2 PROJECT DESCRIPTION

2.1 INTRODUCTION

This chapter of the EIAR provides a description of the existing site and the main components of the proposed Gortloughra Wind Farm (the Project). This EIAR provides details on the construction, operation and decommissioning of the Project in compliance with the EIA Directive. The Gortloughra Wind Farm Project consists of the following elements:

- **The Wind Farm:** which includes 8 no. wind turbines, site access tracks, Turbine Hardstands, 100 m permanent Met Mast, Wind Farm Internal Cabling, borrow pit, Temporary Construction Compound, and all site infrastructure on the Site. It also includes the provision of signage at 4 no. locations for existing cultural heritage on the Site and the provision of biodiversity improvements. This element of the Project is defined as the 'Proposed Development' and is what development consent is sought for. A full summary of the Proposed Development is outlined in section 2.4 of this chapter.
- **Grid Connection Routes and Onsite Substation and Control Building:** This chapter also provides a description of the work required along 2 no. proposed Grid Connection Routes (GCRs) Options and onsite 110 kV substation. This element of the Project will be subject to a separate planning consent process but will be assessed within this EIAR.
- **Turbine Delivery Route (TDR):** The Turbine Delivery Route nodes and the route itself will also be subject to a separate planning consent process but will be assessed within this EIAR.

Together, the works within the Redline Boundary (the Proposed Development), the Grid Connection Route Options, 110 kV Onsite Substation and Control Building and Turbine Delivery Route are defined as the Project which form the basis of the assessments presented within Chapters 5 to 17. This chapter provides details of the construction, operational and decommissioning phases.

All elements of the Project are outlined in **Figure 1.2.**

This chapter includes an overview of the Project followed by a detailed description of the main components and their method of construction. Measures that have been built into the design of the Project to reduce harmful effects on the environment, also known as 'Embedded Mitigation' measures, are set out in the various technical chapters and in this chapter. In addition to these Embedded Mitigation measures, Chapters 5 to 15 also present

mitigation and enhancement measures where specifically relevant to their assessment topic.

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

- Construction Environmental Management Plan (CEMP) in **Appendix 2.1**
- TLI Grid Report and accompanying drawings in **Appendix 2.2**
- ESB Minimum Standard Specifications in **Appendix 2.3**
- List of Projects for Cumulative Assessment **Appendix 2.4**

Common acronyms used throughout this EIAR can be found in **Appendix 1.4**.

2.2 APPLICANT

The applicant for the Proposed Development is Gortloughra Wind Farm Limited, an entity wholly owned by Statkraft Ireland Limited, a leading company in hydropower internationally and Europe's largest generator of renewable energy. Statkraft is one of the biggest renewable energy developers in Ireland with approximately 4 GW of offshore, onshore, solar and grid services projects in the pipeline.

The Statkraft Ireland team, which is based in Cork and Tullamore, Co. Offaly, has constructed a portfolio of approximately 350 MW of wind projects across the country, operates over 500 MW, and has an established track record in wind energy in Ireland, having previously developed wind farms in counties Clare, Cork, Kerry, Donegal, Limerick, Galway, Waterford, Tipperary, Offaly and Tyrone.

2.3 STATEMENT OF AUTHORITY

This Chapter has been prepared by Shirley Holton and David Kiely of Jennings O'Donovan & Partners Ltd. (JOD).

Shirley Holton is an Environmental Scientist with over 3 years' experience in Environmental Consultancy. She graduated with a First-Class Honours Degree (BSc. Hons) in Environmental Science from the Institute of Technology, Sligo. She was also awarded with the Governing Body award for a BSc in Environmental Protection. Shirley's key capabilities include project management; using software such as WindPRO 4.1 and ArcGIS Pro; and the preparation of planning applications, Environmental Impact Assessment Reports, Feasibility Studies, Construction & Environmental Management Plans and management plans relating to surface water, peat, spoil and waste.

David Kiely is a Managing Director of JOD who holds a BE in Civil Engineering from University College Dublin and MSc in Environmental Protection from IT Sligo. He is a Fellow of Engineers Ireland, a Chartered Member of the Institution of Civil Engineers (UK) and has over 40 years' experience. He has extensive experience in the preparation of EIARs and EISs for environmental projects including Wind Farms, Solar Farms, Wastewater Projects, and various commercial developments. David has also been involved in the construction of over 60 wind farms since 1997.

2.4 SUMMARY OF THE PROJECT TO BE ASSESSED

Planning Permission is being sought by the Developer for the construction of eight wind turbines, permanent met mast and all ancillary works.

The Proposed Development will comprise of the following main components:

- Erection of eight wind turbines with an overall ground to blade tip height of 175 m consisting of a rotor diameter of 150 m; and a hub height of 100 m.
- Construction of permanent Turbine Hardstands and Turbine Foundations.
- Construction of one Temporary Construction Compound with associated temporary site offices, parking areas and security fencing.
- Installation of a Meteorological Mast with a height of 100m.
- Development of one on-site Borrow pit.
- Construction of new permanent internal site access tracks and upgrade of existing internal site access roads to include passing bays and all associated drainage infrastructure.
- Development of a permanent internal site drainage network and sediment control systems.
- All associated underground electrical power and communications cabling connecting the wind turbines to the on-site substation.
- Biodiversity enhancement measures.
- Recreational community improvements including the erection of 4 No. permanent information boards relating to cultural heritage and upgrades to amenity tracks across the site.
- All associated site development works.

A 10-year planning permission and 40 year operational life from the date of commissioning of the entire wind farm is being sought.

This EIAR also assesses the construction of an 110 kV On-site Substation and Control Building and 2 no. GCR Options along public roads:

- Option A: Dunmanway 110 kV substation or
- Option B: Carrigdangan 110 kV substation.

While not part of the planning consent for this planning application, this EIA also assesses the works at 18 No. locations along the TDR from Port of Cork to Site and the underground Grid Connection Route Options from the Site to either the Dunmanway or Carrigdangan 110 kV Substations.

2.5 SITE LOCATION AND ENVIRONS

2.5.1 Introduction / Existing Land Use

The Site is located 9.7 km north-west of Dunmanway, Co. Cork and 19 km south-east of the county boundary between Cork and Kerry. The Site is located on relatively high ground, at elevations ranging from 243 m AOD on the northern side of the site at the entrance 326 m, to 510 m AOD towards the middle of the Site and 306 m AOD on the southern side of the Site. A Site Location Map showing the Redline Boundary is detailed in **Figure 1.1**. The Project boundary, which comprises of all elements of the Project is outlined as **Figure 1.2.**

The Site is located within the townlands of an tSeithe Bheag (Shehy Beg), (Muscraí Gaeltacht), Gortloughra, Cloghboola and Inchinroe.

The townlands along which the two grid connection options transverse include:

- **Option A (Dunmanway):** an tSeithe Bheag (Shehy Beg), Gortloughra, Inchinroe, Cloghboola, Cornery, Garraí na Tórnóra (Garryantornora), Tuairín na Lobhar (Tooreenalour), Gort na Carraige (Gortnacarriga), Moneylea, Coolcaum, Coolmountain, Tullagh, Moneyreague, Togher, Cooranig, Keelaraheen, Neaskin, Ardcahan, Knockduff, Gurteennasowna and Ballyhalwick.
- **Option B (Carrigdangan):** an tSeithe Bheag (Shehy Beg), Gortloughra, Inchinroe, Cloghboola, Cornery, Garraí na Tórnóra (Garryantornora), Tuairín na Lobhar (Tooreenalour), Gort na Carraige (Gortnacarriga), Cooragreenane, Coolroe West, Gortnahoughtee, Derryleigh, Gortatanavally, Carrigdangan and Johnstown.

Temporary works along the Turbine Delivery Route will be required to accommodate the delivery of the turbine components. These temporary works are subject to a separate planning application but are assessed as part of this EIAR and are located in the townlands of Lackanashinnagh, Shanacashel, Mallow, Glan, Curradrinagh, Seanlárach (Shanlaragh),

Kilnadur, Inchincurka, Carrigdangan, Johnstown, Commons, Derrygortnacloghy, Gortneadin, Carrignacurra, Cappanclare, Curraheen, Coolroe West, Cooragreenane, Gortaknockane, Gortnacarriga, Tooreenalour, Garraí na Tórnóra (Garryantornora), Cornery, Cloghboola, and Inchinroe.

The Site extends to 117.21 ha. The lands are under the ownership of third parties and the principal land use in the general area is comprised of agricultural sheep grazing, farmland and open mountain heath.

The pre-planning site investigations show that there are vast areas of shallow peat of less than 0.5 m with some isolated and deep pockets of up to 3.8 m. The presence of peat on site and other constraints (section 2.7.1) have influenced the project design. This is further detailed and assessed in **Chapter 8: Soils and Geology**.

The closest receptor (H67) is located 486 m from the nearest turbine (T7). There are 67 houses within 2 km of the proposed turbines. All houses located within 2 km of the proposed turbines are shown on **Figure 1.3**.

2.5.2 Wind Farms in the Area (Cumulative)

There are 28 operational, permitted and proposed wind farms within 20 km of the Site. **Figure 2.1** shows the location of proposed, permitted and operational wind farms within a 20 km radius of the proposed turbines and **Table 2.1** below provides further information on these wind farms. The nearest operational wind farm is Shehy More Wind Farm which is located approximately 260 m to the north of the Site. The closest distance between turbines within Shehy More and the Proposed Development is approximately 550 m, which is between the western most turbine of Shehy More Wind Farm and T2 of the Proposed Development.

Table 2.1: Wind Farms within 20km of the Proposed Turbines

Wind Farm	Status	No. of Turbines	Approximate Distance to Nearest Turbine [km]	Direction from the Proposed Development
Shehy More Wind Farm	Operational	11	0.55	North
Carrigarierk Wind Farm	Permitted	5	5.22	Northeast
Carrigarierk Wind Farm 2	Operational	3	5.74	Northeast
Derrenacrinnig	Permitted	3	7.08	South
Milane Wind Farm	Operational	9	9.20	South
Cleanrath Wind Farm	Operational	9	9.86	Northeast
Grousemount Wind Farm	Operational	38	9.89	Northwest
Derragh Wind Farm	Operational	6	9.93	North
Kilgarvan (Sillahertane) Wind Farm	Operational	10	11.63	North
Gortyrahilly Wind Farm	Proposed	14	11.72	North
Killaveenoge Wind Farm	Operational	10	12.01	South
Currabwee Wind Farm	Operational	7	13.04	Southeast
Lahanaght Hill Wind Farm	Operational	5	13.78	South
Coolknoohil (Everwind) Wind Farm	Operational	11	14.01	North
Midas Wind Farm (Inchee)	Operational	6	14.85	North
Foilgreana Wind Farm	Operational	6	15.30	North
Midas Wind Farm (Glanlee I)	Operational	6	15.70	North
Coomatallin Wind Farm	Operational	4	16.61	South
Kilvinane Wind Farm	Operational	3	17.98	Southeast
Ballybane Wind Farm	Operational	21	18.00	Southwest
Barnadivane Wind Farm	Proposed	6	18.04	East
Kilgarvan Repower	Proposed	11	18.18	North
Inchamore Wind Farm	Proposed	5	18.57	North
Garranereagh Wind Farm	Operational	3	19.72	East

2.5.3 Other Developments (Cumulative)

A list of projects that have been included in the cumulative assessment of effects in this EIAR are included in **Appendix 2.4**. This includes all small, medium and large-scale developments within 10 km of the Site that are currently active in the planning system.

The cumulative impacts of the projects listed in **Appendix 2.4** are assessed for potential effects during the construction, operation and decommissioning of the Proposed Development. This is further detailed through chapters 5 to 17 of this EIAR.

2.5.4 Land Ownership

The Site is located on lands under the ownership of three no. third-party private landowners who have consented to the application and the Proposed Development.

2.6 WIND RESOURCE

Due to the location in the southwest of Ireland, and elevation (ranging from 243 m to 510 m AOD throughout the Site (section 2.5.1)), the Site experiences high average annual wind speeds. The Irish Wind Atlas produced by Sustainable Energy Ireland shows average wind speeds for the country and it shows that wind speeds on the Site are consistent with a windfarm development (7.7 m/sec at 30 m, 8.4 m/sec at 75 m, 8.6 m/sec at 100 m and 8.8 m/sec at 150 m).

2.7 SITE INFRASTRUCTURE AND CONSTRUCTION

Constraints-led design is a commonly used, best practice approach employed in wind farm design. Using this method, environmental sensitivities within the project study area are identified by the design team with a view to pinpointing suitable areas in which wind turbines may be located. The resulting area is known as the 'developable area'.

The Site Study Area was chosen based on its viability in terms of wind resource, land size, planning policy and the availability of a suitable connection to the national grid.

Once all known sensitive receptors within the Study Area are accurately mapped, suitable setback buffers are applied. The size of this setback buffer is related to the sensitivity of the individual receptor as set out in wind energy design guidelines and scientific best practice.

The design is fully compliant with the current 2006 Wind Energy Development Guidelines[1] (WEDGs) and the project team has committed to the setback recommendations in the draft Wind Energy Development Guidelines[2] (draft WEDGs), published in 2019. The draft WEDGs are currently being reviewed by the Government and are currently not in force.

Environmental sensitivities dictate a large proportion of design constraints. However, other considerations such as proximity to houses, existing third-party infrastructure, landscape and visual considerations, and feedback from the community has also influenced the identification of the final developable area. Additionally, setback buffers are applied to existing roads, high voltage electrical lines, telecommunication links, public roads and trails.

[1] Wind Energy Development Guidelines, Department of the Environment, Heritage and Local Government, 2006.
[2] Draft Revised Wind Energy Development Guidelines, Department of Housing, Planning and Local Government, 2019

There are further constraints associated with landscape and visuals. Particular constraints mapped include reverse zone of theoretical visibility (ZTV) from viewpoints. This technique allows the designers to understand from where particular wind turbines (or parts of them) may be visible based on ground topography and indicates the potential visual impact at these locations. From this information, 3D models and photomontages are prepared to further inform the layout of the wind farm and optimise turbine positioning in the context of landscape and visual impact.

Following the application of all known constraints, the developable area is mapped. This is the area in which wind turbines can now be sited. After placing wind turbines within the developable area, allowing for required spacing between the turbines, the resulting wind turbine layout then forms the basis for the design for the wind farm. Other elements of the wind farm design such as onsite access tracks, Turbine Hardstands, the Onsite Substation and Control Building and Temporary Construction Compound are also considered in this process.

Site walkover surveys, site investigations and other surveys (e.g., environmental studies, field surveys and consultation) have also influenced the design.

2.7.1 Proposed Layout Design

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

- distance to watercourses of at least 50 m, where possible
- distance to land drains of at least 20 m
- distance to archaeological monuments and structures of at least 100 m
- distance from turbines to inhabited houses of at least 700 m (for those not involved in the Project)
- avoidance of ground slopes of greater than approximately 10 - 14%
- avoidance of existing telecommunications infrastructure
- distance to neighbouring Wind Farm turbines of >3 x Rotor Diameter (450 m)
- Existing high voltage overhead powerlines on the south of the site where a 500 m buffer is applied
- avoidance of sensitive habitats, e.g., wet heath/blanket bog and/or watercourses containing Freshwater Pearl Mussel (*Margaritifera margaritifera*)

A design by avoidance principle was carried out at the initial stages of the project design. The site selection process and project design will minimise new impacts through the re-use of existing proven infrastructure (i.e., existing tracks). Detailed analysis of the bearing capacity of the surrounding peatlands was carried out and are identified, assessed and mitigated for in **Chapter 8: Soils and Geology**. This includes risk of peat slide and the extensive design measures to minimise that risk.

The proposed cultural heritage information boards and associated trails are assessed in full in **Chapter 13: Cultural Heritage**.

The overall layout of the Site is shown in **Figure 1.2**. This figure shows the proposed locations of the wind turbines and associated hardstanding areas, Onsite Substation and Control Building, Met Mast, Temporary Construction Compound, internal access tracks and the site entrance. The ITM coordinates of the turbines are listed in **Table 2.2**.

Table 2.2: Turbine ITM Coordinates*

Turbine No.	ITM Easting (m)	ITM Northing (m)	ING Easting [m]	ING Northing [m]
T01	514007.06	559976.06	114038.57	59911.15
T02	514578.95	560100.43	114610.58	60035.55
T03	514530.43	559376.94	114562.05	59311.90
T04	515322.78	559654.41	115354.58	59589.43
T06	515804.023	560056.64	115920.46	60006.88
T07	514219.01	558838.91	114250.57	58773.75
T08	514846.27	558857.61	114877.96	58792.46
T09	515300.39	559150.62	115332.18	59085.53

*Note: Turbine 5 was omitted during the iterative design process.

2.7.2 Wind Turbine Generator

The proposed turbines will be of typical modern design and will be a three-bladed, rotor up wind of the tower, variable speed, pitched blade regulated machine. Turbine appearance will be a matt non-reflective finish in a white, off-white or grey colour.

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

Each turbine will have a generator with a maximum capacity of 6 MW giving an overall capacity of the wind farm of 48 MW. The turbines may be direct drive machines or may contain a gearbox. The final turbine will be chosen in a competitive tendering process as part of the Project financing process, after all necessary consents have been secured but will adhere to the parameters set out in **Table 2.3**.

The final choice of turbine model is unknown at this stage, given the competitive tender for turbines on any project commences at construction stage. The candidate turbine model is a Vestas V150 for the purposes of EIA and planning approval. At construction, the Vestas V150 or similar style will be utilised (based on availability). The dimensions outlined in **Table 2.3** of this chapter describe the proposed parameters of the turbines. A schematic drawing of the candidate turbine is shown on **Figure 1.4**.

Table 2.3: Turbine Parameters

Turbine Parameter	Assessment Envelope
Turbine Blade Tip Height	175 m
Rotor Diameter	150 m
Hub Height	100 m

2.7.3 Turbine Foundation and Turbine Hardstands

All turbine suppliers have a requirement for a Turbine Hardstand area to be constructed beside each turbine. The layout of the Turbine Hardstand is designed to accommodate the delivery, laydown, and assembly of turbine components (in particular rotor assembly) prior to turbine lifting and assembly and is shown in **Figure 2.2**. The Turbine Hardstands are needed to support the cranes during turbine construction, the operational and maintenance phase, and for decommissioning. The Turbine Hardstands will be constructed in advance of the Turbine Foundation and will be used to facilitate foundation construction, such as steel reinforcement delivery and pouring of concrete.

Construction of the Turbine and Met Mast Hardstands will require the excavation of overburden material to the noted area and depth, the laying of a geotextile material on the formation surface and placing engineered stone and a top dressing. The main Turbine Hardstands will be 4,155 m^2 and will be 0.3 m in depth depending on the local bedrock profile and the varying soil depth giving a surface area of 33,240 m^2 for eight turbines and a material volume requirement of approximately 9,972 m^3.

The Turbine Foundations will be approximately 25.5 m in diameter and have a depth of 2.25 m. The Turbine Foundation design will be decided by the structural engineers at detailed design stage and is dependent on the turbine sourced at procurement stage. The central part of the foundation will be approximately 6 m in diameter, will be raised from the main Turbine Foundation below ground level and will encompass cast-in bolts to connect to the bottom of the turbine tower and reinforced bar structural elements.

The volume of concrete and steel required for each Turbine Foundation will be 1,150 m^3 and 86 tonnes respectively. The area around and above the Turbine Foundation will be backfilled with compacted granular material and the only portion exposed in the long term will be the central foundation section. Material will be sourced from the onsite borrow pit or from a local quarry (within 55 km) such as one of those identified in **Table 2.4** below.

Table 2.4: Local Quarries and Concrete Suppliers

Quarry	ITM (Easting)	ITM (Northing)	Distance (km)	Direction
Mid Cork Quarries	527417	563055	11.20	E
Kilmichael Quarry	529902	564136	13.6	E
McSweeney Bros	129231	050925	16	SE
Roadstone Castlemore	544615	566921	28.50	NE
Keohane Readymix Shannonvale	537623	545474	26	SE
Finbarr O'Neill Limited	551046	572626	36.5	NE
Roadstone Ballygarvan	569239	564013	53	E

Although site investigations have been carried out as part of this application and the worst-case impacts have been assessed within this EIAR; additional site investigations will be required where planning permission is granted, to facilitate a more detailed design.

Depending on the results of these further confirmatory site investigations, the possibility of less invasive construction methods such as installing rock anchors will be explored as a

means of reducing the footprint and material volumes of the Turbine Foundations. Traditional gravity foundations are considered for EIA purposes as this represents a worst-case scenario due to the amounts of concrete required (c.1,150 m^3 v c.300 m^3 for rock anchors), but it should be noted that the predicted environmental effects, such as loss of habitats and/or impacts on water quality, could be reduced were rock anchor foundations to be used for some of the Turbine Foundations where there is solid competent rock at the foundation level.

Based on the results of peat probing and geotechnical assessments to date (detailed in **Chapter 8: Soils and Geology**), peat depths are not deep enough to require piling of Turbine Hardstands. Therefore, the construction method for all the Turbine Hardstands will be via excavated approach.

The construction methodology for the Turbine Foundations will depend on the strength and depth of the substrata (layers of rock or soil beneath the surface) specific to each location. Turbine Foundations will need to be taken down to competent bearing strata by excavating through the peat / soil, subsoil and rock if necessary.

The method of construction for gravity Turbine Foundation is summarised as follows:

- Set out turbine foundations and required finish levels etc.
- Construct formation and/or supporting structures e.g. piles or rock upfill.
- Construct drainage as required.
- Provide a minimum of 100 mm concrete blinding.
- Place bottom mat of steel reinforcing.
- Place turbine base anchor cage.
- Fix cable ducting and foundation earthing.
- Complete reinforcing steel.
- Fix shuttering to base sidewalls.
- Fix ducts and earthing wires between insert and walls of base.
- Carry out any corrective works as directed by Engineer.
- Check weather conditions and schedule concrete deliveries.
- Place concrete and take quality control slumps and cubes.
- Concrete surface finishing.
- Apply curing and protection of concrete.
- Strip formwork.
- Placing of any earthing wires around and over the base.
- Backfill base sides and place overburden.

- Confirm that cube results are satisfactory[3].
- Grout the top flange.

The method of construction for rock anchor Turbine Foundation is summarised as follows:

- Set out turbine foundations and required finish levels etc.
- Construct temporary coring drilling platform
- Drill cores for rock anchors to the required levels.
- Insert rock anchors and grout into position.
- Construct drainage as required.
- Provide a minimum of 100 mm concrete blinding.
- Place bottom mat of steel reinforcing.
- Place free issue turbine base insert or anchor cage.
- Fix cable ducting and foundation earthing.
- Complete reinforcing steel.
- Fix shuttering to base sidewalls.
- Fix ducts and earthing wires between insert and walls of base.
- Carry out any corrective works as directed by Engineer.
- Check weather conditions and schedule concrete deliveries.
- Place concrete and take quality control slumps and cubes.
- Concrete surface finishing.
- Apply curing and protection of concrete.
- Strip formwork.
- Placing of any earthing wires around and over the base.
- Backfill base sides and place overburden.
- Confirm that cube results are satisfactory.
- Grout the top flange.
- Stress rock anchors.
- Install protective caps to top of rock anchors.

2.7.4 Turbine Delivery Route ("TDR") and Access to the Site

While not part of this planning application, this EIA also assesses the works at 18 No. locations along the TDR from Port of Cork (Ringaskiddy) to Site.

Temporary works will be required to accommodate the delivery of the turbine components. These temporary works are subject to a separate planning application but are assessed as

[3] Concrete cubes made during the pouring of the base are crushed to confirm that the required concrete strength has been reached.

part of this EIAR and are located in the townlands of Lackanashinnagh, Shanacashel, Mallow, Glan, Curradrinagh, Seanlárach (Shanlaragh), Kilnadur, Inchincurka, Carrigdangan, Johnstown, Commons, Derrygortnacloghy, Gortneadin, Carrignacurra, Cappanclare, Curraheen, Coolroe West, Cooragreenane, Gortaknockane, Gortnacarriga, Tooreenalour, Garraí na Tórnóra (Garryantornora), Cornery, Cloghboola, and Inchinroe.

There will be two turbine blade staging areas (e.g. where turbine blades are switched between trailer to a blade lifter) on either side of Crookstown and a blade lifter will be used to facilitate tight movements through Crookstown and bends in the road to Beal na Bláth.

The site access will be from an existing entrance on the L8544 which will be upgraded to allow vehicles to turn in and out. This is further described and assessed in **Chapter 14: Traffic and Transport**. This entrance will be used for delivery of both turbine components and building materials such as rock (where required) and concrete. The site entrance is shown on **Figure 2.3**.

It is proposed that the turbine nacelles, tower hubs and rotor blades will be landed in the Port of Cork. From there, they will be transported to the Site via the N28, N40, N22, R585, R587 and the L8544 to the upgraded site entrance.

The delivery of the turbines will require co-ordination with Cork County Council and An Garda Síochána. The process has been set out in the Transport Management Plan contained in **Appendix 14.2** which will be implemented in full and will be further developed prior to the commencement of construction by the Contractor. The proposed haul route is shown on **Figure 2.4**.

There are 18 No. areas on the haul route that will require works in third party lands. These are shown on **Table 2.5**.

Table 2.5: Areas of Works on Haul Route in Third Party Lands

TDR Locations	Location Notes	Location Coordinates (ITM)
Location No. 7	Overrun Area=512 m^2 Area to be cleared for Oversail, Land Ownership to be Determined, Boundary Vegetation To be Trimmed	E:523246 N:559558
Location No. 12C	Overrun Area=167 m^2 Area to be cleared for Oversail, Land Ownership to be Determined,	E:523777 N:565003

TDR Locations	Location Notes	Location Coordinates (ITM)
	Bridge Widening &Loadbearing Area to be Constructed	
Location No. 14	Overrun Area=167 m^2 Area to be cleared for Oversail, Land Ownership to be Determined, Boundary Vegetation To be Trimmed,	E:522064 N:565137
Location No. 17A	Overrun Area=270 m^2 Area to be cleared for Oversail, Land Ownership to be Determined, Bridge Parapet to be Modified to Allow Oversail	E:519425 N:564233
Location No. 17C	Overrun Area=349 m^2 Area to be cleared for Oversail, Land Ownership to be Determined	E:518813 N:563759
Location No. 17D	Overrun Area=59 m^2 Area to be cleared for Oversail, Land Ownership to be Determined	E:518599 N:563727
Location No. 18B	Overrun Area=70 m^2 Area to be cleared for Oversail, Land Ownership to be Determined,	E:517474 N:563425
Location No. 19	Overrun Area=85 m^2 Area to be cleared for Oversail, Land Ownership to be Determined, Boundary Vegetation to be Trimmed	E:517137 N:563211
Location No. 19A	Overrun Area=201 m^2 Land Ownership to be Determined	E:516480 N:562950
Location No. 20	Overrun Area=540 m^2	E:515804 N:562521
Location No. 20A	Overrun Area=300 m^2 Area to be cleared for Oversail, Land Ownership to be Determined,	E:514912 N:561795
Location No. 20B	Overrun Area=90 m^2 Boundary Vegetation to be Trimmed Land Ownership to be Determined,	E:514461 N:561642
Location No. 21	Overrun Area=255 m^2, Area to be cleared for Oversail, Land Ownership to be Determined,	E: 514148 N:561110
Location No. 21A	Overrun Area=345 m^2 Area to be cleared for Oversail, Land Ownership to be Determined,	E:513671 N:560837
Location No. 22	Overrun Area=940 m^2 Area to be cleared for Oversail, Land Ownership to be Determined,	E:513395 N:560551
Location No. 28	Blade Laydown Area Area=12000 m^2	E:543962 N:566922
Location No. 29	Blade Laydown Area Area=12000 m^2	E:539792 N:563872
Location No. 30	Blade Laydown Area Area=12000 m^2	E:506514 N:556534

2.7.5 Site Access Tracks

The site access tracks are necessary to allow access for cranes and delivery trucks during construction of the Proposed Development and also during servicing/repairs to the wind turbines once operational. The existing access track from the L8544 will be upgraded and used to minimise additional land take. The site access tracks will be upgraded and constructed so that the width will be 5 m but will be wider at bends where a width of 5.5 m is to be provided. The maximum gradient on the Site will be approximately 15.7% with the exception of the access track to the Met Mast which has a gradient of approximately 17.3%. A stone layer will be provided so as to provide a good grip during wet weather. Gradients above 12-14% will usually require components to be towed by a specialist towing vehicle. Considering the maximum gradient on Site, as mentioned above, the towing of delivery vehicles is likely to be required.

Approximately 3,790 m of the existing site access track length will be used for the Proposed Development. Site access tracks are shown on **Figure 1.2(a)**. The upgraded site access tracks will be approximately 17,055 m^2 in surface area and will require approximately 7,675 m^3 of stone material. This is further detailed in the Spoil Management Plan in **Appendix 2.1: Construction Environmental Management Plan** and throughout EIAR Chapters 5 – 17.

There will also be 2,040 m of new site access tracks required for the Proposed Development. These will be constructed to provide a width of 4.5 m and will cover an area of 9,180 m^2 and require c.4,131 m^3 of rock. These roads will be excavated to firm bearing strata and constructed using rock from the turbine foundation excavations, the proposed borrow pit or imported to Site from a nearby quarry as outlined in **Table 2.4**.

The site access track layout follows the existing access track into the Site as far as possible, avoids environmental constraints, and follows the natural contours of the land. Every effort has been made to minimise the length of track necessary.

The site access tracks will be upgraded to carry a minimum 12 tonne axle construction loading. The design will consist of 150 mm of 50 mm Down Quarried Rock / Gravel Pavement on an average of 400 mm Down Crushed Run Rock. The proposed site access track construction detail is shown in **Figure 2.5.** Passing bays and road widening will allow vehicles to safely pass each other. This is highlighted in **Drawing No. 6460-JOD-GLWF-XX-DR-C-0202 and 6460-JOD-GLWF-XX-DR-C-0205**.

The surface of the site access tracks will be maintained during the construction phase. Harmful constituents such as hydrocarbons pose a risk of environmental contamination and also a risk to human health if found in drinking water sources. All imported stone to the Site will have undergone appropriate quality testing to Transport Infrastructure Ireland (TII) specifications.

The pre-existing unpaved tracks on site traverse over several rivers and small drains which flow through culverts beneath the unpaved tracks at the Site. This is further detailed and assessed in **Chapter 9: Hydrology and Hydrogeology**. In addition to the pre-existing crossings at the Site, new access tracks will also be constructed to facilitate access to turbine and hardstand positions. The newly constructed access tracks will not cross any additional EPA mapped rivers or streams which have been deliberately avoided through the design process. There are numerous small man-made and natural drainage channels at the Site which are identified on **Figure 9.7**. Due to the large quantity of small drains existing at the Site, the turbine access road layout could not avoid intersecting several drainage channels at the Site. Many of the drainage channels at the Site are man-made and were dug out in relatively straight lines to improve land drainage. Some of the small drains will be diverted whilst others will be culverted with appropriately sized culverts as set out in the Surface Water Management Plan attached to **Appendix 2.1**.

The site access tracks will only be used temporarily during construction and will be used very infrequently during the operational phase for occasional maintenance activities. The volume of water in the small drains at the Site is generally minimal, many of these drains are ephemeral and dry out completely during dry spells, they are not classified as rivers or streams by the EPA or Tailte Éireann.

Careful planning of culvert sizing and the drainage diversion methodology detailed in the Surface Water Management Plan will see that the crossing of small drains at the Site will result in an anticipated negligible flood risk posed at site access tracks crossing over drainage channels.

No significant risk of flooding has been identified as a result of the Proposed Development due to the elevated nature of the Site relative to the surrounding area.

2.7.6 Met Mast

As part of the grid code[4] requirements, all wind farms with an installed capacity of greater than 10 MW are required to supply continuous, real-time data for the wind farm location. The data required is the wind speed and wind direction at turbine hub height, air temperature and air pressure. The data required for the Proposed Development will be provided by a dedicated Meteorological Mast of 100 m in height (location as detailed in **Figure 1.1**).

The Met Mast will be located on the southwest of the Site as detailed in **Figure 1.2** and will be a free-standing lattice type structure as shown in **Figure 2.7**. The Met Mast foundation will be approximately 12 m by 12 m, with a depth of 2.25 m and will be designed and constructed similar to the Turbine Foundations. It will encompass a cast-in insert or bolts to connect to the bottom of the Met Mast and reinforced bar structural elements. The area around and above the foundation will be backfilled with compacted granular material (gravel like material). The Met Mast will be linked to the Onsite Substation and Control Building via buried Internal Cabling for power and communication and will be required for the full operational duration of the Proposed Development.

2.7.7 Electrical Substation, Control Building and Associated Compound

It is proposed to construct a 110 kV Electrical Substation on the Site, as shown on **Figure 1.2**. This will provide a connection point between the proposed wind farm and the proposed Grid Connection Route Options at either Dunmanway or Carrigdangan 110 kV substations. Electricity transmitted between the turbines and the substation on the Site will be at 33 kV.

The substation will serve two main functions:

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

The construction and electrical components of the Onsite Substation and Control Building will be to ESB specifications within the parameters assessed. ESB specifications are published yearly on the ESB Networks website. The substation compound will be c. 5,550 m^2 and will be 0.3 m in depth and will be constructed from engineered stone material using similar construction techniques as for the crane hardstands, subject to Eirgrid specifications at the construction phase. The overall compound will be enclosed by a 2.65 m high palisade fence and will contain a single building, ancillary equipment, including the transformers, switch gear, fault protection, metering, car parking and other ancillary elements necessary for the operation of the Proposed Development.

[4] EirGrid (13 March 2023). EirGrid Grid Code Version 12

The Onsite Substation building will contain control elements for the Proposed Development. The control components housed at the Onsite Substation and Control Building will include metering equipment, switchgear, the central computer system and electrical control panels. The control building will be a single story pitched roof structure with traditional rendered finishes and measure approximately 15.275 m x 6.12 m with a floor area of approximately 93.48 m^2, subject to Eirgrid specifications at the construction phase. Details of the Onsite Substation and Control Building are shown on **Figure 2.8**. The appearance and finish of the substation building will be similar to an agricultural building with a slated roof and nap plaster finished proposed. It will have a suitably sized footpath around it and an adjacent parking area. The final finish of the control building will be an off-white or grey colour which best fits into the rural Irish landscape.

The Onsite Substation and Control Building will also contain an Eirgrid control building, control room, switchgear room, small store, an office and toilet.

There will be two lightning monopole protection masts which will be approximately 15 m in height, subject to Eirgrid specifications at the construction phase and associated site works. Warning / health & safety signage will be displayed as is normal practice for such installations. Motion sensitive lighting only will be used. Lighting is assessed in **Chapter 6: Biodiversity** and **Chapter 11: Landscape and Visual Amenity**. It is proposed to install a rainwater harvesting system as the source of water for toilet and welfare facilities and potable water being brought onsite in bottles. Wastewater from the staff welfare facilities in the control building will be collected in a sealed storage tank, fitted with a high-level alarm. This is a device installed in a fuel storage tank that is capable of sounding an alarm, during a filling operation, when the liquid level nears the top of the tank. All wastewater will be tankered off-site by a licensed waste collector to the Ballingeary wastewater treatment plant, which is located approximately 7.3 km north of the Proposed Development. There will be no onsite treatment of wastewater.

A telecommunication antenna will be fixed externally to the substation control building for communication and control purposes (e.g. for the Supervisory Control and Data Acquisition (SCADA) System) for the Developer, turbine suppliers and ESB networks. There will be a small area outside the compound and adjacent to the access track that will be a hard-surfaced area for operation and maintenance for parking spaces, subject to Eirgrid specifications at the construction phase.

2.7.8 Transformers and Wind Farm Internal Cabling

The power generated by each wind turbine will be transmitted via underground Wind Farm Internal Cabling to the new 110 kV Onsite Substation and Control Building, at 33 kV, as will the communication signals whose cables will be installed in the same trench. The Wind Farm Internal Cabling network will be installed in trenches approximately 0.6 m wide by 1 m in depth and there will be approximately 5,530 m of Wind Farm Internal Cable trenching (giving a surface area of approximately 3,320 m²). The cable ducting will be installed to ESB Networks Limited requirements as per the design. A cross-sectional drawing is shown in **Figure 2.9**.

The electrical and fibre-optic cables running from the turbines to the Onsite Substation and Control Building compound will be run within the site access tracks and/or their verges. Where the cables are located in blanket bog habitat, they will be laid in the existing and proposed site access tracks themselves to minimise land take and disruption in this habitat. This will be the case for the cables between T6, T7, T8 to the site entrance at L8544. The potential effects on blanket bog habitat are identified, addressed and mitigated against in **Chapter 6: Biodiversity**. The potential effects associated with peat and the risk of peat slippage are identified, assessed and mitigated against in **Chapter 8: Soils and Geology**.

The Wind Farm Internal Cabling routes will be bedded in surplus excavated soil material. Danger tape, incorporating a metallic strip, will be laid during backfilling. Where the Wind Farm Internal Cabling is to cross site access tracks, suitable electrical ducting will be provided. Permanent posts up to approximately 0.5 m in height will mark the trenches at regular intervals and at all changes in direction. An as built layout plan showing the location of underground Wind Farm Internal Cabling will be on permanent display within the control building.

Clay plugs or concrete cut offs will be installed at regular intervals in the cable ducting trenches where they are located on slopes to prevent the trenches from becoming preferential flow paths for runoff from the Site.

Transformers will be located inside each turbine.

Excavated material will be temporarily stored uphill of the trench excavations which will prevent any sediments from being washed downhill as they will be contained in the trench. Silt fences will be installed downgradient of the excavations on steeper slopes to prevent silt runoff. Peat spoils will be used for remediation and restoration. Other spoil will be

permanently stored in the on-site borrow pit. This is further detailed in the Spoil Management Plan in **Appendix 2.1: Construction Environmental Management Plan** and fully assessed in **Chapter 8: Soils and Geology**.

2.7.9 Grid Connections

This chapter provides a description of the work required along 2 no. proposed Grid Connection Route (GCR) Options and Onsite Substation and Control Building. This element of the Project will be subject to a separate planning consent process but will be assessed within this EIAR.

Connection will be sought from the grid system operators by a separate application to ESB Networks Limited. TLI assessed possible connection options for the Proposed Development. The Onsite Substation and Control Building will connect via underground 110 kV cable to either the Dunmanway (Option A) or Carrigdangan (Option B) ESB 110 kV substations. The overall length of Option A GCR between the substation and the existing Dunmanway 110 kV substation is approximately 28 km, of which, approximately 3.98 km is within the Site with the remainder located along the L8776 and the R587. The overall length of Option B between the substation and the existing Carrigdangan 110 kV substation is approximately 22 km, of which, approximately 3.98 km is within the Site with the remainder located along the L8776 and the L4607. The grid connection can be summarised as follows:

- **Option A - Underground Grid Connection to Dunmanway 110kV Substation** utilising sections of UGC in public road, primarily regional roads, and private lands. [28 km]
- **Option B - Underground Grid Connection to Carrigdangan 110kV Substation** utilising sections of UGC in public road, primarily regional roads, and private lands. [22 km]

The GCR Options are provided in **Figure 2.10.** The grid feasibility studies carried out by TLI can be found in **Appendix 2.2**.

The chosen Grid Connection will be constructed to the requirements and specifications (CDS-GFS-00-001-R1) of EirGrid or most recent specification. The electricity will be transmitted as a three-phase power supply meaning there will be three individual conductors in each cable circuit. The three conductors will be laid in separate ducts which will be laid in accordance with EirGrid functional specifications (CDS-GFS-00-001-R1[5] or

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

most recent specification) for 110 kV underground cables. The width of a 110 kV cable trench with a trefoil formation will be 600 mm. The depth of the trench for 110 kV cables is 1 m. A separate duct will be provided within the trench for fibre optic communications. (Please see **Appendix 2.3**).

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

- All relevant bodies i.e. ESB Networks Limited, Gas Networks Ireland, Eir, Cork County Council, Uisce Éireann etc. will be contacted and up to date drawings for all existing services will be sought so that the grid connection ducting does not damage or interfere with existing services. This will be rechecked by the Contractor prior to excavations taking place.
- Immediately prior to construction taking place, the area where excavation is planned will be surveyed by CATSCAN (sub-surface survey technique to locate any below-ground utilities) and all existing services will be verified. Temporary warning signs will be erected.
- Clear and visible temporary safety signage will be erected all around the perimeter of the live work area to visibly warn members of the public of the hazards of ongoing construction works.
- A silt fencing filtration system will be installed on all existing drainage channels for the duration of the cable construction to prevent contamination of any watercourse.
- A 13-tonne rubber tracked 360-degree excavator will be used to excavate the trench to the dimensions of 600 mm wide by 1.22 m deep.
- Excavated road surface material will be taken to a designated recycling facility licensed to accept this type of material[6].
- Excavated stone and soil will be taken off site for recycling/disposal at a licensed facility.
- Once the trench is excavated, a 50 mm depth base layer of sand (in road trench) or 15 n/mm^2 CBM4 concrete will be installed and compacted. All concrete will be offloaded directly from the concrete truck into the trench.
- uPVC ducts will be installed on top of the compacted base layer material in the trench.
- Once the ducts are installed, couplers (a device used for joining pipes) will be fitted and capped to prevent any dirt entering the unjointed open end of the duct.
- The as-built location of the installed ducts will be surveyed and recorded using a total station/GPS before the trench is backfilled to record the exact location of the ducts.

[6] Or may be reused as part of an innovative scheme which has been used in Cork in 2022 where material can be recycled. Road recycling mixes material from the existing road pavement with bitumen and emulsion for the new surface leading to a reduction in emissions, a reduction on haulage of materials and a conservation of resources, providing substantial environmental benefits.

- The co-ordinates will be plotted on as-built record drawings for the grid connection cable operational phase.
- When ducts have been installed in the correct position on the trench base layer, sand (in road trench) or Lean-mix CBM4 (CL1093) (off road trench) will be carefully installed in the trench around the ducts so as not to displace the duct and will be compacted.
- Timer spacer templates will be used during installation so that the correct cover of duct surround material is achieved above, below and at the sides of the duct in the trench.
- A red cable protection strip will be installed above duct surround layer of material and for the full length of the cable route.
- A layer of Lean-mix CBM4 (CL1093) (in road) will be installed on top of the duct surround material to a level 300 mm below the finished surface level.
- Yellow marker warning tape will be installed for the full width of the trench, and for the full length of the cable route, 300 mm from the finished surface level.
- The finished surface of the road will then be reinstated on a temporary basis to the requirements of the Guidelines for Managing Openings in Public Roads, 2017[7].
- Precast concrete cable joint bays together with communications chambers will be installed within the excavated trench.
- The joint bays will be backfilled and the finished surface above the junction box reinstated on a temporary basis as per the requirements of the Guidelines for Managing Openings in Public Roads, 2017. The cable junction boxes will be re-excavated a second time during cable pulling and jointing, after which the finished surface above the joint bays will be reinstated again to its original condition. When trenching and ducting is complete, the installation of the grid connection cable will commence between the Onsite Substation and Control Building and the existing 110 kV substation at either Dunanway or Carrigdangan.
- The underground cable will be pulled through the installed ducts from a cable drum set up at one joint bay and using a winch system which is set up at the next joint bay, the cable will be pulled through.
- The cables will be jointed together within the precast concrete cable junction box (Joint Bay).
- The joint bays will be filled with sand to meet specific resistivity properties and concrete covering slabs installed.
- The finished surface above each cable joint bay is reinstated on a permanent basis to the requirements of the Guidelines for Managing Openings in Public Roads, 2017.

[7] https://www.gov.ie/en/publication/eda1ae-guidelines-for-managing-openings-in-public-roads-2017/

2.7.9.1 Joint Bays

Joint Bays are pre-cast concrete chambers where individual lengths of cables will be joined to form one continuous cable. A joint bay is constructed in a pit. Each joint bay will be 6 m long x 2.5 m x 2.3 m deep and placed approximately every 700 m – 850 m along the route A reinforced concreted slab will be constructed on top of the bay.

The joint bay locations have been dictated by suitable terrain, spacing requirements, and access to facilitate the operation of cable pulling equipment at any phase of the Proposed Development and future operation of the installation in accordance with the EirGrid specifications (CDS-GFS-00-001-R1[8]).

The joint bays will be filled with sand to meet specific resistivity properties and concrete covering slabs installed.

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

2.7.9.2 Directional Drilling Works

Appendix 2.2 shows details of the Grid Connection Routes and the locations of the HDD crossings for each GCR Option. There are 22 no. watercourse crossings along the GCR Option A and 18 no. watercourse crossings along GCR Option B. Directional drilling is the practice of drilling holes in a non-vertical direction for the laying of ducts which contain cables beneath features such as watercourse and this is what is proposed to traverse watercourse crossings. The directional drilling commences at the launch pit which is the entry point for pipes and ducts to be placed. Pipes and ducts are brought through the drilled hole to a receiving pit on the opposite side of the hole to the launch pit. The crossings will comprise 4 x 110 mm High Performance Polyethylene (HPPE) pipes/ducts each directionally drilled. Two separate excavations will be made to a depth of 2 metres to accommodate the directional drilling launch and reception pits in the road on either side of the crossing (no third-party lands either side of the road are anticipated to be required). Spoil arisings will be loaded onto trucks for disposal off-site as soil is excavated. The excavation launch and reception pits will be reinstated using compacted layers of crushed stone on completion of drilling and jointing operations.

[8] CDS-GFS-00-001-R1 110 kV, 220 kV and 400 kV Underground Cable Functional Specification, Engineering & Asset Management Department (Eirgrid Group), 2021.

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

The drill position is always known to the operator and the drill can be manoeuvred in 3 planes / axis. A surveyor will monitor drilling works to ensure that the modelled stresses and collapse pressures are not exceeded. A drilling lubricant will be required, and this will be delivered directly to the drill head by hydraulics. The lubricant will be chemically inert bentonite slurry mixture which lubricate the drill head and remove the drilled earth and stone. Once the conduit is completed, the drill head is exposed at the reception pit and removed. Once the first pilot hole has been completed a hole-opener or back reamer will be fitted in the exit pit and will pull a drill pipe back through the bore to the entry side. The drill rods are connected to the duct pipe and the drill is reversed pulling the pipe back through the conduit.

A spoil volume of 5 m^3 will be excavated for each 100 m run of 4 pipes. This spoil will be largely subsoil material. This material will exit the launch pit within the bentonite slurry mixture. A mobile bunded tank will be located next to the launch pit into which the material/slurry mixture will be pumped. This will be stored outside of the 20 m watercourse buffer zone.

Mitigation measures are set out in the Construction Environmental Management Plan (**Appendix 2.1**) and in EIAR Chapters **8: Soils and Geology** and **9: Hydrology and Hydrogeology**.

2.7.10 Borrow Pit

One borrow pit is being proposed to enable on site stone extraction for the construction of part of the site access tracks and the Turbine Hardstands. It will be located to the north of the Site, between the Temporary Construction Compound and T1. The location is shown in **Figure 1.3**. Spoil will initially be excavated and stockpiled locally or for re-use for site remediation purposes.

Rock breaking equipment will be employed for borrow pit stone extraction. This will involve the use of a 40-60 tonne 360-degree hydraulic excavator with a rock breaker. The rock breaker is supported by a smaller 30-40 tonne rock breaker which breaks the rock down further for feeding into the rock crusher machine. The larger rock breaker breaks out the rock in a progressive manner from the borrow pit (similar to that of the Turbine Foundations)

and the smaller rock breaker breaks it down further. Rock breaking is fully assessed in **Chapter 10: Noise and Vibration** and **Chapter 8: Soils and Geology**. No blasting will be carried out on site, either for borrow pit excavation or for excavation of Turbine Foundations.

The broken-down rock will be loaded into an on-site mobile crusher using a wheeled loading shovel machine and crushed down into the correct grade for use in the civil construction of site access tracks and Turbine Hardstands. Where the borrow pit area becomes exhausted or impractical to extract due to physical site constraints, physical excess stone requirements will be imported to the Site from a nearby quarry as shown on **Figure 2.4**.

2.7.11 Turbine Foundation Rock Breaking

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

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

2.7.12 Onsite Drainage

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

Drainage measures will be provided to attenuate runoff, guard against soil erosion, soil compaction, and safeguard local water quality. Details of the drainage system are shown on **Figure 2.11-2.13** and outlined in detail in the Surface Water Management Plan, part of the CEMP attached as **Appendix 2.1** and full details are provided in **Chapter 9: Hydrology and Hydrogeology.**

Watercourses on site consist of manmade drainage channels and headwaters of the Inchiroe and Shehy Beg Rivers, some of which are ephemeral. Sustainable Urban Drainage System (SuDS) principles will be employed as follows:

Source controls for surface water

- Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sandbags, oyster bags filled with gravel, filter fabrics, and other similar/equivalent or appropriate systems
- Small working areas, covering stockpiles with geotextiles layering to protect against water erosion and runoff in rainy weather, and/or cessation of works in certain areas such as working on a high gradient during wet and windy weather.

In-line controls for surface water

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

Treatment systems for surface water:

- Temporary sumps and attenuation ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbusters and/or other similar/equivalent or appropriate systems.

When heavy rainfall is forecasted, then works will be suspended and postponed to when better weather conditions are forecasted.

Further details on drainage management and mitigation can be found in **Chapter 9: Hydrology and Hydrogeology** and the Surface Water Management Plan attached in the CEMP as part of **Appendix 2.1.**

2.7.13 Table of Key Development Infrastructure Metrics

The Key Development Infrastructure Metrics are contained in **Table 2.7**. This table is provided for ease of reference for EIAR chapter authors and for readers of this EIAR.

Table 2.7: Key Development Infrastructure Metrics

Description	Length [m]	Width [m]	Depth [m]	No.	Area [m^2]	Volume of Excavation [m^3]
Upgraded Site Access Track	3,790	4.5	0.45	-	17,055	7,675
New Site Access Track	2040	4.5	0.45	-	9,180	4,131
Internal Cabling (power & communications)	5,530	0.6	1.00	1	3,320	3,320
Turbine Hardstands – Access Road	1425	-	0.3	8	7,125	2,138
Turbine Hardstands – Hardstand Areas	-	-	0.3	8	33,240	9,972
Turbine Foundations (25.5m diameter)	-		2.25	8	4,090	9,200
Turning Heads	-	-	0.45	4	2,330	1,050
Junctions	-	-	0.45	-	9,130	4,108
Met Mast foundation	13	12	2.25	1	156	350
Electrical Substation	97.44	56.97	0.3	1	5,550	1,665
PP Compound at Substation	34.78	56.97	0.3	1	1,980	595
TDR Road Widening Overrun Area	-	-	0.45	-	3,480	1,555
Borrow Pit	-	-	1.5	1	8,150	12,225
Site Compound	80	35	0.3	1	2,800	840

Description	Length [m]	Width [m]	Depth [m]	No.	Area [m^2]	Volume of Excavation [m^3]
110kV Cable Grid Connection (Option A and B) Up to Site Entrance	3,715	0.825	1.315	1	3,065	4,030
110kV Cable Grid Connection (Option A) Site Entrance to End	17,961	0.825	1.315	1	14,818	19,485
110kV Cable Grid Connection (Option B) Site Entrance to End	18,020	0.825	1.315	1	14,867	19,549

Taking the above figures into consideration, the land take from the Proposed Development will be 125,298 m^2 (12.5 ha) which is the sum of the figures above which are to be retained following construction e.g. site access tracks, Turbine Foundations, Met Mast Foundation, Turbine Hardstands, Met Mast Hardstand and 110 kV Onsite Substation and Control Building. The Grid Connection Routes will involve works on 14,818 m^2 for Option A or 14,867 m^2 for Option B (**Table 2.7**) of area on the public roads to be reinstated following the laying of the ducts and so is classed as temporary land take.

2.7.14 Site Signage

Signs will be placed (in accordance with any planning conditions issued) on the L8544 showing directions to the Site in the English and Irish languages. Additional signage can also be placed on the public road, warning of construction vehicles entering and egressing the Site for road safety measures.

Within the Redline Boundary, the Site entrance on the L8544 will have a sign confirming that it is the entrance to the Site and the speed limit of 30 km/h. There will also be additional signs during the construction phase confirming that construction works are taking place and proper precautions must be taken by anyone entering the Site. There will be no entry to unauthorised persons or the general public during construction. Additional details can be found in **Chapter 14: Traffic and Transport.**

Four no. information boards will be erected on site which will provide information about the local archaeological and cultural heritage of the Site. This is further detailed in **Drawing No.'s 6460-JOD-GLWF-XX-DR-C-0205, 6460-JOD-GLWF-XX-DR-C-0206, and 6460-JOD-GLWF-XX-DR-C-0208;** and in **Chapter 13: Cultural Heritage**.

2.7.15 Peat and Spoil Management

2.7.15.1 Spoil Quantities

The quantities of spoil likely to be generated at the Proposed Development have been calculated by Jennings O'Donovan & Partners. It is estimated that based on site surveys carried out by EcoQuest Environmental using peat probes that the amount of peat spoil predicted to be generated during construction of the wind farm is approximately 55,806 m^3 of peat spoil.

The total amount of cut material below the peat layer estimated from the Proposed Development is approximately 210,000 m^3 with the amount of fill being estimated at 196,000 m^3. This means 14,000 m^2 of additional material will be needed which will be sourced from Turbine Foundation excavations and the borrow pit.

2.7.15.2 Landscaping & Reinstatement

The levels of peat on site are generally low. Berms or large designated storage areas for the storage of spoil will not be permitted. However, any peat spoil will be used to safely and appropriately to reinstate exposed areas around infrastructure such as slopes/graded ground around site access tracks and Turbine Hardstands and on the Turbine Foundations or where there is degraded bog that can be enhanced by depositing peat on it. This will be done under the supervision of the Site Engineer and Ecological Clerk of Works and is assessed in both **Chapter 6: Biodiversity** and **Chapter 8: Soils and Geology** of this EIAR.

Peat that cannot be used for reinstatement around the Site, will be taken into the borrow pit. The designated borrow pit area measures 8,150 m^2 (0.8 ha) and a capacity of approximately 12,225 m^3 assuming that spoil can be stored up to a total height (for safety reasons) of approximately 1.5 m. This will allow the total estimated amount of spoil to be stored taking into account a bulking factor of 10% (total of approximately 13,448 m^3). These areas are shown on **Figure 1.2(b)** and the existing site conditions are shown in **Plates 2.1** and **2.2**.

2.7.15.3 Non-Peat Spoil

It is envisaged in the design that all the non-peat material won on Site can be used as fill on site and in the following places:

- Subsoil to be used around the blade laydown areas where load capacities required are less; and
- Rock won from excavations to be used within site access track and Turbine Hardstand build up.

There will also be spoil generated from the Grid Connection Route Options works. This will be in the form of tarmacdam/asphalt, compacted rock fill material and subsoils. The total amount of spoil material from the Grid Connection Route Options works is estimated to be 10,775 m^3 for Option A or 10,812 m^3 for Option B. Asphalt will be re-used where possible or placed on the market for new construction projects as recommended by the Environmental Protection Agency[9]. The remaining material will need to be taken off site and recycled/disposed of at Benduff Landfill Site which is an appropriate licenced facility to deal with inert waste.

2.7.16 Ecological Enhancement

An area of land of approximately 20 ha has been designated within the Site that will be used as a habitat enhancement area. The target habitat occurring in the HMP Management Lands are wet heath and montane heath habitat. It is noted that none of the lands currently included in the c. 20 Ha of HMP Management Lands are managed under any nature conservation schemes, and thus there are no restrictions to land management practices, which is evident by virtue of excessive livestock grazing pressure, throughout the Site, in within areas of lower elevation and level ground within the HMP Management Lands. The implementation of this HMP as part of the overall Gortloughra Wind Farm project provides an opportunity to manage and conserve the area of wet and montane heath habitat occurring within the HMP Management Lands, as well as the HMP Restoration Lands for the lifetime of the Proposed Development. The land use restrictions that would be required for habitat restoration in this area will comprise:

1. Fencing of Habitat Management Plan (HMP) lands that will be treated for the establishment and enhancement of heath habitat – this point applies to areas of the construction phase footprint that will be treated with the aim of returning the vegetation to heath habitat.

[9] https://www.epa.ie/news-releases/news-releases-2023/epa-publishes-national-criteria-that-allow-for-the-safe-reuse-of-site-won-asphalt-road-planings-as-a-by-product.php [Accessed 14/11/2024]

2. Restriction of livestock in lands subject to Point 1 and for at least the initial 3 years to allow of establishment of heath vegetation in these areas.
3. Where monitoring indicates that it is suitable to allow grazing after year 3 in lands subject to Point 1, then grazing will can commence. If the results of monitoring indicate failure of establishment of heath vegetation, then grazing restriction may need to be extended while remedial habitat management actions, such as seeding with heather etc., are undertaken.
4. Grazing in the HMP landholding should be by sheep only once grazing is allowed.
5. Monitoring would be ongoing for the lifetime of the wind farm e.g. years 1 – 3, 5, 7, 10, 15, 20 ,25, 30. Additional more localised measures where relevant could also be specified in the HMP e.g. drain blocking etc.

Further details on biodiversity enhancement can be found in **Chapter 6: Biodiversity and Appendix 6.5: Habitat Management Plan**.

2.7.17 Archaeology and Cultural Heritage

There is an enclosure (CO093-078003-) located 5 m south of an area of fill to be introduced on the south side of the track to reduce the gradient of a steep slope in this area. This will not require any ground excavation work within the fill area.

A hut site (CO093-078001-) is 12 m south of an area of fill to be introduced to reduce the gradient of a steep slope on the south side the existing track. This will not require any ground excavation work fill area.

An second hut site (CO093-078002-) is 10 m south of an area of fill to be introduced to reduce the gradient of a steep slope on south side of existing trackway to the north. This will not require any ground excavation work within the fill area.

A third and final hut site (CO093-078004-) is 5 m south of an area of fill to be introduced to reduce the gradient of a steep slope on south side of existing trackway to the north. This will not require any ground excavation work within the fill area.

These sites are fully assessed in **Chapter 13: Cultural Heritage**.

2.8 CONSTRUCTION

The construction phase will begin with site preparation works and will be complete when the turbines are built and ready for commissioning, and when all wastes have been removed from the Site. For this Proposed Development, it is envisaged that the construction phase will last approximately 16-18 months. An indicated construction programme is set out at **Table 2.8**.

Table 2.8: Indicative Construction Programme

Activity	Month															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Site Establishment/ Fencing off	X															
Internal Access Road Upgrade & Construction and Turbine Delivery Route works		X	X	X	X											
Substation & Compound Construction				X	X	X	X									
Substation Electrical Works									X	X	X	X	X	X		
Substation Commissioning										X						
Excavation & Construction of Turbine Foundations & Hardstands		X	X	X	X	X	X	X	X							
Internal Cabling Installation								X	X	X						
Turbine Delivery and Erection										X	X					
Grid Connection									X	X	X	X	X			
Energisation														X		
Turbine Commissioning															X	X
Site Restoration															X	X

2.8.1 Construction and Environmental Management Plan (CEMP)

A CEMP is appended to the EIAR in **Appendix 2.1**. The CEMP includes all the mitigation measures proposed within the EIAR and the NIS. A Summary of the mitigation measures is also included in **Appendix 18.1**. In the event that planning permission is granted for the Proposed Development, the CEMP provides a commitment to mitigation and monitoring and reduces the risk of pollution whilst improving the sustainable management of resources. The environmental commitments of the Proposed Development will be managed through the CEMP and will be secured in contract documentation and arrangements for construction and later phases, such that there will be a robust mechanism in place for their

implementation. The CEMP addresses the construction phase, and will be continued through to the commissioning, operation and final decommissioning phases (refer to Decommissioning Plan as part of the CEMP in **Appendix 2.1**). An Ecological Clerk of Works (ECoW) with experience in overseeing wind farm construction projects will be appointed by the Developer for the duration of the construction phase so that the CEMP is effectively implemented. The Contractor will be required to appoint an Environmental Manager.

2.8.2 Refuelling

Vehicles will be refuelled off-site where possible. For vehicles that require refuelling on-site, fuels will be stored in the Temporary Construction Compound and bunded to at least 110% of the storage capacity of fuels to be stored. Refuelling will take place via a mobile double skinned fuel bowser. The bowser will be a double axle refuelling trailer which will be towed to the refuelling locations by a 4x4 vehicle. The 4x4 will carry, a drip tray, spill kit and absorbent mats in case of any accidental spillages. Only designated competent personnel will refuel plant and machinery on the Site. This is further assessed in **Chapter 9: Hydrology and Hydrogeology**.

2.8.3 Concrete

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

The main concrete pours at the turbine locations will be planned in advance and proposed mitigation measures are detailed in **Chapter 9: Hydrology and Hydrogeology**. The potential effects associated with concrete are identified, assessed and mitigated against in **Chapter 9** and demonstrates how the protection of the environment has further influenced the project design.

The chutes wash out on-site will require a small volume of water. This water will be directed to the concrete washout area which will be a temporary lined impermeable containment area or a siltbuster type washout unit[10] or similar. The unit catches solid concrete and filters and contains the washout liquid for pH adjustment and solid separation. The residual liquids and sediments will be disposed of at an appropriately licenced facility, namely Ballingeary Water Treatment Plant.

[10] https://www.siltbuster.co.uk/solutions/concrete-washwater/

If a temporary lined impermeable containment area is used, it will be constructed using straw bales and lined with an impermeable geotextile membrane. An example is shown on **Plate 2.1**. An alternative construction method would be to dig a hole in the ground and place an impermeable geotextile membrane in the hole so that no wastewater can penetrate the cover and seep into the soil and groundwater.

Plate 2.1: Example of a Temporary Concrete Washout Area

The washout area is covered when not in use during periods when wet weather is forecast to prevent ponding of rainwater. During periods of dry weather, the area can be left uncovered to allow evaporation of water. Once concrete pours have been completed, the remaining water will be tankered off site to a licenced facility for disposal. Solid concrete can be broken up and disposed of at a licenced facility along with other construction waste. It is estimated that there will be approximately 1-2 m^3 of solid concrete waste per Turbine Foundation pour that will need to be disposed of, or a maximum of 18 m^3 in total.

It is expected that the Turbine Foundations will be left in-situ during decommissioning and so will not require breaking up and disposal.

Deliveries of concrete for Turbine Foundation construction are generally carried out outside of normal working hours to limit impacts on traffic and local road users. The noise impacts of these deliveries have been assessed in detail in **Chapter 10: Noise and Vibration**. Each turbine pour can take place in a single day, so over eight days in this case.

The concrete trucks will not be washed out on site but will be washed out on return to the batching plant. The Transport Management Plan (TMP) specifies the routes and arrangements for concrete delivery as well as outlining emergency measures to be taken. Refer to TMP in **Appendix 14.2**. Quarries and concrete suppliers in the area are shown on **Figure 14.1**.

2.8.4 Waste Generation

During construction a number of types of waste will be generated from the Proposed Development. The types and estimated quantities are shown in **Table 2.9**. A detailed Waste Management Plan accompanies this EIAR in **Appendix 2.1: CEMP**.

Table 2.9: Types of Waste from Construction

Waste Type	Estimated Quantities
General (segregated wastes from canteen, plastic, cardboard, etc.)	1 skip/month
Concrete	18 m^3
Plastic (10kg/turbine blade)	240 kg
Cable Offcuts	1 tonne
Timber Pallets	20 - 30
Timber Cable Drums	30 - 40
Oils/Fluids	N/A
Metals	1 skip/month

The Contractor will avoid or minimise the volume of waste generated.

Waste will be stored a minimum of 50 m from nearby watercourses or drains at the Site.

Waste storage and disposal will be carried out in a way which prevents pollution in compliance with legislation.

All waste to be transported off-site to a licensed disposal site. The nearest licenced waste facility is 9 km to the east of the Site in Dunmanway (Civic Amenity Services). Excavated material along the Grid Connection Route will be removed to a licenced waste facility.

All oil storage facilities will have secondary containment facilities of 110% storage capacity (e.g., bund, enclosure, drip tray). All of these will be regularly inspected for visual signs of leaks or something that would impact on their capacity – e.g., a drip tray full of rainwater. This is further detailed in **Appendix 2.1: Construction Environmental Management Plan**.

Waste storage areas will be clearly located and signed. Key waste streams will be separated.

Cable drums will be collected onsite for reuse, while cable offcuts will be transported off-site to be recycled at an appropriately licensed facility such as at the Ashgrove Recycling & Waste Management Centre, which is located approximately 50 km east of the site in Cork City. Metals will be recycled at an appropriately licensed facility such as KWD Recycling in Killarney.

All waste will be transported from Site at appropriate frequency by a registered waste contractor to prevent over-filling of waste containers.

Frequency of Checks. The contractor will see that all storage facilities are checked on a weekly basis.

Only trained operatives will handle hazardous substances. Any and all stored hazardous waste (e.g., 17 05 03* soil and stones containing hazardous substances) will be clearly labelled.

During operation, it is not anticipated that significant quantities of waste will be generated from the Proposed Development. Should a turbine blade need to be replaced (due to damage), then some plastic waste will be generated, which can be expected to be similar to the construction phase, that is approximately 10 kg of plastic waste per blade.

2.8.5 Dust Suppression

During periods of dry and windy weather, there is potential for dust to become friable and cause nuisance to nearby residences and users of the local road network. This is further assessed in **Chapter 15: Air and Climate**, **Chapter 14: Traffic and Transport** and **Chapter 12: Material Assets**. Damping down (wetting of the surface) may be required to provide that dust does not become friable. A wheel cleaning facility will be employed on-site where mud and debris will be removed from vehicles egressing the Site and reduce

mud and debris from getting onto the local road network, in particular the L8776, by which all traffic to the Proposed Development will access the Site, where it could dry out, become friable and potentially cause a nuisance. HGVs entering the Site carrying aggregates will be covered to prevent dust generation. A road sweeper will be available for use on the approach roads to the Proposed Development in case of any mud or debris making it onto the public road network.

2.8.6 Construction Hours

It is estimated that the Proposed Development will have approximately 92 construction workers during the peak construction phase. Working hours for construction will be from 07:00 to 19:00 on weekdays, with reduced working hours at weekends, from 08:00 to 13:00 on a Saturday. No work will be carried out on Sundays or Public Holidays. It should be noted that during the turbine erection phase, operations will need to take place outside those hours to facilitate Turbine Foundation construction and so that lifting operations are completed safely. Hours of working for Turbine Foundation construction will be agreed with Cork County Council prior to the commencement of Turbine Foundation construction. A detailed Traffic Management Plan ("TMP") (**Appendix 14.2**) will be implemented for the construction phase, which shall be agreed during the planning compliance stage with the Planning Authority so that strict controls as described herein are in place with all suppliers coming to the Site.

2.8.7 Construction Compound and Temporary Works Area

The Temporary Construction Compound will be set up upon commencement of the construction phase. The proposed location for the Temporary Construction Compound is found in the northern portion of the Site, at the site entrance as shown in **Figure 1.2(a)** and the layout is shown in **Figure 2.14**. The compound will be 80 m by 35 m and approximately 0.3 m in depth [2,800 m^2 / 840 m^3]. The compound will be used as a secure storage area for construction materials and to contain temporary site accommodation units for sealed type staff welfare facilities. The compound will contain cabins for office space, meeting rooms, canteen area, a drying room, parking facilities, and similar personnel type facilities.

Temporary widening of the site access tracks and provision of passing bays will allow vehicles to pass each other safely during the construction phase.

An area within the compound will be used for the storage of fuel and oils and this will be suitably bunded. The bund will be lined with an impermeable membrane in order to prevent any contamination of the surrounding soils, vegetation and water table. Double protection

containers / equipment will be used along with drip trays and details are included in the CEMP, included as **Appendix 2.1**.

During the construction phase, water will be supplied by a water bowser. The maximum wastewater production is estimated to be the same as the maximum water consumption (up to 2,000 litres per day). The Project will include an enclosed wastewater management system at the Temporary Construction Compound capable of handling the demand during the construction phase with 92 construction workers on site at peak. A holding tank is proposed for wastewater management. Wastewater will be removed off-site and disposed of at an appropriately licensed Wastewater Treatment Plant such as Ballingeary Wastewater treatment plant (D0431-01).

2.8.8 Construction of Turbine Hardstands and Turbine Foundations

The construction method for all the Turbine Hardstands will be via excavated approach to approximately 0.3 m depth. Each Turbine Hardstand will be approximately 85 m by 65 m. Foundations will be taken down to competent bearing strata by excavating through the soil, subsoil, and rock if necessary.

The locations of Turbine Hardstands and Turbine Foundations were designed on a constraints-based approach during the feasibility stage of the Project so that the placement of turbines is optimised from an environmental and production perspective. Peat was avoided in this process.

The method of construction for turbine foundation is also described below:

- Install temporary drainage around perimeter of excavation
- Excavate soil and rock
- Form a level working area to build foundation
- Install formwork and reinforcement
- Pour concrete
- Cure concrete
- Once the concrete has set and the earthing system is in place, backfill the foundation with rock
- Use soil to build up the area around the turbine base

2.8.9 Construction Turbine Assembly

Once on Site, the wind turbine components will follow a detailed route and plan to minimise manoeuvring. Components will be placed on Turbine Hardstands prior to assembly. It is

proposed that a 'just in time' delivery strategy will be in place for turbine blades to reduce the need for temporary set down areas. Typically, one large crane (750-1,000 tonnes) will be required for erecting the turbines, assisted by a smaller crane (150-200 tonnes). Similar cranes will also be required for maintenance during the operational phase. As with all other vehicles, refuelling of cranes will be carried out in accordance with site procedures to minimise the risk of spillage or pollution.

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

1. The blades can be attached to the nacelle and hub on the ground. The hub and blades are then lifted as one.

2. The hub can be attached to the nacelle and the two blades attached to the hub while the nacelle is on the ground – the "bunny lift". The nacelle is then lifted into position and the third blade lifted into place separately. This requires manoeuvring of several components on the ground and usually the repositioning of cranes.

3. Lifting the nacelle and hub as one unit, as described above and then attaching the blades one at a time, rotating the hub between lifts. The blade lifting operations do not require repositioning of the crane.

The most appropriate method from the three described above, will be decided by the lifting contractor and the turbine manufacturer, prior to turbine erection. Risk of accidents has been assessed in **Appendix 2.1: Construction Environmental Management Plan** (Emergency Response Plan) and in **Chapter 17: Major Accidents and Natural Disasters**.

2.8.10 Construction Traffic

It is estimated in **Chapter 14: Traffic and Transport**, that during civil construction, 8,017 fully loaded Heavy Goods Vehicle trips will be required for the Proposed Development. This breaks down to 668 loads per month or an average of 21 to 23 loads per day.

The peak number of deliveries per day will occur during the concrete pour for Turbine Foundation construction. An estimated 100 concrete deliveries will be required per Turbine Foundation. Other materials will also be delivered on such days, so a realistic estimation of

peak deliveries is 110 deliveries per day (for 8 separate days in the construction programme when the Turbine Foundations will be poured). On these concrete pour days, 14-18 deliveries per hour will be required.

The total amount of spoil material from the grid connection works on the public road network is estimated to be 10,775 m^3 if Option A is chosen or 10,812 m^3 if Option B is chosen. This material will need to be taken off site and recycled/disposed of at an appropriate licenced facility, in this case Dunmanway Civic Amenity Centre and this will lead to 1,201 (Option A) or 901 (Option B) HGVs travelling from the grid connection works to the disposal site.

Prior to construction commencing on site, the Traffic Management Plan (TMP) will be developed by the Contractor and submitted to Cork County Council for agreement. This Plan will contain details of all proposed signage on the L8544 warning of the entrance to the construction site/wind farm. Please see **Appendix 14.2** for TMP. In the event planning permission is granted for the Proposed Development, the final TMP by the Contractor will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned.

2.8.11 Construction and Management of Site Drainage

Drainage measures will be implemented to the Proposed Development to attenuate runoff, guard against soil erosion, soil compaction, and safeguard local water quality. Details of the proposed drainage system are shown on **Figure 2.11** to **2.13**. Please note that the drainage plan will be subject to a detailed design process at pre-construction phase but will conform to the parameters set out in the EIAR. Full details are provided in **Chapter 9: Hydrology and Hydrogeology**.

A buffer zone of 50 m will be in place for natural streams where possible. The main watercourse is the Shehy Beg River which runs along the Redline Boundary on the east of the Site. Best practice Sustainable Urban Drainage System (SuDS) principles will be employed as follows:

- Source controls for surface water:
    - Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sandbags, oyster bags filled with gravel, filter fabrics, and other similar/equivalent or appropriate systems.
    - Small working areas, covering stockpiles, weathering off stockpiles, cessation of works in certain areas or other similar/equivalent or appropriate measures.
- In-line controls for surface water:

- Interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sandbags, oyster bags, straw bales, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps/attenuation lagoons, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriates systems.

- Treatment systems for surface water:
  - Temporary sumps and attenuation ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbusters and/or other similar/equivalent or appropriate systems.

If heavy rainfall is predicted, then works will be suspended or scaled back.

Further details on drainage management and mitigation can be found in **Chapter 9: Hydrology and Hydrogeology**.

2.8.12 Watercourse Crossings

There are 3 no. watercourse crossings required on the proposed site access tracks. There is one crossing on Unnamed Stream (20_392) at the access track within the eastern portion of the Site which will be upgraded for the increased site access track widths to allow heavier vehicles to traverse it for the Proposed Development. The remaining two crossings are located to the southeast namely the Order 2 Shehy Beg stream (20_397) and one to the west which is an unnamed order 1 stream (21_655). Both are of small streams on site and culverts will be constructed using precast bottomless culverts of approximately 4 m width. Crossings will be constructed in accordance with the NRA (now TII) Guidance[11]. Proposed crossing designs are shown on **Figures 2.6 (a), (b) & (c)**.

2.8.13 Construction Supervision and Monitoring

The construction activities will be monitored by a Geotechnical Engineer, a qualified archaeologist, a Structural Engineer and an ECoW. The Geotechnical Engineer will be contracted for the detailed design phase and their services retained throughout the construction and reinstatement phases. The Geotechnical Engineer will oversee all earthworks and excavation activities and monitor for issues such as ground stability, water ingress into excavations etc.

[11] *'Guidelines for the crossing of watercourses during the construction of national road schemes'* (National Roads Authority, *2008)*

The ECoW will be employed prior to the commencement of the construction phase and will monitor the working corridor (the area inside which construction works and plant and equipment manoeuvring will take place) and review the pollution control measures and working practices during construction and have input into site remediation. The ECoW will have stop work authority if, for example, a sensitive habitat feature is encroached upon or there is the possibility of silt/pollution runoff to natural watercourses. This is further discussed in **Chapters 6: Biodiversity** and **9: Hydrology and Hydrogeology**.

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

In the event that any sub-surface archaeological remains are identified during pre-construction site investigations or the construction phase, excavation works will cease and the remains will be recorded and left to remain *in situ* within cordoned off areas while the National Monuments Service are notified and consulted in relation to appropriate future mitigation strategies, which may entail preservation *in situ* by avoidance or preservation by record by archaeological excavations. This role is further discussed in **Chapter 13: Cultural Heritage**.

Monitoring of watercourses is detailed in **Appendix 2.1: Construction Environmental Management Plan** and in **Chapter 9: Hydrology and Hydrogeology**. Regular weekly inspections of the installed drainage system will be undertaken, especially after heavy rainfall events, to check blockages and see that there is no build-up of standing water in any part of the system where is it not designed to be. A report will be produced monthly during the consultation phase detailing the results of the water quality monitoring.

Excess build-up of silt will be removed at check dams, attenuation/settlement ponds or any other drainage feature by scraper or excavator and under the supervision of the ECoW.

During the construction phase, field testing and laboratory analysis of a range of parameters with relevant regulatory limits and Environmental Quality Standards (EQSs) will be undertaken for each watercourse close to the Site, and specifically following heavy rainfall events (i.e. weekly, monthly and event based).

The CEMP will be further developed in more detail once the Contractor has been appointed. This will set out the proposed site organisation, sequencing of works, methodologies, mitigation measures and monitoring measures. Furthermore, a schedule of mitigation and monitoring measures for all phases of the Project has been included as **Appendix 18.1**.

Daily monitoring of excavations by the Geotechnical Engineer will occur during the construction phase. If high levels of seepage inflow occur, excavation work will immediately be stopped, and a geotechnical assessment undertaken. This is further detailed in **Chapter 8: Soils and Geology**.

A structural engineer will also be contracted onsite to supervise foundation construction for the 8 no. turbines.

The L8776 and R585 and R587 near the Site used to transport construction materials will be monitored during construction, so that any damage caused by construction traffic associated with the Proposed Development can be identified and repaired, as soon as possible, depending on the level of damage / inconvenience, to avoid issues for other road users. It is envisaged that depending on the quality of the rock (only known after extraction), stone will be taken from excavations for Turbine Foundations and site access tracks and Turbine Hardstands and/or the on-site borrow pit. However, if the rock on site (either from excavations or the borrow pit) is unsuitable, aggregates will be sourced from a local quarry and concrete may be sourced from further afield such as Cork City, depending on the supplier. This is assessed in **Chapter 14:Traffic and Transportation**.

2.8.14 Reinstatement and Monitoring

Following completion of construction, all plant and machinery will be removed from the Site. The temporary works areas needed for the construction period such as blade laydown areas, will be reinstated using the original spoil material removed and stockpiled close to the location from where it was excavated. Stockpiles will be restricted to less than 2 m in height and located outside of the surface water buffer zones. All stockpiling locations will be subject to approval by the Site Manager and Project Ecological Clerk of Works (ECoW). This is fully assessed in **Chapter 8: Soils and Geology** and **Chapter 9: Hydrology and**

Hydrogeology. The Temporary Construction Compound will be reinstated to its previous land use. The chosen Grid Connection Route Option will be reinstated to its original condition. Joint bays will be reinstated as per the Forestry Road Manual (Guidelines for the design, construction and management of forest road).

All rubbish and waste/excess materials will be removed from Site to Dunmanway Civic Amenity Site which is an appropriate licenced facility from where it will be reused/recycled, where possible, or disposed of accordingly.

Peat and spoil materials excavated during construction of the infrastructure will be used to reinstate any areas of temporary infrastructure such as blade laydown areas and for landscaping around infrastructure such as Turbine Hardstands and site access tracks. Peat turves will be removed in layers with the vegetated side up. The top vegetated turves will be placed on top of reinstated / restored areas so that the turves can 'knit' together effectively and form areas of restored peatland habitat in accordance with the Habitat Management Plan in **Appendix 6.5**.

The on-site installed drainage network will be left in place. This will be periodically monitored to see that it is operating to its stated design purpose. This is further detailed in **Chapter 9: Hydrology and Hydrogeology** and will be agreed upon with the planning authority where consent of this application is given. Water monitoring on nearby natural watercourses will be undertaken during and post construction to determine if any pollution event has occurred, and if so, implement measures to rectify the impact which will be agreed with IFI. In addition to this, an Emergency Response Plan and a Water Quality Monitoring Plan can be found in **Appendix 2.1**.

2.8.15 Construction Sequencing

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

1. Temporary Construction Compound and welfare facilities
2. Site Preparation
3. Site access tracks
4. Crane hardstands & Onsite Substation and Control Building
5. Turbine Foundations
6. Wind Farm Internal Cabling
7. Installation of the Grid Connection Route Option
8. Erection of wind turbines

9. Commissioning and Energisation

The Onsite Substation and Control Building will be constructed in parallel with Turbine Hardstands, Turbine Foundations and Wind Farm Internal Cabling. The first step will be to construct the Temporary Construction Compound and welfare facilities. Access to the area will be via the existing site entrance off the L8544. The next step will be to prepare the areas of the Site where Site infrastructure is to be located by marking out the construction works corridor and the relevant environmental buffer zones as required.

Site access tracks will be constructed up to the proposed Onsite Substation and Control Building and the foundations for the IPP and Eirgrid control buildings will be excavated to firm bearing strata. Then shuttering will be erected around the foundation area, and this will be filled with concrete imported to Site. Once the concrete has cured, then the walls can be erected using blocks and the pitched style roofs can then be erected. Finally, the electrical and control equipment can be installed.

Following the Site preparation, the site access tracks and associated drainage will be constructed according to the Vestas specifications within the parameters of the EIAR. The next step will involve construction of the crane hard-standing areas for the eight No. turbines according to the Vestas specifications. The eight Turbine Foundations can then be excavated and Turbine Foundations constructed using reinforcing bar (rebar) and imported concrete. No concrete batching will take place on site. Following the construction of the Turbine Foundations, Wind Farm Internal Cabling from the turbine locations to the Onsite Substation and Control Building will be laid in trenches along or in the constructed site access tracks.

The chosen Grid Connection Route Option, which is subject to a separate planning consent, will then be constructed. If Grid Connection Route Option A is chosen, the connection line will be constructed from the Site to Dunmanway 110 kV ESB Substation through the local road network via underground cable duct for a length of 24 km. For Grid Connection Route Option B, the connection line will be constructed from the Site to Carrigdangan 110 kV ESB Substation through the local road network for a length of 21.8 km.

The last step will be to erect the eight no. wind turbines on the Turbine Foundations using two cranes. Commissioning and testing of the turbines can then proceed. Energisation will then follow once complete.

2.8.16 Construction Employment

It is estimated that approximately 92 construction workers will be employed on-site at peak.

2.9 COMMISSIONING

Wind farm commissioning can take in the region of 2 months to complete from the erection of the final turbine to the commercial exportation of power to the national grid. It involves commissioning engineers working through an entire schedule of SCADA (Supervisory Control and Data Acquisition) and electrical and mechanical testing and control measures to check that the wind farm will perform and export power to the national grid, as designed.

2.10 AERONAUTICAL LIGHTING

Any specified turbine or obstacle 100 m or greater will be installed with a warning light system under direct specification and in accordance with International Civil Aviation Organisation (ICAO) Annex 15 requirements or as per the lighting requirements agreed with the IAA prior to construction.

The following data will be supplied to the IAA:

- The WGS84 coordinates (In degrees, minutes and seconds) for each turbine.
- Height above ground level (to blade tip) and elevation above mean sea level (to blade tip) in both meters and feet.
- Horizontal extent (rotor diameter) of turbines and blade length where applicable in both meters and feet.
- Lighting of the wind farm, which turbine(s) is/are lit, and what type of lighting.

2.11 COMMUNITY BENEFIT

2.11.1 Financial Contributions

Gortloughra Wind Farm Limited 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 and be successful under the Government's Renewable Electricity Support Scheme (RESS) support programme. This is further detailed in section 1.7.2 of **Chapter 1: Introduction**.

2.11.2 Archaeological/Amenity Enhancements

There are existing agricultural tracks across the Site which are occasionally utilised by members of the local community to obtain access to archaeological features on site. During the construction phase of the Proposed Development, all access to these tracks will be limited for health and safety purposes. Following the completion of construction of the

Proposed Development, it is proposed to provide that the site access tracks are available for use by the public as an amenity which will connect into the historic 'Butter Road' that passes to the south of the Site. This road was used by local farmers for generations to transport butter to the Butter Exchange in Cork City. There are a number of archaeological features on the Site as detailed in **Chapter 13: Archaeology & Cultural Heritage** and it is proposed to include 4 no. information boards around the Site outlining the location and information about the features. The locations of these information boards have been noted on **Drawings 6460-JOD-GLWF-XX-DR-C-0205**, **6460-JOD-GLWF-XX-DR-C-0206**, and **6460-JOD-GLWF-XX-DR-C-0208**.

2.12 OPERATION AND MAINTENANCE

During the operation of the wind farm, the turbine manufacturer, the wind farm operator, or a service company will carry out regular maintenance of the turbines. In addition, operation and monitoring activities will be carried out remotely with the aid of computers connected via a telephone broadband link. Routine inspection and preventative maintenance visits will be necessary to provide for the smooth and efficient running of the wind farm and Onsite Substation and Control Building.

2.13 DECOMMISSIONING

The Applicant is applying for a consent for a period of 40 years. Cranes of similar size to those used for construction will disassemble each turbine using the same crane hardstands. The towers, blades and all components will then be removed from Site and reused, recycled, or disposed of in a suitably licenced facility. The turbine transformers will also be removed from Site. There is potential to reuse turbine components, while others can be recycled.

Underground cables will be removed while the ducting will be left in-situ. The Turbine Foundations will remain in-situ.

Turbine Hardstand areas will be remediated to match the existing landscape as closely as possible. Access tracks will be left for use by the landowner.

Any structural materials suitable for recycling will be disposed of in an appropriate manner. The financial costs of decommissioning, at current material values, will be more than met by the recycling value of the turbine components.

Prior to wind turbine removal, due consideration will be given to any potential impacts arising from these operations. Some of the potential issues could include:

- Potential disturbance by the presence of cranes, HGVs, and personnel on-site;
- On-site temporary compound would need to be located appropriately; and/or
- Time of year and timescale (to be outside sensitive periods).

Prior to the decommissioning work, a comprehensive plan will be drawn up that takes account of the findings of this EIAR and the contemporary best practice at that time, to manage and control the component removal and ground Reinstatement.

Further details can be found in the Decommissioning Plan in the CEMP in **Appendix 2.1** which will be agreed with the Planning Authority prior to the commencement of decommissioning works.