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ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED SHANCLOON WIND FARM, CO. GALWAY

VOLUME 2 – MAIN EIAR

CHAPTER 2 – DEVELOPMENT DESCRIPTION

Prepared for:

RWE Renewables Ireland Ltd

RWE

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CHAPTER 1 - INTRODUCTION

REVISION CONTROL TABLE, CLIENT, KEYWORDS AND ABSTRACT

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Abstract: Fehily Timoney and Company (FT) has been retained by RWE Renewables Ireland Ltd. to prepare an EIAR for the Proposed Development of Shancloon Wind Farm, Co. Galway. This document is the Environmental Impact Assessment Report (EIAR) for the planning consent stage of the proposed wind farm development.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF IMAGES

2. DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) describes the proposed site 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 Appendix documents provided in Volume III:

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 wind farm site (referred to in this EIAR as the 'Site') which includes the turbine array and associated civil and electrical infrastructure and the on-site 110 kV substation and loop-in connection to the existing Cashla-Dalton overhead line;
- The turbine delivery route (referred to in this EIAR as the 'TDR').

The location of the Proposed Development is shown in Figure 2.1, Volume IV. An overview of the Site Layout is shown in Figure 2.2a Figure 2.2b and Figure 2.2c. The layout of the TDR is presented in Figure 2.3.

2.2 Overview of the Proposed Development

The development proposed by RWE Renewables Ireland Ltd. (the Applicant) is an 11 no. turbine wind farm and associated infrastructure including internal access tracks, hard standings, permanent meteorological mast, onsite 110 kV substation, a loop-in grid connection to the National Electricity Grid (NEG), internal electrical and communications cabling, temporary construction compounds, drainage infrastructure, earthworks and spoil management and all associated works related to the construction of the wind farm as well as measures designed to protect and enhance existing habitats.

On 28th May 2025 An Bord Pleanála (The Board) (later referred to as An Coimisiún Pleanála)[1] 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 Board (case ref. ABP-321507-24). The Board are the competent authority for the purposes of the Environmental Impact Assessment (EIA). On 16th December the Applicant made a request to An Bord Pleanála for a design flex opinion (case ref. ABP-321495-24). The Planning and Development, Maritime and Valuation (Amendment) Act 2022, provides for design flexibility in the case of applications for development specified in the Seventh Schedule relating to rapidly changing technology and the potentially long lead-in times between the making of a planning application and the procurement of equipment. Under Section 37CC (1) of the Planning and Development Act 2000 (as amended), it states that a prospective applicant who proposes to make an application for development specified in the Seventh Schedule may request a meeting with the Board for the purpose of Section 37CD as part of consultation referred to in Section 37B (1). Accordingly, RWE Renewables Ireland Limited commenced pre-application consultation under Section 37B (1) seeking the Boards opinion on design flexibility. The Board, on 13th June 2025, provided an opinion under section 37CD of the Planning and Development Act 2000 (as amended) the following details may be confirmed after the proposed application has been made and decided:

- Turbine Dimensions
  a) Turbine tip height
  b) Rotor diameter
  c) Hub height

The proposed application is consistent with the opinion provided by the Board in accordance with section 37CD of the Act. The EIAR has been prepared to reflect the opinion provided by the Board.

A 10-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm (including meteorological mast) is being sought. This reflects the lifespan of modern-day turbines.

A permanent planning permission is being sought for the Grid Connection and 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 wind farm.

The 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 current best practice.

The draft WEGs propose a setback distance for visual amenity purposes of 4 times the turbine tip height from the nearest point of the curtilage of any residential property (a distance of 720 m based on the proposed turbine tip height of 180m), subject to a mandatory minimum setback of 500 metres. In this regard, the layout and design of the wind farm complies with the current Draft Revised Wind Energy Development Guidelines, 2019. An exception may be provided for a lower setback requirement from existing or permitted dwellings or other sensitive properties to new turbines where the owner(s) and occupier(s) of the relevant property or properties are agreeable to same.

[1] NOTE: Part 17, Section 495(3) of the Planning and Development Act 2024 provides that references in any enactment, legal proceedings or document to An Bord Pleanála shall, on and after the commencement of said section, be construed as references to An Coimisiún Pleanála. Part 17, Section 495(3) of the Planning and Development Act 2024 was commenced on 18th June 2025. Any reference to An Bord Pleanála in this EIAR can be construed as meaning An Coimisiún Pleanála where it relates to a time after 18th June 2025.

Presented hereunder are the elements of the Proposed Development for which development consent is being sought and all other associated project components assessed in this EIAR but for which planning consent is not being sought within the current application.

The Proposed Development for which consent is being sought as part of this planning application will consist of the following:

- Construction of 11 no. wind turbines with a ground to blade tip height range of 179.25 m to 180 m. The wind turbines will have a rotor diameter ranging from 149.1 m to 155 m and a hub height ranging from 102.5m to 105m.
- Construction of permanent turbine foundations and crane pad hardstanding areas and associated drainage;
- Construction of 13,725 m of internal access tracks and associated drainage infrastructure (of which 1,770 m will be floated road);
- Upgrading of 3,565 m of existing tracks and road and associated drainage infrastructure;
- Construction of 1,180 m of temporary access track to facilitate HDD cable crossing of the Togher River;
- Creation of 1 no. new construction and operation access to the wind farm Site from the L-2234 local road and one road crossing of the L-2220-21 local road;
- All associated drainage and sediment control including interceptor drains, cross drains, settlement ponds and swales;
- Installation of new watercourse crossings including 1 no. 18.5 m single span bridge crossing and 14 new piped culverts;
- All associated excavation, earthworks and spoil management;
- 3 no. temporary construction compounds and associated ancillary infrastructure including parking;
- Construction of 1 no. permanent onsite 110kV electrical substation, associated new access road off of the L-6100 local road, and associated construction compound including:
    - Welfare facilities;
    - Electrical infrastructure;
    - Parking;
    - Wastewater holding tank;
    - Rainwater harvesting tank;
    - Security fencing;
- Works associated with the connection of the wind farm to the national electricity grid, which will be via a loop-in 110 kV underground cable connection 650 m in length to the existing Cashla-Dalton 110 kV overhead line in the townland of Tonacooleen, with two new 16m high steel loop-in lattice tower end masts for loop-in connection at the connection point.
- Installation of 33 kV medium voltage electrical and communication cabling underground between the proposed turbines and the proposed on-site substation and associated ancillary works including Control Building;
- Erection of 1 no. permanent meteorological mast to a height of 110 m above ground level with a 4m lightning pole on top.
- Turbine Delivery Accommodation works:

  - R332 / L6483 Junction (Beagh Townland) - temporary load bearing surface will be laid and the drainage ditch temporarily culverted. Vegetation will be cleared. One utility pole will be temporarily removed.
  - L6483 (Beagh, Cloonmweelaun and Ironpool Townlands)- temporary load bearing surface will be laid to provide a minimum 4.5 m running width and a 5.5 m clearance width for turbine delivery.
  - L6483 (Ironpool Townland) – temporary load bearing surface will be laid and vegetation will be cleared. Two road signs will be temporarily removed.
- Felling of 0.54 ha of conifer plantation forestry;
- 2,032 m Treeline/hedgerow removal;
- 9.7 ha of Biodiversity Enhancement lands plus 2,457.50 m of hedgerow/treeline planting;

Certain temporary accommodation works associated with the Turbine Delivery are assessed within this EIAR but for which planning consent is not being sought within the current application (Refer to Table 2.6). These works to facilitate the delivery of turbine components and haulage to Site include hedge or tree cutting, relocation of powerlines/poles, lampposts, signage and local road widening. For these locations, works associated with road infrastructure have been identified and assessed in the EIAR, however, permission for these works will be sought separately as necessary.

2.3 Proposed Development Location

The proposed wind farm is wholly located in the jurisdiction of Galway County Council, in proximity to the Mayo border. At its closest point, the turbine array is located approximately 4km north-east of Shrule, County Mayo (which is the closest settlement to the Proposed Development) and 8.5km north-west of Tuam, County Galway.

The Site is located within the townlands of Beagh, Beagh More, Cloonbar, Cloonmweelaun, Cloonnaglasha, Cloonteen, Corillaun, Derrymore, Ironpool, Shancloon, Toberroe and Tonacooleen, County Galway. Of these, the on-site substation is located within Corillaun and loop-in connection within neighbouring Tonacooleen.

The TDR will be from Galway Port and will pass through the following townlands along the road network: Airgloony, Annagh, Annagh Beg, Annagh Hill, Ballinphuil, Ballintober, Ballybaan Beg, Ballybackagh, Ballybanagher, Ballybrit, Ballygaddy, Beagh, Brockagh, Bullaun, Caherateemore North, Caherateemore South, Caherbriskaun, Caraunduff, Carnmore, Carnmore West, Castlegrove West, Castlelambert, Cloonascragh, Cloondarone, Cloonkeen North, Cloonkeen South, Cloonmore, Cloonmweelaun, Cloonnavaddoge, Cloonteen, Cloontooa, Coolagh, Doughiska, Fartagar, Garraun North, Garrauncreen, Glenmore, Glennascaul, Ironpool, Killaloonty, Killeelaun, Kilmore, Kilskeagh, Laragh More, Lisheenkyle East, Lisheenkyle West, Mahanagh, Mira, Palmerstown, Pollacorragune, Pollnagroagh, Rathmore, Rathmorrissy, Sheeaunpark, Tobernavean and Townparks.

2.3.1 Wind Farm Development Boundary

The development application area (i.e. the red line boundary depicting the land to which the application relates) encompasses a land area of 154 ha (1.54km^2) and is shown on Figure 2.2a, Figure 2.2b and Figure 2.2c. The infrastructure footprint within the application area of the Proposed Development is 19.6 ha (0.196 km^2). Biodiversity enhancement measures will also be included within the Proposed Development boundary and comprises 6.5 ha of woodland and treeline/hedgerow planting in order to enhance landscape connectivity for bats and mammals, along with 2.7 ha of habitat enhancement for Marsh Fritillary. Refer to Figure 2.2a, Figure 2.2b and Figure 2.2c for details of the overall wind farm layout and Figure 9.4a, Figure 9.4b and Figure 9.4c for associated biodiversity enhancement areas.

2.3.2 Existing Land use

The Proposed Development is located within a rural setting. Land use within the Site comprises agriculture and historic peat extraction, with smaller pockets of commercial forestry also present along the periphery. Residential property density in the area is low with ribbon development and one-off housing dominating the residential development in the area.

The proposed wind turbines are located fully with an area defined as Open to Consideration for wind energy development under the Galway County Development Plan 2022-2028. The Landscape Character of the Proposed Development lands is the 'North Galway Complex Landscape Type' which is "an extensive grassland plain stretching from the Suck River in the east to the watershed of the River Clare in the west. It includes elevated areas such as Slieve Dart in the north, as well as lakes, turloughs, raised bogs, wetlands and winding rivers". Site topography is relatively flat and varies broadly between 10m AOD and 41m AOD. The nearest protected view to the Proposed Development is close to Headford, looking in a north-westerly direction, which is away from the Proposed Development.

The current Wind Energy Development Guidelines (2006) advise that noise is unlikely to be a significant problem where the distance from the nearest turbine to any noise sensitive property is more than 500 metres. The Draft Revised Wind Energy Development Guidelines, 2019 propose a setback distance for visual amenity purposes of 4 times the turbine tip height from the nearest point of the curtilage of any residential property (a distance of 720 m based on a tip height of 180m), subject to a mandatory minimum setback of 500 metres.

There are 224 residential properties (or proposed residential developments which have received/hold active planning consent) within 2 km of the turbine array and 49 residential properties (or consented residential developments) within 1km of the turbine array, as shown on Figure 2.4. The closest property to a turbine (Eircode H54 KH73) is located 357 m distance from Turbine T01, however this property is under the control of the Developer and will be taken out of use as a residential property and will not be occupied for the operational period of the development should the Proposed Development be granted planning permission. The next nearest property is a derelict building (currently uninhabitable property) located 720.4m south-east of T1 (no Eircode assigned). The closest inhabitable (currently inhabited) residential property to the Proposed Development is located 728m east of T11 (Eircode H54 XC65).

The on-site substation is located within the south-west of the Site and is 430 m from the nearest residential neighbour.

The lands adjacent to the proposed loop in connection to the Cashla-Dalton overhead line host historical records for a ringfort (GA028-046----), children's burial ground (GA028-046001-) and hut site (GA028-046002-). Otherwise, there are no known archaeological records within the Site or TDR accommodation works. The nearest known archaeological feature to the turbine array is a ringfort (GA028-040----) located ca. 90m south of T3.

Tailte Éireann land cover mapping identifies the following land cover types within the Site: bare peat and cutover bog, wet grassland, improved (agricultural) grassland, broadleaf forest, artificial surfaces (tracks), rivers and streams, scrub, transitional forest, raised bog, hedgerows and treelines. Agricultural grassland and wet grassland dominate the Site.

The Site sits within the BLACK (SHRULE)_010 waterbody subbasin, hosting the Black and Togher Rivers. EPA hydrometric station number 30030 located in Shrule does not provide flow data for the catchment, as such the EPA River Flow Estimating Hydrotool was used to determine catchment characteristics as follows: 95%ile (low) flow is 0.352m3/s, 50%ile (mean) flow is 2.559m3/s and 5%ile (high) flow is 11.945 m3/s. Beyond Shrule, the Black River forms part of the Lough Corrib SAC (site code 000297) and SPA (site code: 004042), which is also a Ramsar site. Further details on protected areas in the locality is presented in Chapter 9.

The Togher and Black Rivers are part of the Corrib Headford Arterial Drainage Scheme, which is maintained by the Office of Public Works. Historically, these benefiting lands have flooded, although the Galway County Development Plan Strategic Flood Risk assessment (2022 – 2028) does not assign a flood zone class to the area. Further information on flood risk at the Site is presented in Chapter 12, which includes the output of a Flood Risk Assessment and flood model for the Proposed Development. The Proposed Development will require a number of drain and watercourse crossings as discussed further Chapter 12.

Ground investigation (GI) at the Site confirms that the underlying geology comprises is Dinantian Pure Bedded Limestones (Ardnasillagh Formation) with varying depths of overburden comprising topsoil / peat (with depths varying between 1.3m to 5.5m below ground level (BGL), typically underlain by sandy/gravelly clay and granular gravel deposits. The depth to rock varies within the Site, with GI indicating rockhead at between 5.20m BGL to 17.00m BGL.

Surface karst features (collapse dolines) are present throughout the Site. These features are believed to form along unmapped fault lines that create zones of weakened and fractured rock beneath the overlying Quaternary deposits (predominantly Glacial Till). Further information on karst at the Site is presented in Appendix 11.2 – Karst Assessment Report.

2.3.3 Land Ownership

The Proposed Development is located on lands under third-party private ownership. These landowners have consented to the application for the Proposed Development. Declarations of Identity accompany the planning application.

Of note is one property (Eircode H54 KH73) that is under the control of the Developer and will be taken out of use as a residential property and will not be occupied for the operational period of the development should the Proposed Development be granted planning permission.

2.3.4 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 locations. The Sustainable Energy Authority of Ireland (SEAI) Wind Speed Atlas[2] 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 of 8.5 m/s at 150 m above ground level.

Meteorological monitoring carried out within the proposed development lands between February 2021 and September 2024 (using a lidar system located at ITM coordinates 531978.72,753818.92) recorded mean horizontal wind speeds at 183m height of 8.944 m/s and 8.689 m/s at 158m height. This correlates well with the SEAI historic data.

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

2.3.5 Other Developments Assessed for Cumulative Impacts

Other Wind Energy Developments

Other existing or proposed wind energy developments located within 20 km of the proposed Shancloon Wind Farm [3] are illustrated on Figure 2.5 and are considered in the impact assessment.

Operational/Permitted Wind Energy Developments

The Cloonlusk wind energy development comprises 2 No. 2 megawatt wind turbines on 75m towers (V52-850 models) and is located 15.16 km south-east of the Proposed Development. These turbines were constructed in 2017 under planning consent from Galway County Council (ref 082407 and 14518).

Proposed Wind Energy Developments

The proposed Laurclavagh Renewable Energy development, located approximately 8km southwest of Tuam (and 10.5km south of the Proposed Development), is currently lodged as a strategic infrastructure development application to An Bord Pleanála (ref: PA07.319307). The proposed development will comprise 8 no. wind turbines with an overall turbine tip height of 185 metres; a rotor blade diameter of 163 metres; and hub height of 103.5 metres.

The proposed Clonberne Wind Farm is an 11-turbine wind farm located approximately 10.5 km east of Tuam (and 18 km east of the Proposed Development). The development is currently lodged as a strategic infrastructure development application to An Bord Pleanála (ref: PA07.320089). The proposed turbines will have a an overall turbine tip height of 180 metres; a rotor blade diameter of 162 metres; and hub height of 99 metres.

A single turbine development by Sharedturbine Ltd. in the townland of Cloonascragh, Tuam, Co. Galway was granted planning permission in 2023 (Ref Galway County Council 221175). The development is for a turbine with a hub height of 97m, and blade rotor diameter of 136m, and is located c. 12.2km from Shancloon Wind Farm.

Other Large Scale and/or Local Developments

Having regard to European Commission Guidelines (2019) on the 'Assessment of Indirect and Cumulative Impacts as well as Impact Interactions' within the Environmental Impact Assessment (EIA) process planning searches were undertaken using the following online planning enquiry portals to search for large-scale developments within 20km of the Proposed Development and smaller scale developments e.g. individual residential dwelling, within 500m of the Proposed Development:

- Galway County Council (GCC);
- Mayo County Council (MCC); and
- An Bord Pleanála (ABP).

[3] A 20 km zone is used in assessing other wind energy developments in the locality based on the Wind Energy Development Guidelines (2006) which states that '*For blade tips in excess of 100m, a Zone of Theoretical Visibility radius of 20km would be adequate*'

Appendix 2.4, Volume III provides the list of applications considered in the cumulative assessment, with Table 2-1 identifying the consented large-scale developments which are notable in terms of potential for cumulative effects. Other developments listed in Appendix 2.4 were determined as having no potential for cumulative effects due to the scale of impact identified in supporting planning documents for the developments, their distance from the Proposed Development and the stage of development of the developments.

Table 2-1: Other Developments Considered Cumulatively

Planning Authority	Application Number	Development Description	Cumulative Consideration
Galway County Council	221030	to refurbish the existing Castlebar-Cloon 110kV overhead line.	No potential for cumulative effects. These works will be completed in advance of the Proposed Development.
Galway County Council	23355	To upgrade the existing 220kV Substation in the townland of Barrettspark, Co. Galway, & Tower 138 in the townland of Oughtagh, Co. Galway	No potential for cumulative effects. These works will be completed in advance of the Proposed Development.
Galway County Council	212138	for the construction of a two storey commercial office building for use by Western Hygiene Supplies Ltd.	No potential for cumulative effects due to scale and location.
Galway County Council	2435	for Instream habitat restoration works in the Omaum River	No potential for cumulative effects due to catchment locations relative to the Proposed Development.
Galway County Council	2460226	for instream habitat restoration works in the Nanny River: including the addition of spawning gravel, random boulders and the excavation of pools.	No potential for cumulative effects due to catchment locations relative to the Proposed Development.
Mayo County Council	21707	installation of fencing, solar pumps and drinking troughs. a natura impact statement has been prepared in respect of this proposed development	No potential for cumulative effects due to scale and location.
Galway County Council	221204	for development consisting of the importation of inert soil & stone material for the site restoration of a former gravel pit	No potential for cumulative effects due to scale and location.

Planning Authority	Application Number	Development Description	Cumulative Consideration
Galway County Council	2360887	i) to construct a new standalone warehouse on a brownfield site at the rear of existing commercial buildings; ii) to upgrade existing internal roadways, & to connect to the existing service internal roadways, which in turn connect to the public road; iii) to connect to the public drainage & potable water services, & for all associated infrastructure & connections; iv) for the construction of a new ESB substation on the site; & v) for all boundary & site treatments, including the provision of surface car parking & dock levellers to serve the building	No potential for cumulative effects due to scale and location.
Mayo County Council	22769	construction of a housing development of 60 no. apartments in 2 no. five storey buildings; pedestrian and vehicular access to Kilcolman road	No potential for cumulative effects due to scale and location.
Galway County Council	19302	and complete the extension to the factory known as building 1 at Valeo Vision Systems. Full planning permission also sought to retain and complete the Sub Station, which is under construction adjacent to building 1 at Valeo Vision systems.	No potential for cumulative effects due to scale and location.
Galway County Council	202032	for the construction of a community leisure/gymnasium facility with associated services. Gross floor space of proposed works: 448 sqm	No potential for cumulative effects due to scale and location.

Planning Authority	Application Number	Development Description	Cumulative Consideration
Galway County Council	2260819	quarrying operations including the extraction of minerals (sand and gravel) over an area of 6.5ha to a final depth of 34m aod, mineral processing activities, the loading of materials, the transportation of materials from the quarry and all related ancillary works related to the same;	Potential for cumulative effects. Consent granted 2023. Potential that haulage from Mortimer's Quarry to the Proposed Development could act cumulatively with this consented quarry given that the same road network local to Tuam will be used.
Galway County Council	19920	for development at Sean Purcell Road, Tuam. The development will consist of: the construction of a new 50 bed Residential Care Centre (Gross floor Area 3,843 m2) on a site of 1.27Ha.	No potential for cumulative effects due to scale and location.
Galway County Council	20419	for the construction of a Concrete Batching Plant on and adjacent to a Quarry site previously approved under Planning Reference 06/2275 and An Bord Pleanala Reference PL.07.222783.	No potential for cumulative effects. The batching plant was consented in 2020 and is within Mortimer's Quarry. A NIS accompanied the application which included mitigation to ensure no adverse effects on Lough Corrib.
Galway County Council	201691	for the construction of a new dwelling house, domestic garage and on-site treatment system, along with all associated site works. An NIS (Natura Impact Statement) is being included in this application.	No potential for cumulative effects due to scale and location.
Galway County Council	2460190	for the development consisting of the following: demolition of existing dwelling and shed; construction of 5no. terraced dwellings; associated bin and bike store	No potential for cumulative effects due to scale and location.

Planning Authority	Application Number	Development Description	Cumulative Consideration
Galway County Council	201601	to construct 22 No. two storey dwelling houses and completion of 6 No. shell and core dwelling units, also completion of services including roads, Landscaping, Foul and Surface water sewers, and watermain to areas fronting the proposed development.	No potential for cumulative effects due to scale and location.
Galway County Council	202039	for a Sports facility for use ancillary to the School, comprising; - Full size GAA synthetic playing pitch - Associated pitch fencing - Floodlighting - Sports building comprising changing rooms, gym and multi-purpose room, together with all ancillary accommodation - Car park	No potential for cumulative effects due to scale and location.
Galway County Council	211623	for development that will consist of the construction, operation and decommissioning of a solar photo-voltaic panel array to export electricity to the national grid. The solar panel array will consist of up to approximately 40,000 square metres of solar photovoltaic panels supported by ground mounted frames	No potential for cumulative effects due to scale and location.

2.4 Site Infrastructure

2.4.1 Wind Farm

The proposed wind farm will consist of 11 no. wind turbine generators (WTG's), a 110 m meteorological mast, and 1 no. 110kV substation compound along with ancillary civil, drainage and electrical infrastructure (including loop-in connection).

2.4.1.1 Wind Turbine Description

The final choice of make and model of the turbine that will be developed at the Site will be dictated by a competitive tender process of the various turbines on the market at the time, but will be in accordance with the following design parameters/turbine specification:

- ground to blade tip height range of 179.25 m to 180 m
- rotor diameter ranging from 149.1 m to 155m
- hub height ranging from 102.5m to 105m

The turbine model will be a conventional three-blade horizontal axis turbine. Schematic drawings of the design parameters 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.

2.4.1.1.1 Turbine Layout

The proposed wind farm layout reflects the outcome of iterative engineering and environmental constraints assessments carried out during the wind farm design process aimed at eliminating or minimising adverse effects on the environment and considered *inter alia* risks to sensitive habitats, presence of known or potential archaeological features, risk to sensitive species, assessment of ground conditions and optimisation of cut-fill balance as part of design and existing drainage patterns and water catchment characteristics. 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.

The design rationale and evolution of the wind farm layout is described in Chapter 3 - Site Selection and Alternatives.

Turbine location co-ordinates in Irish Transverse Mercator (ITM) are detailed in Table 2-1:

Table 2-2: Turbine Coordinates

Turbine No.	ITM Easting	ITM Northing
T1	532132.67	754078.86
T2	531396.16	754500.54
T3	531596.37	753976.43
T4	531885.92	753394.59
T5	533285.84	754179.26
T6	533952.48	754649.09
T7	534433.24	754559.89
T8	533732.73	755199.29
T9	533408.47	755568.20
T10	533136.03	755860.91
T11	534946.66	755115.37

The turbines will have a multiple painted coating to protect against corrosion. All surfaces will have a matt non-reflective finish. This minimises visual impact, as recommended by the following guidelines on wind energy development:

- "Wind Energy Development – Planning Guidelines" (2006), Department of the Environment, Heritage and Local Government;
- "The Influence of Colour on the Aesthetics of Wind Turbine Generators," ETSU W/14/00533/00/00
- PAN 45, The Scottish Office Environment Department;
- PPG22, Department of the Environment - Welsh Office;
- Technical Advice Note 8, Welsh Assembly, 2005.

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 and IAA will be notified of the intention to commence crane operations with at least 30 days prior notification of their erection, noting IAA as part of scoping consultation made the following statement:

In the event of planning consent being granted, the applicant should be conditioned to contact the Irish Aviation Authority to: (1) agree an aeronautical obstacle warning light scheme for the wind turbine development, (2) provide as-constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location and (3) notify the Authority of intention to commence crane operations with at least 30 days prior notification of their erection.

2.4.1.1.2 Turbine Tower and Foundation

Extensive site investigation has been carried out at the Site, the purpose of which was to determine the ground conditions across the Site. This information has been used to identify the most likely foundation solution for the structures on the site including roads, hardstandings, turbine foundations and buildings. Further details on the site investigation carried out to inform the Proposed Development are presented in Chapter 11.

Given the depth of peat across the Site, the high static water level and the poor strength quality of most of the shallow subsoils and the presence of dolines, piled turbine foundations will be used across the Site. Gravity foundations will be used where confirmatory investigations show that suitable founding strata are located at shallow depths above the water table (or where ground water can be comfortably controlled by conventional pumping). The excavation footprint to allow construction, whether the foundation is piled or gravity, will be the same. As such there will be no material difference in the volumes of spoil management need associated with either turbine foundation option.

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 Site is entirely underlain by mid-Carboniferous Limestone, predominantly of the Ardnasillagh Formation and results from combined desktop study, site reconnaissance and ground investigations suggest that karst is confined to the Quaternary deposits overlying the limestone. A geotechnical engineer or engineering geologist with experience in identifying surface karst features will be appointed to oversee the construction.

Surface depressions or suspected doline features have been identified within the Site and site infrastructure has been located to avoid such features in so far as possible. However there remains the need to remove some of these features to allow construction (see Figure 11.7, Volume IV for doline locations). These features will be removed by excavation of the existing soils and replaced with engineered fill. The associated volumes of spoil removal have been accounted for in the assessment under Chapter 11 – Soils, Geology and Hydrogeology and are shown in Table 2-5 of this Chapter.

Gravity Foundation

Gravity foundation will comprise a reinforced concrete base designed to distribute the loads to the ground directly. Foundation bases will consist of circular concrete base which will be 20m – 25m m in diameter and 5 m in depth with a central circular raised plinth which will be used to anchor the turbine tower at its base. Gravity foundation will be constructed as follows

- The extent of the excavation will be marked out.
- Around the perimeter of the foundation formation a shallow interceptor drain will be formed and settlement pond / swale constructed.
- The base of the foundations will be excavated to competent bearing strata. This will typically be within the upper 5 m but will be confirmed on-site by the Site Engineer.
- Excavated soil will be managed in accordance with the Soil Management Plan Appendix 11.4.
- Where necessary, temporary pumps and sumps may be required to maintain a dry, clean formation. Pumped water will be directed to the settlement ponds prior to entering the drainage system.
- A layer of concrete blinding (lean mix) will be laid 75 mm thick directly on top of the newly exposed formation to provide a level platform.
- Formwork and reinforcement will be fixed.
- Ductwork will be installed as required for cables, and formwork erected around the steel cage.
- Concrete will be placed using a concrete pump in accordance with the requirements of the Structural Engineer and compacted using vibrating pokers.
- Concrete (nominally 800 m3 per foundation) would typically be in two pours, the first pour being the main base, which is approximately 90% of the foundation; the second and remaining 10% forming the plinth section which sits on the top of the main base.
- Upon completion of the concreting works the foundation base will be covered against precipitation.
- Steel shutters will be used to pour the upper plinth section.
- Once the concrete is set the earthing system is put in place and the foundation is backfilled with suitable material to tie in with the required level of the hardstanding.
- The foundation will be backfilled with a cohesive material, where possible using the material arising during the excavation.

Piled Foundations

The piled 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 III.

While load bearing resistances may be achievable in the subsoils, the piles will be extended into the bedrock in order to provide certainty on stability given the occurrence of dolines[4] in the area. For the piled foundations it will be necessary to embed the piles directly into the bedrock using rock sockets. The pile toe level will depend on the depth to bedrock (see Appendix 11.1 – Geotechnical and Peat Stability Report for founding depths). These will be further established by detailed ground investigations prior to the construction of the Proposed Development. The piles to be constructed will be large diameter reinforced concrete piles and will range in the order of 600mm to 1200mm diameter. Between 14 and 16 piles will be used at each piled turbine foundation. Concrete volumes required for piled foundations averages as 733 m^3 per foundation, which has been rounded up to 800 m^3 for the purpose of this impact assessment (assuming 900mm diameter piles and 16no. per turbine foundation and based on indicative founding depths of piles at each turbine as listed in Table 9-1 of the Peat Stability Assessment Report, Volume III).

It is intended also that the crane pads are provided a piled foundation at locations where gravity foundation is determined not to be feasible by the Engineer following detailed design. Similar concrete volumes will be required for either a gravity or piled solution at crane pad locations.

Preparatory work for piling will include the following:

- Site clearance and setting out of the works area followed by soil stripping (which will be managed in accordance with the Soil Management Plan) in order to reach a suitable formation level for the piling platform.
- Around the perimeter of the foundation formation a shallow interceptor drain will be formed and settlement pond / swale constructed.
- Construction of a piling platform (also referred to as pling matt) which is a work platform used for piling rigs providing a stable base from which they can operate, and typically comprise gravels or crushed rock compacted in layers. The piling platform will be designed based on the rig size and specific ground conditions at each turbine location, which will be determined during the detailed design stage. The piling platform will be incorporated into the hardstand as part of construction.

[4] A doline, also known as “Dropout” or “Cover Collapse” is a subsidence features limited to overburden deposits (soils) overlying the bedrock. ”. Based on the Site’s geology it is thought that fractures in the bedrock caused by regional scale faulting have allowed for overburden material to migrate downward thereby causing voiding and subsequent collapse of the overlying superficial deposits.

Rock socket piles will be used to embed the piles into solid rock. This is a best practice technique in karst environments which involves drilling into the rock layer to create a socket which is slightly larger than the pile. This creates a void around the outer edge of the pile which is filled with grout / cement. This 'socket' in the rock provides the pile with stability by providing resistance against lateral loads and uplift forces. The method requires that piles are bored using a continuous auger until such point as rock-head is met. The auger drill head is then changed to penetrate into the intact rock head. This is followed by rotary piles: an auger core which is followed by a temporary outer steel casing / sleeve to maintain support in the bored excavation. As the casing is inserted, an auger / core-barrel is used to excavate and 'muck-out' inside the casing. When the predetermined pile toe level has been achieved, a prefabricated reinforced steel cage is introduced into the bore, and concrete is poured by means of a tremie-pipe (such that concrete is filled from the bottom of the bore upwards). The temporary casing is then removed. Where the appointed geotechnical engineer or engineering geologist for the works deems that, due to the karst environment, there is a risk of concrete wash out into the environment during piling, the bored pile will be cast within a permanent casing or geotextile sock/bag to prevent the loss of concrete or drilling fluids such as bentonite and vinyl-polymer.

Note that for piled foundations the water level within the pile shaft will be maintained at or above the surrounding ground water level to ensure that there is no differential head encouraging piping/boiling[5] of the soil at the base of the excavation.

Once all the piling for base has been completed the piles are checked to ensure that their cut off level is appropriate for the required base of the foundation. If this is not the case some pile head cutting may be required. When all piles are to the required level the area is lean-mixed and the foundation base rebar is tied and concrete is poured for the foundation whereby the foundation comprises a reinforced concrete base designed to distribute the loads across the piles. The foundation base will consist of circular concrete base which will be 20 m - 25 m in diameter and 4 m in depth with a central circular raised plinth which will be used to anchor the turbine tower at its base. Concrete will be placed using a concrete pump in accordance with the requirements of the Structural Engineer and compacted using vibrating pokers. Steel shutters will be used to pour the upper plinth section. Ductwork will be installed for cables. Upon completion of the concreting works the foundation base will be covered against precipitation. Once the concrete is cured the earthing system is put in place and the foundation is backfilled with suitable material to tie in with the required level of the hardstanding. The foundation will be backfilled with a cohesive material, where possible using the material arising during the excavation.

Based on a review of the ground investigation information for the Site, a preliminary assessment of the likely founding depths for each turbine location was carried out. A summary of this assessment is provided in Table 2-3.

[5] Piping/boiling of the soil is a seepage failure due to groundwater flow

Table 2-3: Summary of Indicative Turbine Foundation Type and Founding Depths

Turbine No.	Relevant GI	Indicative founding depth (m bgl)	Comment
T1	PBH-01	14.5 (Bedrock)	The site investigation works carried out indicate that a piled foundation may be required.
T2	PBH-02, BH-6, PTP-01, PTP-02, TP-3	10.5 (Bedrock)	The site investigation works carried out indicate that a piled foundation may be required.
T3	PBH-03A	10.0 (Bedrock)	The site investigation works carried out indicate that a piled foundation may be required.
T4	PBH-04, BH-1, PTP-03, PTP-04, TP-1, TP-2	6.0 (Bedrock)	The site investigation works carried out indicate that a piled foundation may be required.
T5	PBH-05	9.0 (Bedrock)	The site investigation works carried out indicate that a piled foundation may be required.
T6	PBH-06, PTP-06	13.0 (Bedrock)	The site investigation works carried out indicate that a piled foundation may be required.
T7	PBH-07	8.0 (Bedrock)	The site investigation works carried out indicate that a piled foundation may be required.
T8	PBH-08, PBH-09, PBH-10, PBH-11, PBH-12, PBH-13, BH-2, BH-3 PTP-07,	17.0 (Bedrock)	The site investigation works carried out indicate that a piled foundation may be required.
T9	PBH-13, PTP-08, PTP-09,	17.0 (Bedrock)	The site investigation works carried out indicate that a piled foundation may be required.
T10	PBH-15, PTP-10	13.0 (Bedrock)	The site investigation works carried out indicate that a piled foundation may be required.
T11	PBH-16	16.2 (Bedrock)	The site investigation works carried out indicate that a piled foundation may be required.

It should be noted that confirmatory ground investigation will be carried out prior to construction at each turbine location in the form of a borehole with in-situ SPT testing at 1m intervals in the overburden and follow-on rotary core through bedrock to confirm the foundation types and founding stratums assumed in Table 2-3. It is likely that following the completion of further ground investigation prior to construction that a number of the turbine bases will be deemed suitable for gravity type foundations.

For the piled turbine foundations, a typical piling type and configuration could be up to 16 no. 1200-1600mm diameter rotary bored piles. See Planning Drawings P20-306-0300-0021 and P20-306-0300-0022 for details. Gravity type foundation detail is shown in Planning Drawing P20-306-0300-0018.

The turbine tower will be connected to the foundation plinth. The turbine will comprise a full tubular steel tower or a hybrid concrete/ steel tower. The hybrid towers consist of a concrete bottom part with a transition piece towards a tubular steel top. The concrete part is made of precast high strength concrete rings, and the tubular steel top is made of flange joined steel sections. Full steel tower comprises fully of flange joined steel sections.

The tower will be delivered to the Site in four sections. As a worst case the following turbine component parameters have been considered:

Component	Aprox. Length (m)	Aprox. Weight (t)
Base	16.474	85.636
Mid 1	22.68	79.866
Mid 2	27.16	68.693
Top	33.6	67.885

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

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

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 first floor of the tower is 3 m above ground level it is accessed by a galvanised steel staircase and a steel hatch door which will be kept locked except during maintenance. 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.

2.4.1.1.3 Turbine Blades and Hub/Nacelle

The turbine blades comprise fibreglass reinforced epoxy, carbon fibres and solid metal tip. The final choice of make and model of the turbine that will be developed at the Site will be dictated by a competitive tender process of the various turbines on the market at the time, but will be in accordance with the following design parameters/turbine specification:

- Blade length ranging from 72.4m to 76m (rotor length of 74.55m to 77.5m);
- Blade width (maximum chord length) ranging from 4.2m to 4.5m;
- Blade swept area of ranging from 17,460 m^2 to 18,869 m^2.

The turbines will have a cut in wind speed of 3 m/s and cut out speed of between 25 m/s and 27 m/s. Turbine rotor rotation is in a clockwise direction. The turbine begins generating electricity at a wind speed of 3 m/s, with rated power generation at wind speeds of 12 to 14 m/s.

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 with the pitch range being -5° to 95°.

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. Additionally, the turbines will be equipped with a Fire Suppression System. The turbine will also be equipped with an Ice Detection and Anti-Icing System.

2.4.1.1.4 Turbine Transformer and Wind Farm Power Output

The proposed wind turbines will have an assumed rated electrical power output of between 5.6 MW and 6.6 MW. This may vary as a result of the final turbine type, power output modelling and turbine development over the period leading up to construction. For the purposes of this EIAR, a minimum rated output of 5.6 MW and a maximum rated output of 6.6 MW has been used to calculate the power output of the proposed wind farm.

The Proposed Development will have an Export Capacity (MEC) ranging from 61.6 MW to 72.6 MW depending on the power output. This range of generation capacity has been used to calculate the power output of the proposed Wind Farm over its 30-year operational life based on the following calculation:

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

where:

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

B = The capacity factor, which takes into account the intermittent nature of the wind, the availability of wind turbines and array losses etc. A capacity factor of 35 % is applied here[6]*.*

C = Rated capacity of the wind farm: 61.6 –72.6 MW

The proposed wind farm has the potential to produce between approximately 5,666 MWh (megawatt hours) and 6,678 MWh of electricity per year over the lifetime of the Proposed Development.

[6] 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.

The electricity produced by the proposed wind farm would be sufficient to supply between approximately 44,968 – 52,998 Irish households with electricity per year (depending on MEC), based on the average Irish household using 4.2 MWh of electricity (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).

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.

2.4.1.2 Site Access and Internal Road Infrastructure

Site Access

Access to the Shancloon wind farm will be from the L2234 local road and will be used for construction, operation and decommissioning. A new access will be constructed to facilitate the delivery of turbine components and construction materials. All loads including turbine towers, turbine blades and trucks with materials will enter the Site via this new access from the L-2234. This access point will also be used for construction and operation vehicles and will be used by both HGV's and LGV's. The access to the Site will be from the L2234 local road will be constructed to facilitate the delivery of turbine components. All turbine components accessing the Site will use this entrance. The general local road speed limit applies of 60kph and the minimum sight distance for an 60kph road of 120m, in line with Transport Infrastructure Ireland (TII) standards (TII Publication DN-GEO-03060), will be achieved through the construction of a sweeping bell mouth entrance and the clearance of vegetation (TDR PoI 16).

The layout of the Proposed Development includes for a new crossing of the L2220 and L22202 local roads. Construction, operational and decommissioning stage movement of vehicles at this new junction will be managed in accordance with the Traffic Management Plan.

The 110 kV substation will be accessed via a new entrance constructed off the L6100. It is proposed to construct a bell mouth to facilitate vehicles entering the substation site at this point and achieve minimum sight line distances.

The locations of the site entrance and accesses are shown on Figure 2.2a and Figure 2.2c, Volume IV and on Planning Drawings P20-306-0101-0001 and P20-306-0101-0003.

The accesses have been selected with consideration for safety of public road users and construction staff and to ensure that it can be constructed to comply with the requirements of both Galway City and County Council and TII design requirements for direct accesses.

Locations of passing bays along the TDR and haul routes have been identified and are discussed further in Chapter 14.

Wind Farm Internal Access Tracks

The internal access tracks serving the wind farm will incorporate existing roads and tracks (which will be upgraded) and new access roads (which will be constructed). 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. The internal road layout has taken into account the following key factors:

- Buildability having regard to existing ground conditions and land drainage;
- Minimise watercourse crossings;
- Sustainability by avoiding habitats of higher value and making use of existing tracks and roads.
- Optimising cut/fill balance.

The Proposed Development makes use of the existing road network insofar as possible. It is proposed to utilise approximately 530m of existing roads (comprising 380m of the L-22204 and 150m of the L-22202) and to upgrade of c. 960m of existing agricultural tracks as part of the Proposed Development. The remaining internal access roads will be newly constructed of either floating road or excavated road (refer to Figure 2.2a, Figure 2.2b and Figure 2.2c, Volume IV). These existing tracks and roads will be widened as necessary to a total running width of five metres, with wider sections at corners and will include the laying of new surface dressing where necessary.

Access tracks will have a running width of 5 m along straight sections and wider junctions and turning areas as required as shown on accompanying planning application drawings ref. P20-306-0100-0011 to P20-306-0100-0073 in accordance with wind turbine manufacturer requirements for the wind turbines of this size. The proposed new roadways will include passing bays to facilitate traffic passing around the Site. The site access tracks will be battered to safe permanent side slopes of 1V:2H. All site access tracks will comply with the turbine supplier's requirements.

The proposed new internal access tracks will be founded on suitable substrate (refer to Chapter 11 Land, Soils and Geology) and as such will include both floating road and excavated road. Figure 2.2a, Figure 2.2b and Figure 2.2c shows the locations of excavated and floated road. The cross-sectional detail of an excavated track design and a floating track design is provided on Planning Drawing P20-306-0300-0016. All tracks will have an engineered crossfall to shed surface water into adjacent site drainage.

Floating type construction of access tracks is proposed where peat depths are deeper than 1.0m. The floating construction design leaves the peat deposit in place and utilises a construction of layered geo-grid, geo-textiles and aggregate fill, which is placed over the peat deposits. This system forms a 'floating' platform to spread the construction loads over the peat. This layer comprises approximately 800 mm of crushed stone laid on geotextile to form the track. This produces a stone batter with the edges of the site track raised above the surface.

Floating road design will be in accordance with the following:

- Floating Roads on Peat. A report into Good Practice in Design, Construction and Use of Floating Roads on Peat with particular reference to Wind Farm Developments in Scotland (Scottish Natural Heritage, 2010);
- Good Practice During Wind Farm Construction (Scottish Natural Heritage, 2019).

This sequence of construction is as follows:

- Mark out the alignment of the road;
- Install advance drainage ahead of construction;
- Clear the road alignment of major protrusions such as rocks, trees, down to ground level leaving any residual stumps and roots in place, leaving the local surface vegetation and soils in place;
- Fill local hollows or depressions along the route alignment with lightweight fill e.g. a brash mat;
- Place geo-grids along the alignment of the road in accordance with the relevant manufacturer's specification.
- Place aggregate material onto the geo-grid. The final specification of the aggregate grading shall be dictated by the chosen geo-grid mesh size. The degree of compaction required will be dictated by the local ground conditions determined at detailed design.

The floated road within Cloonbar Bog will be supported by a double row of sheet piles in order to ensure suitable ground stability and bearing capacity given that the road will be constructed parallel to the Black (Shrule) River (OPW arterial drainage channel reference CH4/13/7). Road construction at this location will be as follows:

- Install a floating road platform for the press in pile rig / hydraulic vibrating pile rig and road construction machinery;
- The first row of sheet piles will be installed on the stream side to the appropriate predetermined depth (as informed by detailed site investigation carried out post consent) using vibratory piling rigs or press-in piling rigs.
- Floating road shall be constructed behind the sheet pile wall with two layers of geogrids and as per the floated road design and construction sequence set out int eh preceding section;
- The second row of sheet piles will be installed parallel to the first row on the opposite side of the floated road.
- Excavations shall be made at intervals as determined by the design engineers to 0.5m depth below the ground level for the installation of reinforced tie bars which will connect the two rows of sheet piles, thereby restricting the lateral movement of the sheet piles.
- Back fill the excavation with excavated material to the ground level
- Finish laying the floating road.

Excavated road design will consist of a minimum 500mm hardcore on geo-textile membrane. The proposed construction methodology for newly constructed tracks is as follows:

- Mark out the alignment of the road;
- Install advance drainage ahead of construction;
- Excavate to formation level;
- The formation will be prepared to receive the geotextile membrane.
- A well graded aggregate stone will be placed and compacted in layers to minimum 500mm depth.
- A layer of compacted Cl 804 material will be placed on top to provide a suitable running surface.
- Surplus excavated material will be placed along the side of sections of the tracks in suitable locations as identified in the Soil Management Plan (Appendix 11.4).

The stone required for the construction of the internal access roads 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 14.3, Volume IV.

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

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

A drainage system will be installed adjacent to the internal access tracks. 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 (Appendix 12.2). SuDS design approach will ensure that existing drainage patterns will be maintained. Drainage ditches will be formed within the excavated width and along the sides of the internal access tracks. Drainage infrastructure will be constructed in parallel with the access track construction.

The internal access track crosses an existing High Pressure Gas Transmission Main at the point at which the track parallels the L-22204 local road (see 100-Series planning application drawings). This is the Gas Networks Ireland (GNI) Mayo - Galway natural gas distribution main which is connected to the nearby Beaghmore Transmission Above Ground Installation (AGI). Consultation with GNI has confirmed that the gas main comprises a heavy walled pipe at this location (up to ITM X: 532528.770 ITM: Y 753639.059 Meters) and as such GNI has confirmed that no additional protection measures e.g. slabbing, are required for this crossing. GNI has confirmed the turbine array is sufficiently set back from their infrastructure noting that they require a distance of 2 times hub height of wind turbine set back.

2.4.1.2.1 Hardstand and Laydown Area

Each wind turbine will have an associated turbine hardstand area and temporary 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 (see Planning Drawings P20-306-0300-0001 to P20-306-0300-0011).

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

A turbine hardstanding area consists of a main crane pad hardstanding with a number of additional smaller hardstandings that act as set down and assembly areas, located as shown on the accompanying planning drawings P20-306-0300-0001 to P20-306-0300-0011. 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.

All crane pads will be designed taking account of the loadings provided by the turbine manufacturer and will consist of a compacted stone structure. The crane hardstands will be constructed in a similar manner to the excavated site roads. Where an excavated crane hardstand cannot be used due to the depth of peat, the hardstand will be supported by using reinforced concrete piles as per the methodology outlined for piled foundations discussed above.

Hard standing formation will consist of a minimum 500mm hardcore on geo-textile membrane. The construction methodology for hard standings will be as follows:

- The formation will be prepared to receive the geotextile membrane.
- Stone (sourced locally from licensed quarries) will be placed and compacted in layers to minimum 500mm depth.
- Drainage ditches will be formed, within the excavated width and along the sides of the hard standing.
- Surplus topsoil will be placed along the side of the hard standing (avoiding any existing land drains) and dressed to blend in with surrounding landscaping.

2.4.1.2.2 Watercourse Crossings Within the Site

Regulation 50 of the European Communities (Assessment and Management of Flood Risks) Regulations 2010 SI 122 of 2010 (as amended) requires that: "No Person, including a body corporate, will construct any new bridge or alter, reconstruct, or restore any existing bridge over any watercourse without the Consent of the Commissioners or otherwise than in accordance with plans previously approved of by the Commissioners."

The word "bridge" as defined in said Regulations includes a culvert or other like structure. The word "watercourse" as defined in said Regulations includes rivers, streams, and other natural watercourses, and also canals, drains, and other artificial watercourses.

The OPW is responsible for the implementation of the regulations and consent to construct any bridge will be sought from the OPW via their application process. Details on the application process and guidance / requirements of the bridge design and considerations in terms of flow can be found in the OPW guide Construction, Replacement, or Alteration of Bridges and Culverts (A Guide to Applying for Consent under Regulation 50 of the EU (Assessment and Management of Flood Risks) Regulations SI 122 of 2010 and Section 50 of The Arterial Drainage Act, 1945).

All watercourse crossings required for the Project will be subject to the requirements of Regulation 50.

One existing bridge crossing of the BLACK (SHRULE)_010 river (EU waterbody section code: IE_WE_30B020200) will be incorporated into the internal Site access. This bridge was constructed as part of the Corrib Headford arterial drainage scheme in the 1960's (structure ref. 9664 B2 on channel C4/13). Fehily Timoney and Company conducted a visual structural inspection of the bridge in January 2024 and determined that the bridge is in good condition overall and suitable for turbine delivery (see Appendix 2.5 – Bridge Inspection report).

The Proposed Development will include new watercourse crossings, as set out in Table 2-4 below. It is proposed to install one single-span bridge and 14 culvert crossings. In addition to Section 50 requirements, the proposed crossings will be designed in line 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'. Locations proposed crossing structures are presented in 0100-Series planning application drawings and details are presented in drawing P20-306-0300-0015 and P20-306-0501-0002.

The plant which will be used in the construction of the watercourse crossings will include:

- Excavators;
- Dump Trucks;
- Mobile Crane;
- Concrete Truck and Pump;
- Hand Compactor;
- Smooth Rollers;
- Pumps.

Table 2-4: River Crossings within the Wind Farm Site

Watercourse Crossing Ref	ITM Coordinates		Width at Base (m)	Width at top of bank (m)	Bank Height (m)	Depth of Water (m)	Type of Crossing
WC01	533089.53,	754307.53	8.83	17.28	3.84	0.74	18.5m slab length clear-span bridge on Togher River
CV01	532044.8643	753994.955	2.8	3.5	4.0	3.2	Upgrade of existing piped culvert on land drain used for turbary access
CV02	532051.1549	753526.061	0.9	1.0	0.2	0	piped culvert on land drain
CV03	533228.5454	754414.8103	1.42	2.8	1.8	0.62	Upgrade existing farm access piped culvert on land drain
CV04	533543.7619	754815.8888	0.8	4.1	1.5	0.44	piped culvert on land drain
CV05	533324.1022	755645.1961	0.46	1.4	1.33	0.52	piped culvert on land drain

Watercourse Crossing Ref	ITM Coordinates		Width at Base (m)	Width at top of bank (m)	Bank Height (m)	Depth of Water (m)	Type of Crossing
CV06	533874.0242	754968.9821	1.14	3.64	1.53	0.48	Upgrade existing farm access piped culvert on land drain
CV07	534245.0059	754535.1195	0.54	2.87	0.8	0.35	piped culvert on land drain
CV08	534419.3487	755076.0733	0.78	3.5	1.82	0.38	piped culvert on land drain
CV09	534699.8902	755083.9407	0.51	0.51	0.1	0	piped culvert on land drain
CV10	534787.3713	755074.1173	1.2	1.2 – 4.5	0.2	0	piped culvert on land drain
CV11	534764.4714	755050.5955	1.27	4.07	1.25	0.42	piped culvert – replace existing 600mm diameter culvert on land drain
CV12	534932.3086	755031.4635	0.6	4.17	1.2	0.34	piped culvert – upgrade of existing drain crossing on land drain
CV13	535338.3095	755225.2358	2.2	4.53	1.97	0.75	piped culvert on land drain
CV14	535417.3152	755371.7636	2.6	4.01	1.82	0.7	dual piped culvert on BLACK (SHRULE)_010 river

*Clear Span Bridge Details and Construction Methodology (*see Planning Drawing P20-306-0300-0015)

The bridge will be installed on-line (i.e. on the existing channel without the need for waterbody diversion) 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 flumed in order to facilitate construction in dry conditions. The flume installation will take place in low flow conditions. Mitigation for the protection of sensitive biological receptors when fluming / overpumping are presented in Chapter 9 – Biodiversity.

Foundations: The bridge will be constructed using three bridge abutments (one on the northern side and two on the southern side of the river). Abutments will be pre-cast concrete sections. 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 a minimum of 2.5m from the banks of the BLACK (SHRULE)_010 River. 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. It is calculated that 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.

Abutments: 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.

Deck: The bridge deck will be set above the 1% AEP flood height (100-year event plus climate change). The modelled peak 1% AEP + CC water level at the upstream face of the proposed bridge is 28.4m OD. Therefore, in compliance with the OPW Section 50 minimum freeboard requirements, the soffit level the bridge will be constructed to a minimum level of 28.7m OD. The bridge will be made up of precast concrete beams with a span of 18.5 m (see Planning Drawing P20-306-0300-0015). 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. When in place, cable ducts will be placed in the voids between each of the beam webs and mesh reinforcement placed above them. Cement Bound Granular Mixtures B (Cl 822) will surround the ducts and be compacted in accordance with Cl813.10 and Table 8/4 of TII Specification of Roadworks. 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 road formation level.

Parapets and Deck Topping: 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 100mm and with a crossfall from the centre of the deck to the parapet to allow water to drain.

Construction of the water crossing will be scheduled to align with fisheries seasonal restrictions.

The access road on the approach to the watercourse will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of the watercourse crossing.

All drainage measures, including check-dams and /or silt traps, along the proposed road will be installed in advance of the works along with the first layer of road construction.

All earthworks adjacent to the crossing locations will be carried out so as to prevent soil entering the watercourse and will be in accordance with the Spoil Management Plan and mitigation measures set out in Chapter 12 – Hydrology and Water Quality.

Safe pedestrian access over the stream for this installation will be via a steel walkway & handrail which will span the stream.

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

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 road alignment and the existing watercourse channel. The project engineer will determine the required gradient of the culvert. Standard details for piped culverts are provided in Planning Drawing P20-306-0501-0002.

The access road 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 overpumping 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 / overpumping are presented in Chapter 9 – Biodiversity.

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 an 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 unless otherwise specified in Chapter 9 – Biodiversity.

The culverts will be such that it will not prevent fish, eel or lamprey passage.

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 road by cross drains. Further details on the locations of such cross drains are provided in the Surface Water Management Plan and in the Drainage Drawings presented in 0100-Series planning application drawings. The cross drains will be an appropriately sized pipe buried in the sub-base of the road at the necessary invert level to ensure ponding or pooling doesn't occur above or below the cross drain and water can continue to flow as necessary.

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

- 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).
- 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.

2.4.1.3 Meteorological Mast

1 no. permanent meteorological (met) mast will be erected on Site at the location shown in Figure 2.2a. The permanent met mast will be of the following general configuration:

- 110 m high lattice steel mast with a shallow concrete foundation, which includes a 4m lightning rod which will extend above the mast structure.

The met mast installation works will be carried out by a small crew and are described as follows:

- An access track will be extended towards the mast location as shown on Figure 2.2a and in accordance with detail presented in Planning Drawing P20-306-0300-0012. The access track will be 3.5m in width. Temporary and permanent drainage infrastructure will be extended, and underground cable power supply will be provided along the new access.
- A small aggregate crane pad of 10m x 10m in size will be constructed in front of the proposed mast location.
- General construction methods for the above access track and hard standing will match those described for wind farm access tracks and hard standings.
- The foundation will be excavated followed by shuttering, steel fixing and finally concrete pouring by ready mix truck. Excavation and concrete operations will be carried out in accordance with the CEMP. The foundation will be 10m x 10m x 1.8m in size.
- Following crane setup, the mast sections will be delivered and unloaded by truck.
- In accordance with an agreed lifting plan, mast sections will be lifted by crane into place. Wind speeds will be monitored at all times during lifting operations by the lead climber and crane operator.
- Mast sections will be bolted together by climbers.
- Following erection of main mast sections, lightning protection and other ancillary components will be fixed to the mast.

2.4.1.4 Peat /Spoil Deposition Areas

Civil engineering assessment of the Proposed Development indicates the requirement for 217,541m^3 of stone fill across the Site to provide fill for the internal access roads, hardstands, upfill to foundations and the temporary compounds. Further details are provided in Appendix 11-4: Peat and Spoil Management Plan, Volume III of the EIAR.

Spoil and Overburden Management

The predicted overburden volumes generated during construction (191,201 m^3) have been calculated and are outlined in Table 2.5. All spoil and overburden will be stored within the Site, as shown on Figure 2.2a, Figure 2.2b and Figure 2.2c, Volume IV. Further details are provided in the Peat and Spoil Management Plan.

Prior to the use of the storage area an interceptor drain will be excavated upslope in order to intercept existing overland flow and divert it around the storage area prior to discharge via an overland diffuser on the downslope side. A dirty water cut-off drain will be provided on the downhill side of the storage area to catch potential sediment-laden run-off and transfer it to a settlement pond.

Table 2.5: Summary of Excavated Peat and Spoil Volumes on Site

Infrastructure Element (1)	Typical Dimensions	Peat Volume (m^3) (2)	Spoil (non-peat) Volume (m^3) (2) and (3)	Comment
11 no. Turbines and Hardstands	27m diameter excavation footprint for turbine foundation with hardstand area.	97,731	39,470	Hardstanding area and foundation footprint
Access Roads	Assumed 5m running surface with 6m wide development footprint.	2,443	19,726	
Temporary Construction Compound 1 (East)	1 no. Hardstanding areas (total area 12,400m^2).	0	13,640	
Temporary Construction Compound 2 (West)	1 no. Hardstanding areas (total area 3,600m^2).	0	3960	
Substation	Hardstanding area of (14,725m^2)	0	9,094	
Met Mast	12 x 12m foundation footprint and 40 x 40m hardstanding area (met mast).	0	990	
Doline	Surface karst Feature approx. 4 no. 20m diameter	0	4,147	
	Total =	**100,174m^3**	**91,027m^3**	**Total = 191,201m^3 (peat and spoil volume) (4)**

Note (1) The location of the infrastructure elements on site are shown on 100-Series Planning Drawings.

Note (2) A factor of 15% (bulking factor of 10% and 5% contingency) has been applied to the excavated peat volumes and a factor of 10% (5% bulking factor and 5% contingency) has been added to spoil volumes to allow for expected increase in volume upon excavation and to allow for a variation in ground conditions across the site.

Note (4) It should be noted that the excavated rock volume is not included in the total volume quoted above in Table 2.5. It is assumed that the excavated rock volume will be re-used on site as part of the construction works for the development and hence will not require reinstatement on site.

A summary of the potential peat and spoil placement/reinstatement areas at the Shancloon wind farm site are given in Table 2.6. Note in order to limit the requirement to cross the local road network for the purposes of peat and spoil movement, the Site has been delineated into a western and eastern parcel for spoil management.

Table 2.6: Summary of Peat and Spoil Placement/Reinstatement Areas on Site

Location [1]	Peat and Spoil Volume (m^3)	Comment
Peat placement alongside designated access roads	0	No Peat shall be placed along access roads.
Designated Peat storage area West (A)	11,625	See Drawing P20-306-0100-0011 to P20-306-0100-0073 for further details
Designated Peat storage area West (B)	27,875	
Designated Peat storage area West (C)	37,625	
Designated Peat storage area West (D)	16,750	
Designated Peat storage area West (E)	7,400	
Designated Peat storage area West (F)	6,875	
Designated Peat storage area East	50,000	
Designated Peat storage area near T11	3,150	
Landscaping [2]	22,000	It is estimated that approximately 2,000m^3 of peat will be required for landscaping purposes at each of the 11 no. turbine locations.
Total =	**192,550m^3**	

2.4.1.5 Biodiversity Management / Enhancement

RWE has pledged that it will strive to leave a living legacy behind, not just in the development of clean renewable energy, but also by increasing biodiversity and habitats under its control while helping reduce the country's carbon emissions. RWE will work with local landowners and ecologists to develop areas within the wind farm that can be rewilded or otherwise enhanced and improved for the benefit of wildlife, delivering positive biodiversity elements in its wind farm development. To that end a Biodiversity Enhancement and Management Plan (BEMP) has been prepared which prescribes land management practices to be employed as part of the Proposed Development (see Appendix 9.1, Volume III and accompanying Figures in Volume IV) as summarised in Table 2-7.

Table 2-7: Summary of BEMP Measures

BEMP ID	Enhancement Measure	Objective	Area
WP1, WP2 WP3 and WP4	Native woodland tree planting	To offset for the loss of mixed woodland at TDR accommodation works location POI16 and to provide new areas of planting to enhance native and local biodiversity and to improve structure and landscape connectivity for fauna.	49653.72 m2
SW1, SW2 and SW3	Dry Stone Wall	To increase diversity of habitat in the development area: dry stone walls provide a specific natural ecosystem for many species including reptiles, bees, invertebrates, birds and mammals, along with specialist vegetation including algae, fungi, mosses and lichens.	310m
HT1, HT2 and HT3 AND TP1, TP2, TP3, TP4 and TP5 AND RV1 to RV4	Treeline and hedgerow planting	The objective of hedgerow and treeline planting is to provide more natural planting to compensate for the intensity of hedgerow management in the wider environment (and indeed within Site), as associated with agricultural practices. The locations of the planting have been specifically identified to provide landscape connectivity for mammals and birds. Planting is also proposed to offset against the loss of hedgerow as required to be removed as bat buffers from the wind turbines.	2,454m
MF1 and MF2	Management of wet grassland for Marsh Fritillary	This existing wet grassland is heavily grazed. This area will be managed and enhanced by the exclusion of livestock, to transform this area into a more species-diverse wetland habitat.	41,760.50 m2

BEMP ID	Enhancement Measure	Objective	Area
PR1 (restoration area) and DB1, DB2 and DB3 (associated drain blocking locations)	Rehabilitation of cutaway peatland	The drains adjacent to the facebank of the cutover bog near T11 and parallel drains within the raised bog, east of T11, will be blocked. Peat from within the footprint of the Proposed Development will be mounded against the facebank, the objective of which will be to re-establish water levels at the bog surface of the adjacent intact raised bog, and to increase the extent of favourable conditions within the raised bog habitat. The site-specific drainage that is proposed for the wind farm infrastructure is entirely separate from the drain blocking and rewetting that is proposed as part of this habitat enhancement.	5201.16 m2

The measures set out in the BEMP include those designed to protect and enhance existing habitats. Higher value habitats will be actively managed to maintain and improve their value and lower value habitats will see specific interventions designed to improve their attractiveness for a range of species.

The BEMP measures will be employed for the lifetime of the windfarm.

2.4.1.6 Felled Forestry

Felling of 0.40 ha of coniferous forestry is required at the turn off onto the L-6483 from the R332 road to accommodate turbine delivery. An additional 0.14 ha of coniferous forestry will be clear-felled to accommodate the construction of the on-site electrical caballing between the wind farm and 110 kV substation. Areas requiring felling are showing on Figure 2.2a, Figure 2.2b and Figure 2.2c.

Replacement replanting of forestry in Ireland is subject to license in compliance with the Forestry Act 2014 as amended. The consent for such replanting is covered by the Forestry Regulations 2017 (S.I. No. 191 of 2017). The total amount of felling proposed for the project therefore is 0.54 ha hectares. It should be noted that the 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 scope of the licence can only be determined at the time of licence application, as such the location of the replant lands are not determined at this time. Detailed consideration of the approach to afforestation requirements associated with the project will be as per the 'Environmental Requirements for Afforestation' (DAFM, 2024).

The Forest Service of the Department of Agriculture, Food & the Marine is Ireland's national forest authority and is responsible for all forest licensing. In light of the foregoing and for the purposes of this project, the developer commits that the location of any replanting (alternative afforestation) associated with the project will be greater than 10km from the wind farm site and also outside any potential hydrological pathways of connectivity i.e. outside the catchment within which the proposed 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 this replanting In addition, the developer commits to not commencing the project until both felling and afforestation licences are in place and this ensures the afforested lands are identified, assessed and licensed appropriately by the relevant consenting authority.

The forestry within the Site was originally planted as a commercial crop and will be felled and replanted in the coming years should the Proposed Development not proceed.

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.

2.4.2 Electrical Infrastructure / Grid Connection

2.4.2.1 On-Site Electrical Cabling

Electricity generated from wind turbines will be collected at medium voltage (33kV) by internal circuits of buried cables and joint bays. These circuits will be routed to the proposed 110 kV on-site substation. The internal collector circuit cable routes are shown on the planning application drawings and will follow the alignment of the internal access tracks. A short section, c. 150m, of the cable alignment is along the L-6225-13. Additionally, the route will cross the L-2220-21. Otherwise, the remaining sections of the are off road within agricultural land or forestry.

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 and there will be three individual circuits servicing the Site. 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, drain, or underground service.

For cables in trefoil formation the depth of the cable trench will be 1250 mm and the width of one internal cable trench with a trefoil formation will be 450 mm, two circuits will be 1000 mm and three circuits will be 1550 mm (see Planning Drawings 051021-DR-301 to 051021-DR-303).

Flat formation will require a wider trench width (approximately 1200 mm for a single circuit) than a trefoil formation, however the trench depth is shallower (at 860 mm minimum). The diameter of the ducting will be selected to suit the range of cross-sectional areas of electrical cables and will fall between 110 mm and 200 mm diameter. For crossings of drains and culverts see Planning Drawing 051021-DR-311 and 051021-DR-312. Particular to existing services, flat formation will be required as follows:

1. Crossing of Gas Transmission Mains: The cable route parallelling the L-22204 local road will require an overcrossing of the Gas Networks Ireland Mayo - Galway natural high pressure gas distribution main which is connected to the nearby Beaghmore Transmission Above Ground Installation (AGI). At this location the crossing will comprise two cable circuits and will require a flattened crossing with a trench width of 2390 mm (see Planning Drawing 051021-DR-113). GNI has instructed that the cables need to have at least 600mm separation from the red indicator tape for all transmission pipelines (whether high pressure or low pressure) and that open cut trenching is preferred with all works supervised.
2. Crossing of Uisce Éireann services: The cable route crossing of the L-2220-21 local road will cross an existing 250 mm diameter uPVC potable water trunk main (which is under gravity flow). At this location the crossing will comprise two cable circuits and will require a flattened crossing with a trench width of 2390 mm. In this regard, the Applicant has applied to the Uisce Éireann Diversions Team for a Confirmation of Feasibility to building over or near Uisce Éireann assets (ref. DIV24312).

As part of the scoping and consultation process for the Proposed Development, searches of existing utility services were carried out to identify whether there were any other where major assets exist such as high voltage electricity cables or utility and telecommunications services. There are no known services within any other areas of the Site. However, in advance of the construction phase cable detection tools, ground penetrating radar and slit trenches will be used, as appropriate, to verify existing services and their exact location. It is expected that partial road closures and stop/go system will be put in place to facilitate this work. This will enable the works to be completed as quickly and as safely as possible, with minimal disruption time for residents of the area. This is described in more detail in Chapter 14 - Traffic and Transportation.

Further details on cable trench construction methodologies can be found in the CEMP and are outlined below.

2.4.2.1.1 Trenching Methodology

The following section outlines the methodology to be followed during trenching works.

- All existing underground services along the grid route will be confirmed prior to the commencement of construction works;
- At watercourse and drain crossings, the contractor will be required to adhere to environmental control measures as described in the Construction Environmental Management Plan (CEMP);
- Where the cable route intersects with culverts, the culvert will remain in place (where possible) and the ducting will be installed either above or below the culvert to provide minimum separation distances in accordance with EirGrid and Irish Water specifications;
- In the event that culverts require removal for ducting installation, a suitable method of damming the water source and pumping the water around the work area will be set out in a method statement and agreed with the relevant stakeholders. Once the ducts are installed the culvert will be reinstated to match existing levels and dimensions. If works of this nature are required, the contractor will liaise with Inland Fisheries Ireland in advance of works;
- Excavated material will be temporarily stockpiled onsite for re-use during reinstatement. Stockpiles will be restricted to less than 2m in height. Stockpiles will be located a minimum of 50m from surface water features and all stockpiling locations will be subject to approval by the Site Manager and Project Ecological Clerk of Works (ECoW);

- Excavated material will be employed to backfill the trench where appropriate and any surplus material will be transported off site and disposed of at a fully authorised soil recovery site;
- Any earthen (sod) banks to be excavated will be carefully opened with the surface sods being stored separately and maintained for use during reinstatement;
- The excavated trench will be dewatered if required, from a sump installed within the low section of the opened trench. Where dewatering is required, dirty water will be fully and appropriately attenuated, through silt bags, before being appropriately discharged to vegetation or surface water drainage feature;
- Where required, grass will be reinstated by either seeding or by replacing with grass turves;
- No more than a 50m section of trench will be opened at any one time. The second 50m will only be excavated once the majority of reinstatement has been completed on the first;
- The excavation, installation and reinstatement process will take approximately one day to complete a 100m section;
- Following the installation of ducting, pulling the cable will take approximately one day between each joint bay, with the jointing of cables taking approximately 1 week per joint bay location.

Image 2-1: Example of 110kV Underground Duct Installation

2.4.2.1.2 Ducting Installation Methodology

The trenching and ducting works will follow the step-by-step methodology below.

- Grade, smooth and trim trench floor when the required depth and width have been obtained.
- Place bedding layer of Cement Bound Granular Mixture B (CBGM B) material in accordance with its specification and compact it so that the compacted thickness is as per drawings.
- Lay the bottom row of ducts in trefoil or flat formation as detailed on design drawings. Use spacers as appropriate to establish horizontal duct spacing. Fit a secure cap / bung to the end of each duct run to prevent the ingress of dirt or water.

- Carefully surround and cover ducts with CBGM B in accordance with the design drawings and specifications and thoroughly compact without damaging ducts.
- Place cable protection strips on compacted CBGM B directly over the ducts.
- Lay the top row of ducts onto the freshly compacted CBGM B including the cable protection strips above the bottom row of ducts. Place a secure cap at the end of each duct to prevent the ingress of dirt or water.
- Carefully surround and cover ducts with CBGM B material in accordance with drawings and thoroughly compact without damaging ducts.
- Place red cable protection strip on top of compacted CBGM B over each set of ducts as shown on the drawings.
- Place and thoroughly compact CBGM B material or Clause 804 backfill, or soil backfill as specified and place warning tape at the depth shown on the drawings.
- For concrete and asphalt/bitmac road sections, carry out immediate temporary/permanent reinstatement in accordance with the specification and to the approval of the local authority or landowner, unless otherwise agreed with local authorities.
- For unsurfaced/grass sections, backfill with suitable excavated material to ground level leaving at least 100mm topsoil or match existing level at the top to allow for seeding or in areas of peat replace turves as per the specification of the local authority or landowner.
- Clean and test the ducts in accordance with the specification by pulling through a brush and mandrel. Install 12mm polypropylene draw rope in each duct and seal all ducts using robust duct end seals fitted with rope attachment eyes in preparation for cable installation at a later date. All the works should be witnessed by an EirGrid Clerk of Works (CoW) as required.

2.4.2.2 Surface Cable Markers & Marker Posts

Surface cable markers will be placed along the route where the cable depth is unavoidably shallow due to constraints such as existing services. These cable markers will indicate the precise location of the GCR and will be metallic plates in accordance with ESBN and EirGrid standards.

Marker posts will be used on non-roadway routes to delineate the cable route and joint bay positions. Corrosion proof aluminium triangular danger sign, with a 700mm base, and with centred lightning symbol, on engineering grade fluorescent yellow background will be installed in adequately sized concrete foundations. Marker post will also be placed in the event that the cable burial depth is not standard. Siting of any marker posts will be agreed with EirGrid as part of the detailed design process.

2.4.2.2.1 Horizontal Directional Drilling (HDD)

Horizontal Direction Drilling (HDD) will be employed to pass the 33 kV cable circuits under the riverbed of the Togher River (see Figure 2.2a for HDD location and Planning Drawing 051021-DR-308 for HDD crossing detail). Access to the HDD crossing location will be by temporary access track which will be 3m in width and formed with aggregate (see Figure 2.2a). This track will be removed and the land re-graded with soil to a natural profile and reinstated as appropriate to previous landuse following the works.

HDD is a method of drilling under obstacles such as bridges, railways, water courses, etc. in order to install cable ducts under the obstacle. This method is employed where installing the ducts using standard installation methods is not possible.

A competent specialist HDD contractor will be appointed for the proposed works. The HDD Contractor will conduct the drilling works in a safe and controlled manner with due regard for site constraints including environmental issues. The Contractor will be required to ensure that their proposed works do not adversely affect, existing services / utilities, groundwater / aquifers. The drilling methodology is as follows:

- A launch and reception area is required for directional drilling: 180m2 for the HDD entry side, and circa 550m2 on the HDD exit side. These areas will be fenced on both sides of the river crossing which will be the locations of the entry and exit pits within the adjacent agricultural lands.
- Fuels, lubricants and hydraulic fluids for equipment use on Site will be carefully handled to avoid spillage, properly secured and provided with spill containment kits in case of incident.
- The timing of grid connection cable laying will be carried out during metrologically dry seasons/periods and HDD on the stream crossing will not be carried out during the salmonid spawning season.
- The depth of the bore will be at least 3m below the level of the river bed so as not to conflict with watercourse hydrology;
- Inert, biodegradable drilling fluid will be used;
- There will be no refuelling within 50m of the watercourse.
- The drilling rig and fluid handling units will be located on one side of the river and will be stored on double bunded 0.5mm PVC bunds which will contain any fluid spills and storm water run-off.
- Entry and exit pits (2m width x 3m length x 1m depth) will be excavated using an excavator. The excavated material will be temporarily stored within the works area and used for reinstatement or disposed of to a licensed facility.
- A steel box will be placed in each pit. This box will contain any drilling fluid returns from the borehole.
- The HDD pilot bore will be undertaken using a wireline guidance system. Assembly will be set up by the drilling team and steering engineer. The steering system will provide real time directional information to the surveyor at the driller's console and will be used to navigate the bores.
- A comprehensive monitoring system will be established to closely oversee any procedures involving bentonite, encompassing the careful observation of pumping pressure, the precise formulation of drilling mud (including drilling fluid volume, viscosity and weight), and the accurate measurement of mud returns and pH. A closed-loop drilling fluid mixing and circulation system with recycling capability will be utilised.
- Fluid return lines used in HDD process will be tested for leaks prior to use to check their reliability.
- The pilot bore will be drilled to the pre-determined profile and alignment under the watercourse crossing.
- The steering engineer and drill team will monitor the drilling works to ensure that modelled stresses and pressures are not exceeded.
- The drilled cuttings will be flushed back by drilling fluid to the entry and exist pits and re-cycled for re-use. The nature of the cuttings will be monitored to understand the ground conditions as the drilling progresses.
- Once the first pilot hole has been completed a hole-opener or back reamer will be fitted in the exit side which will then be pulled back to the entry side as part of the pre-reaming/hole opening process to enlarge the hole to the correct size.

- When the pre-reaming/hole opening/hole cleaning has been completed, a reamer of slightly smaller diameter than the final cut will be installed on the drill string to which the ducts will be attached for installation. The steel boxes will be removed, with the drilling fluid disposed of to a licensed facility.
- The ducts will be cleaned and proven, and their installed location surveyed.
- The entry and exit pits will be reinstated to the specification of the landowner.

2.4.2.2.2 Joint Bays

Joint bays (see Planning Drawing 051021-DR-307) will have typical spacings of 700m to- 850m apart and are pre-cast concrete structures installed below finished ground level. Where the double or triple circuit occurs, the joint bay on each circuit will be staggered by 20m-30m apart.

The following steps outline the methodology for joint bay construction and reinstatement:

- The contractor will excavate a pit for joint bay construction, including for a sump in one corner.
- Grade and smooth floor; then lay a 50mm depth of thick sand for pre-cast concrete construction on 200mm thick Clause 804 granular material.
- Place pre-cast concrete sections on sand bedding.
- Where joint bays are located under the road surface the joint bay will be backfilled with compacted layers of Clause 804 and the road surface temporarily reinstated as specified by the local authority.
- For cable installation and jointing, the cable is supplied in pre-ordered lengths on large cable drums. Installing “one section” of cable normally involves pulling three individual conductors into three separate ducts. The cable pulling winch must be set at a predetermined cut off pulling tension as specified by the designer. The cable will be connected to the winch rope, using approved suitably sized and rated cable pulling stocking & swivel and a pulling head, fitted by the cable manufacturer. A sponge may also be secured to the winch rope to disperse lubricant through the duct. Lubrication is also applied to the cable in the joint bay before it enters the duct.
- Once the “two sections” of cable (total of 6 conductors) are pulled into the joint bay, a jointing container is positioned over the joint bay and the cable jointing procedure is carried out in this controlled environment.
- Following the completion of jointing and duct sealing works, place, and thoroughly compact cement-bound sand in the joint bay, in approximately 200mm layers to the level of the cable joint base to provide vertical support. Install additional layers of cement-bound sand and compact each layer until the cement-bound sand is level with the top of the joint. Install an additional 100mm cement-bound sand layer. Install cable protection strip. Backfill with cement-bound sand to a depth of 250mm below surface and carry out permanent reinstatement including placement of warning tape at 400mm depth below finished surface.

2.4.2.3 On-Site Electrical Substation and Loop-in Connection

An onsite 110 kV electricity substation will be constructed within the Site as shown in Figure 2.2a. This will provide a connection point between the wind farm and the proposed loop-in grid connection point to the existing Cashla-Dalton 110 kV overhead line (see Figure 2.2a).

Substation foundation – designed in accordance with Document Reference: XDS-GFS-13-001-R2 Substation Civil and Building Works.

Artesian groundwater was encountered in borehole PBH-20 (the proposed on-site substation location) as part of ground investigation and groundwater monitoring oat the Site. At this location, a slow but continuous flow of water was observed coming out of the top of the installation well (approximately 0.2m above the existing ground level). Ground investigation findings indicate that the underlying bedrock aquifer is confined. Bedrock depths taken from boreholes on Site range from 5.20 to 17.0m bgl with a mean depth of 11.15m bgl. Excavation depths during the construction phase of the substation will not be in excess of 3m bgl. It is therefore considered that there will be a sufficient cover of low permeability Quaternary deposits to prevent groundwater within the underlying confined aquifer from entering open excavations associated with the substation development.

The dimensions of the substation compounds will be 123 m X 62.8 m and will include a substation control building and electrical components necessary to export the electricity generated from the wind farm to the national grid. The substation compound will be surrounded by a ca. 2.5-metre-high steel palisade fence and internal fences will also be provided to segregate different areas within the main substation compound.

Lighting will be required on site, and this will be provided by lighting poles located around the substation and exterior wall mounted lights on the control buildings.

The control building located within the substation compound will measure 25 m by 18 m and 8.38 m in height. The Independent Power Production (IPP) building will include grid operator control rooms, an office space and welfare facilities for staff during the operational phase of the wind farm and will measure 10.7m by 20.1m and 6.9m in height.

Due to the nature of the Proposed Development, there will be a small water requirement for occasional toilet flushing/hand washing with a rainwater harvesting tank adjacent to the control building. A wastewater holding tank will be provided outside the substation compound fence line so that it can be maintained where required without requiring access to the substation compound. The wastewater holding tank will be a sealed storage tank with all wastewater tankered off site as required by an authorised waste collector to a wastewater treatment plant. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007, will be employed to transport wastewater away from the site. The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. Potable water will be delivered to site and stored in a holding tank in the substation control building.

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 gantry's and cable chairs;
- Power transformers;
- Power quality compensation equipment;
- Concrete plinths and bunds;
- External lighting;
- Lightening protection masts;
- Telecommunications masts;
- Security cameras;
- Palisade fencing and gates.

Lightning protection (at 18m height) and telecommunications masts (at 20m height) will represent the tallest structures in the compound.

The proposed substation compound is presented in accompanying planning application drawings.

It is proposed to connect the development via underground 110 kV cable to the existing Cashla-Dalton 110 kV overhead line. Two new loop-in masts will be required to allow for the connection to the existing Cashla-Dalton 110 kV overhead line. The proposed loop-in connection is presented in accompanying planning application drawings.

The overall length of the grid connection between the on-site substation and the existing overhead line is 650 m and will require a crossing of the L-6100 road, otherwise the cable is to be constructed within agricultural lands.

As part of the scoping and consultation process for the Proposed Development, searches of existing utility services were carried out to identify areas where major assets exist such as high voltage electricity cables or gas mains. Private utility and telecommunications companies were also consulted. There are no known services within this road. However, in advance of the construction phase cable detection tools, ground penetrating radar and slit trenches will be used, as appropriate, to verify existing services and their exact location. It is expected that partial road closures and stop/go system will be put in place to facilitate this work. This will enable the works to be completed as quickly and as safely as possible, with minimal disruption time for residents of the area. This is described in more detail in Chapter 14 - Traffic and Transportation.

The 110 kV cable will consist of 3 No. 125mm diameter HDPE power cable ducts, 2 No. 125mm diameter HDPE communications ducts and 1 No. earth continuity conductor duct to be installed in an excavated trench. The trench will be typically 825mm wide by 1,315mm deep.

The ducts will be installed, and the trench reinstated in accordance with landowner, EirGrid and Galway City and County Council specifications. The electrical cabling/fibre cable will be pulled through the installed ducts. Construction methodologies implemented and materials used will ensure that the GCR is installed in accordance with the requirements and specifications of EirGrid.

The loop-in and loop-out masts a will generally be constructed by installing the foundations and lower section of the mast first. The upper sections of the masts will only be constructed when the rest of the grid connection infrastructure is ready to become live. This approach will minimise the amount of time the main 110kV line must be switched off.

2.4.3 Turbine Delivery

Large components associated with the wind farm construction e.g. turbine blades and tower sections, will be transported to site via the identified turbine delivery route (TDR). An abnormal load permit will be sought for this movement.

The proposed turbine delivery route is presented in Figure 2.3. A Delivery Route Selection and Assessment was carried out to identify the optimum delivery route to site and is presented as Appendix 14.1 in Volume III of this EIAR. The only suitable Port of Entry (PoE) for this site is Galway. It is not feasible to approach the site from the north due to a constraints through a number of towns. As such turbine delivery is proposed to be via the following route:

- Loads will exit the Galway docks and head northeast on Lough Atalia Road;
- Loads will take a slight right onto College Road / R339. They will then continue to follow R339;
- Loads will turn left at Connolly Avenue;
- Loads will then turn right onto Tuam Road / R336;
- Loads will turn right at the R386 / N6 junction and will proceed eastbound on the N6;
- Loads will continue on the N6 and the M6 eastbound;

- At Junction 18 loads would turn left onto the M17 northbound;
- Loads would follow the Tuam bypass onto the N17;
- Loads will turn left onto the R332;
- Loads will turn left onto the L6483 and continue west to the L-2234-24 and on to the proposed site entrance.

The objective will be to maintain the strategic capacity and safety of the N17 and N84 carriageways at all times, cognisant of the National Development Plan, 2021 – 2030, with key sectoral priorities for maintaining the national road network to a robust and safe standard for users.

Temporary accommodation works (see Table 2-8) will be required along the TDR to facilitate the delivery of large components to the Site. No permanent road widening or junction accommodation works are required along the turbine delivery route. Some temporary hardcore surfacing will be required at roundabouts and areas of oversail. All temporary accommodation works associated with the TDR will be fully reinstated following the construction stage.

Where overhead utilities and obstructions require removal at to provide adequate overhead clearance this will be done 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. A traffic management plan will be agreed with Galway City and County Council in advance of any such works. Any trenching and road reinstatement works associated with utility diversions will be subject to a road opening license which will be obtained in advance of the works and will be carried out in such a way as to ensure one lane of traffic will be open to traffic at all times. Such works will be carried out over a number of days (estimated 1 day per service). Further details and assessment of these works are provided in Chapter 14- Traffic and Transportation.

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.

Elements of the temporary accommodation works for the delivery of turbines are summarised below. Works within private lands are included within the planning application red line boundary. All other works are within the road.

Table 2-8: Accommodation Works on Delivery Route

POI Ref.	Location	Description of Works	Third Party Lands Required?	Included in this Planning Application
1	Exit from Galway Harbour	Loads will need to travel through the car park where parking should be suspended and the fences removed. All street furniture should be removed. Loads will over-sail the right-hand verge of Lough Atalia Road where one lighting column should be removed.	no	No – this element is assessed in the EAIR but is part of the wider project and will be subject to a separate consent as applicable

POI Ref.	Location	Description of Works	Third Party Lands Required?	Included in this Planning Application
2	Lough Atalia Road Railway Overbridge	Loads will straddle the centre line of the road. The bridge clearance is 5.46m and loads should be set on a lower suspension to provide additional clearances to the structure. Recent studies have been completed by the port authority which confirmed that a blade of similar dimensions is able to exit the port via this route.	no	No – this element is assessed in the EAIR but is part of the wider project and will be subject to a separate consent as applicable
3	Lough Atalia Road / College Road Junction	Loads will merge onto the R339 northbound by undertaking a contraflow manoeuvre. Loads will over-sail both verges through the section. One traffic signal head should be removed from the right-hand verge and one traffic signal head, one road sign, and two bollards should be removed from the left-hand verge.	no	No – this element is assessed in the EAIR but is part of the wider project and will be subject to a separate consent as applicable
4	R339 / R338 Junction	Blade tip will over-sail the left-hand verge on entry where one traffic signal should be removed. Loads will over-sail the exit splitter island where one traffic signal, one crossing signal and pedestrian guardrails should be removed.	no	No – this element is assessed in the EAIR but is part of the wider project and will be subject to a separate consent as applicable
5	R339 / Connolly Avenue Junction	Loads will turn left to join Connolly Avenue northbound. Blade tip will oversail the south eastern verge. Loads will overrun and oversail the footway on the inside of the left bend where a load bearing surface will be laid and one traffic signal and two lighting columns will be removed. Loads will overrun and oversail the eastern footway of the exit road where a load bearing surface should be laid and one traffic signal will be removed.	no	No – this element is assessed in the EAIR but is part of the wider project and will be subject to a separate consent as applicable

POI Ref.	Location	Description of Works	Third Party Lands Required?	Included in this Planning Application
6	Connolly Avenue / R336 Junction	Loads will turn right at the junction to join the R336 eastbound. The blade will oversail the lefthand verge on the entry arm of the junction. Loads will over-run and over-sail the inside verge of the right turn where a load bearing surface should be laid and two lighting columns will be removed.	no	No – this element is assessed in the EAIR but is part of the wider project and will be subject to a separate consent as applicable
7	R336 / N6 Junction	Loads will turn right at the junction to join the N6 eastbound, undertaking a contraflow manoeuvre. The blade will over-sail the left-hand verge on entry where one road sign will be removed and vegetation trimmed. Loads will oversail the inside verge of the right turn where one traffic signal, one lighting column and the pedestrian guardrail will be removed.	no	No – this element is assessed in the EAIR but is part of the wider project and will be subject to a separate consent as applicable
8	N6 / R865 Junction	Loads will continue through the junction to remain on the N6 eastbound. No works required	no	No – this element is assessed in the EAIR but is part of the wider project and will be subject to a separate consent as applicable
9	N6 / R339 Junction	Loads will continue through the junction to remain on the N6 eastbound. Loads will oversail the central reservation on the exit arm where one bollard should be removed.	no	No – this element is assessed in the EAIR but is part of the wider project and will be subject to a separate consent as applicable
10	N6 Coolagh Roundabout	Loads will take the first exit at the roundabout via the slip road to remain on the N6 eastbound. Blade will oversail the outside verge of the bend where four road signs should be removed. Loads will oversail the inside verge where four lighting columns and two road signs should be removed.	no	No – this element is assessed in the EAIR but is part of the wider project and will be subject to a separate consent as applicable

POI Ref.	Location	Description of Works	Third Party Lands Required?	Included in this Planning Application
11	M6 Junction 18 Slip Road	Loads would leave the M6 and join the slip road for the M17. Escorts to ensure that the convoy can safely complete the manoeuvre.	no	No – this element is assessed in the EAIR but is part of the wider project and will be subject to a separate consent as applicable
12	M17 / N83 Roundabout	Loads will continue straight over the M17 roundabout. Loads will overrun and oversail through the centre of the roundabout island where a load bearing surface should be laid. Loads will oversail the western verge on approach to the roundabout.	no	No – this element is assessed in the EAIR but is part of the wider project and will be subject to a separate consent as applicable
13	N17 / R332 Junction	Loads will turn left from the N17 onto the R332. Loads will oversail the junction entry splitter island where one chevron sign and one road sign should be removed. Bollards will be oversailed. Two lighting columns and three road signs should be removed from the western verge on entry. Loads will overrun the entry splitter island at the roundabout and the central island where load bearing surfaces should be laid. Five road signs should be removed. Loads will oversail the exit splitter island at the roundabout where one bollard and one road sign should be removed.	no	No – this element is assessed in the EAIR but is part of the wider project and will be subject to a separate consent as applicable
14	R332 Kilconly Left Bend	Loads will continue through the left bend. Loads will oversail the verge on the inside of the bend where one road sign should be removed and vegetation should be trimmed.	no	No – this element is assessed in the EAIR but is part of the wider project and will be subject to a separate consent as applicable

POI Ref.	Location	Description of Works	Third Party Lands Required?	Included in this Planning Application
15	R332 Right Bend Castlegrove	Loads will continue through the right bend. Loads will oversail both verges where trees and vegetation should be trimmed through the inside verge. One utility pole should be removed.	no	No – this element is assessed in the EAIR but is part of the wider project and will be subject to a separate consent as applicable
16	R332 / L6483 Junction	Loads will turn left onto the L6483 at the junction. Loads will oversail and overrun into third party land on the inside of the left bend where a load bearing surface should be laid and the drainage ditch culverted. Trees and vegetation will be cleared and one utility pole removed.	Yes – see Declaration of Identity submitted as part of planning application.	Yes
17	L6483	Loads will continue west on the L6483. The road along this section will need to be widened to provide a minimum 4.5m running width and a 5.5m clearance width. Widening will be within local authority lands.	No	Yes
18		Loads will turn left onto the L6483 towards the proposed site entrance. Loads will oversail and overrun into third party land on the inside of the left bend where a load bearing surface should be laid. Two road signs should be removed. Trees and vegetation should be cleared.	Yes – see Declaration of Identity submitted as part of planning application.	Yes

The schedule of turbine component deliveries will be determined by the turbine supplier however it is reasonable and conservative to assume that five convoys will be required to deliver all of the turbine components to site over the course of the turbine installation works which is expected to take place over the course of 6 months. This is based on a total of 7 no. loads per turbine to deliver blades, tower sections and nacelles, with each convoy consisting of components for two turbines at a time. Over the course of the 6-month installation period, it has been assumed convoys will be scheduled to deliver components to site every 4 weeks. The impact on residents and businesses is assessed in Chapter 6, Population, Human Health and Material Assets.

2.5 Construction

In the event that the Planning Authority 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 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 loop-in connection works to the national grid will be completed. Construction techniques are outlined in the CEMP.

The hours of construction activity for the Proposed Development will be limited to avoid unsociable hours as per the current code of practice for noise and vibration control on construction and open sites (BS 5228-1:2009+A1:2014). Construction operations will generally be restricted to between 08:00 hours and 19:00 hours Monday to 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. Such works will be notified to and agreed with the Local Authority in advance. Work on Sundays or public holidays will only be conducted in exceptional circumstances or in an emergency. 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.

2.5.1 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.

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	X	X																						
Site clearance and felling	X	X																						
Internal access tracks	X	X	X	X	X	X	X	X	X	X	X	X												
Turbine hard standings			X	X	X	X	X	X	X	X	X	X	X	X										
Turbine foundations								X	X	X	X	X	X	X	X									
TDR accommodation works											X													
Turbine Installation														X	X	X	X	X	X	X	X			
Met Mast																			X	X				
Onsite substation													X	X	X	X	X	X						
Cable Works (On-Site)															X	X	X	x	X	X	X			
Cable Works (In Public Road)															X	X	X	X	X	X	X			
Testing and Commissioning																					X	X	X	X
Landscaping, reinstatement, demobilisation																							X	X

2.5.2 CEMP

A Construction and Environmental Management Plan (CEMP) is contained in Appendix 2.1 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.

2.5.3 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 Galway City and County Council, to provide a safe environment for road users and construction workers. A Traffic Management Plan is contained in the CEMP. 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 stone required for the construction of the internal access roads will be sourced from licensed local quarries.

The Site is surrounded by a comprehensive road network with routing options available via the main Site entrance. Access to the proposed substation compound will be facilitated via the L-6100 which is accessed directly from the N84. The proposed haul routes for the delivery of materials associated with the construction of the Proposed Development are outlined in Figure 14.3, Volume IV.

Construction deliveries will use the R332, the L-6483 and L-2234 as the designated delivery routes for the Site which will be accessed via the N17 and the N84. The haul routes are primarily along national secondary and regional roads, with additional local roads leading to the Site. A traffic Management Plan has been prepared for the Proposed Development and is included as Appendix 14.2, Volume III.

It is noted that Galway County Council, through EIAR scoping consultation, has indicated that resurfacing works to the R332 (R332 Kilmaine to Foxhall Road Realignment, Widening and Resurfacing) are envisaged in the near future. Turbine delivery and haulage activities for the Proposed Development will be co-ordinated with Galway County Council such that works do not interfere with resurfacing works.

Mayo County Council is proposing the Cong Relief Road. Haulage activities for the Proposed Development will be co-ordinated with Mayo County Council such that works do not interfere the Cong Relief Road.

Dust Suppression

In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. If necessary, water will be taken from stilling ponds in the site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and the construction compound 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 wheelwash facility will be provided at the Proposed Development and will be used by vehicles entering and exiting the Site. 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 if any section of the public roads were to be dirtied by trucks associated with the Proposed Development.

2.5.4 Soil and Peat Management

Management of all excavated soils and peat will be carried out in accordance with the Soils Management Plan contained in Volume III. Peat and spoil management areas are indicated on Planning Drawings P20-306-0100-0003 to P20-306-0100-0010 and in Figure 2.2a, Figure 2.2b and Figure 2.2c, Volume IV.

2.5.5 Surface Water Management and Site Drainage

Site drainage at the Proposed Development 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 compounds. The drainage system for the existing tracks and roads will 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 against impacts on surface water bodies and will be included as part of the Proposed Development as per the Surface Water Management Plan (Appendix 12.2).

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 Image 2-1 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 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 roads and associated drainage infrastructure will follow contours as much as possible to reduce the gradient of the road and road drains (swales). This will reduce velocities within the swales, and consequently erosion.

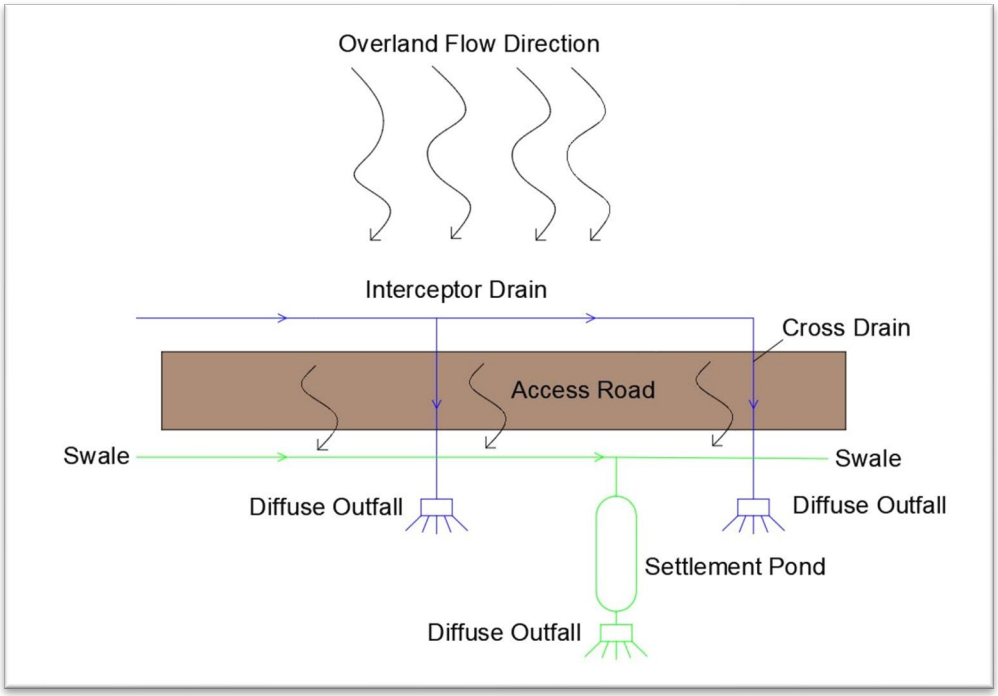

Image 2-2: Drainage Diagram

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 2h is applied for designing the ponds as outlined in CIRIA C648. This will allow silts 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.

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

2.5.6 Waste Management

A Waste Management Plan for the Proposed Development has been included in the CEMP, Volume III.

The Developer, in conjunction with appointed contractor, will prevent, reduce, reuse and recover as much of the waste generated on site as practicable and ensure the appropriate transport and disposal of residual waste to off-site licensed facilities. The location of these facilities are identified in Table 2-9. 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 Proposed Development construction phase will be collected, source separated and stored in dedicated receptacles at the temporary compounds 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 2-9: Licensed Waste Facilities in the Vicinity of Shancloon Wind Farm

Licensed Waste Facility Location	Type of Waste
T/A Walsh Complete Waste Management, Deerpark Industrial Estate, Oranmore, Co. Galway (WFP-G-19-0002-01)	Paper and cardboard packaging, mixed packaging, wooden packaging, concrete, bricks, wood, plastic, mixed construction and demolition wastes, plastics, mixed metals, soil and stones, bituminous mixtures, cables, glass, textiles, rubber, combustible waste, bulky waste, mixed municipal waste, solid wastes from soil remediation.
Frank Mortimer Ltd. Cartron, Belclare, Tuam, Co. Galway. (WFP-G-21-0007-02)	Soil and stone, concrete, glass, bituminous mixtures, mixed construction and demolition waste.
Tuam Recycling Centre, Athenry Road, Tuam, Co. Galway (COR-G-13-001-CA)	Mixed recyclables.

Waste quantities generated during construction of similar-sized developments are included hereunder with typical recovery / reuse that can be achieved.

Table 2-10: Anticipated 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

2.5.7 Temporary Construction Compounds

During the construction, it will be necessary to provide temporary facilities for construction personnel. Three temporary construction compounds will be constructed, the locations of which are shown on Figure 2.2a, Figure 2.2b and Figure 2.2c, Volume IV and the dimensions are provided on planning drawings. The three compounds will be as follows:

- Compound 1 (east) near site entrance 12,400m^2 in area
- Compound 2 (west) near T2 3,600m^2 in area
- Compoun3 at substation 2,300m^2 in area

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 construction 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.

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

2.6 Operation

Wind farm commissioning is expected to 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).

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 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 is applying for permission for a 30-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.

30 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.

Routine inspection of the bridge crossings within the Site will be carried out in accordance with EIRSPAN Bridge Management System Routine Maintenance Manual (Transport Infrastructure Ireland, September 2022)

2.7 Community Gain

The Developer will set up a community benefit fund which will allocate funds from the wind farm to community groups in the area should the wind farm be granted planning permission and be successful under the Government's RESS support programme. If the proposed wind farm is not successful under RESS the Developer has committed to develop a community benefit fund in line with the RESS support programme.

If consented, the proposed Shancloon Wind Farm will provide sustainable, low carbon energy generation infrastructure to meet Ireland's growing demand. The development benefits to the local community would include significant investment in local infrastructure and electrical systems, local job creation, and a contribution of over €1 million per annum to Galway City and County Council as annual rates over the project lifetime of 30 years.

If consented the Proposed Development will also provide a community fund calculated in accordance with the Renewable Electricity Support Scheme (RESS) Terms and Conditions at €2 per MW/h of electricity produced by the project. This is to be made available to the local community for the duration of the RESS (15 years). The average capacity factor of wind energy projects in Ireland is 35% (RESS 2 Terms and Conditions pg57, October 2021),). Assuming this efficiency, and a capacity of c. 61.6MW, the community benefit fund would amount to an average of almost €378,000 per annum. The actual fund will vary around this average from year to year, depending on each year's wind conditions. Within the terms and conditions of RESS an annual payment of €1,000 is to be provided to each household within 1km of any proposed turbine. 40% of the fund will be allocated to not-for-profit community enterprises, with an emphasis on low carbon initiatives. Up to 10% of the Fund is to be allocated for an independent Administrator to administer the Funds. The remainder of the fund will be directed towards local clubs, societies and other initiatives. It is envisaged that the communities nearest the Proposed Development will benefit most from the Community Fund.

2.8 Risk of Major Accidents and Disasters

The CEMP includes an Emergency Response Plan (ERP). It 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 Article 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.

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, ground augering/coring, trial pitting, geophysics and rotary core sampling. The findings of the peat assessment showed the minimum, maximum and mean peat depth on site to be 0.0m, 8.0m and 2.29m respectively.

Elevations range from approximately 28 to 40m AOD. In general, the proposed Site can be described as having very gentle to gentle slopes. Slopes at the proposed turbine locations range from 2 to 5°. The slopes at the proposed turbine locations within areas of peat display a slope of 2°. Results of Peat Stability Assessment for the Site (Appendix 11.1) show no signs of instability within peat deposits across the Site.

In general, findings from the intrusive investigation indicate the Site is predominantly underlain by localised deposits of peat (typically in areas of lower elevation), over glacial deposits of fine-grained till and subordinate coarse-grained till, underlying shaley limestones of the Ardnasillagh Formation.

Surface karst features (predominantly collapse dolines) are present throughout the Site. These features are believed to form along unmapped fault lines that create zones of weakened and fractured rock beneath the overlying Quaternary deposits (predominantly Glacial Till). The fault zones allow for piping of the fine grained portion of the Glacial Till, through fractured rock, resulting in voiding and eventual collapse of the soils overlying the limestone bedrock. The result is a broadly circular bowl shaped depression of varying widths and depths. The formation of these collapse dolines is actively occurring across the site with newly forming depression observed during the site reconnaissance. No karst features were observed within the underlying shaley limestones of the Ardnasillagh Formation. No evidence of significant karst features such as caves were noted within the Site as part of this assessment.

As dolines are considered to be actively occurring within the site, the design of the wind farm infrastructure has taken account for this potential risk. Foundations for the larger infrastructure elements such as the turbine bases will be piled into the underlying bedrock and not founded on the overlying Glacial Till deposits as there is potential for unrecorded voids and future occurrences of voiding within these soils.

Traffic

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

All structural fill for access tracks, turbine hardstands, turbine foundations and on-site substation will be sourced from local quarries and will have a dedicated haulage route identified such that it will reduce potential for impact on local road users.

Traffic Management Plan (TMP) is provided specifying details relating to traffic management (Appendix 14.2, 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

Design

Flood risk assessment for the Proposed Development is included in Chapter 12 – Hydrology and Water Quality and includes a Site Specific Flood Risk Assessment (SSFRA) which determined that the location of the proposed substation and the grid connection do not fall within a delineated predictive fluvial Flood Zone 'A' or Flood Zone 'B'. The location of the proposed sub-station and grid connection therefore fall within Flood Zone 'C'. The location of proposed turbines T01, T02, T03, T04, T05, T06, T08, T09, T10 and T11 do not fall within a delineated predictive fluvial Flood Zone 'A' or Flood Zone 'B'. The location of these proposed turbines therefore fall within Flood Zone 'C'. The location of proposed turbine T07 falls within a delineated predictive fluvial Flood Zone 'A' and Flood Zone 'B'.

To ensure a robust and sustainable development, the finished floor level of the proposed substation will be constructed to a minimum level of 0.5m above the predictive peak 0.1% AEP flood level at cross sectional location C13 – i.e. 26.94m OD + 0.5m = 27.44m OD. Any vulnerable elements of Proposed Turbine T01 shall be constructed to a minimum level of 0.3m above the peak 0.1% AEP (1 in 1000 year) flood level at cross section C5 - i.e. 28.15m OD + 0.3m = 28.45m OD. To ensure a robust and sustainable development, any vulnerable elements of Proposed Turbine T05 shall be constructed to a minimum level of 0.3m above the peak 0.1% AEP (1 in 1000 year) flood level at cross section C1 - i.e. 28.55m OD + 0.3m = 28.85m OD. The base of proposed turbine T07 will be sealed to prevent water ingress. No vulnerable components of the turbine will be located at ground level and will be constructed to a minimum level of 31.3m OD, which is 0.3m above the 0.1% AEP (1 in 1000 Year) fluvial flood level at this location (31.0m OD + 0.3m = 31.3m OD).

In consideration of findings and output of this SSFRA, and the implementation of the recommendations listed above, the flood risk to and from the development as proposed is considered to be LOW. The wind farm development as proposed is not predicted to result in an adverse impact to the existing hydrological regime of the area or increase flood risk elsewhere and is therefore considered to be appropriate from a flood risk perspective.

Construction

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.

MeteoAlarm: 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.

2.9 Decommissioning

On decommissioning, cranes will disassemble the above ground turbine components which will be removed off site for recycling. All the major component parts are bolted together, so this is a relatively straightforward process.

The foundation pedestals will be covered over and allowed to re-vegetate naturally. Leaving the turbine foundations in situ is considered a more environmentally sensible option as to remove the reinforced concrete and piles associated with each turbine would result in environmental nuisances such as damage to peat, noise and vibration and dust. Turbine foundation pedestals and hardstanding areas will be covered over with topsoil previously stripped and used for landscaping purposes during the construction stage and left to revegetate naturally.

It is proposed that all the internal site access tracks and turbine hard standings will be left in place. These will continue to be used for agriculture.

The temporary accommodation works along the TDR will not be required for the decommissioning phase as turbine components can be dismantled on site and removed using standard HGVs.

Grid connection infrastructure including the on-site substation and ancillary electrical equipment will form part of the national grid and will be left in situ.

The mast will be decommissioned using a similar methodology as the construction except in reverse.

It is expected that the decommissioning phase will take 6 months to complete.

The key site targets are as follows;

- 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; and,
- 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 housekeeping 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;

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 destination of the turbines post decommissioning is unclear at this time and will be subject to an assessment of potential for recovery of parts.

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 turbine foundations will be backfilled and covered with soil material from areas of earthworks. The soil/peat 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 road 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.

The 110 kV cable and substation will remain in situ and will become an ESB networks asset and will be part of the national electricity grid and therefore it is not proposed to remove this cable.

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