2 PROJECT DESCRIPTION

2.1 INTRODUCTION

This Chapter of the EIAR provides a description of all elements of the Project and forms the basis of the assessments presented within Chapters 4 to 17. This Chapter provides details of the construction, operational and decommissioning phases.

This Chapter includes an overview of the Project followed by a detailed description of the main components and their method of construction. Measures that have been built into the design of the Project to reduce effects, also known as 'Embedded Mitigation' measures, are set out throughout the EIAR. In addition to these Embedded Mitigation measures, mitigation and enhancement measures where specifically relevant to their assessment topic are also set out.

This Chapter of the EIAR is supported by Figures in **Volume III** and the following Appendix documents provided in **Volume IV**:

- Construction Environmental Management Plan (CEMP) in **Appendix 2.1**
- Wind Farms within 20 km of the Development in **Appendix 2.2**
- Grid Connection Details in **Appendix 2.3**
- List of Projects for Cumulative Assessment in **Appendix 2.4**
- Consideration of Afforestation in **Appendix 2.5**

Common acronyms used throughout this EIAR can be found in **Appendix 1.2**.

2.2 PROJECT DESCRIPTION

Permission is being sought by the Developer for the construction of 5 No. Wind Turbines, a meteorological mast, an on-site substation, Turbine Delivery Route and all ancillary works.

The development will consist of

- A wind farm with an operational lifespan of 35 years (from the date of commissioning of the development).
- The construction of five turbines with an overall ground to blade tip height ranging from 177 m to 185 m inclusive; a rotor diameter ranging from 149 m to 155 m inclusive; and a hub height ranging from 102.5 m to 110.5 m inclusive.
- Construction of permanent turbine hardstands and turbine foundations.
- Construction of one temporary construction compound with associated temporary site offices, parking areas and security fencing.

- Installation of a (35-year life cycle) meteorological mast with a height of 110 m and a 4 m lightning pole on top, such that the overall structure height will be 114 m.
- Development of one on-site borrow pit.
- Construction of new permanent internal site access roads and upgrade of existing internal site access roads to include passing bays and all associated drainage infrastructure.
- Development of a permanent internal site drainage network and sediment control systems.
- Construction of a permanent 38 kV electrical substation including a control building with welfare facilities, all associated electrical plant and equipment, parking, security fencing and gates, all associated underground cabling, wastewater holding tank, and all ancillary structures and works.
- All associated underground electrical and communications cabling connecting the wind turbines to the on-site wind farm substation.
- Ancillary forestry felling to facilitate construction of the Development.
- All associated site development works including berms, landscaping, and soil excavation.
- Upgrade of existing forest access roads to include passing bays and all associated drainage infrastructure.
- Upgrade works on the Turbine Delivery Route to include the following:
    - Works at an entrance to an existing forest road accessed off the N22 to include localised widening of the forest road and creation of a splayed entrance, removal of existing vegetation for visibility splays and removal of street furniture to facilitate construction traffic including the delivery of abnormal loads and turbine component deliveries.

A 10-year planning permission and 35-year operational life for the wind turbines and met mast, from the date of commissioning of the entire wind farm is being sought. This reflects the lifespan of modern-day turbines.

A permanent planning permission is being sought for the substation and all associated electrical plant, equipment cabling security fencing and gates, wastewater holding tank, and all ancillary structures and works as these will become an asset of the national grid under the management of ESB & EirGrid and will remain in place upon decommissioning of the wind farm.

The Grid Connection consists of one 38 kV substation (to include one control building with welfare facilities, all associated electrical plant and equipment, security fencing and gates, all associated underground cabling, wastewater holding tank, and all ancillary structures and works) and a 38 kV cable to connect to Ballyvouskill 220 kV Substation.

A temporary access road off the N22 in the townland of Cummeenavrick will facilitate the safe turning of vehicles leaving the Site.

Permission is not being sought for a Grid Connection Route or the turning area in Cummeenavrick, however the below is assessed as part of the Project in the EIAR:

- All works associated with the permanent connection of the wind farm to the national electricity grid comprising a 38 kV underground cable in permanent cable ducts from the proposed, permanent, on-site substation, in the townland of Inchamore and onto the townlands of Inchamore, Derreenaling, Derryreag, Cummeenavrick, Glashacormick, Clydaghroe and Cummeennabuddoge to the existing Ballyvouskill 220 kV Substation in the townland of Caherdowney.
- The construction of a temporary access road off the N22 in the townland of Cummeenavrick to facilitate a 180 degrees turning manoeuvre by construction vehicles and reinstatement at the end of the construction period.

2.3 SITE LOCATION AND ENVIRONS

2.3.1 Introduction / Existing Land Use

The Site, as shown in **Figure 2.1**, is located within an agricultural and forested landscape. Inchamore is situated between Milleeny, Co. Cork, Coomagearlahy, and Derryreag, in Co. Kerry. The Site is located 5.9 km west of Ballyvourney, Co. Cork and borders the county boundary between Cork and Kerry. It is 54 km west of Cork City, and 23 km north-east of Kenmare, Co. Kerry.

The Development is located within the townlands of Inchamore, Mileeny Derryreag and Derreenaling.

The overall length of the grid connection between the substation and the existing 220 kV GIS substation (**Figure 1.2**) is 19.9 km, of which 1.3 km is within the Site. The remaining 18.6 km is located off-road and in third-party lands through the townlands of Inchamore, Derryreag, Derreenaling, Cummeenavrick, Glashacormick, Clydaghroe, Cummeennabuddoge and Caherdowney. The proposed grid connection will consist of underground 38 kV cables.

Temporary works will be required to accommodate the delivery of the turbine components. These temporary works are included as part of this application and are located on the access road from the N22 to the Site.

The Site extends to 170.1 ha of which 145.4 ha largely consists of low yielding, commercial forestry. Coillte own 76.0 ha of the forestry (53% of forestry on site) while 69.4 ha (47%) of the forestry is owned privately.
Coillte owned land comprises different stages of coniferous plantation forestry. The species comprise mainly of Sitka Spruce with small pockets containing Lodgepole Pine, Alder, Birch and Beech.

The remaining land (24.6 ha) is third party property and the principal land use in the general area consists of a mix of agricultural sheep and cattle grazing, farmland, residential properties, agricultural structures and open mountain heath.

There are 39 houses within 2 km of the proposed turbines.

In addition to this, there is an abandoned house located to the west of the proposed substation, on Coillte lands and within the Site. This house is under the ownership of Coillte and will not be occupied for the lifetime of the Development.

Of the 39 No. houses within 2 km of the proposed turbines, the closest house to a turbine that is to be assessed as part of this EIAR, is H1. This is located 753 m from T2. All houses located within 2 km of the proposed turbines are shown on **Figure 1.3**.

2.3.2 Removal of Forestry and Replant Lands

The Site contains 142.4 ha of commercial forestry. Turbines T2, T3, T4 and T5 are surrounded by forestry. Tree felling will be required as part of the Project. To facilitate the construction of access roads, civil works, site compounds, borrow pits and Turbine Hardstands, 26.43 ha coniferous forestry will need to be permanently clearfelled. The felling area proposed is the minimum necessary to construct the Development and to comply with any environmental mitigation.

To ensure a tree clearance method that reduces the potential for sediment and nutrient runoff, the construction methodology will follow the specifications set out in:

- Forest Service's (Department of the Marine and Natural Resources) Forestry and Water Quality Guidelines (2000)

  - Buffer Zone Guidelines
  - Ground Preparation and Drainage
  - Roads
  - Harvesting
- Forest Service's (Department of the Marine and Natural Resources) Forest Harvesting and the Environmental Guidelines (2000)
  - Harvesting
  - Roading

The use of existing forestry infrastructure will be maximised to lessen disturbance from machines used for felling.

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

- The felling plan, surface water management, construction management, emergency plans and any contingency plans (Please see **Appendix 2.1** and **Appendix 2.2**);
- Environmental issues relating to the site;
- The outer perimeter of all buffer and exclusion zones;
- All health & safety issues relating to the site.

All construction of tracks, including the creation of buffer zones and roadside drainage, will take into consideration the following specifications, which have been developed by the Forest Service (Department of Agriculture, Food and the Marine (DAFM)):

- Forest Protection Guidelines (Forest Service - Department of Marine and Natural Resources)
  - Protecting against future threats – pests and diseases
- Forestry and Water Quality Guidelines (Forest Service - Department of Communications, Marine and Natural Resources)
  - Buffer Zone Guidelines
  - Ground Preparation and Drainage
  - Roads
    - Harvesting
- Forest Harvesting and Environmental Guidelines (Forest Service - Department of Marine and Natural Resources)
  - Harvesting
  - Roading

- Forestry and Freshwater Pearl Mussel Requirements - Site Assessment and Mitigation Measures
- Forest Biodiversity Guidelines
- Forestry and The Landscape Guidelines
- Forestry and Archaeology Guidelines

This forestry to be felled is mostly consisting of Sitka Spruce or Lodgepole Pine and the felling is expected to take up to 3 months.

The above felling hectarage includes some areas which have recently been felled already for commercial timber extraction. Detailed consideration of the approach to afforestation requirements associated with the Project is included in **Appendix 2.5: Consideration of Afforestation**. It should be noted that the permanent clearfelling of trees in the State requires a felling licence. The associated afforestation of alternative lands equivalent in area to those lands being permanently clearfelled is also subject to licensing ('afforestation licensing'). The Forest Service of the Department of Agriculture, Food & the Marine is Ireland's national forest authority and is responsible for all forest licensing. In light of the foregoing and for the purposes of this Project, the Developer commits that the location of any replanting (alternative afforestation) associated with the project will be greater than 10 km from the (wind farm) Site and also outside any potential hydrological pathways of connectivity i.e., outside the catchment within which the proposed project is located. On this basis it is reasonable to conclude that there will be no more than imperceptible, indirect or in-combination effects associated with the replanting. In addition, the Developer commits to not commencing the Project until both felling and afforestation licences are in place and this ensures the afforested lands are identified, assessed and licensed appropriately by the consenting authority.

2.3.3 Wind Farms in the Area

There are 27 wind farms within 20 km of the Site. **Figure 2.3** shows the location of proposed, permitted and operational wind farms within a 20 km radius of the proposed turbines. **Appendix 2.2** provides further information on these wind farms.

- The nearest operational wind farm is Coomagearlaghy Kilgarvin Wind Farm which is located 2.7 km to the south-west of the Site.
- The nearest permitted but not yet constructed wind farm is Gortnakilla, Clonkeen Killarney, 1.87 km to the west.
- Gortyrahilly Wind Farm is a proposed 14 No. turbine wind farm located 4.95 km south of Inchamore Wind Farm. Gortyrahilly Wind Farm has the same developers as Inchamore Wind farm.

- Wind farms which are in the pre-application stages have also been included. Cummeennabuddoge Wind Farm has been included and is being designed and developed by the same developers as the proposed Inchamore Wind Farm.

Please see further details in **Appendix 2.2**.

2.3.4 Land Ownership

A portion of the Site (76.0 ha) is owned by Coillte. However, the majority of the Site is located on lands under the ownership of third-party private landowners who have consented to the application and the Development. Letters of consent accompany this application.

2.4 WIND RESOURCE

Due to the location, in the south-west of Ireland, and elevation, the Site experiences high average annual wind speeds. The Irish Wind Atlas produced by Sustainable Energy Ireland shows average wind speeds for the country and it shows that wind speeds on the Site are consistent with those that can facilitate a wind farm development (8.2 m/s at 75 m, 8.3 m/s at 100 m and 9.05 m/s at 150 m).

2.5 SITE INFRASTRUCTURE AND CONSTRUCTION

2.5.1 Proposed Layout Design

The layout of the Development has been designed to minimise the potential environmental effects of the wind farm while utilising the maximum energy yield from the Site's wind resource. The layout design was informed by the following constraints and buffers:

- No works will occur within a distance of at least 65 m from watercourses (excluding Road and Grid crossings).
- No works will occur within a distance to land drains (i.e., perforated drain pipes, used in domestic, commercial, agricultural and industrial areas to stop the ground from being waterlogged) of at least 25 m (excluding Road and Grid crossings).
- No works will occur within a distance to archaeological monuments and structures of at least 100 m.
- No works will occur within a distance from turbines to inhabited houses of at least 740 m.
- Avoidance of ground slopes of greater than 10 - 14 %.
- Avoidance of existing telecommunications infrastructure and links that traverse the site.
- Avoidance of sensitive watercourses containing Freshwater Pearl Mussel (*Margaritifera margaritifera*).

The overall layout of the Site is shown in **Figure 2.2**. This figure shows the proposed locations of the wind turbines and associated hardstanding areas, electrical substation, met mast, temporary construction compound, borrow pit, internal access roads and the site entrance. The ITM coordinates of the five turbines are listed in **Table 2.1**.

Table 2.1: Turbine ITM Coordinates

Turbine No.	ITM Easting (m)	ITM Northing (m)	Elevation (m)
T1	512358	578940	450.90
T2	512852	578514	371.56
T3	512972	579041	400.12
T4	513613	579050	370.92
T5	513947	578689	371.72

2.5.2 Wind Turbine

The proposed turbines will be of modern design and will be a three-bladed, rotor upwind of the tower, variable speed, pitched blade regulated machine. Turbine appearance will be a matt non-reflective finish in a white, off-white or grey colour. The foundation-to-tip height will range from 177 m to 185 m.

The turbine will have a circular based tower, sitting on a reinforced concrete foundation. The tower will support the nacelle, rotor hub, and rotor blades. Commercial wind turbine towers are made of steel or a hybrid of steel and concrete. The components within the nacelle are mainly metal (steel, copper, aluminium, etc.) with a metal/plastic/glass-reinforced plastic (GRP) body. The blades can be made of a matrix of glass-fibre reinforced polyester or wood-epoxy or similar composite materials.

Each turbine will have a generator with a capacity of between 5.6 MW and 6.6 MW. The turbines may be direct drive machines or contain a gearbox. The final turbine will be chosen in a competitive tendering process as part of the Project financing process, after all necessary consents have been secured.

A schematic drawing of the candidate turbines is shown on **Figure 1.4**.

This EIAR assessment considers and assesses all scenarios within the range of turbine parameters. The range of turbine parameters can be seen in **Table 2.2**.

Table 2.2: Turbine Parameters

Turbine Parameter	Assessment Envelope
Turbine Blade Tip Height	177 m to 185 m
Rotor Diameter	149 m to 155 m
Hub Height	102.5 m to 110.5 m
Turbine Foundations (Diameter)	22 m to 25.5 m
Turbine Foundations (Depth)	2.8 m to 3.2 m
Turbine Foundations (Plinth Diameter)	5 m and 6 m

2.5.3 Turbine Hardstands and Turbine Foundations

The Turbine Hardstand is designed to accommodate the delivery, laydown, and assembly of turbine components (in particular, rotor assembly) prior to turbine lifting and assembly and is shown in **Figure 2.4**. The Turbine Hardstands are needed to support the cranes during turbine construction, operation and maintenance and for decommissioning. The Turbine Hardstands will be constructed first and used to facilitate Turbine Foundation construction, such as steel reinforcement delivery and pouring of concrete.

The total area of each Turbine Hardstand will be 4,740 m^2 and includes the main crane hardstand (2,770 m^2), the component set down area (1,290 m^2), the assist crane hardstands (290 m^2) and the vehicle parking (390 m^2) as shown in **Figure 2.4**. These areas will consist of hardcore material topped with crushed stone. 'Areas cleared of any obstacles' (3,060 m^2) will be left as greenfield areas for lifting operations associated with wind turbine components.

Construction of the Turbine Hardstand and met mast hardstand will require the excavation of soils, the laying of a geotextile material on the formation surface and placing engineered stone and a top dressing. The main Turbine Hardstands and associated storage and assembly areas will cover an area of 4,740 m^2 each and will be 0.6 m in depth depending on the local bedrock profile and the varying soil depth. This gives a surface area of 23,700 m^2 for the five turbines.

The Turbine Foundations will range between 22 m to 25.5 m in diameter and have a depth ranging from 2.8 m to 3.2 m. The Turbine Foundation design will depend on the turbine type and will be decided by the structural engineers at detailed design stage and will be within these design parameters. The central part of the foundation (plinth) as seen on **Drawing No. 6226-PL-701** and **6226-PL-702**, will range between 5 m and 6 m in diameter and will be raised from the main Turbine Foundation below ground level. It will encompass a cast-in insert or bolts to connect to the bottom of the turbine tower and reinforced bar structural elements.

The area around and above the Turbine Foundation will be backfilled with compacted stone or crushed rock.

Further site investigations will be undertaken post consent to confirm that conditions do not vary from those encountered during site investigations. Traditional gravity foundations are considered for EIA purposes as the results of the site investigation indicate that piled foundations are not predicted to be required. These are concrete structures that depend on their own weight to achieve sufficient stability against overturning and sliding.

Turbine Foundations will need to be taken down to a level where the underlying soil or rock can bear the weight of a structure without shifting or compressing. This will be done by excavating through the peat / soil, subsoil and rock where necessary (depending on the various geological locations).

The method of construction for a Turbine Foundation is described as follows:

- Install temporary drainage around the perimeter of the excavation;
- Excavate peat / soil and rock;
- Back fill the foundation with excavated rock;
- Form a level working area to build the foundation;
- Install formwork and reinforcement;
- Pour the concrete;
- Once the concrete has set and the earthing system is in place, backfill the foundation with suitable excavated material, and
- Use the soil to build up the area around the Turbine Foundation perimeters (0.6 m width x 0.6 m depth).
- All excess soil will be placed in the on-site borrow pit.

2.5.3.1 Machinery Access for Felling

For the 26.43 ha of felling, it is intended that much of the existing forest road infrastructure will be utilised. The turbine layout seeks to maximise use of the forestry access tracks and fire lines already present. Where there is already a road there will be less intrusion and disturbance to the soil and surrounding trees. Some widening and building up of the existing road network will be required as part of the infrastructure for the Development which will minimise impacts on habitats compared to the construction of new forest roads. These upgraded roads will also be used for access for felling.

2.5.4 Access to the Site

The proposed site entrance is located to the north of the Site on the N22. The Turbine Delivery and Construction Haul Route will utilise this site entrance. The site entrance is shown on **Figure 2.5**.

It is proposed that the turbine nacelles, tower hubs and rotor blades will be landed at Ringaskiddy Port, County Cork. From there they will be transported to the N22 and on to the access track on private lands and on to the Site. Works required to the forest roads within the site include widening, reducing the gradient of road sections, surfacing with bitumen macadam and implementing a drainage plan.

For abnormal loads between Ringaskiddy Port and the Site, works will be required to facilitate the delivery of turbine components. These will be relatively minor in nature, for example, temporary removal of street furniture and signage. The extent of works has been determined by reference to the Collett Report of October 2021 (**Appendix 15.1**) and to the results of a swept path analysis. The Swept Path Analysis drawings are included as **Appendix 15.2**.

The delivery of the turbines will require co-ordination with a number of statutory bodies including Cork County Council, An Garda Síochána and delivery details are set out in **Chapter 15: Traffic and Transportation**.

2.5.5 Site Access Roads (Internal Road Network)

The Site Access Roads are necessary to allow access for cranes and delivery trucks during construction of the Development and during servicing/repairs to the wind turbines. The existing forest tracks/Site Access Roads will be used as far as possible to minimise additional land take. These roads will be upgraded as necessary so that the maximum width will be 4.5 m. Site Access Roads will be wider at bends and at passing bay locations where

the width will be 5.5 m. Gradients will be limited to no more than 1 in 7 (14%) and a stone layer provided, so as to provide a good grip during wet weather. Gradients of Site Access Roads will not exceed this value.

Table 2.3: Estimated Excavation for Road Construction

Road Section	Length (m)	Width (m)	Area (m^2)	Average Peat Depth (m)	Depth to firm Sub-soil/Rock (m)	Depth of Sub soil to be excavated (m)	Total Volume to be excavated (m^3)	Vol of peat to be excavated (m^3)	Vol of soil to be excavated (m^3)	Vol of rock to be excavated (m^3)
Upgraded Site Access Road	3,102	2.00	6,203	0.60	0.70	0.10	4,342	3,722	677	-
New Site Access Road	3,555	4.50	15,998	0.60	0.70	0.10	11,199	9,599	1,714	-
Off-site Road Upgrade Nodes at N22	-	-	1,118	-	0.30	0.30	335	-	335	-
Totals	**6,657**	**6.50**	**25,024**	**1.20**	**1.70**	**0.50**	**15,876**	**13,321**	**2,556**	**-**

As set out in **Table 2.3**, 3,102 m of the existing Site Access Road will be upgraded. This will involve widening the roads to cater for larger vehicles and loads. Site Access Roads are shown on **Figure 2.6**. Upgraded Site Access Roads will be approximately 6,203 m^2 in surface area and will require approximately 1,400 m^3 of crushed stone material.

There will also be 3,555 m of new Site Access Roads required for the Development, none of which will be floated, based on the results of the site investigations. These will be constructed to provide a width of 4.5 m and 5.5 m at bends and will cover an area of 15,998 m^2 and require 1,700 m^3 of crushed rock. These roads will be excavated to a level where the underlying soil or rock that can bear the weight of traffic without shifting or compressing. They will be constructed using rock from the on-site borrow pit and capping stone from nearby quarries listed in section 15.2 of **Chapter 15: Traffic and Transportation**. The Site Access Roads will facilitate a minimum 12 tonne axle construction loading. The design will consist of 250 mm to 510 mm of sub-base material. The Site Access Road construction detail is shown in **Figures 2.7 and 2.8.**

The Site Access Road layout avoids environmental constraints and follows the natural contours of the land. Every effort has been made to minimise the length of road necessary.

Site Access Roads will be maintained during the construction phase. This will involve cleaning and surface improvement works. Harmful constituents from fuel spills and drips such as hydrocarbons pose a risk of environmental contamination and also a risk to human health if found in drinking water sources. All imported stone to the Site will have undergone appropriate quality testing. When weathered, the stone will not contain any constituents which may be harmful to the environment, surface and groundwater in particular. Further details of the prevention of this can be found in the Emergency and Response Management Plan of the CEMP in **Appendix 2.1**.

There are three proposed crossings of land drains and natural streams/flushes along the internal Site Access Roads. All crossings are Clear Span Bridges. The bridges will be constructed with reinforced concrete and will join to the gravel Site Access Tracks. The bridges will range from 10 m to 27.5 m in length. Timber post and rail fencing will be included with galvanised chain link fence on the internal face. Further to consultation with Inland Fisheries Ireland (IFI), the proposed crossings have been designed in accordance with Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters, 2016 as set out in **Management Plan 2: Water Quality Management Plan** of the CEMP (**Appendix 2.1**). Details of the crossings are included in Drawings No.'s **6226 PL WC-01 to 6225 PL WC 03**.

In addition to this, six service crossings, 113 No. existing culvert crossings and three watercourse/bridge crossings occur along the Grid Connection Route. This is detailed in **Appendix 2.4: Grid Connection details**.

2.5.6 Met Mast

As part of the grid code[1] requirements and as an independent assessment of wind farm performance, all wind farms with an installed capacity of greater than 10 MW are required to supply continuous, real-time weather data for the wind farm location. The data required is the wind speed and wind direction at turbine hub height, air temperature and air pressure. The data required for the Development will be provided by a dedicated meteorological mast measuring 110 m in height with a 4 m lightning mast (location as detailed in **Figure 2.2**).

The Met Mast will be located in the south-west of the Site as detailed in **Figure 2.2**. It will be a free-standing lattice type structure as shown in **Figure 2.9**. The Met Mast foundation will be 10 m by 10 m, with a depth of 2.25 m. It will be designed and constructed similarly to the Turbine Foundations. It will encompass a cast-in insert or bolts to connect to the

[1] EirGrid (15 December 2021). EirGrid Grid Code Version 10

bottom of the met mast and reinforced bar structural elements. The area around and above the foundation will be backfilled with compacted crushed rock. The Met Mast will be linked to 38 kV Substation via buried Internal Cabling for power and communication. It will be required for the full operational duration of the Development.

2.5.7 Electrical Substation, Control Building and Associated Compound

It is proposed to construct one 38 kV electricity substation within the Site, as shown on **Figure 2.2.** This will provide a connection point between the wind farm and the grid connection point at the existing Ballyvouskill 220 kV Substation. Electricity transmitted between the turbines and the substation on the Site will be at 38 kV. The layout of the substation and compound is further detailed in **Figure 2.10**.

The substation will serve two main functions:

1) provide housing for switchgear, control equipment, monitoring equipment, and storage space necessary for the proper functioning of the wind farm, and
2) allow for metering and for switchgear to connect to the National grid.

The construction and electrical components of the substation will be to EirGrid specifications. The substation compound area will be 1,314 m^2 and the foundation will be 0.6 m in depth and will be constructed from engineered stone material using similar construction techniques (as detailed in **Appendix 2.1**) as for the Turbine Hardstands. The overall compound will be enclosed by a 2.65 m high palisade fence and will contain a single control building, ancillary equipment, including the transformers, switch gear, fault protection, metering, car parking and other ancillary elements necessary for the operation of the Development. It will also include a container sized unit which can be used to accommodate a statcom (for grid reactive power compensation) or a harmonic filter for grid stabilisation.

The control building will contain an ESB room, control room, switchgear room, small store, an office and toilet. The control components will include metering equipment, switchgear, the central computer system and electrical control panels. A spare parts store and workshop will also be located in the control building. The control building will be a single story pitched roof structure with traditional rendered finishes. Details of the control building are shown on **Figure 2.10**. The appearance and finish of the control building will be similar to an agricultural building with a slated roof and nap plaster finish. It will have a suitably sized footpath around it and an adjacent parking area. The final finish of the control building will be an off-white or grey colour.

There will be four lightning monopole protection masts which will range between 16 m and 18 m in height and associated site works. Warning / health & safety signage will be displayed as is normal practice for such installations. Motion sensitive lighting only will be used. It is proposed to install a rainwater harvesting system as the source of water for toilet facilities. A potable water supply will be brought on site in bottles. Wastewater from the staff welfare facilities in the control building will be collected in a sealed storage tank, fitted with a high-level alarm. This is a device installed in a fuel storage tank that is capable of sounding an alarm, during a filling operation, when the liquid level nears the top of the tank. All wastewater will be tankered off-site by a licensed waste collector to the nearest wastewater treatment plant, Ballyvourney/Ballymakeera. There will be no on-site treatment of wastewater.

A telecommunication antenna will be fixed externally to the substation control building for communication and control purposes (e.g., for the Supervisory Control and Data Acquisition (SCADA) System).

2.5.8 Transformers and Internal Cabling

Each turbine will be connected to the substation on site via underground Medium Voltage (MV) 38 kV cables. There will be circa 4,243 m of internal cabling. Fibre-optic cables will also connect each wind turbine to the wind turbine control system located within the Control Building. The electrical and fibre-optic cables running from the turbines to the substation compound will be run in cable ducts 1 m below the ground surface within the Site Roads and/or their verges.

2.5.9 Grid Connection

A Grid Connection offer will be sought from the grid system operator by application to EirGrid. The substation will connect via underground 38 kV cables to the existing Ballyvouskill 220 kV substation. The cable will connect into existing infrastructure within the confines of the substation and its compound.

The route of this underground Grid Connection Route is provided in **Figure 1.2.** The overall length of the Grid Connection Route between the substation and the existing 220 kV GIS substation is 19.9 km, of which 1.3 km is within the Site. The remaining 18.6 km is located off-road and in third-party lands.

The proposed grid route will follow the old route of the N22 for a short distance (c.0.469 km) before following forestry tracks to the existing Ballyvouskill Substation.

The Grid Connection will be constructed to the requirements and specifications (CDS-GFS-00-001-R1) of EirGrid. The electricity will be transmitted as a three-phase power supply meaning there will be three individual conductors in each cable circuit. The three conductors will be laid in separate ducts which will be laid in accordance with EirGrid functional specifications (CDS-GFS-00-001-R1[2]) for 38 kV underground cables. The width of a 38 kV cable trench with a trefoil formation will be 600 mm. The depth of the trench for 38 kV cables is 1.22 m. A separate duct will be provided within the trench for fibre optic communications. (Please see **Appendix 2.4**)

The following is a summary of the main activities for the installation of ducts:

- Confirmatory drawings for all existing services will be obtained from EirGrid, Gas Networks Ireland, Eir, Local Authorities and Irish Water.
- Immediately prior to construction taking place, the area where excavation is planned will be surveyed by CAT scan (sub-surface survey technique to locate any below-ground utilities) and all existing services will be verified. Temporary warning signs will be erected.
- Clear and visible temporary safety signage will be erected all around the perimeter of the live work area to visibly warn members of the public of the hazards of ongoing construction works.
- A 13-tonne rubber tracked 360-degree excavators will be used to excavate the trench to the dimensions of 600 mm wide by 1.22 m deep.
- A silt fencing filtration system will be installed on all existing drainage channels before and for the duration of the cable construction to prevent contamination of any watercourse.
- Once the trench is excavated, a 50 mm depth base layer of sand (in road trench) or concrete (off road trench) will be installed and compacted. All concrete will be offloaded directly from the concrete truck into the trench.
- uPVC ducts will be installed on top of the compacted base layer material in the trench.
- Once the ducts are installed, couplers (a device used for joining pipes) will be fitted and capped to prevent any dirt entering the unjointed open end of the duct.
- The as-built location of the installed ducts will be surveyed and recorded using a total station/GPS before the trench is backfilled to record the exact location of the ducts.
- The co-ordinates will be plotted on as-built record drawings for the grid connection cable operational phase.

[2] https://www.eirgridgroup.com/site-files/library/EirGrid/110kV-Underground-Cable-Functional-Specification-General-Requirements.pdf

- When ducts have been installed in the correct position on the trench base layer, sand (in road trench) or concrete (off road trench) will be carefully installed in the trench around the ducts so as not to displace the duct and compacted.
- Timber spacer templates will be used during installation so that the correct cover of duct surround material is achieved above, below and at the sides of the duct in the trench.
- A red cable protection strip will be installed above the layer of material surrounding the duct and for the full length of the cable route.
- A layer of concrete (in road) or excavated material (off road) will be installed on top of the duct as a surround material to a level 300 mm below the finished surface level.
- Yellow marker warning tape will be installed for the full width of the trench, and for the full length of the cable route, 300 mm from the finished surface level.
- The finished surface of the road will then be reinstated and finished with a bituminous layer. For off-road sections of the Grid Connection Route, the trenches will be reinstated with the related excavated material.
- Precast concrete cable joint bays (junction boxes see Section 2.5.9.1 below) will be installed within the excavated trench.
- The junction boxes will be backfilled and the surface above the junction box will be finished with a bituminous layer. The cable junction boxes will be opened a second time during cable pulling and jointing, after which the finished surface above the joint bays will be reinstated again to its original condition.
- When trenching and ducting is complete, the installation of the grid connection cable will commence between the substation and the existing 220 kV substation at Ballyvouskill.
- The underground cable will be pulled through the installed ducts from a cable drum set up at one joint bay and using a winch system which is set up at the next joint bay, the cable will be pulled through.
- The cables will be jointed together within the precast concrete Joint Bay.
- The surface above each cable joint bay will be finished with a bituminous layer to the satisfaction of the Local Authority and as good as the pre-existing condition.

2.5.9.1 Joint Bays

Joint Bays are pre-cast concrete chambers along the Grid Connection Route where individual lengths of cables will be joined to form one continuous cable. A joint bay is constructed in a pit. Each joint bay will be 6 m long x 2.5 m x 2.3 m deep. A reinforced concreted slab will be constructed on top of the bay.

The 18 No. joint bay locations have been dictated by suitable terrain and access to facilitate the operation of cable pulling equipment at any phase of the development and future operation of the installation in accordance with the EirGrid specifications (CDS-GFS-00-001-R1).

Communication chambers, which are similar to small manholes, will be installed at the joint bay locations to facilitate connection of fibre-optic communication cables.

2.5.9.2 Directional Drilling Works

Three water crossings along the proposed Grid Connection route (**Appendix 2.4, Part 4**) will be constructed by means of directional drilling technology and the rest will be by watercourse/bridge crossings (three) or open trenching of existing culverts. Where the Grid Connection Route is within existing road infrastructure, these watercourse crossings have already been established. For off-road sections, there are no proposed water course crossings.

Directional drilling is the practice of drilling holes in a horizontal direction for the laying of ducts which contain cables beneath features such as a watercourse. The directional drilling commences at an excavated area known as the launch pit which is the entry point for pipes and ducts to be placed. The drill rods are pushed through the ground from the launch pit to the reception pit (similar to launch pit but at the other side of the watercourse). At the reception pit, the pipes are attached to the lead drill rod and pulled back through the ground to the launch pit. The crossings will comprise 4 x 110 mm High Performance Polyethylene (HPPE) pipes/ducts. Two separate excavations will be made either side of the watercourse to a depth of 2 metres to accommodate the directional drilling launch and reception pits. Spoil arisings will be stored adjacent to the pit locations for reinstatement, at a minimum 25 metre buffer distance from the watercourse. These temporary spoil mounds will have side slopes battered back to 1:1. Silt fencing will be erected around the base of each temporary mound prior to excavation. The excavation launch and reception pits will be reinstated on completion of drilling and jointing operations.

The drill head will be placed in the open excavation (launch pit) and it will be guided in by the operator for the first 1-2 metres. A series of drill rods will be connected to the head as it travels further along the shaft.

The drill position is always known to the operator and the drill can be manoeuvred in three planes / axes. A surveyor will monitor drilling works to ensure that the modelled stresses

and collapse pressures are not exceeded. A drilling lubricant will be required. This will be delivered directly to the drill head by hydraulics. The lubricant will be chemically inert bentonite slurry mixture which lubricates the drill head and removes the drilled earth and stone. Once the crossing is drilled, the drill head is exposed at the reception pit and removed. Once the first pilot hole has been completed a hole-opener or back reamer will be fitted in the exit pit and will pull a drill pipe back through the bore to the entry side. The drill rods are connected to the duct pipe and the drill is reversed by pulling the pipe back through the channel.

A spoil volume of 4 m^3 will be excavated for each 100 m run of four pipes. This spoil will be largely subsoil material. This material will exit the launch pit within the bentonite slurry mixture. A mobile bunded tank will be located next to the launch pit into which the material/slurry mixture will be pumped. This will be stored outside of the 65 m watercourse buffer zone.

2.5.10 Borrow Pit

One borrow pit will be constructed as part of the Development, as per **Figure 2.2**. It will be located west of T5 and covers an area of 38,674 m^2. As outlined in **Table 2.4**, the borrow pit will provide 50,276 m^3 excavated material to provide fill for the roads, hardstands, upfill to foundations and the temporary compound. The borrow pit will be excavated only as required. Where rock and fill material are available from the excavation of Turbine Foundations (as per **Table 2.4 and Table 2.5**), this material will be used first. The use of an on-site borrow pit will reduce the need to transport material to the Site.

Once the required rock has been extracted from the borrow pit, it will be reinstated using any surplus inert material from the site and made secure using permanent stock proof fencing. The method for restoration of the borrow pit is to encourage stabilisation and early establishment of vegetation cover, where available, vegetative sods/turves or other topsoil in keeping with the surrounding vegetation type will be used to provide a dressing for the final surface. The borrow pit will be reinstated with excavated material from the Site and will be capped to a level of 0.8 m above the existing ground level.

Table 2.4a: Volume of Rock required from Borrow Pits

Volume of imported rock required for road and hardstand surfacing (m^3)	Rock required for Road Construction/ Upgrade (m^3)	Rock required for Turbine Hardstand Construction (m^3)	Total Rock required for Construction (m^3)	Volume of Rock to be Extracted from Excavations (m^3)	Rock required from Borrow Pits (m^3)
4,979	13,741	39,105	52,846	3,004	49,842

Table 2.4b: Volume of Rock to be Extracted from Borrow Pits

Area (m^2)	Depth (m)	Volume to be extracted from Borrow Pits (m^3)
38,674	1.3	50,276

Table 2.4c: Volume of Excavated Material to be Re-used On-Site

Total Volume (m^3) of Excavated Material to be stored on site	Volume of Borrow Pits (m^3)	Volume used to top borrow pits (m^3)	Total Volume of material to be stored in Borrow Pits (m^3)	Volume to be used in berms (m^3)
77,478	50,276	30,939	81,215	605

Excavated material will be used in berms around Turbine Foundations and Turbine Hardstands. The remainder of the material will be used to reinstate the onsite borrow pit (**Appendix 2.1 CEMP, Management Plan 4: Peat and Spoil Management Plan**).

Site investigation borehole logs indicate that bedrock is showing minor signs of weathering at the Site. Unconfined Compressive Strength results indicate the bedrock underlying the Site is considered weak. Details of the site investigations that were carried out and the stone type/suitability are provided in **Appendix 8.1: Site Investigation Survey**. **Tables 2.4 a, 2.4 b** and **2.4 c** are based on the trial pit and borehole log data within **Appendix 8.1**. Where rock is seen as unsuitable, rock will be imported from local quarries, as identified in **Chapter 15: Traffic and Transportation**.

When the borrow pit is no longer required, it will be reinstated using any surplus inert material such as peat and subsoil from the Site, allowed to restore naturally and made secure using permanent stock proof fencing.

The rock will be extracted from the proposed borrow pit using two main methods, rock breaking and rock blasting. The primary method will be rock breaking. These are discussed below.

2.5.10.1 Rock Breaking

Weaker rock will be extracted using a hydraulic excavator and a ripper. Where stronger rock is encountered and cannot be extracted using an excavator, then rock breaking equipment will be employed. This will typically involve the use of a 40-60 tonne 360-degree hydraulic excavator with a rock breaker. The rock breaker is supported by a smaller 30-40 tonne rock breaker which breaks the rock down further for feeding into the rock crusher machine. The larger rock breaker breaks out the rock in a progressive manner from the borrow pit and the smaller rock breaker breaks it down further.

The broken-down rock is loaded into mobile crusher using a wheeled loading shovel machine and crushed down into the correct grade for use in the construction of Site Access Roads and Turbine Hardstands.

2.5.10.2 Rock Blasting

Where rock is very strong and blasting is required, this is carried out using a mobile drilling rig which is used to drill vertical holes into the rock area that requires blasting. This is where explosives are used. It will take the drilling rig 3 to 4 days to drill the number of holes required for a single blast. A specialist engineer will be employed to determine the locations and depths of blasting required. The specialist blasting engineer will arrange for the correct amount of explosives to be delivered to the Site for each blast. The management of explosives delivery and storage on-site will be agreed with An Garda Síochána in advance. The blast engineer will set the explosives and manage the blast. The rock generated from the blast will usually be the correct size to be loaded directly into the mobile crusher. The effects of blasting on noise are assessed in **Chapter 10: Noise and Vibration.**

2.5.11 Onsite Drainage

The existing surface water runoff is contained within natural and artificial drainage channels that include stream and river waterbodies, drainage ditches, and other minor natural and artificial manmade drainage features.

Drainage measures will be provided to attenuate runoff, guard against soil erosion, soil compaction, and safeguard local water quality. There is a total of 28 No. stilling ponds proposed and located throughout the Site and can be seen on **Figure 2.6**. Details of the

drainage system are shown on **Figures 2.11-2.14** and outlined in detail in the Surface Water Management Plan, part of the CEMP **(Appendix 2.1**). Full details of the proposed drainage are provided in **Chapter 9: Hydrology and Hydrogeology.**

There are three streams in total on Site, made up of one waterbody (Sullane_010). A buffer zone of at least 65 m will be in place for these streams. Where this is not possible for example, at the three watercourse crossings where Site Access Roads will be constructed; construction methods incorporating mitigation measures from this EIAR are set out in **Appendix 2.1: CEMP** and **Appendix 17.1: Schedule of Mitigation Measures.**

Sustainable Drainage System (SuDS) principles namely separation of overland flow from construction areas, the mimicking of diverted overland flow around construction areas and treatment trains to treat water from construction areas, will all be employed as explained in **Chapter 9: Hydrology and Hydrogeology**. Associated controls are listed below:

Source controls for surface water

- Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sandbags, oyster bags filled with gravel, filter fabrics, and other similar/equivalent or appropriate systems. Detailed plates and figures of these can be found in **Appendix 2.1**.
- Maintaining small working areas; covering stockpiles with geotextiles to protect against water erosion and runoff in rainy weather, and/or cessation of works in certain areas such as working on a high gradient during wet and windy weather.

In-line controls for surface water

- In line controls are controls which are directly applied to the surface water body including interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sandbags, oyster bags, straw bales, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps/attenuation lagoons, sediment traps, pumping systems, settlement ponds and/or temporary pumping chambers.

Treatment systems for surface water:

- Temporary sumps and attenuation ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbusters.

When heavy rainfall is predicted works will be suspended or scaled back.

It is proposed that all drainage will be left in place upon completion of the construction phase. Full details on drainage management and mitigation can be found in **Chapter 9: Hydrology and Hydrogeology** and the **Surface Water Management Plan** attached as part of the CEMP in **Appendix 2.1**.

2.5.12 Table of Key Development Infrastructure Metrics

The Key Development Infrastructure Metrics are contained in **Table 2.5**. This table is provided for ease of access to these metrics for reference by the personnel writing the other EIAR Chapters. The dimensions of each element of site infrastructure can be seen in Series 100 Site Layout Plans 6226-PL-100-108 Planning Drawings.

Table 2.5: Key Development Infrastructure Metrics

Description	Length (m)	Width (m)	Depth (m)	No.	Area (m^2)	Volume of Excavation (m^3)
Upgraded Site Access Road	3,102	2.00	0.60	1	6,203	3,722
New Site Access Road	3,555	4.50	0.60	1	15,998	9,599
Off-site Road Upgrade Nodes	-	-	0.60	1	1,118	671
Turbine Hardstands – cranes	-	-	1.20	5	23,700	28,440
Turbine Foundations (25.5 m diameter)	-	-	2.85	5	3,064	8,732
Met Mast foundation	10	10.00	2.25	1	100	225
Electrical Substation	-	-	0.60	1	1,314	788
Site Compound	70	52.00	0.60	1	3,640	2,184
Internal Cabling	4,743	0.45	1.00	1	2,134	2,134
110 kV Cable Trench	4,743	0.60	1.34	1	2,846	3,813
Joint Bays	6	2.50	2.00	18	270	540
Link box	2	1.25	1.00	18	45	45
Comms box	1	1.03	1.29	18	19	24
Drainage	-	-	1.00	1	2,368	2,368
Borrow Pit	-	-	1.30	1	38,674	50,276

Table 2.6: Summary of Estimated Excavation Quantities (m^3)

**All excavated materials will be disposed of at a licensed facility*

Excavated Material Type	Excavated Material Volume (m^3)	Proposed Re-Use Volume		Comments
Roads	15,876	13,321 2,556	m^3 peat m^3 subsoil	Peat and subsoil material will be used to reinstate the onsite borrow pits.
Turbine Foundations	7,250	1,562 3,083 2,605	m^3 peat m^3 subsoil m^3 rock	Peat will be used as backfill to foundations. Any surplus will be used to reinstate the borrow pits after extraction. Subsoil will be deposited locally adjacent to Turbine Bases. 144 m^3 will be used as berms around Turbines. Any surplus will be used to reinstate the borrow pits after extraction. Rock will be crushed and used as hardcore in Site Access Tracks and Turbine Hardstands.
Turbine Hardstands	41,949	14,220 27,729	m^3 peat m^3 subsoil	Peat and subsoil are to be deposited locally at hardstand edges. 360 m^3 will be used as berms around Turbine Hardstands. Any outstanding peat will be air dried and used to fill borrow pits.
Electrical Sub-Stations & temporary Compounds.	9,907	1,385 8,522 0	m^3 peat m^3 subsoil m^3 rock	Peat is to be temporally stored and re-used to reinstate the Temporary Compound Areas. Subsoil will be dried and used to reinstate the borrow pits after extraction
Grid Connection*	6,854	0 6,557 297	m^3 peat m^3 subsoil m^3 rock	To be disposed of at a licensed facility (LoW 17 05 03*, 17 05 04) Please see Waste Management Plan for more details

Excavated Material Type	Excavated Material Volume (m^3)	Proposed Re-Use Volume	Comments
Drainage	2,280	2,280 m^3 peat	Peat is to be temporally stored and re-used to reinstate the Temporary Compound Areas.

2.6 CONSTRUCTION

The first phase of the Development will comprise the construction phase. This phase will begin with site preparation works and will be complete when the turbines are built and ready for commissioning, and when all wastes have been removed from the site. For this Development, it is envisaged that the construction phase will last approximately 21 months, with commissioning taking a further three months. An indicated construction programme is set out at **Table 2.7**.

2.6.1 Construction Sequencing

It is envisaged that the following will be the sequence of construction for the Development:

1. Site Preparation including felling and drainage (e.g., stilling ponds);
2. Site Roads and further tree felling;
3. Contractor Compound and Welfare Facilities;
4. Turbine Hardstands, Turbine Foundations, met mast foundations, Internal cable ducting, 38 kV substation;
5. Installation of the Grid Connection;
6. Erection of wind turbines and met mast;
7. Commissioning and Energisation.

The first step will be to prepare the Site for construction. This will include felling and implementing the designed drainage measures for all site infrastructure. The Site Access Roads will then be constructed and/or upgraded. The next step will be to construct the Temporary Construction Compound and Welfare Facilities. The next step will be to prepare the areas of the site where site infrastructure is to be located by marking out the construction works corridor, the relevant environmental buffer zones.

Following the site preparation, construction of the crane hard-standing areas for the five turbines will occur. The five Turbine Foundations will then be excavated and foundations constructed using reinforcing bar (rebar) and imported concrete. No concrete batching will take place on site.

Following the construction of the Turbine Foundations, internal cable ducting from the turbine locations to the on-site 38 kV substation will be laid in trenches along the constructed access roads.

The Grid Connection Route will then be constructed. There will be 19.9 km of trenches for underground cabling (UGC) to Ballyvouskil 220 kV substation. The ducts to be installed in an excavated trench which will be 600 mm wide and 1 m deep. There will be variations on this design to adapt to bridge crossings, service crossings and watercourse crossings as per TLI Technical notes included in **Appendix 2.4**.

The last step will be to erect the five wind turbines on the foundations using two cranes. Commissioning and testing of the turbines can then proceed.

Table 2.7: Indicative 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
Site Establishment/Felling and Fencing	X	X	X	X																X	
Internal Access Road Upgrade & Construction		X	X	X	X	X	X			X	X									X	
Substation & Compound Construction		X	X	X	X	X	X	X													
Substation Electrical Works									X	X	X	X	X	X	X	X	X				
Substation Commissioning																X	X				
Excavation & Construction of Turbine Foundations & Hardstands		X	X	X	X	X	X	X	X	X	X										
Internal Cabling Installation										X	X	X	X	X	X	X					

Activity	Month																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Turbine Delivery and Erection											X	X	X	X	X	X					
Grid Connection						X	X	X	X	X	X	X	X	X	X	X	X				
Energisation																		X			
Turbine Commissioning																			X	X	X
Site Restoration																		X	X	X	X

2.6.2 Construction and Environmental Management Plan (CEMP)

A CEMP is appended to the EIAR in **Appendix 2.1**. The CEMP includes an Emergency Response Plan, Peat and Spoil Management Plan, Surface Water Management Plan, Water Quality Management Plan, Waste Management Plan, Decommissioning Plan and Traffic Management Plan. The CEMP includes all the mitigation measures proposed within the EIAR and the NIS related to the Construction Phase. A Summary of all the mitigation measures of the EIAR is also included in **Appendix 17.1**.

The CEMP provides a commitment to mitigation and monitoring and reduces the risk of pollution whilst improving the sustainable management of resources. The environmental commitments of the Development will be managed through the CEMP and will be secured in contract documentation and arrangements for construction and later phases, such that there will be a robust mechanism in place for their implementation. The CEMP addresses the construction phase, and will be continued through to the commissioning, operation and final decommissioning phases. An Environmental Manager / Ecological Clerk of Works (ECoW) with appropriate experience having completed a similar role will be appointed for the duration of the construction phase so that the CEMP is effectively implemented.

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

The following sections describe key activities which, if unmitigated against, may cause harm or nuisance to the public. The potential impacts of each are considered in each chapter of this EIAR.

2.6.3 Refuelling

Vehicles will be refuelled off-site where possible. For vehicles that require refuelling on-site, fuels will be stored in the temporary construction compound and bunded to at least 110% of the storage capacity of fuels to be stored. Refuelling will take place via a mobile double skinned fuel bowser. The bowser will be a double axle refuelling trailer which will be towed to the refuelling locations by a 4x4 vehicle. The 4x4 will carry, a drip tray, spill kit and absorbent mats in case of any accidental spillages. Only designated competent personnel will refuel plant and machinery on the Site.

2.6.4 Concrete

There will be no concrete batching on the Site. Rather, it will be transported to the Site as it is required. A dedicated, bunded area will be created to cater for concrete wash-out and this will be within the temporary construction compound located to the north-east of T3. This will be for the wash-out of the chutes only after the pour. Concrete trucks will then exit the Site and return to the supply plant to wash out the mixer itself.

The main concrete pours at the turbine locations will be planned in advance and proposed mitigation measures (detailed in **Chapter 9: Hydrology and Hydrogeology**) are summarised as follows:

- Avoiding large concrete pours, for Turbine Foundations for example, on days when heavy or prolonged rainfall is forecast i.e., 25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or rainfall depth greater than monthly average in seven days (prolonged heavy rainfall over a week). Concrete pouring will be avoided during a period in which a Met Éireann Status Red weather event has been implemented
- Ensuring that all concrete pour areas are dewatered prior to pouring concrete and while the concrete is curing
- Making covers available so that areas can be covered if heavy rain arrives during the curing process which will prevent runoff of concrete which has a high pH

2.6.5 Dust Suppression

During periods of dry and windy weather, there is potential for dust to become friable and cause nuisance to nearby residences and users of the local road network (assessed in **Chapter 10: Air and Climate**). Damping down of internal roads and other site infrastructure will be required in this instance to see that dust does not become friable. This is most likely to occur during periods of dry and/or windy weather. This requires wetting the material and ensuring water is supplied at the correct levels for the duration of the work activity.

To reduce mud and debris from getting onto the local road network, a wheel wash facility will be employed at the site exit which will wash mud and debris from vehicles egressing the Site.

Where rock is sourced from off-site (see locations in **Figure 15.3**), HGVs entering the Site carrying rock will be covered to prevent dust generation. A road sweeper will be available for use in case of any mud or debris making it onto the public road network.

2.6.6 Construction Hours

The Development will have approximately 25 construction workers during the peak of the construction phase. Working hours for construction will be from 07:00 to 19:00 on weekdays, with reduced working hours at weekends, from 08:00 to 13:00 on a Saturday. It should be noted that during the turbine erection phase, operations will need to take place outside those hours with concrete pours commencing at 05:00 and continuing till 16:00, to facilitate Turbine Foundation construction and so that lifting operations are completed safely. Hours of working for Turbine Foundation construction will be agreed with Cork County Council prior to the commencement of Turbine Foundation construction. **Chapter 15: Traffic and Transportation** refers to this in further detail. A detailed Traffic Management Plan (**Appendix 2.1**) will be implemented during the construction phase.

2.6.7 Construction Compound and Temporary Works Area

The temporary construction compound will be set up upon commencement of the construction phase. The proposed location for the temporary construction compound is north-east of T3 as shown in **Figure 2.15** and the layout is shown in **Figure 2.16**. The compound will be 70 m by 50 m and will comprise a stoned platform 0.6 m in depth [3,500 m^2 / 2,100 m^3]. The compound will be used as a secure storage area for construction materials and to contain temporary site accommodation units for staff welfare facilities. The compound will contain cabins for offices space, meeting rooms, canteen area, a drying room, parking facilities, and similar personnel facilities.

An area within the compound will be used for the storage of fuel and oils and this will be suitably bunded and the bund will be lined with an impermeable membrane in order to prevent any contamination of the surrounding soils, vegetation and water table. Double protection containers / equipment will be used along with drip trays and details are included in the CEMP, included as **Appendix 2.1**.

During the construction phase, water will be supplied to the temporary compound by water bowser. The maximum wastewater production is estimated to be the same as the maximum water consumption (2,000 litres per day)[3]. The project will include an enclosed wastewater management system at the temporary compound to deal with wastewater arising from staff (**Figure 2.16**) and capable of handling the demand during the construction phase with 25 construction workers on site at peak. A holding tank is proposed for wastewater management. Wastewater will be removed off-site weekly, by a licensed wastewater disposal company and disposed at an appropriate licenced facility, likely to be in Ballyvourney/Ballymakeera.

2.6.8 Construction of Crane Hardstands and Foundations

The construction method for all the crane hardstands will be via excavated approach. Each crane hardstand will be 4,670 m^2. Foundations will be taken down to competent bearing strata by excavating through the soil, subsoil, and rock if necessary.

The method of construction for Turbine Foundation is described below:

- Install drainage around perimeter of excavation (see **Chapter 9: Hydrology and Hydrogeology** for full details of proposed drainage);
- Excavate soil and rock and temporarily store adjacent to the works;
- Form a level working area to build foundation;
- Install formwork and reinforcement;
- Pour concrete;
- Cure concrete;
- Once the concrete has set and the earthing system is in place, backfill the foundation with rock, and
- Use excavated soil to build up the area around the turbine base.
- The remaining volume of excavated material is to be used to reinstate the borrow pit.

2.6.9 Construction Turbine Assembly

Once on Site, the wind turbine components will follow a prescribed route to minimise manoeuvring. Components will be placed on Turbine Hardstands prior to assembly. A 'just in time' delivery strategy will be in place for turbine blades to reduce the need for temporary set down areas. One large crane will be required for erecting the turbines, assisted by a smaller crane. The same number of cranes will also be required during the operational phase for maintenance and replacement works.

[3] Table 3 of the EPA WW treatment Manual (Treatment systems for Small Communities, Business, Leisure Centres and Hotels), Environmental Protection Agency, 1999. Quarry (excluding canteen) best reflects a construction site.
[Available online: https://www.epa.ie/publications/compliance--enforcement/wastewater/EPA_water_treatment_manual_-small-comm_business.pdf]

The towers will be delivered in sections, and work on assembly will not start until a suitable weather window is available, e.g., Wind Gust Speed Threshold of less than 6 ms^{-1}. The bottom tower section will be bolted onto the concrete foundations. The mid tower section will then be lifted into position and bolted to the bottom tower section. Finally, the top tower section will be lifted into position and bolted to the mid tower section. Three methods can be used to attach the blades:

1. The blades can be attached to the nacelle and hub on the ground. The hub and blades are then lifted as one. The nacelle of a wind turbine houses the drive train and other tower-top components. The hub of the wind turbine connects the blades to the main shaft and ultimately to the rest of the drive train.
2. The hub can be attached to the nacelle and the two blades attached to the hub while the nacelle is on the ground – the "bunny lift". The nacelle is then lifted into position and the third blade lifted into place separately. This requires manoeuvring of several components on the ground and usually the repositioning of cranes.
3. Lifting the nacelle and hub as one unit, as described above and then attaching the blades one at a time, rotating the hub between lifts. The blade lifting operations do not require repositioning of the crane.

The most appropriate method will be decided by the lifting contractor and the turbine manufacturer, prior to turbine erection.

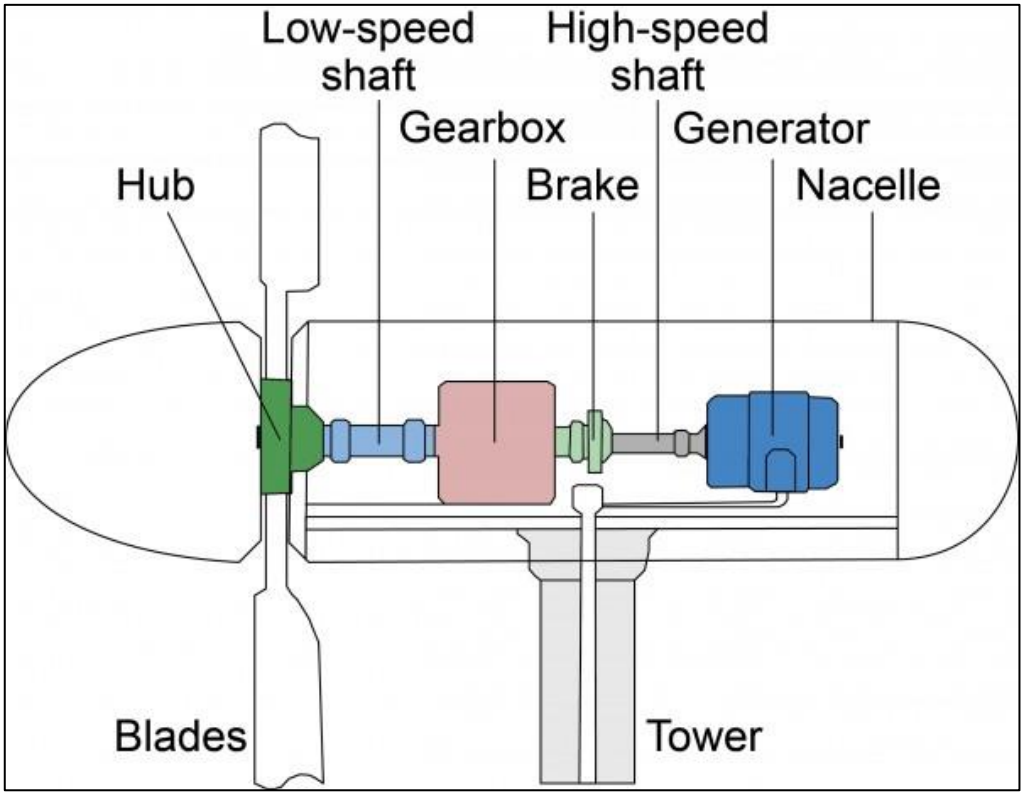

Plate 2.1: Turbine components[4] Source: (University of Michigan, 2022)

2.6.10 Construction Traffic

It is estimated in **Chapter 15**, that during civil construction, 1,781 fully loaded Heavy Goods Vehicle trips will be required for the Development. This breaks down to 162 loads per month or an average of 7 to 9 loads per day.

The peak number of deliveries per day will occur during the concrete pour for Turbine Foundation construction. An estimated 140 concrete deliveries will be required per Turbine Foundation. Other materials will also be delivered on such days, so a realistic estimation of peak deliveries is 150 deliveries per day (for at least six separate days in the construction programme when the Turbine Foundations will be poured). On these concrete pour days, 14-18 deliveries per hour will be required.

2.6.11 Reinstatement and Monitoring

Following completion of construction, all plant and machinery will be removed from the Site. The construction compound and other temporary works/assembly areas needed for the construction period, will be reinstated using the original spoil material removed and

[4] (Michigan, 2022)
University of Michigan, 2022. *Center for Sustainable Systems.* [Online]
Available at: https://css.umich.edu/publications/factsheets/energy/wind-energy-factsheet
[Accessed 29 August 2022].

stockpiled close to the location from where it was excavated as explained in **Chapter 5: Terrestrial Ecology** and **Chapter 8: Soils and Geology**. Stockpiles will be restricted to less than 2 m in height and located outside of the surface water buffer zones. All stockpiling locations will be subject to approval by the Site Manager and Project Ecological Clerk of Works (ECoW).

The grid route will be completed as described in Section 2.5.9.

All on-site installed drainage network will be left in place. This will be monitored on a quarterly basis to see that it is operating to its stated design purpose. Water monitoring on nearby natural watercourses will be undertaken prior to, during and post construction to determine if any pollution has migrated off-site, and if so, implement measures to rectify the impact. Details of this can be found in **Chapter 9: Hydrology and Hydrogeology.**

There will be no reinstatement works required during the decommissioning phase.

2.6.12 Construction Supervision and Monitoring

The construction activities will be monitored by a Site Engineer, Geotechnical Engineer, a qualified archaeologist and an Ecological Clerk of Works (ECoW).

The Geotechnical Engineer will be contracted for the detailed design phase and their services retained throughout the construction and reinstatement phases. The Geotechnical Engineer will oversee all earthworks and excavation activities and monitor for issues such as ground stability, water ingress into excavations etc. Roles and responsibilities are further detailed in **Appendix 2.1**.

Daily monitoring of excavations by the Geotechnical/Site Engineer will occur during the construction phase. If high levels of seepage inflow occur, excavation work will immediately be stopped and a geotechnical assessment undertaken. Further details of what this will involve are detailed in **Chapter 8: Soils and Geology** and **Chapter 9: Hydrology and Hydrogeology**.

The ECoW will be employed prior to the commencement of the construction phase to monitor and review the pollution control measures and working practices during construction and have input into site remediation. The ECoW will have stop work authority if, for example, a sensitive habitat feature is encroached upon or there is the possibility of silt/pollution runoff to natural watercourses.

The potential exists for the presence of unrecorded, sub-surface archaeological features within green field locations in proposed construction areas within the Site. A series of construction phase archaeological investigations under licence by the National Monuments Service will be carried out by a suitably qualified archaeologist. The archaeologist will have responsibility for ensuring that potential archaeological features are protected should any be discovered during excavations. The Site will be accessible to the appointed archaeologist at all times during working hours and the nominated archaeologist will monitor all invasive works.

If any sub-surface archaeological remains are identified during site investigations, they will be cleaned, recorded and left to remain *in situ* within cordoned off areas while the National Monuments Service are notified and consulted in relation to appropriate future mitigation strategies, which may entail preservation *in situ* by avoidance or preservation by record by archaeological excavations.

Water monitoring details are included in **Management Plan 2: Water Quality Management Plan** as part of **Appendix 2.1** and will be implemented prior to commencement of construction. Regular inspections of the installed drainage system will be undertaken by the Ecological Clerk of Works, especially after heavy rainfall events, to check blockages and see that there is no build-up of standing water in any part of the system where is it not designed to be.

Excess build-up of silt will be removed at check dams, attenuation/settlement ponds or any other drainage feature by scraper or excavator and under the supervision of the ECoW. During the construction phase, field testing and laboratory analysis of a range of parameters with relevant regulatory limits and Environmental Quality Standards will be undertaken for each watercourse close to the site, and specifically following heavy rainfall events (i.e., weekly, monthly and event based). The locations and are included in **Chapter 9: Hydrology and Hydrogeology**.

The CEMP for the Development sets out the proposed site organisation, sequencing of works, methodologies, mitigation measures and monitoring measures.

The local road network near the Site is used to transport construction materials and will be monitored during construction, so that any damage caused by construction traffic associated with the Development can be identified and repaired, as local roads are more prone to damage than national roads. This monitoring will be undertaken on the N22 and at

the Development entrance. Readymix concrete will be sourced from local quarries when required (see locations in **Figure 15.4**) and monitoring, such as visual inspections, will also be undertaken on the route from these, as required. This is detailed and assessed in **Chapter 15: Traffic and Transportation**.

2.6.13 Construction Employment

Based on our experience, it is estimated that between 36 and 63 direct and indirect jobs could be created during the construction phase of the Project. It is not expected that all of these jobs will be based at the Site.

2.7 COMMISSIONING

Wind farm commissioning can take in the region of three 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).

2.8 OPERATION AND MAINTENANCE

During the operation of the wind farm, the turbine manufacturer, the wind farm operator, or a service company will carry out regular maintenance of the turbines, substation and site infrastructure. Personnel will enter the site via the site entrance at the N22. Monthly routine inspection and preventative maintenance visits will be necessary to provide for the smooth and efficient running of the wind farm. This will occur over one day with one vehicle attending the Site. In addition, operation and monitoring activities will be carried out remotely with the aid of computers connected via a telephone broadband link.

The permanent site infrastructure can be utilised in the event that replacement turbine components are required, such as a new blade.

2.9 DECOMMISSIONING

The Applicant is applying for a consent for a period of 35 years for the operation of the wind farm. The full description of the decommissioning is as follows:

- Removal of five wind turbines and above ground concrete plinths.
- Removal of above ground meteorological mast structure.
- Removal of all associated underground electrical and communications cabling connecting the wind turbines to the wind farm substation. Ducting is to remain *in-situ*.

All other elements of the proposed development including the on-site substation, will remain in-situ. The Site Access Roads and associated drainage systems will serve ongoing forestry and agriculture activity in the area. All other hard surfaced areas will be allowed to revegetate naturally. Based on the experience of the EIAR project team of monitoring operational wind farm sites throughout the country, the approach of allowing these areas to revegetate naturally has proven to be very successful and less environmentally impactful than removing this infrastructure.

Cranes of similar size to those used for construction will disassemble each turbine using the same crane hardstands. The towers, blades and all above ground components will be removed from site and reused, recycled, or disposed of in a suitably licenced facility. Turbine parts will be cut on site so as to fit on articulated trucks (The financial costs of decommissioning, at current material values, will be more than met by the recycling value of the turbine components).

Potential impacts will be similar to that of the construction phase, albeit to a lesser extent and are described in each chapter of this EIAR.

A decommissioning plan is included as part of the CEMP in **Appendix 2.1**. Prior to the decommissioning works, a plan will be submitted to the planning authority for written agreement. The plan will take account of contemporary best practice.

2.10 COMMUNITY BENEFIT

In addition to helping Ireland reduce environmentally damaging fossil fuel emissions and helping avoid significant fines from the EU, Inchamore Wind Farm will also contribute positively to the national and regional economy.

A SEAI report indicated that in 2019 wind energy generated 32% of all electricity, avoided 3.9 million tonnes of CO_2 emissions; and avoided approximately €260 million in fossil fuel imports[5]. Additionally, a report published by Barringa in January 2019 states that:
"Our analysis indicates that the deployment of 4.1 GW of wind generation capacity in Ireland between 2000 and 2020 will result in a total net cost to consumers, over 20 years, of €0.1bn (€63 million to be exact), which equates to a cost of less than €1 per person per year."[6]

[5] https://www.seai.ie/publications/Energy-in-Ireland-2020.pdf [Accessed 08/02/2022]
[6] https://windenergyireland.com/images/files/baringa-wind-for-a-euro-report-january-2019.pdf [Accessed 08/02/2022]

In addition to the above financial costs and benefits, the Barringa report outlines that wind generation in Ireland avoids:

"33 million tonnes of power sector CO_2 emissions. The total carbon emissions from electricity generation in 2017 was 11.7 Mt, so a saving of 33 Mt is equivalent to almost 3 years of total carbon emissions in the electricity sector today. 137 TWh of fossil fuel consumption at a saving of €2.7bn. In comparison, Ireland consumed 44 TWh (3814 ktoe) of fossil fuels for electricity generation in 2017, so a saving of 137 TWh is equivalent to 3 years of current fossil fuel consumption for electricity generation."

The Project has the potential to bring significant positive benefits to local communities. It will support sustainable local employment; it will contribute annual rates between €280,000 to €330,000 to the local authority; and it will provide opportunity for local community investment in the project in line with the new Renewable Energy Support Scheme (RESS). This is a Government of Ireland initiative that provides support to renewable energy projects in Ireland. A Community Benefit Fund will be put in place for the RESS period (i.e., 15 years of the operation) of the Project to provide direct funding to those areas surrounding the Project. The significant annual community benefit fund will be established in line with Government policy which will include funding for both wider community initiatives and a Near Neighbour scheme focused on houses in close proximity to the Project.

It is anticipated that for each megawatt hour (MWh) of electricity produced by the wind farm, the project will contribute €2 into a community fund for the RESS period i.e., first 15 years of operation. If this commitment is improved upon in upcoming Government Policy, this will be adjusted accordingly.

The Project has the potential to contribute between €170,000 and €200,000 e per annum in the local area for community funding for the RESS period, consistent with Government Policy. However, the above figure is indicative only and is and will be dependent on the generation capacity of the wind farm which is influenced by a number of factors including:

- Number and type of wind turbines permitted
- Capacity and availability of energy production of the delivered turbines
- Quantity of wind and wind conditions in any given year

2.10.1 Fund Usage and Administration

The Community Benefit Fund belongs to the local community surrounding the Development. The premise of the fund is that it will be used to bring about significant, positive change in the local area. To make this happen, the first step will be to form a benefit fund development

working group that clearly represents both the closest neighbours to the Project as well as nearby communities. Workshops will be organised to facilitate consideration of the priorities for the local fund. This group will then work on designing the governance and structure of a community entity that will administer the Community Benefit Fund.

It is acknowledged that the people living closest to a wind farm are the most important stakeholders and a proportion of the Community Benefit Fund will be set aside as a dedicated "Near Neighbour Fund". The exact structure of this will be confirmed as part of the development of the overall Community Benefit Fund but would typically provide support of varying degrees for properties up to 2 km from turbines. This is supported by the requirements set out in the RESS2 and may be adjusted in future RESS schemes that may relate to this Project.

2.10.2 Community Investment

The Renewable Energy Support Scheme (RESS) - RESS-2[7] sets out that future renewable energy project proposals will enable the possibility for local communities to invest in projects in a meaningful way as a means to directly gain from the financial dividends that a project can provide should it be consented, built and operated.

This element was not included in the RESS-1 or RESS-2 Schemes but it is expected to form part of later RESS-3 Scheme which likely will apply to this Project. In preparation for this, the Developer has been working with external agencies to develop workable models of Community Investment.

7 https://www.gov.ie/en/publication/7f0bb-renewable-electricity-support-scheme-2-ress-2/, Accessed 20/01/2022.