constraints incurred by the concrete curing process. Work on Sundays or public holidays will only be conducted in exceptional circumstances or in an emergency. Turbine lifting works will be scheduled to accommodate low wind weather windows. Additional emergency works may also be required outside of normal working hours as quoted above. Further details on working hours and restrictions of same are provided in the CEMP (Appendix 2.1) and the Grid Connection CEMP (Appendix 2.1B).

2.5.4 CEMP

A Construction and Environmental Management Plan (CEMP) is contained in Appendix 2.1 of Volume III, and a separate Grid Connection CEMP is contained in Appendix 2.1B of Volume III.

The CEMP sets out the key environmental management measures associated with the construction, operation and decommissioning of the Proposed Development, to ensure that during these phases of the Proposed Development, the environment is protected, and any potential impacts are minimised. The CEMP will be developed further at the construction stage, on the appointment of the main contractor to the Proposed Development to address the requirements of any relevant planning conditions, including any additional mitigation measures that are conditioned.

The CEMP document is divided into six sections:

- **Section 1:** Introduction provides details on the existing site and the Proposed Development.
- **Section 2:** Existing Site Environmental Conditions provides details of the main existing geotechnical, hydrological, ecological and archaeological conditions onsite. These conditions will be considered by the Contractor in the construction, operation and decommissioning of this Proposed Development and the prescribed measures complied with.
- **Section 3**: Overview of Construction Works, this section provides an overview of the construction works proposed and drainage and sediment controls to be installed.
- **Section 4:** Environmental Management Plan (EMP), this section outlines the main requirements of the EMP and outlines controls for the protection of the environment for example soil management, waste management, traffic management, site drainage management, site reinstatement & decommissioning, habitat and archaeology management etc.
- **Section 5:** Safety & Health Management Plan, this section defines the work practices, procedures and management responsibilities relating to the management of health and safety during the design, construction and operation of the Proposed Development.
- **Section 6:** Emergency Response Plan contains predetermined procedures to ensure the safety, health and welfare of everybody involved in the Proposed Development and to protect the environment during the construction phase of the Proposed Development.

2.5.5 Traffic Management

A careful approach will be taken to planning the entirety of the works associated with the Proposed Development to ensure minimal impacts on road users and the public.

A Traffic Management Plan will be adopted, in consultation with Kildare County Council, Offaly County Council and Laois County Council, to provide a safe environment for road users and construction workers. A Traffic Management Plan is contained in Appendix 14.1 (Volume III). In the event permission is granted for the Proposed Development the Traffic Management Plan will be finalised following the appointment of the contractor for the main construction works to address the requirements of any relevant planning conditions, including any additional mitigation measures that are conditioned and will be submitted to the planning authority for agreement.

Construction Haul Routes

The Site is surrounded by a comprehensive road network with routing options available via the main Site entrance. The proposed haul route for the delivery of materials associated with the construction of the Proposed Development are outlined in Figure 14.2 (Volume IV of this EIAR) and extract included at Plate 2-3 below.

Construction deliveries from Kilmurray Sand and Gravel Quarry will use the R400, M6, N52, R420, and the R419 as the designated delivery route to the main site entrance. Construction deliveries from Roadstone Quarry Tullamore will use the R443, N52, R420 and R419 as the designated delivery route to the main site entrance.

The haul routes are primarily along regional roads, with one motorway and one national road. The local road network does not form part of the haul routes.

It is anticipated that a succession of 20T and/or 8m³ trucks will transport the material at a peak frequency of 10 to 13 HGVs/hour. Peaks in construction traffic are typically associated with the pouring of turbine foundations. Specialist vehicles will be used for the delivery of the wind turbine components and substation transformer. These components will follow the Turbine Delivery Route outlined in Section 2.4.3 above and in the Route Survey Report completed by Pell Frischmann (refer to Appendix 2.3 in Volume III of this EIAR for more details).

Other materials are expected to be delivered on flatbed trucks (40ft or smaller depending on size of deliveries). Hours of operation will be limited for HGV movements to allow for residents to avoid conflict with commuter traffic during the morning and evening peak hours, during local school start and finish times.

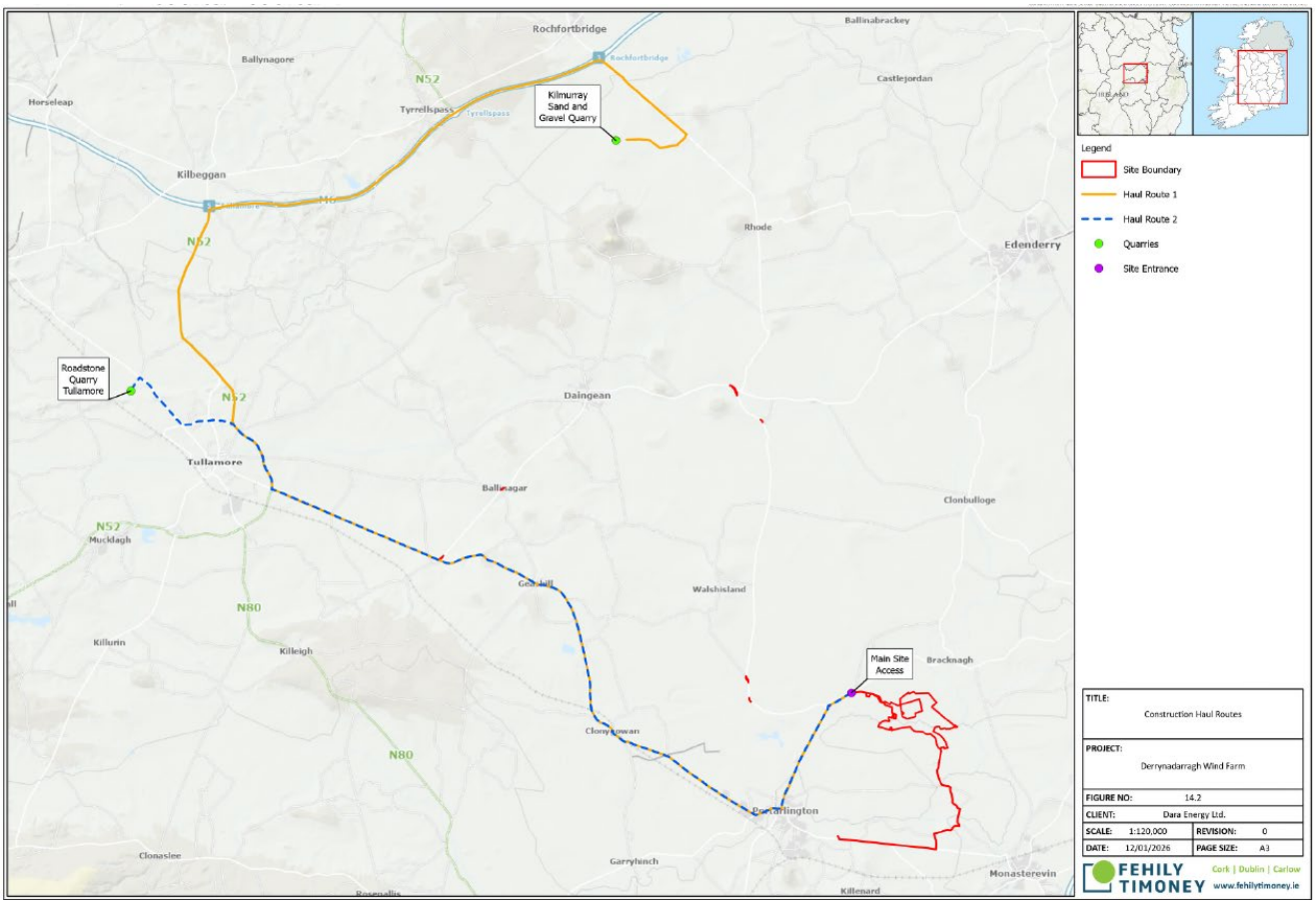

Plate 2-3: Haul Routes

Dust Suppression

In periods of extended dry weather, dust suppression may be necessary along haul roads to manage dust, water will be taken from stilling ponds in the site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and the construction compounds to prevent the generation of dust. Silty or oily water will not be used for dust suppression, because this would transfer the pollutants to the haul roads and generate polluted runoff or more dust. Water bowser movements will be carefully monitored, as the application of too much water may lead to increased runoff. A site speed limit will also be adhered to which will assist in suppressing dust on the Proposed Development site.

Vehicle Washing

Wheels or vehicle underbodies are often washed before leaving sites to prevent the build-up of mud on public (and site) roads. A vehicle or wheel wash facility will be provided close to the northern and southern accesses at the Proposed Development and will be used where required Please refer to 0100 series planning drawings for locations and Drawing No. P22-145-0500-0010. The site roads will be well finished with non-friable, compacted hardcore, and so the public road-going vehicles will not be travelling over soft or muddy ground where they might pick up mud or dirt. A road sweeper will be available and utilised if any section of the public roads were to be dirtied by trucks associated with the Proposed Development.

2.5.6 Soil and Peat Management

For the construction phase of the Proposed Project the activities that will generate peat and spoil are as follows:

(1) Upgrade of existing access tracks (excavate and replace) including temporary widening of local road to facilitate deliver of turbine components

(2) Construction of new excavated roads through peat

(3) Construction of floating roads over peat (will not generate peat and spoil but the methodology for construction is included for completeness)

(4) Excavation and placement of arisings

(5) Excavations in peat for turbine bases, hardstands and other infrastructure foundations

(6) Excavations in peat for underground cables

Management of all excavated soils and peat will be carried out in accordance with the Peat and Spoil Management Plan, please refer to Appendix 11.3 of Volume III of the EIAR.

2.5.7 Surface Water Management and Site Drainage

Site drainage at the Derrynadarragh Wind Farm will implement Sustainable Drainage Systems (SuDS). This design approach ensures that existing drainage patterns will be maintained throughout the site.

An appropriate drainage design as proposed for this development is the primary mitigation measure for the protection of waterbodies, incorporating silt protection infrastructure and control measures to reduce the rate of surface water runoff from the wind farm site.

The drainage system will be constructed alongside all turbine hardstands, internal access tracks, substation and the temporary construction compound. The drainage system for the existing tracks and roads will largely be retained. Where the roads require widening, this will involve the re-location of existing roadside swales to allow for widening.

As standard and best practice approach, surface water runoff attenuation and drainage management are key elements in terms of mitigation against impacts on surface water bodies.

Two distinct methods will be employed in the management of construction surface water runoff. The first method involves keeping clean water clean by avoiding disturbance to natural drainage features, minimising any works in or around drainage features, and diverting clean surface water flow around excavations and construction areas. The second method involves collecting any drainage waste from works areas within the site that might carry silt or sediment, and to route them towards settlement ponds prior to controlled diffuse release over vegetated natural surfaces. There will be no direct discharge to surface water.

'Clean' water is separated from 'dirty' water utilizing interceptor drains as illustrated in Plate 2-4**.** below. The interceptor drains will be installed on the upslope side of the construction area. This will reduce the amount of water from the construction area that will need to be treated before it can be safely discharged into the environment. Collected clean water will be carried under wind farm infrastructures by cross drains at regular intervals to ensure the original hillside flow is not impeded. The maximum distance between the cross drains will be 250m. The cross drains will be connected to a diffuse outfall to allow collected water to disperse overland.

The proposed access tracks will be constructed from a permeable aggregate material which allows the runoff to infiltrate underground. The excess water will drain into the swales which will be connected, during the construction stage, to the settlement ponds. The settlement ponds will have a diffuse outfall which will disperse the flow across the site. On completion of the works the settlement ponds will be filled in and the swales will be connected to a diffuse outfall.

The proposed access tracks and associated drainage infrastructure will follow contours as much as possible to reduce the gradient of the access tracks and related drains (swales). This will reduce velocities within the swales, and consequently erosion.

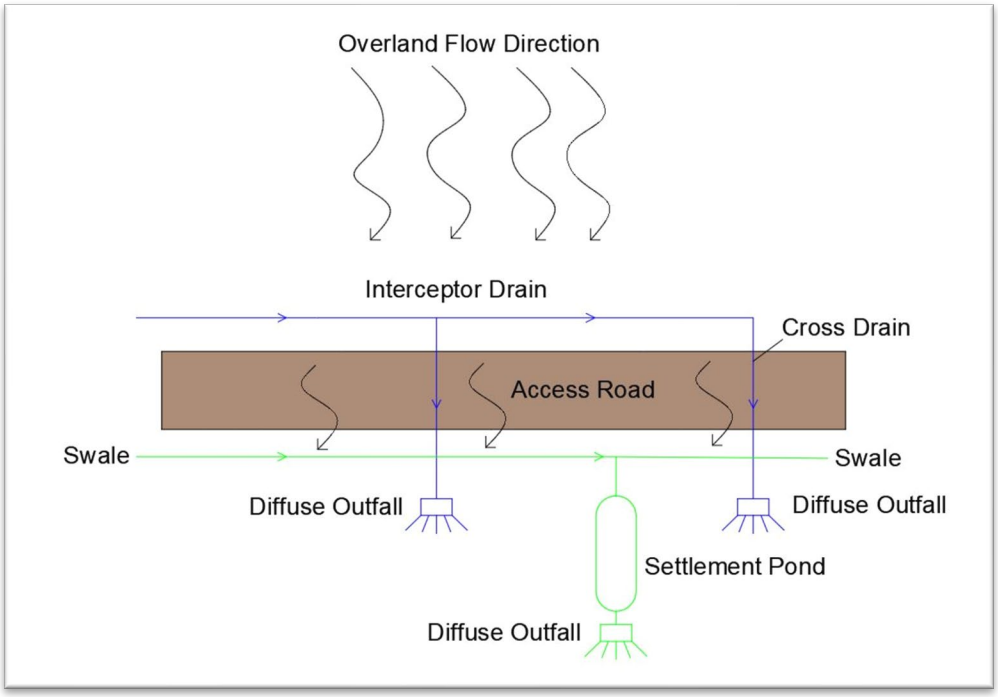

Plate 2-4: Drainage Diagram

The settlement ponds will be designed in the accordance with CIRIA C648. The volume of a settlement pond is related to the area draining into it. Any upslope runoff from site will be diverted from ponds. This is achieved by interceptor drains as discussed above.

Suspended solids will settle out only when the water is still. It is necessary to retain the water in the settlement pond for several hours to allow the suspended solids to settle out. Retention time depends on the particle size, disturbance of the water, depth of water, temperature and particle density. Retention time of two hours is applied for designing the ponds as outlined in CIRIA C648. This will allow silt to settle out.

CIRIA C648 recommends designing the outfall from the ponds to accommodate 1 in 10 years storm event, for this Proposed Development the outfalls will be designed to accommodate flows associated with 1 in 100-year event. The settlement ponds will be 1.0m deep. The proposed size of the settlement ponds is provided in the Surface Water Management Plan (SWMP), enclosed at Appendix 12.2, Volume III of this EIAR.

The existing access tracks, where required, will be upgraded. Where the existing drainage infrastructure does not prevent mixing of clean and dirty water, it is proposed to improve drainage at these locations by implementing drainage methodology proposed for new access tracks.

Further details on hydrology and drainage are contained in Chapter 12 Hydrology and Water Quality, the Surface Water Management Plan (SWMP) which is enclosed at Appendix 12.2, Volume III of this EIAR, and on accompanying planning application drawings. The proposed drainage is shown on Planning Drawings Series-0100 and 0500.

2.5.8 Waste Management

A Waste Management Plan for the Proposed Development has been included in the CEMP, at Appendix 2.1, Volume III of this EIAR.

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 temporarily in dedicated receptacles at the temporary compound during construction pending removal to an appropriately licensed waste facility. Any materials containing invasive species will be appropriately managed and sent to authorised facilities.

A Construction Waste Management Plan has been prepared for the Proposed Development in line with the "Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects" (2021) as published by the Department of the Environment, Community and Local Government.

The Waste Management Plan will 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. The Construction Waste Management Plan will comply with the Statutory requirements of the National Waste Management Plan for a Circular Economy.

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

Table 2-7: Licensed Waste Facilities in the Vicinity of Derrynadarragh Wind Farm

Licensed Waste Facility Location	Type of Waste
J. Ryan Haulage Ltd. Cushina, Portarlington, Co. Offaly (c. 3.4km from site)	Soil and stones
Pat Mangan, Ballycon Mount Lucas Daingean Co. Offaly (c. 16.4km from site)	Soil and stones
Killeshal Precast Concrete Ltd, Killeshal, Daingean, Co. Offaly R35 YK85 (c. 24km from site)	Concrete, soil and stones, mixed construction and demolition waste
T/A Oxigen Environmental Barnan, Daingean Co. Offaly R35 EE64 (c. 26km from site)	Waste plastics (except packaging), waste from forestry, waste metal, paper and cardboard packaging, plastic packaging, wooden packaging, metallic packaging, composite packaging, mixed packaging, glass packaging, textile packaging, concrete, bricks, tiles and ceramics, mixture of concrete, bricks, tiles and ceramics, wood, glass, plastic, copper, bronze, brass, aluminum, lead, zinc, iron and steel, tin, mixed metals, cables, soil and stones, insulation materials, gypsum-based construction materials, mixed construction and demolition wastes, paper and cardboard, ferrous metal, non-ferrous metal, plastic and rubber, glass, wood containing dangerous substances, wood, textiles, minerals (for example sand, stones), combustible waste (refuse derived fuel)
Anthony Cocoman, Shean Edenderry Co. Offaly (c. 17km from site)	Concrete, soil and stones
Hinch Plant Hire Ltd, Ballydownan Geashill Co. Offaly (c. 15.6km from site)	Soil and stones
John Mallen, Ballycon Mount Lucas Co. Offaly, (c. 15.1km from site)	Concrete, soil and stones, dredging spoil

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 in the construction compound:

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

Table 2-8: Typical Waste Quantities for Wind Farm Development

		Reuse		Recycle/Recovery		Disposal	
Waste Type	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	1200	10	120	80	960	10	120
Timber/Wood	1000	40	400	55	550	5	50
Plasterboard	360	30	108	60	216	10	36
Metals	300	85	255	10	30	5	15
Concrete	200	20	40	65	130	15	30
Other	540	20	108	60	324	20	108
Total	3600		1031		2210		359

2.5.9 Temporary Site Compounds

During the construction, it will be necessary to provide temporary facilities for construction personnel. Two temporary site compounds, the locations of which are shown on Figure 2.4, Volume IV will be constructed. Wheel wash facilities will be provided within the site near the site entrance point.

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;
- material/non-fuel storage areas;
- employee parking;
- bunded fuel storage
- contractor lock-up facility;
- diesel generator;
- waste management areas.

The temporary site compounds will be established by removing topsoil down to a firm substrate, laying down geotextile material and then constructing a working surface of stone sourced from within the Site, and surrounded by security fencing. The topsoil will be removed and stored in accordance with the Spoil Management Plan contained within the CEMP in Appendix 2.1, Volume III of this EIAR.

Temporary facilities will be removed, and the lands reinstated on completion of the construction phase.

2.6 Operation

Wind farm commissioning can take several months to complete from the erection of the final turbine to the commercial exportation of power to the national grid. It involves electrical and mechanical testing and control measures to check that the wind farm will perform and export power to the national grid, as designed and commissioning engineers working through an entire schedule of SCADA (Supervisory Control and Data Acquisition).

During the operational period, the turbines will operate automatically on a day-to-day basis, responding by means of anemometry equipment and control systems to changes in wind speed and direction. The turbine manufacturer or a service company will carry out regular maintenance of the turbines. Scheduled services will typically occur twice a year.

The operation of the wind turbines will be monitored remotely, and an operative working from a remote headquarters will oversee the day to day running of the proposed wind farm.

The applicant requests the grant of permission is on the basis of a 35-year operational period from the date of full operational commissioning of the wind farm. With permission for the onsite substation and grid connection sought in perpetuity given that the substation will form part of the national electricity network. Therefore, the substation will be retained as a permanent structure and will not be removed.

Thirty-five years is the anticipated minimum useful lifespan of wind turbines which are being produced for the market today. The lifespan of wind turbines has been increasing steadily in recent years and allowing this duration will improve the overall carbon balance of the development, therefore maximising the amount of fossil fuel usage that will be offset by the wind farm. Leaving the wind turbines in-situ until the end of their useful lifespan would be optimum from an environmental viewpoint, particularly in relation to carbon savings.

Routine Maintenance

Wind farms are designed to operate largely unattended and during the operational phase the wind farm will normally be unmanned. Each turbine will have its own in-built supervision and control system that will be capable of starting the turbine, monitoring its operation and shutting down the turbine in the case of fault conditions.

Supervisory operational and monitoring activities will be carried out remotely with the aid of computers connected via a telephone modem link.

Visits will be necessary to carry out routine inspection and preventive maintenance. A light vehicle will be required for routine access, occurring about once weekly, and in the event of any unscheduled fault conditions. In the unlikely event of a major component failure, a mobile crane will be required on site.

2.7 Decommissioning

In accordance with the CEMP (Appendix 2.1, Volume III), the following section provides an overview of the decommissioning phase works. The decommissioning works will be completed to approved standards, which include specified materials, standards, specifications and codes of practice (at the time decommissioning takes place).

An experienced main contractor will be appointed to undertake the of the decommissioning of the wind farm development. The main contractor will comply with the Construction and Environmental Management Plan (CEMP) prepared for the construction phase and the Operation and Environmental Management Plan (OEMP) implemented during operation and any revisions made to those documents throughout the phases in which they were adopted. The contractor will produce a detailed and site-specific Decommissioning Plan prior to commencement of decommissioning.

The key site targets are as follows;

- Ensure decommissioning works and activities are completed in accordance with mitigation and best practice approach presented in the accompanying Environmental Impact Assessment Report (EIAR) and associated planning documentation;
- Ensure decommissioning works and activities have minimal impact/disturbance to local landowners and the local community;
- Ensure decommissioning works and activities have minimal impact on the natural environment;
- Adopt a sustainable approach to decommissioning;
- Provide adequate environmental training and awareness for all project personnel.

The key site objectives are as follows;

- Using recycled materials if possible, e.g. soil and overburden material for backfilling and reinstatement;
- Ensure sustainable sources for materials supply where possible;
- Avoidance of any pollution incident or near miss as a result of working around or close to existing watercourses and having emergency measures in place;
- Avoidance of vandalism;
- Keeping all watercourses free from obstruction and debris;
- Correct implementation of the sustainable drainage system (SuDS) drainage design principles;
- Keep impact of decommissioning works to a minimum on the local environment, watercourses, and wildlife;
- Correct fuel storage and refuelling procedures to be followed;
- Good waste management and house-keeping to be implemented;
- Air and noise pollution prevention to be implemented;
- Monitoring of the works and any adverse effects that it may have on the environment.
- Decommissioning methods will be altered where it is found there is the potential to have an adverse effect on the environment;

An overview of the anticipated decommissioning methodologies is provided below.

Wind Turbines

Prior to any works being undertaken on wind turbines, they will be disconnected from the grid by the site operator in conjunction with ESB Networks and EirGrid. The dismantling and removal of wind turbines of this scale is a specialist operation which will be undertaken by the turbine supplier that completed the installation where possible. Turbine dismantling will be undertaken in reverse order to methodology employed during their construction. A number of large-scale cranes will be brought back to site utilising the existing hard stand areas. The dismantling of turbines will be bound by the same safety considerations as was the case during construction in terms of weather conditions where works will not be undertaken during adverse weather conditions and in particular not during high winds.

The turbines will most likely be removed from site in a similar manner to how they were transported to the site originally in extended articulated trucks. The destination of the turbines post decommissioning is unclear at this time as a re-use option may be sourced if early decommissioning occurs. Therefore, the removal of turbines from site is considered in terms of all turbine components being removed intact and as they transported to site.

The transport of disassembled turbines from the site will be undertaken in accordance with a Transport Management Plan which will be issued to and agreed with the competent authority at that time as part of a permit application for the delivery of abnormal loads using the local roads under the Road Traffic (Special Permits for Particular Vehicles) Regulations 2007. The Transport Management Plan will provide for all necessary safety measures, including a convoy and Garda escort as required, off-peak turning/reversing movements and any necessary safety controls.

Turbine Foundations

On the dismantling of turbines, it is not intended to remove the concrete foundation from the ground. It is considered that its removal will be the least preferred options in terms of having potential effects on the environment. Therefore, the nine turbine foundations will be backfilled and covered with soil material from areas of earthworks. The soil will be spread and graded over the foundation using a tracked excavator and revegetation allowed to occur naturally.

On-site Underground Cabling (for Turbines)

The electrical and fibre optic cabling that connects each turbine will be removed from the cable ducting. The cabling will be pulled from the cable duct using a mechanical winch which will extract the cable and re-roll it on to a cable drum. This will be undertaken at each of the joint bays/pull pits along the cable. The access track will be excavated using a mechanical excavator at each cable pulling pit location and will be fully re-instated once the cables are removed. The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance for an underground element that is not visible.

2.8 Risk of Major Accidents and Disasters

The CEMP includes an Emergency Response Plan (ERP) which provides details of procedures to be adopted in the event of an emergency relating to health & safety or environmental protection.

SEVESO

The Proposed Development is not connected with or in close proximity of any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations (SEVESO sites), therefore no significant effects associated with major industrial accidents involving dangerous substances are anticipated.

Fire

In accordance with Chapter 19 of the Safety, Health and Welfare at Work Acts 2005 (as amended), the Proposed Development shall be subject to a fire safety risk assessment which will assist in the identification of any major risks of fire on site. Additionally, individual numbers will be painted on to the top of each turbine hub in order to assist any aerial fire service in navigation over the site and surrounding lands.

Ground Conditions

Ground conditions within the Site were assessed against the Scottish Government's 2017 guidance document, '*Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments'.* Intrusive ground investigation works were carried out as part of the peat stability assessment included peat depth probing, shear strength testing and trial pitting.

A comprehensive Soil Management Plan has been developed for the Proposed Development which details the management of peat and other soils within the Site. This can be found in the CEMP in Appendix 2.1.

Traffic

The Proposed Development will utilise the existing local road network during the construction phase.

Structural fill for access tracks, turbine hardstands, turbine foundations and on-site substation will be sourced from local quarries.

A Traffic Management Plan (TMP) is provided specifying details relating to traffic management (see CEMP Appendix 2.1, Volume III). Prior to the commencement of the construction phase of the Proposed Development a detailed Traffic Management Plan will be prepared by the Contractor for agreement with the relevant local authorities and An Garda Síochána.

Climate and Flooding

The scientific community and governments across the world are in agreement that the global climate is changing at an unnatural rate. This is due to human activities, which have significantly contributed to natural climate change through our emissions of greenhouse gases. This interference is resulting in increased air and ocean temperatures, drought, melting ice and snow, rising sea levels, increased rainfall, flooding and other influences.

On the launch of the *Climate Action and Low Carbon Development* (Amendment) Bill (2021), the current Taoiseach, Michéal Martin, remarked at the time:

> *"The impact of our actions on the planet is undeniable. The science is undisputed. Climate change is happening, and we must act." (Government of Ireland, 2020)*

The CAP provides a framework for delivering the Government's target of a 51% reduction (relative to 2018) in greenhouse gas (GHG) emissions by 2030. CAP24 follows the *Climate Action and Low Carbon Development (Amendment) Act* 2021, which commits Ireland to a legally binding target of net zero greenhouse gas emissions no later than 2050, and a reduction of 51% by 2030. The Act provides a governance framework for annual revisions of the Climate Action Plan and the development of a National Long-Term Climate Action Strategy at least once every ten years. As part of this plan, the Government is also committed to reducing emissions by an average 7% per annum by 2030. The CAP is underpinned by a series of sectoral emissions reduction ambitions and enabling actions, with a selection of relevant actions that are relevant to the Proposed Development, as outlined below.

The Proposed Development will have a Maximum Export Capacity of electricity of approximately 64.8 MW. This will result in the net displacement of 65,461 to 76,019 tonnes of CO_2 per annum, depending on the power rating employed, as detailed in Chapter 7: Air and Climate. The Proposed Development will significantly increase indigenous renewable energy generation allowing Ireland to become less reliant on imported fossil fuel and bolster Ireland's energy security.

The Proposed Development will further assist in mitigating the effects of climate breakdown, and help Ireland achieve its climate neutral economy, by no later than 2050, as within the '*National Climate Objectives'*, as set out in the *Climate Action and Low Carbon Development* (Amendment) Act 2021.

A Site Specific Flood Risk Assessment (SSFRA) for the Proposed Development is included at Appendix 12.1 (Volume III), Chapter 12 – Hydrology and Water Quality (Volume II). This SSFRA has investigated the local hydrological conditions relevant to the proposed wind farm and the TDR watercourse crossing. The study indicates that the proposed development, including a section of the TDR, is susceptible to fluvial flooding during 1-in-100-year (Flood Zone A) flood events, as identified in Stage 1 – Flood Risk Identification and further analysed in Stage 2 – Initial Flood Risk Assessment. It was also established that the site is affected by pluvial flooding, as evidenced by historical records.

The areas particularly affected include turbines T1, T4, T5, T8, and T9, along with their associated access tracks, as well as other areas where localised impacts on access roads were identified. A proposed bridge crossing the River Cushina is necessary to access the turbines located on the southern side of the site and to facilitate the grid connection route.

The proposed wind farm has been designed so that critical or essential infrastructure, such as the substation and the joint bays along the grid connection route, are located outside of flood zones. However, other elements of the development, such as some turbines and access tracks, are situated within flood-prone areas. In these cases, turbine plinths have been elevated above the 1-in-100-year flood level, accounting for the effects of climate change and incorporating a freeboard (clearance) of 500 mm. This design ensures that floodwaters will not impact the electrical or mechanical components of the turbines.

Access tracks have not been raised above flood levels in order to avoid obstructing the floodplain and to preserve its storage capacity. Since these tracks will primarily be used for maintenance rather than emergency access, and during known weather conditions, this approach has been deemed to be in accordance with best practice guidance.

The development does not increase the risk to human life, as access will be controlled and managed during adverse conditions. There will be no permanent human occupation within the flood zone.

At the TDR watercourse crossing, which traverses a floodplain, five relief culverts have been designed alongside the proposed bridge to minimize any impact on existing flooding conditions.

All proposed bridges, both for the wind farm and the TDR watercourse crossing, have been designed to comply with OPW requirements. They are designed for a 1-in-100-year return period, including a 20% allowance for climate change, and a minimum freeboard of 300 mm.

The works programme for the construction stage of the development will take account of weather forecasts and work will be suspended in the case of extreme weather events. The following forecasting and weather warning systems are available and will be used on a daily basis at the site to direct proposed construction activities:

General Forecasts: Available on a national, regional and county level from the Met Eireann website (www.met.ie/forecasts). These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates;

Weather Warning or Advisories: Met Éireann's main suite of warnings are issued by the duty forecaster between 10am and midday and are updated as necessary as new information becomes available. In general, warnings will not be issued more than 60-hours ahead of the expected adverse weather but advisories on potential hazards are issued up to a week in advance. The three warning categories are:

- Yellow: Not unusual weather. Localised danger.
- Orange: Infrequent. Dangerous/disruptive.
- Red: Rare. Extremely dangerous/destructive.

Meteo Alarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale.

Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events;

Rainfall Radar Images: Images covering the entire country are freely available from the Met Eireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3-hour record is given and is updated every 15 minutes. Radar images are not predictive.

Consultancy Service: Met Eireann provide a 24-hour telephone consultancy service. The forecaster will provide interpretation of weather data and give the best available forecast for the area of interest.

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