Appendix 7 – Updated Natura Impact Statement (NIS)

NIS Title
Natura Impact Statement (NIS)

Natura Impact Statement

Gortloughra Wind Farm

DEC Ltd.

August 2026

Gortloughra Wind Farm

Co. Cork

Natura Impact Statement

Document Stage	Document Version	Prepared by
Final	1	Pat Doherty MSc, MCIEEM

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1 INTRODUCTION

Doherty Environmental Consultants Ltd. has been commissioned by Gortloughra Windfarm Ltd. to undertake a Natura Impact Statement to inform an Appropriate Assessment (AA), to be undertaken by the competent authority under Article 6(3) of the EU Habitats Directive, Council Directive 92/43/EEC, as transposed into national legislation by *inter alia* Part XAB of the Planning and Development Act 2000 as amended (the "Planning and Development Act"), of a project comprising:

- 8 turbine wind farm at Gortloughra, Co. Cork;
- Provision of grid connection route via one of two possible options, Option A between the proposed wind farm site and the existing ESB 110kV substation at Dunmanway and Option B between the proposed wind farm site and the existing 110 kV substation at Carridangan, Co. Cork,
- A haul route from the Port of Cork to the proposed development site. Widening of the existing haul route will be required at 17 no. locations.

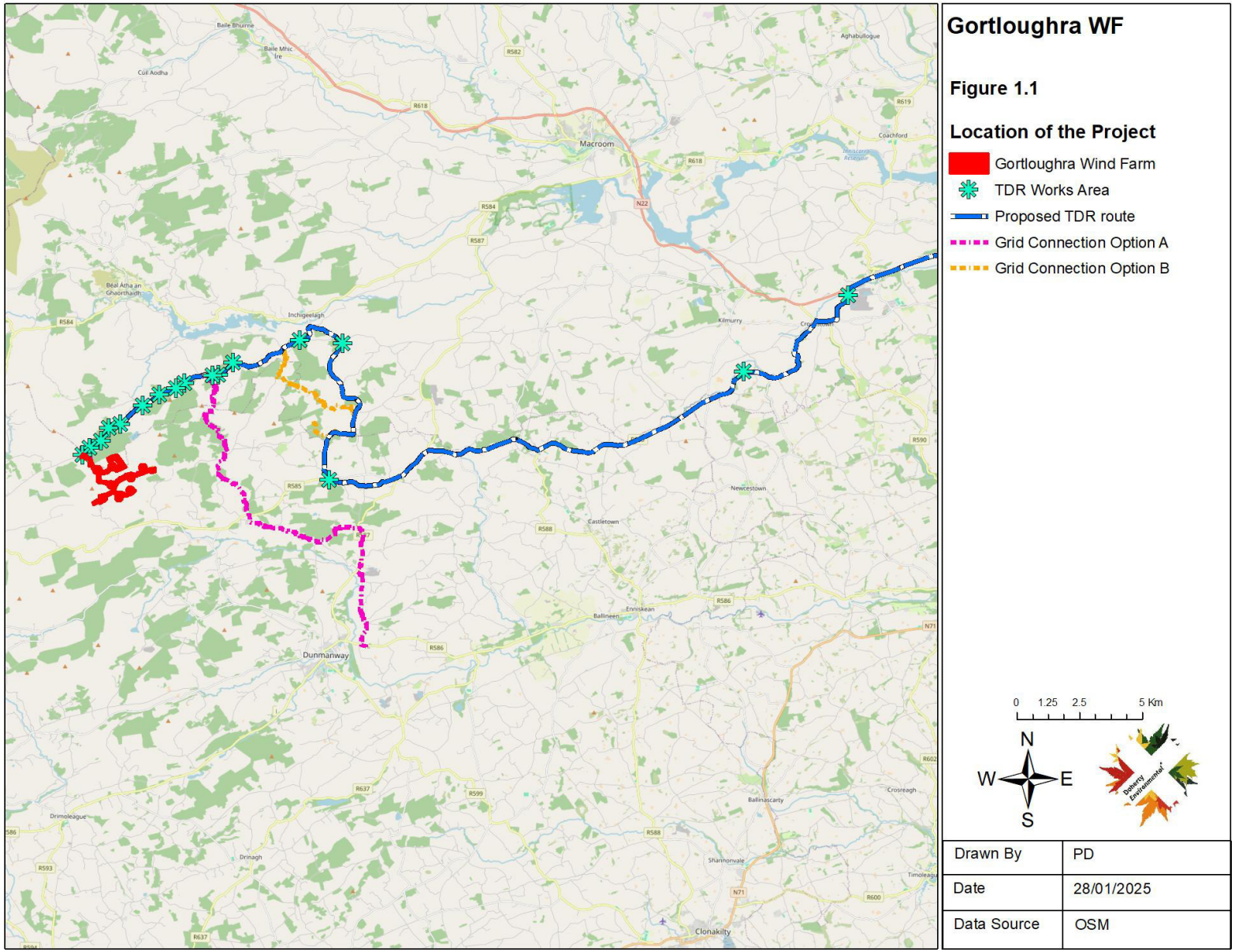
Figure 1.1 shows the location of the proposed wind farm site; the location of the proposed grid connection route and the 17 no. haul route widening locations along the proposed haul route. **Figure 1.2** shows the proposed wind farm layout.

In accordance with Article 6(3) of the Habitats Directive, as transposed into Irish law by *inter alia* Part XAB of the Planning and Development Act, a screening exercise for Appropriate Assessment (AA) has been completed to assess whether it could or could not be excluded, on the basis of objective information, that the project, either individually or in combination with other plans or projects, is likely to have a significant effect on any European Sites. The screening exercise for Appropriate Assessment was completed by DEC Ltd. on behalf of Gortloughra Wind Farm Ltd and concluded, on the basis of objective information, that, in the absence of appropriate mitigation, it could not be excluded at the screening stage that the project, individually or in combination with other plans or projects, will have a significant effect on one number European Site, namely the:

Bandon River SAC

The screening exercise was informed by a highly precautionary approach. Such an approach was adopted to ensure consistency with the extremely low threshold for triggering likely significant effects as determined in both European and Irish case law. On the basis of that conclusion, it has been determined that AA is required in order to assess the implications of the project for the Bandon River SAC. In accordance with Section 177T of the Planning and Development Act, a NIS of the project has been prepared in order to assist the competent authority, in this case Cork County Council, in carrying out its Appropriate Assessment. This NIS provides an examination, analysis and evaluation of the likely impacts from the Project, both individually and in combination with other plans and projects, in view of best scientific knowledge and the conservation objectives of the European Sites concerned.

It also prescribes appropriate mitigation to ensure that the Project will not adversely affect the integrity of those sites identified as being at risk of adverse effects. Finally, it provides complete, precise and definitive findings, which are capable of removing all reasonable scientific doubt as to the absence of adverse effects on the integrity of the European sites concerned.



Gortloughra WF

Figure 1.1

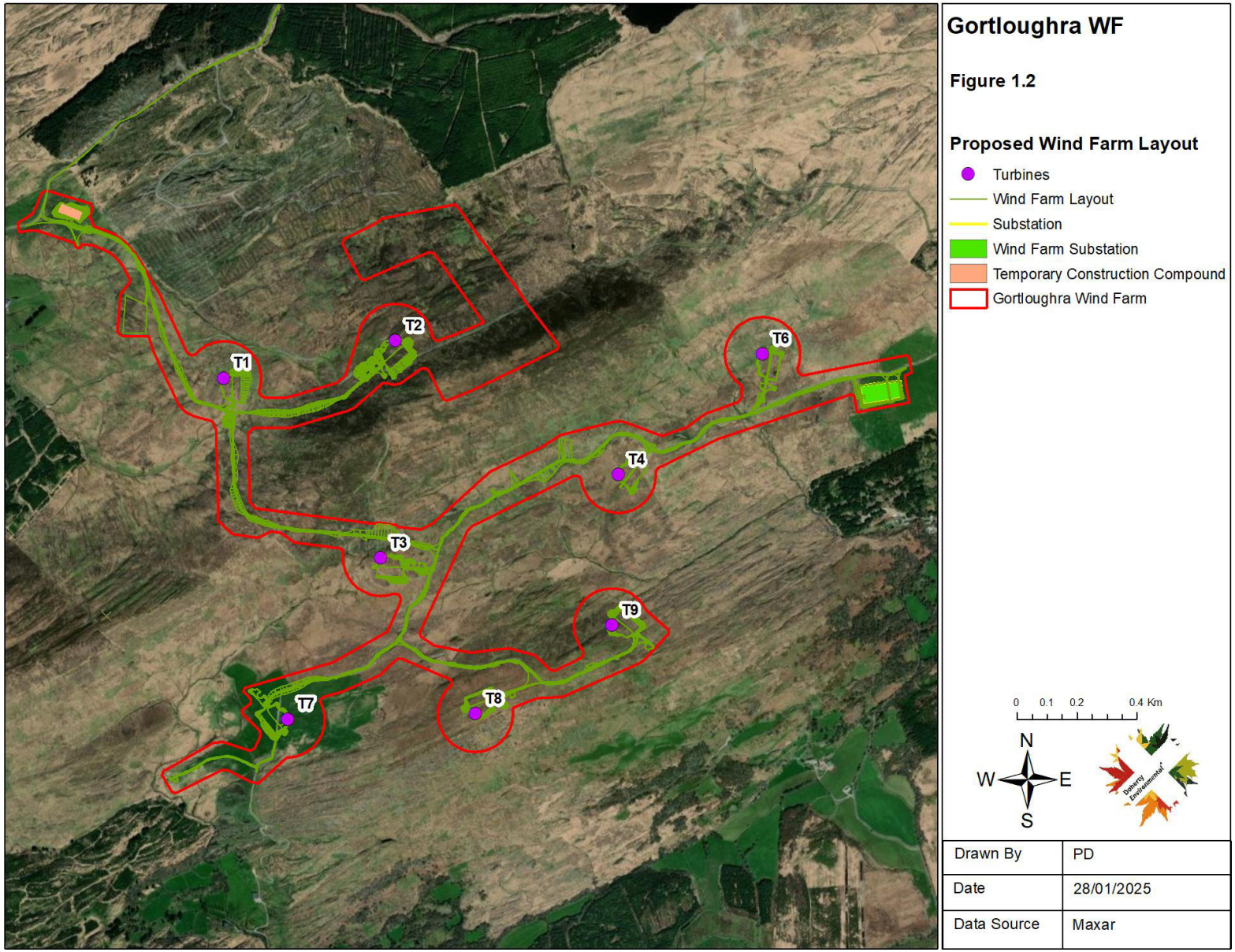
Location of the Project

- Gortloughra Wind Farm
- TDR Works Area
- Proposed TDR route
- Grid Connection Option A
- Grid Connection Option B

0 1.25 2.5 5 Km

N
W E
S

Drawn By	PD
Date	28/01/2025
Data Source	OSM



Gortloughra WF

Figure 1.2

Proposed Wind Farm Layout

- Turbines
- Wind Farm Layout
- Substation
- Wind Farm Substation
- Temporary Construction Compound
- Gortloughra Wind Farm

0 0.1 0.2 0.4 Km

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W E
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Drawn By	PD
Date	28/01/2025
Data Source	Maxar

1.1 STATEMENT OF AUTHORITY

This Natura Impact Statement has been prepared by Mr. Pat Doherty BSc., MSc, MCIEEM, of DEC Ltd. Mr. Doherty is a consultant ecologist with over 20 years' experience in completing ecological impact assessments and environmental impact assessments. Pat has been involved in the completion of assessment reports for proposed developments and land use activities under the EIA Directive and Article 6 of the Habitats Directive since 2003 and 2006 respectively. He has extensive experience completing such reporting for projects located in a variety of environments and has a thorough understanding of the biodiversity issues that may arise from proposed land use activities. Pat was responsible for completing one of the first Appropriate Assessment reports for large scale infrastructure developments in Ireland when he prepared the Appropriate Assessment for the N25 New Ross Bypass in 2006/07. Since then, Pat has completed multiple examinations of both plans and projects in Ireland. He has completed Natura Impact Statements for national scale plans such as Ireland's CAP Strategic Plan and National Seafood Development Plan and regional and county scale plans including County Development Plans, Local Area Plans, Tourism Strategies and Climate Action Plans. Pat has completed multiple Natura Impact Statements for a range of development types that include large scale infrastructure developments in sectors such as transport and energy as well as industrial, commercial and residential developments.

Pat has completed focused certified professional development training in Appropriate Assessment as well as in a range of ecological survey techniques and assessment processes. Training has been completed for National Vegetation Classification (NVC) and Irish Vegetation Classification (IVC) surveying, bryophyte survey for habitat assessment and identification, professional bat survey and assessment training, mammal surveying and specific training for bird and bat survey techniques. Ongoing training has been completed by approved training providers such as CIEEM, British Trust for Ornithology, the Botanic Gardens and the Field Studies Council.

2 METHODOLOGY

2.1 GUIDANCE

This NIS has been undertaken in accordance with National and European guidance documents: Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities (DEHLG 2010) and *Assessment of Plans and Projects Significantly Affecting Natura 2000 sites – Methodological Guidance of the Provisions of Article 6(3) and (4) of the Habitats directive*

92/43/EEC. The following guidance documents were also adhered to during the preparation of this NIS:

- A guide for competent authorities. Environment and Heritage Service, Sept 2002. Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (2010). DEHLG.

- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites – Methodological Guidance of the Provisions of Article 6(3) and (4) of the Habitats Directive 92/42/EED. European Commission (2021).

- Managing Natura 2000 Sites – The provisions of Article 6 of the Habitats Directive 92/43/EEC. European Commission (2018).

The information provided in this NIS is also guided by European and Irish case law guiding the approach to Stage 2 Appropriate Assessment. It is noted that the consideration of impacts provided in Section 6 this NIS has been undertaken in the absence of any regard to construction phase best practice measures and operation phase design measures that aim to safeguard the receiving environment and European Sites from potential adverse impacts.

2.1.1 Background to Habitats Directive Article 6 Assessments

The EC (2021) guidelines outline the stages involved in undertaking an assessment of a project under Article 6(3) and 6(4) of the Habitats Directive. The assessment process comprises the three stages outlined below. This NIS presents the findings of an examination, analysis and evaluation of the project to inform a Stage 2 Appropriate Assessment of the project.

- Stage 1 – Screening: This stage defines the proposed project, establishes whether the proposed project is necessary for the conservation management of the European Site and assesses the likelihood of the project to have a significant effect, alone or in combination with other plans or projects, upon a European Site.

- Stage 2 – Appropriate Assessment: If a plan or project is likely to have a significant affect an Appropriate Assessment must be undertaken. Case law has established that such an Appropriate Assessment, to be lawfully conducted, in summary:

(i) must identify, in the light of the best scientific knowledge in the field, all aspects of the proposed development which can, by itself or in-combination with other plans or projects, affect the conservation objectives of the European site;

(ii) must contain complete, precise and definitive findings and conclusions and may not have lacunae or gaps; and

(iii) may only include a determination that the proposed development will not adversely affect the integrity of any relevant European site where the competent authority decides (on the basis of complete, precise and definitive findings and conclusions) that no reasonable scientific doubt remains as to the absence of the identified potential effects. If adverse impacts can be satisfactorily avoided or successfully mitigated at this stage, so that no reasonable doubt remains as to the absence of the identified potential effects, then the process is complete. If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must proceed to stage three and, if necessary, stage four.

- Stage 3 – This stage of the process is governed by Article 6(4) and arises where adverse effects on the integrity of a European site cannot be excluded and where the developer considers that the plan or project is necessary for imperative reasons of overriding public interest. This is only possible if there are no alternative solutions, the imperative reasons of overriding public interest are duly justified, and if suitable compensatory measures are adopted to ensure that the overall coherence of the European Sites is protected.

2.1.2 Stage 2: Appropriate Assessment

The EC Guidance Assessment Criteria for a Stage Two Appropriate Assessment provides the following steps:

1. the collection of information on the project and on the European Sites concerned;
2. An assessment of the implications of the project in view of the site's conservation objectives, individually or in combination with other plans or projects;

3. An evaluation as to whether the project can have adverse effects on the integrity of European Sites;

4. The consideration of mitigation measures (including their monitoring).

This NIS addresses each of these items, through the following sections provided below.

2.2 SCIENTIFIC INVESTIGATIONS

A range of scientific site investigations have been completed for the project and these are relied upon in this Natura Impact Statement. The primary investigations include ecological field surveys, hydrological field surveys and geotechnical field surveys.

Desk-based investigations were completed to identify pathways connecting the proposed development to European Sites. Datasets used to assist with the desk-based investigations include:

- NPWS European Sites and site-specific conservation objectives datasets;
- EPA Rivers and Lakes dataset;
- EPA surface water catchment and sub-catchment datasets;
- NPWS Article 17 Habitats and Species datasets;
- OSI Geohive and OSI Historic townlands online mapping portal;
- National Biodiversity Data Centre (NBDC) online mapping portal; and
- NPWS Protected Species Dataset for the proposed development site and surrounding area.

The ecological field surveys that have been completed include:

- Habitats and vegetation surveys and mapping at the proposed development site

- Ornithological surveys which included non-breeding season and bird species vantage point surveys, transect surveys and hinterland surveys completed between the winter season of 2019/2020 and the breeding season of 2024.

- Bat surveys over spring, summer and autumn during the 2020 and 2021bat activity seasons.

- Aquatic surveys including habitat assessment, fish habitat suitability assessment surveys, biological water quality surveys and physio-chemical water sampling.

Detailed hydrological and geotechnical surveys were also completed at the proposed development between 2021 and 2024.

The methods used during the completion of these site investigations are described in full in Chapter 6, 7, 8 and 9 of the Gortloughra Wind Farm EIAR (Jennings O'Donovan, 2025).

3 PROJECT DESCRIPTION

3.1 PROJECT OVERVIEW

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.

3.2 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 2.1**.

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 2.1** describe the proposed parameters of the turbines. The final chosen turbine will comply with these parameters.

Table 3.1: Turbine Parameters

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

3.3 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. 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 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. 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 590 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 2.2** below.

Table 3.2: 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

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[1].
- Grout the top flange.

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

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.

3.3.1 Turbine Delivery Route ("TDR") and Access to the 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 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 blades are switched between trailer to 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 TDR is subject to a separate planning process but is assessed in this NIS.

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 entrance will be used for delivery of both turbine components and building materials such as rock (where required) and concrete.

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.

There are 18 No. areas on the haul route that will require works in third party lands. These are shown on **Table 2.3**.

Table 3.3: Areas of Works on Haul Route in Third Party Lands

TDR Locations	Location Notes	Location Coordinates
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:523246.006m N:559558.0518m
Location No. 12C	Overrun Area=167 m^2 Area to be cleared for Oversail, Land Ownership to be Determined, Bridge Widening &Loadbearing Area to be Constructed	E:523777.845m N:565003.439m
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:522064.635m N:565136.788m
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:519425.049m N:564232.712m
Location No. 17C	Overrun Area=349 m^2 Area to be cleared for Oversail, Land Ownership to be Determined	E:518813.863m N:563758.964m
Location No. 17D	Overrun Area=59 m^2 Area to be cleared for Oversail,	E:518599.811m N:563726.642m

TDR Locations	Location Notes	Location Coordinates
	Land Ownership to be Determined	
Location No. 18B	Overrun Area=70 m^2 Area to be cleared for Oversail, Land Ownership to be Determined,	E:517474.091m N:563425.023m
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:517136.561m N:563211.308m
Location No. 19A	Overrun Area=201 m^2 Land Ownership to be Determined	E:516480.137m N:562950.494m
Location No. 20	Overrun Area=540 m^2	E:515803.941m N:562520.686m
Location No. 20A	Overrun Area=300 m^2 Area to be cleared for Oversail, Land Ownership to be Determined,	E:514911.820m N:561795.037m
Location No. 20B	Overrun Area=90 m^2 Boundary Vegetation to be Trimmed Land Ownership to be Determined,	E:514460.798m N:561642.180m
Location No. 21	Overrun Area=255 m^2, Area to be cleared for Oversail, Land Ownership to be Determined,	E: 514148.437m N:561109.644m
Location No. 21A	Overrun Area=345 m^2 Area to be cleared for Oversail, Land Ownership to be Determined,	E:513670.772m N:560837.009m
Location No. 22	Overrun Area=940 m^2	E:513394.549m N:560550.525m

TDR Locations	Location Notes	Location Coordinates
	Area to be cleared for Oversail, Land Ownership to be Determined,	
Location No. 28	Blade Laydown Area Area=12000 m^2	E:543962.280m N:566922.370m
Location No. 29	Blade Laydown Area Area=12000 m^2	E:539792.015m N:563871.865m
Location No. 30	Blade Laydown Area Area=12000 m^2	E:506513.861m N:556533.906m

3.3.2 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. 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.

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. 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. 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. 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.

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 ensure that the crossing of small drains at the Site will result in an anticipated negligible flood risk posed at site access roads 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.

3.3.3 Met Mast

As part of the grid code[2] 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.

The Met Mast will be located on the southwest of the Site and will be a free-standing lattice type structure. 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 110 kV Substation via buried Internal Cabling for power and communication and will be required for the full operational duration of the Proposed Development.

3.3.4 Electrical Substation, Control Building and Associated Compound

It is proposed to construct a 110 kV Electrical Substation on the Site. This will provide a connection point between the proposed wind farm and the proposed grid connection point at either Dunmanway or Carrigdangan 110 kV substations. Electricity transmitted between the turbines and the on-site 110 kv substation will be at 33 kV.

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

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 substation 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.

The Electrical Substation building will contain control elements for the Proposed Development. The control components housed at the substation 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. 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 Electrical Substation 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. 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 road that will be a hard-surfaced area for operation and maintenance for parking spaces, subject to Eirgrid specifications at the construction phase.

3.3.5 Transformers and Internal Cabling

The power generated by each wind turbine will be transmitted via underground Wind Farm Internal Cabling to the new 110 kV Electrical Substation, 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.

The electrical and fibre-optic cables running from the turbines to the Electrical Substation 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 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.

3.3.6 Grid Connection

This chapter 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 NIS.

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 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 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 [3] or 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.

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[4].

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

[4] 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.

- 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.

- 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[5].

- Precast concrete cable joint bays together with communications chambers will be installed within the excavated trench.

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

- 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 Electrical Substation and the existing 110 kV substation at 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.

3.3.6.1 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[6]).

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

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.

3.3.6.2 Directional Drilling Works

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. 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.

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 m³ 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**.

3.3.6.3 Borrow Pits

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 Site Compound and T1. 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 Turbine Foundations and the smaller rock breaker breaks it down further.

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 site physical excess stone requirements will be imported to the Site from a nearby quarry.

3.3.6.4 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

3.3.6.5 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.

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. .

3.3.7 Table of Key Development Infrastructure Metrics

The Key Development Infrastructure Metrics are contained in **Table 2.4**.

Table 3.4: 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 – Main cranes	-	-	0.6	8	5,800	3,480
Turbine Hardstands – Aux Crane Pads	-	-	0.3	8	3,455	1,037
Turbine Hardstands – Blade Fingers	-	-	1	8	1,695	1,695

Description	Length [m]	Width [m]	Depth [m]	No.	Area [m^2]	Volume of Excavation [m^3]
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
110kV Cable Grid Connection (Option A) Up to Site Entrance	3,715	0.6	1	1	2,230	2,230

Description	Length [m]	Width [m]	Depth [m]	No.	Area [m^2]	Volume of Excavation [m^3]
110kV Cable Grid Connection (Option A) Site Entrance to End	17,961	0.6	1	1	10,775	10,775
110kV Cable Grid Connection (Option B)	18,020	0.6	1	1	10,812	10,812

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 Electrical Substation. The Grid Connection Routes will involve works on 10,775 m^2 for Option A or 10,812 m^2 for Option B of area on the public roads to be reinstated following the laying of the ducts and so is classed as temporary land take

3.4 CONSTRUCTION

The first phase of the Development will comprise the construction phase. This phase will begin with site preparation works and will be complete when the turbines are built and ready for commissioning, and when all wastes have been removed from the site. For this Development, it is envisaged that the construction phase will last approximately 18 months. An indicated construction programme is set out at **Table 2.5**.

Table 3.5: 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			

Activity	Month															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Energisation														X		
Turbine Commissioning															X	X
Site Restoration															X	X

3.4.1 Construction and Environmental Management Plan (CEMP)

A CEMP is appended to the EIAR in **Appendix 2.1**. The CEMP includes an emergency response plan, spoil management plan, surface water management plan, surface water quality and inspection management plan and a waste management plan. The CEMP includes all the mitigation measures recommended within the EIAR and the NIS. A summary of the mitigation measures is included in **Appendix 18.1** of the CEMP.

In the event planning is granted for the 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 project will be managed through the CEMP and will need to be secured in contract documentation and arrangements for construction and later phases, such that there is a robust mechanism in place for their implementation. The CEMP will address the construction phase, and will be continued through to the commissioning, operation and final decommissioning phases. An Environmental Manager / Ecological Clerk of Works (ECoW) with appropriate experience will be appointed for the duration of the construction phase so that the CEMP is effectively implemented.

3.4.2 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 capacity of the largest tank within the bund or 25% of the total tank capacity, whichever is greater. Refuelling will take place via a mobile double skinned fuel bowser. The bowser will be a double axel 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.

3.4.3 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. 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. 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[7] 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.

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.

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

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. 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.

3.4.4 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. Damping down may be required so that dust does not become friable. A wheel wash facility will be employed on-site which will wash mud and debris from vehicles egressing the Site and reduce mud and debris from getting onto the local road network where it could dry out and become friable and potentially causing a nuisance. Where stone is sourced off-site, HGVs entering the Site carrying stone will be covered to prevent dust generation. A road sweeper will be made available for use in case of any mud or debris making it onto the public road network.

3.4.5 Construction Hours

The Development will have 123 to 147 construction workers during the construction phase. Working hours for construction will be from 07:00 to 19:00 throughout the week, with reduced working hours at weekends. 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") will be put in place for the construction phase, which shall be agreed during the planning compliance stage with the Planning Authority so that strict controls are in place with all suppliers coming to the Site.

3.4.6 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. 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.

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 compound capable of handling the demand during the construction phase with 50 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).

3.4.7 Construction of Turbine Hardstands and Turbine Foundations

The construction method for all the crane hardstands will be via excavated approach to approximately 0.3m depth. Each crane hardstand will be 85m by 65m. 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 area;
- 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 stone and excavated soil deposits;

- Use retained excavated soil deposits to build up the area around the turbine base.

3.4.8 Construction Turbine Assembly

Once on Site, the wind turbine components will be routed according to a specific detailed route plan to minimise manoeuvring. Components will be placed on turbine hardstands prior to assembly. A *'just in time'* delivery strategy will be in place for turbine blades to reduce the need for temporary set down areas. One large crane will be required for erecting the turbines, assisted by smaller cranes. 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. Three methods can be used to attach the blades:

1. The blades can be attached to the nacelle and hub on the ground. The hub and blades are then lifted as one;
2. The hub can be attached to the nacelle and the two blades attached to the hub while the nacelle is on the ground – the "*bunny lift*". The nacelle is then lifted into position and the third blade lifted into place separately. This requires manoeuvring of several components on the ground and usually the repositioning of cranes;
3. Lifting the nacelle and hub as one unit, as described above and then attaching the blades one at a time, rotating the hub between lifts. The blade lifting operations do not require repositioning of the crane.

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

3.4.9 Construction Traffic

It is estimated that during civil construction, approximately 8,017 loads will be delivered to Site. This breaks down to approximately 668 loads per month or an average of 21 to 23 loads per day excluding Sundays and bank holidays.

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. 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

3.4.10 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.

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 site 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. .

3.4.11 Watercourse Crossing

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[8].

All 3 no. watercourse crossings are located within the Bandon_SC_010 sub-catchment.

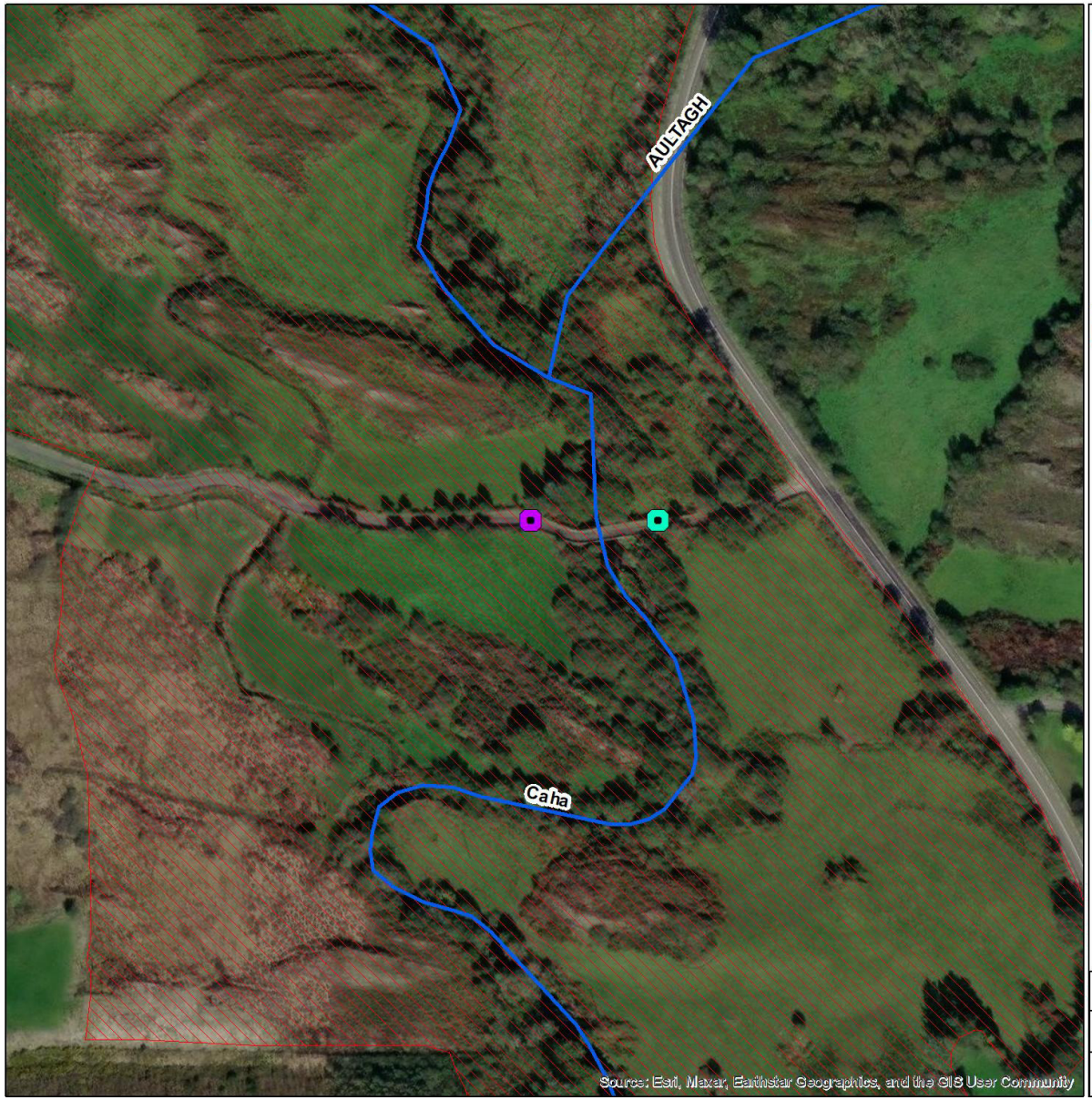
The proposed grid connection route Option A will require 22 no. crossings of watercourses. These include one no. crossing of the Caha River within the boundary of the Bandon River SAC. Launch pits and receptor pits will be installed either side of the Caha River to facilitate the horizontal directional drilling works. The launch pit and the receptor pit will be placed within the existing

[8] *'Guidelines for the crossing of watercourses during the construction of national road schemes'*

(*National Roads Authority, *2008)

road formation during the horizontal directional drilling. The location of the launch pit and receptor pit for the horizontal directional drilling under the Caha River, within the Bandon River SAC, is shown on Figure 3.1.

Launch pits and receptor pits for all other watercourse crossings along the proposed grid connection route Option A will be situated within the existing road formation either side of the watercourse corridor. All launch pits and receptors pits will be buffered from the watercourse by a minimum distance of 25m. This distance is to facilitate the provision of suitable angles for the drilling between the launch pit and receptor pit.



Gortloughra WF

Figure 3.1

Launch & Receptor Pits at Caha River Crossing

Feature

- Launch Pit
- Receptor Pit
- Rivers & Streams
- Bandon River SAC

N
W E
S

0 0.015 0.03 0.06 Km

Drawn By	PD
Date	28/01/2025
Data Source	Maxar; NPWS; EPA

3.4.12 Construction Supervision and Monitoring

The construction activities will be monitored by a geotechnical engineer, a qualified archaeologist and an ecological clerk of works (ECoW). The geotechnical engineer will be contracted for the detailed design phase and their services retained throughout the construction and reinstatement phases. The geotechnical engineer will oversee all earthworks and excavation activities and monitor for issues such as ground stability, water ingress into excavations etc.

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.

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.

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.

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.

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 the on-site borrow pit. However, if the rock in 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.

3.4.13 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). The temporary Construction Compound will be reinstated to its previous land use. The chosen Grid Connection Route 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 form areas of restored habitat in accordance with the HMP in **Appendix 6.5 , Volume III of the Gortloughra Wind Farm EIAR**.

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. 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.

3.4.14 Construction Sequencing

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

1. Contractor compound and welfare facilities
2. Site preparation
3. Site roads
4. Crane hardstandings
5. Turbine foundations
6. Internal cable ducting
7. Installation of the grid connection
8. Erection of wind turbines
9. Commissioning and energisation

The 110 kV substation which is subject to a separate consent process will be constructed in parallel with turbine hardstands, foundations and ducting. The first step will be to construct the Temporary

Construction Compound and Welfare Facilities. Access to the area will be via Site Entrance 1. 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 needed.

Site Access Tracks will be constructed up to the proposed 110 kV Onsite Electrical Substation 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 foundations constructed using reinforcing bar (rebar) and imported concrete. No concrete batching will take place on site. Following the construction of the Turbine Foundations, internal cable ducting from the turbine locations to the on-site 110 kV Electrical Substation will be laid in trenches along or in the constructed Site Access Tracks.

The chosen grid connection, which is subject to a separate planning consent will then be constructed. If grid connection option A, 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 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 21.8km.

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

3.4.15 Construction Employment

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

3.5 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.

3.6 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.

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.

3.7 OPERATION & 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 110 kV Electrical Substation.

3.8 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 foundations will remain in-situ.

Hardstand areas will be remediated to match the existing landscape as closely as possible. Access Roads will be left for use by the relevant landowner(s).

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.
- Time of year and timescale (to be outside sensitive periods).

4 DESCRIPTION OF THE PROJECT SITE

4.1 LOCATION OVERVIEW

The proposed wind farm 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.

The southern extent of the Site is located within the townland of Shehy Beg. To the south and south-east of the site are the townlands of Shanacrane West and Tooren respectively.

To the north of the Site there are additional areas of blanket bog, forestry, Douce Mountain, Lough Nambrackderg, pre-existing Shehy More Windfarm and the townlands of Shehy More, Cloghboola, Derryriordane South and Inchiroe. To the east of the site is the townland of Coolmountain and additional areas of forestry.

To the west and south-west of the Site are the townlands of Gortloughra, Coomclogh, Glanycarney, the Cousane Gap and the R585 road. The wider area surrounding the Site is rural in nature with low intensity agriculture in the form of pastoral grassland, peat harvesting and commercial forestry plantations being the predominant land use.

The topography of the Site is mountainous and undulating with slopes locally recorded up to 30° at some probe locations. The turbines are generally located on areas of moderate slope (typically less than 10°, although locally slopes do exceed 10°) and with low peat depths (typically less than 0.5 m). Due to the slope of the ground, little ponding was observed, however most of the peat was saturated during the field surveys.

The Site forms part of the southern fringes of the Shehy Mountains and is therefore generally elevated in nature. The highest peak at the site is Shehy More (546 m OD) which broadly divides the northern and southern sections of the Site. To the north of the Site is Douce Mountain (474 m OD), in between Douce Mountain and Shehy More is a valley through which the L8544 local road traverses and which forms part of the northernmost extent of the Site. The northern portion of the site ranges in elevation from 200 m OD with increasing steeper inclines existing to the south as far as the summit of Shehy More at 546 m OD.

The southern face of Shehy More is also steep with elevations reducing rapidly from 546m OD to 400 m OD across an approximate distance of 300 m. The southernmost extent of the Site ranges in elevation from approximately 250 – 300 m OD. Further south beyond the Redline Boundary the topography is generally flat in the townland of Shanecrane East at an elevation of approximately 120 m. To the west of the Site beyond the EIAR boundary is Carrigmount with an elevation of 342 m OD. To the east and south-east of the Site there are peaks ranging in elevation from 312 m OD, 332 m OD and 375 m OD and the Cousane Gap through which the R585 regional road traverses.

The townlands along which the two grid connection options transverse (subject to a separate planning consent process) 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 118.7 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.

4.2 TOPOGRAPHY

The Site forms part of the southern fringes of the Shehy Mountains and is therefore generally elevated in nature. The highest peak at the Site is Shehy More (546m OD) which broadly divides the northern and southern sections of the Site. To the north of the Site is Douce Mountain (474m OD), in between Douce Mountain and Shehy More is a valley through which the L8544 local road traverses and which forms part of the northernmost extent of the Site. The northern portion of the site ranges in elevation from 200m OD with increasing steeper inclines existing to the south as far as the summit of Shehy More at 546m OD.

The southern face of Shehy More is also steep with elevations reducing rapidly from 546m OD to 400m OD across an approximate lateral distance of 300m. The southernmost extent of the Site ranges in elevation from approximately 250 – 300m OD. Further south beyond the Redline Boundary, the topography is generally flat in the townland of Shanecrane East at an elevation of approximately 120m.To the west of the Site, beyond the Redline Boundary is Carrigmount with an elevation of 342m OD. To the east and south-east of the Site there are peaks ranging in elevation from 312m OD, 332m OD and 375m OD and the Cousane Gap through which the R585 regional road traverses.

4.3 SOILS & GEOLOGY

The Site is located across land which is predominantly underlain by by Devonian age sedimentary "Old Red Sandstone" (Ardaturrish Member and Old Head Sandstone Formation). Outcrops of bedrock are present throughout the Site, particularly within the upland (central) parts of the main Site around Shehy More. The proposed Grid Connection options also traverse Devonian age "Old Red Sandstone. In addition to the Ardaturrish Member and Old Head Sandstone Formation, the Grid Connection Route options also traverse the Toe Head Formation, Castlehaven Formation, Gun Point Formation, and Caha Mountain Formation. The Grid Connection Route also traverses the Little Island Formation, Waulsortian Limestone, Ballysteen Formation, Cork Red Marble Formation, the Ballytrasna Formation, the Gyleen Formation and the Clashavodig Formation.

Structurally, the site is crossed by a northwest-southeast trending fault which does not appear to pass through any turbine locations but does cross the GCR and TDR. An anticlinal fold axis trends east-west across the northern part of the site. These structures will not have any significant effect on the Proposed Development.

From information obtained from the GSI and EPA websites, the following soils are understood to exist on the Site.

Shallow rock covers the majority of the site with minor areas of blanket peat and glacial till (based on the GSI online mapping). Peat is absent from most of the Site and from the vast majority of the Grid Connection and Turbine Delivery Route;

Glacial till derived from the underlying sandstone and shale covers approximately 10% or less of the main Site area and around 50% of the Grid Connection and Turbine Delivery Route.

Approximately 50% or more of the main site has very shallow/exposed bedrock and hence has little or no superficial geology cover.

Peat depths within the Redline Boundary of the Site are given in **Table 4.1** below.

Table 4.1: Peat Depth Distribution by Category

Peat Depth Category	Number of Survey Points
A – Rock/Very Shallow Peat/Topsoil (0.0-0.5m)	253
B – Shallow (0.6-2.0m)	91
C – Moderately Deep (2.1-3.5m)	9
D – Deep (3.6-5.0m)	1
E – Extremely Deep (>5m)	0
Total	**354**

The table shows that the majority of the peat covering the Redline Boundary area of the Site lies in the range of 0.0-0.5m depth. The maximum peat depth recorded was 3.8m, with an average depth over the main Site of 0.49m. An additional 1112 probes were undertaken outside the current Redline Boundary.

4.4 HYDROLOGY

The Site, and both Grid Connection route options are located within three separate catchment areas, including the Lee, Cork Harbour and Youghal Bay Catchment Area, the Bandon-Illen Catchment Area and the Dunmanus-Bantry-Kenmare Catchment Area in Hydrometric Areas 19, 20 and 21 respectively. The Proposed Development and Grid Connection route options are located within three WFD sub-catchments. These include the Lee[Cork]_SC_010 sub-catchment, the Bandon_SC_010 sub-catchment and the Coomhola_SC_010 sub catchment. These sub-catchments are geographically spread across three Margaritifera Sensitive Areas in accordance with Annex II and Annex V of the EU Habitats Directive. These include the Lee Upper, Bandon/Caha and the Owvane Margaritifera Sensitive Areas.

The Site is intersected by four EPA mapped rivers or small streams, with sixteen rivers or small streams being located either within or in relative proximity to the Redline Boundary. Many of these streams merge to form larger channels. The Site also contains multiple unmapped small natural and artificial drainage channels. Eight EPA mapped channels located north of the summit of Shehy More (Streams 1 - 8), are tributaries of the Gortloughra River which in turn is a tributary of the Owvane River, which is also referred to as the "*Ouvane River*". The Gortloughra River has the EPA name designation of "*Inchiroe*" and has a stream order of 3. The Gortloughra River flows for approximately 2km west of the Site until it merges with the Owvane River. The Owvane River has the EPA name designation of "*Owvane (Cork)*" and has a stream order of 4. The Owvane River flows in a south-westerly direction to the north of Kealkill before ultimately draining into Bantry Bay at Ballylickey.

Eight small channels are located south of the summit of Shey More (Channels 9 – 16, inclusive), all of which are tributaries of the River Bandon. Six of these small channels have a stream order of 1 and are unnamed streams. Two of these channels have a stream order of 2 and have the EPA names of "*Shehy_Beg*" and "*Shanacrane_East*". Six channels located in the south-eastern area of the Site all merge into the "*Shehy_Beg*" River to the south-east of the Site in the townland of Tooreen. The Shehy Beg River ultimately merges with the Bandon River, approximately 4km to

the south-east of the Redline Boundary. Two channels drain the south-west portion of the Site, namely the "*Shanacrane_East*" and a small unnamed stream. Both of these streams ultimately merge and continue as the EPA named "*Shanacrane_East*" which merges with the Bandon River approximately 3.8km southwest of the Redline Boundary. The Bandon River then continues to flow in a south-easterly direction, through the Bandon River SAC and east of Dunmanway before turning eastward towards the villages of Ballineen and Enniskean. It then flows through the centre of Bandon town, and on to Innishannon and Kilmacsimon, before draining into Kinsale Harbour.

Approximately 300m east of the Redline Boundary, within the existing Shehy More Windfarm site, is the EPA named "*Cloghboola 19*" stream which flows in a north-easterly direction into Lough Nambrackderg, which is also located within the existing Shehy More Windfarm site. Lough Nambrackderg drains in a north-westerly direction via the EPA named "*Cloghboola 19*" stream which merges with the Sruhaunphadeen stream. The Sruhaunphadeen stream in turn merges with the Bealaphadeen Stream, which ultimately flows into Lough Allua, approximately 5km northeast of the Site. Approximately 200m north of the Site, within the existing Shehy More Windfarm site, an area of forestry plantation exists containing three channels which flow in a northerly direction to merge with another unnamed stream which ultimately merges with the Sruhaunphadeen Stream. Approximately 350m northwest of the of the Site boundary, three unnamed channels rise and merge to form Channel 6 which flows in a southerly direction before turning west and merging with the Gortloughra River.

The Grid Connection route option to Carrigdangan substation follows the road network and would traverse across fifteen mapped watercourses along the road network, two mapped watercourses within the Redline Boundary, and four field surveyed drainage channels within the Redline Boundary. The Grid Connection route option to Dunmanway substation follows the road network to Dunmanway and would traverse across twenty-one mapped watercourses along the road network, two mapped watercourses within the EIAR boundary, and four field surveyed drainage channels within the Redline Boundary.

4.5 BIODIVERSITY

4.5.1 Designated Sites

The proposed wind farm site is not located within any designated sites. The proposed TDR does not occur within any European Sites. The Grid Connection Route Option A intersects the Bandon

River SAC. Route Option A crosses the Bandon River SAC along a local road at the townland boundary of Neaskin and Ardcahan. The route crosses the Caha River at this location. **Figure 4.1** shows the location of the Option A crossing with respect to the SAC.

All other designated sites are located at more remote distances from the project, with the next nearest being The Gearagh SAC, located approximately 8.5km to the northeast.

4.5.2 Habitats

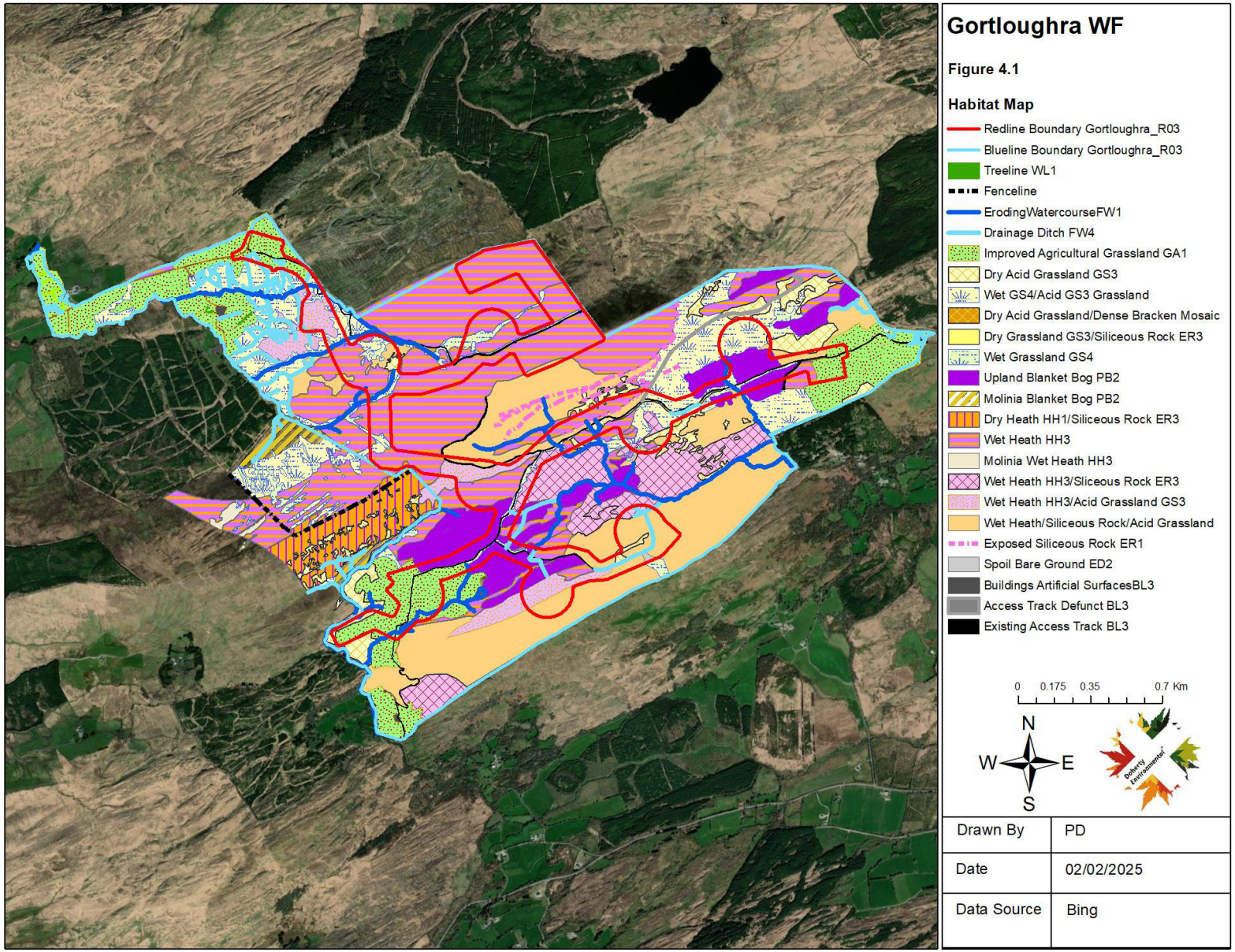
4.5.2.1 Proposed Wind Farm Site

A habitat map of the proposed wind farm Site is presented as **Figure 4.2** below. The habitats occurring at the proposed wind farm site consists of discrete areas of improved agricultural grassland to the west, east and north of the project site. Aside from these areas of improved agricultural grassland the remainder of the wind farm site is comprised of unenclosed upland acid grassland and heathland habitats. Pockets of peat bog also occur within spurs on the south facing slopes of Shehy More.

The entire extent of the proposed grid connection route Option A and Option B will be situated within existing road formations between the proposed Site and the existing substation at either Dunmanway or Carridangan.

4.5.2.2 Proposed TDR Widening Locations

The habitats occurring at the 18 no. TDR widening locations comprise improved agricultural grassland, hedgerows, dry meadows and grassy verges, wet grassland and wet heath. No element of the TDR occurs within the Bandon River SAC, whilst only one no. TDR widening locations (TDR No. 7) is located within the Bandon River catchment. This TDR is buffered from all watercourses, with the nearest being located approximately 150m from this widening locations over terrestrial vegetated ground. As such the TDR widening location element of the project was screened out during the screening of the project.


Gortloughra WF
Figure 4.1
Habitat Map
Redline Boundary Gortloughra_R03
Blueline Boundary Gortloughra_R03
Treeline WL1
Fenceline
ErodingWatercourseFW1
Drainage Ditch FW4
Improved Agricultural Grassland GA1
Dry Acid Grassland GS3
Wet GS4/Acid GS3 Grassland
Dry Acid Grassland/Dense Bracken Mosaic
Dry Grassland GS3/Siliceous Rock ER3
Wet Grassland GS4
Upland Blanket Bog PB2
Molinia Blanket Bog PB2
Dry Heath HH1/Siliceous Rock ER3
Wet Heath HH3
Molinia Wet Heath HH3
Wet Heath HH3/Sliceous Rock ER3
Wet Heath HH3/Acid Grassland GS3
Wet Heath/Siliceous Rock/Acid Grassland
Exposed Siliceous Rock ER1
Spoil Bare Ground ED2
Buildings Artificial SurfacesBL3
Access Track Defunct BL3
Existing Access Track BL3
0 0.175 0.35 0.7 Km
N
W E
S
Drawn By PD
Date 02/02/2025
Data Source Bing

4.5.3 Grid Connection Route

The entire stretch of the grid connection route from the proposed wind farm site to the existing ESB substation at either Dunmanway or Carridangan will be located within the footprint of existing public road corridors.

Horizontal directional drilling will be used at all watercourse crossing locations along both grid connection route options. At these bespoke locations the electrical cable ducts will be drilled underground below the watercourses. The launch and receptor pits required for the horizontal directional drilling will be positioned within the road corridor.

The habitat occurring along the cable route is entirely comprised of road surface which is representative of buildings and artificial surfaces (BL3).

4.5.4 Non-volant mammals

indicating the presence of red deer was also observed. No evidence indicating the presence of badgers was observed during field surveys.

No otter holts or couches were observed along the watercourses draining the proposed wind farm site. The main streams draining the proposed wind farm site (i.e. the Gortloughra, Shanacrane and Shehy Beg Streams) provides suitable foraging habitat for otters, whilst other first order streams feeding these streams are of low fisheries value and are of limited foraging value for otters. No otter activity was recorded along the Gortloughra, Shanacrane and Shehy Beg Streams during camera trap monitoring.

No evidence of non-volant mammals was recorded at any of the proposed widening areas along the TDR.

4.5.5 Bat Species

In general, the landscape that the Development is a part of, is of low to moderate suitability for common pipistrelle, soprano pipistrelle, brown long-eared, Leisler's, Daubenton's, Natterer's and whiskered bat. The proposed site and its environs are of low suitability for lesser horseshoe bat and Nathusius' pipistrelle.

Nine species of bats have been recorded as present at the Development during the bat surveys. All are listed as 'Least Concern' on the Irish Red List, and Annex IV of the EU Habitats Directive.

Lesser horseshoe bats were recorded at low activity levels within the wind farm site during bat activity survey for the 2020 bat activity season. No lesser horseshoe bat activity was recorded during the bat activity surveys for the 2021 bat activity season (see EIAR Chapter 6: Appendix 6.2).

4.5.6 Bird Species

Following bird surveys completed for the proposed Site a total of 30 key ornithological receptors have been identified . Of these species ten are Red-list status under the BoCCI (Gilbert et al., 2021). These include golden plover, dunlin, grey wagtail, kestrel, whinchat, meadow pipit, redwing, snipe, red grouse and swift. A further 15 Amber-listed species were observed, whilst 5 Green-listed species were also identified as key ornithological receptors.

Table 4.2 lists the bird species that have been identified as key ornithological receptors for the assessment of ornithological impacts (see EIAR Chapter 7). The sensitivity of species as outlined on Table 4.2 are as per Chapter 7 of the Gortloughra Wind Farm EIAR.

Table 4.2: Key Ornithological Receptors

Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low/Negligible Sensitivity
Chough	Grey Wagtail	Cormorant	Buzzard
Dunlin	Kestrel	Goldcrest	Grey Heron
Golden Plover	Meadow Pipit	House Martin	Sparrowhawk
Hen harrier	Red Grouse	House Sparrow	Greater Black-Backed Gull

Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low/Negligible Sensitivity
Peregrine	Redwing	Lesser Black-backed Gull	
	Snipe	Linnet	
	Swift	Sand Martin	
	Whinchat	Skylark	
		Starling	
		Swallow	
		Teal	
		Wheatear	
		Willow Warbler	

4.5.7 Invertebrates

Invertebrates recorded at the proposed wind farm site include the small heath butterfly which was recorded within the commonage area during field surveys. Other species observed include orange tip, small tortoiseshell, common blue, green-veined white, meadow brown, ringlet and small white.

No marsh fritillary were recorded at the proposed wind farm site during field surveys. The marsh fritillary larval foodplant, *Succisa pratensis*, rarely occurs within the swards of habitats occurring

at the wind farm site and TDR widening locations. The general absence of this plant from the project site does not provide for suitable habitat for the sustenance of marsh fritillary populations.

4.5.8 Aquatic Fauna

Details of aquatic fauna, including freshwater pearl mussel, brook lamprey and fisheries of the Bandon_SC_010 sub-catchment are set out in **Section 5.1** below.

5 BANDON RIVER SAC

Likely significant effects to the Bandon River SAC were identified during the Screening for Appropriate Assessment. The potential for likely significant effects to occur to this European Sites is based upon the potential impacts that could arise as a result of the proposed development, the presence of pathways connecting the source of impact to qualifying features of interest of this SAC and the sensitivity of qualifying features of interest o the SAC to impacts. The qualifying features of interest of the Bandon River SAC are listed in Table 5.1 below and those that occur within the zone of influence of the project are identified. Each of the qualifying features of interest that are connected via pathways to the proposed development and are located within its zone of influence are highlighted in yellow in Table 5.1. the rationale for identifying these features within the zone of influence of the project are also outlined.

Table 5.1: European Sites and relevant qualifying features of interest (highlighted in yellow) within the zone of influence of the Proposed development

European Sites	Distance	Qualifying features of interest	Pathway	Source
Bandon River SAC	0km – Intersected by the proposed grid connection route and the proposed haul route	Floating River Vegetation [3260]	Hydrological pathway	Wind farm & grid connection route Option A & B
		Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]	Hydrological pathway	Wind farm & grid connection route Option A & B
		Margaritifera margaritifera (Freshwater Pearl Mussel) [1029]	Hydrological pathway	Wind farm & grid connection route Option A & B
		Lampetra planeri (Brook Lamprey) [1096]	Hydrological pathway	Wind farm & grid connection route Option A & B

5.1 BANDON RIVER SAC

The Bandon River SAC consists of relatively short adjoining stretches of the Bandon and Caha Rivers. These rivers flow in a southerly direction to the east of Dunmanway, Co. Cork. As set out in Table 5.1 above site is a SAC selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[3260] Floating River Vegetation

[91E0] Alluvial Forests*

[1029] Freshwater Pearl Mussel (Margaritifera margaritifera)

[1096] Brook Lamprey (Lampetra planeri)

Wet broadleaved semi-natural woodland is found in an undisturbed area of braided river channels and islands below Dunmanway. The river channels are well defined and the islands appear solid. Canopy dominants are Hazel (Corylus avellana) and Sessile Oak (Quercus petraea), with scattered Downy Birch (Betula pubescens), Ash (Fraxinus excelsior), Rusty Willow (Salix cinerea subsp. oleifolia) and Alder (Alnus glutinosa). There is a very sparse understorey composed of Hawthorn (Crataegus monogyna), Holly (Ilex aquifolium) and saplings of Hazel and Sessile Oak. Epiphytes are abundant on trees, including species such as Ivy (Hedera helix), Honeysuckle (Lonicera periclymenum) and bryophytes such as Isothecium myosuroides. The ground flora is dominated by Ramsons (Allium ursinum), Wood Anemone (Anemone nemorosa) and Ivy, along with Lesser Celandine (Ranunculus ficaria) and Irish Spurge (Euphorbia hyberna). Goldilocks Buttercup (Ranunculus auricomus), a very rare plant in Co. Cork, has been recorded from this woodland.

Floating river vegetation is found along the length of the river and is dominated by water-crowfoots (Ranunculus spp). Other aquatic plants found include Alternate Water-milfoil (Myriophyllum alterniflorum), Broad-leaved Pondweed (Potamogeton natans) and at least four water-starwort species (Callitriche spp.). Mosses present on rocks and attached to tree roots include Fontinalis antipyretica in slack flow areas, and Fontinalis squamosa, Rhynchostegium riparioides and Amblystegium riparium in moderate flows. The landward fringe of deep pools supports Yellow Water-lily (Nuphar lutea), Bogbean (Menyanthes trifoliata), Marsh-marigold (Caltha palustris), Water Mint (Mentha aquatica) and Fool’s Water-cress (Apium nodiflorum). Shoreweed (Littorella

uniflora) and Six-stamened Waterwort (Elatine hexandra) are two species of local importance which are found in the river. In moderate current flow below the Long Bridge, the larger stones are covered by the moss Brachythecium rivulare and the liverwort Chiloscyphus polyanthos var. polyanthos. Boulders covered in Nostoc algae are probably of local occurrence in Ireland. The liverwort Riccardia chamaedryfolia and the moss Fissidens crassipes found under the Long Bridge are considered to be rare in Ireland.

The SAC is also designated for its role in supporting populations of freshwater pearl mussel and brook lamprey. The following subsections provides an overview account for each of the qualifying features of interest of the SAC, as well as current baseline water quality and fisheries information along the Bandon River SAC downstream of the project.

5.1.1 Freshwater pearl mussel

A Sub-Basin Management Plan (SBMP) was prepared for the freshwater pearl mussel population of the Bandon Catchment. Pearl mussels require specific habitat conditions for the survival of viable populations. The principal habitat requirements are oligotrophic, well oxygenated waters of high-water quality with low levels of sedimentation and a firm substrate of gravels and sand.

Such conditions occur throughout the Bandon catchment and the distribution of pearl mussels in this catchment is known to be widespread with records from as high as Cullenagh Lake to as low as Bandon Town. The areas of the Bandon River catchment supporting populations of freshwater pearl mussel, as mapped for the SBMP, are shown on Figure 5.1. Significant survey effort to establish the extent of the population within the Bandon River at Dunmanway was undertaken between the mid 1990's and 2005. Attempts to survey the population along the river in 2009 were repeatedly thwarted by spate conditions. Thus it is noted in the SBMP that the current status of the population is based on survey work completed up to 2005.

While the surveys undertaken to date found the population to be abundant in places, with up to 75 individuals per square metres recorded (Ross, 2005), the population consisted mainly of adult mussels: the surveys recorded no mussels with shell lengths lower than 65mm. The results of surveys also suggested that juvenile habitat is seriously impaired. High levels of silt in the Caha River have been recorded and are likely to be affecting juvenile survival. Examination of salmonids during electro-fishing surveys in 2009 found none to be encysted with glochidia, suggesting that although good numbers of salmonids are present within the Bandon River the mussel population

may be too stressed to brood glochidia to maturity. Other unfavourable conditions have been recorded within the catchment such as macrophyte cover over 5% at pearl mussel habitats (legislation requires cover to be <5%). The SBMP does note that the population of the Bandon River is likely to support in excess of 50,000 individuals. Notwithstanding these numbers the conservation status of the Bandon River catchment mussel populations is considered to be unfavourable due to low levels of recruitment and impaired juvenile habitat.

The nearest location of known pearl mussel beds to the project site along the stretch of the Caha River crossed by the proposed grid connection route Option A (at the townland of Neaskin and Ardcahan). Extensive mussel beds occur along the Caha River at this crossing location as well as upstream and downstream of the crossing location. Extensive mussel beds occur along the main channel of the Bandon River also at that location.

The distribution of freshwater pearl mussels as recorded for the 2009 SBMP within the SAC are shown on Figure 5.2. As part of the site-specific conservation objectives for the Bandon River SAC the area of suitable habitat for freshwater pearl mussels, has been identified and mapped by the NPWS. The stretch of the Bandon River that has been identified as suitable fresh water Pearl mussel habitat is shown on Figure 5.2. It is this stretch of the Bandon River that is the target for continued distribution of this species within the SAC.

5.1.2 Brook lamprey

The brook lamprey spends its life in freshwater. It breeds in areas of gravelly river bed, before spending the juvenile stage of the lifecycle buried in areas of fine silt downstream. Juvenile lamprey habitat is generally found along rivers where deposition occurs such as in lateral areas along straight stretches flowing at low to level grades or on the inner sides of bends and meanders. Adult brook lamprey undertake relatively short migrations upstream with distances travelled often less than 1km[9].

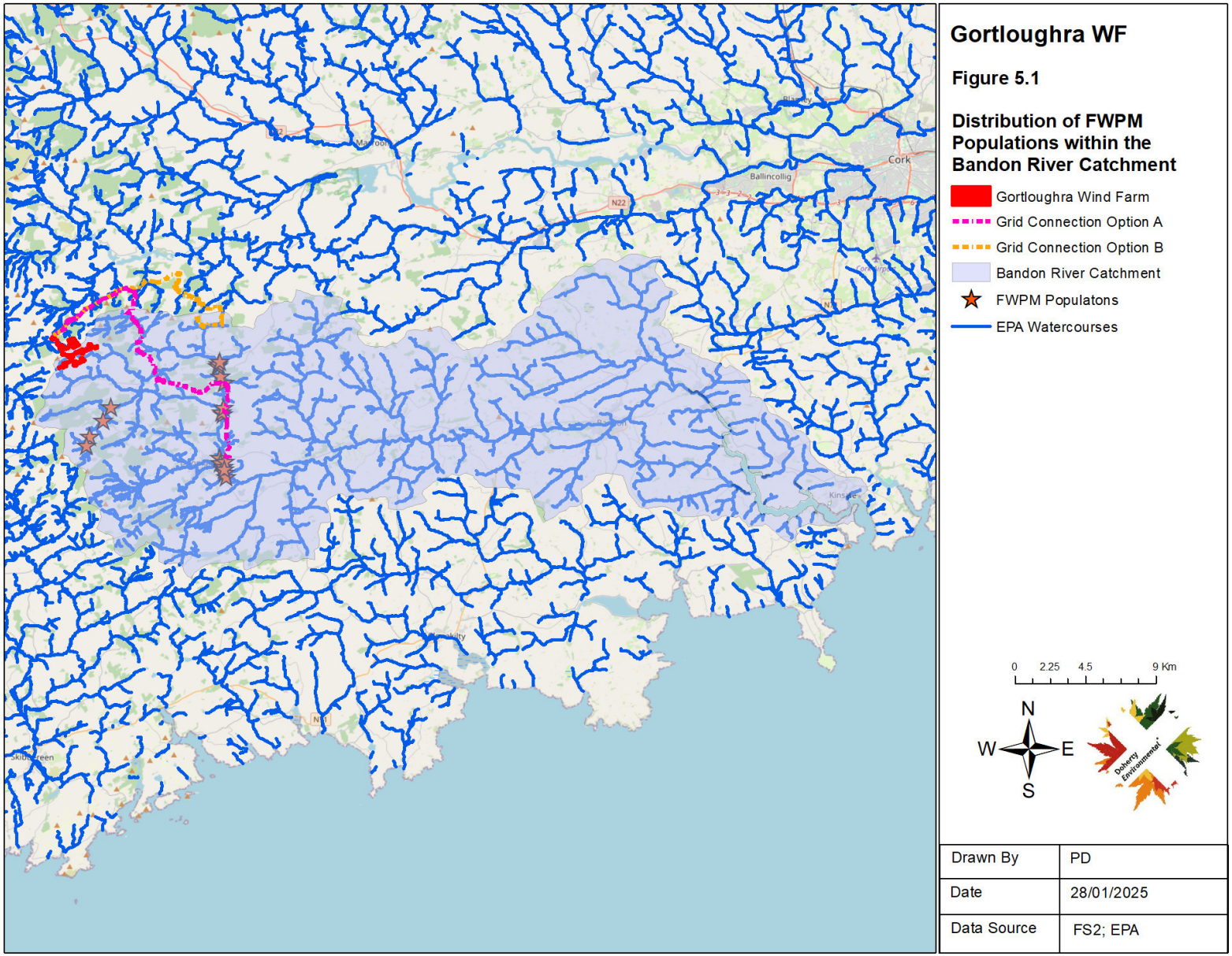
9 Hardisty, M. W. and Potter, I. C. 1971 The general biology of adult lampreys. In M.W. Hardisty and I. C. Potter (eds.) The Biology of Lampreys, Volume 1, Academic Press, London.

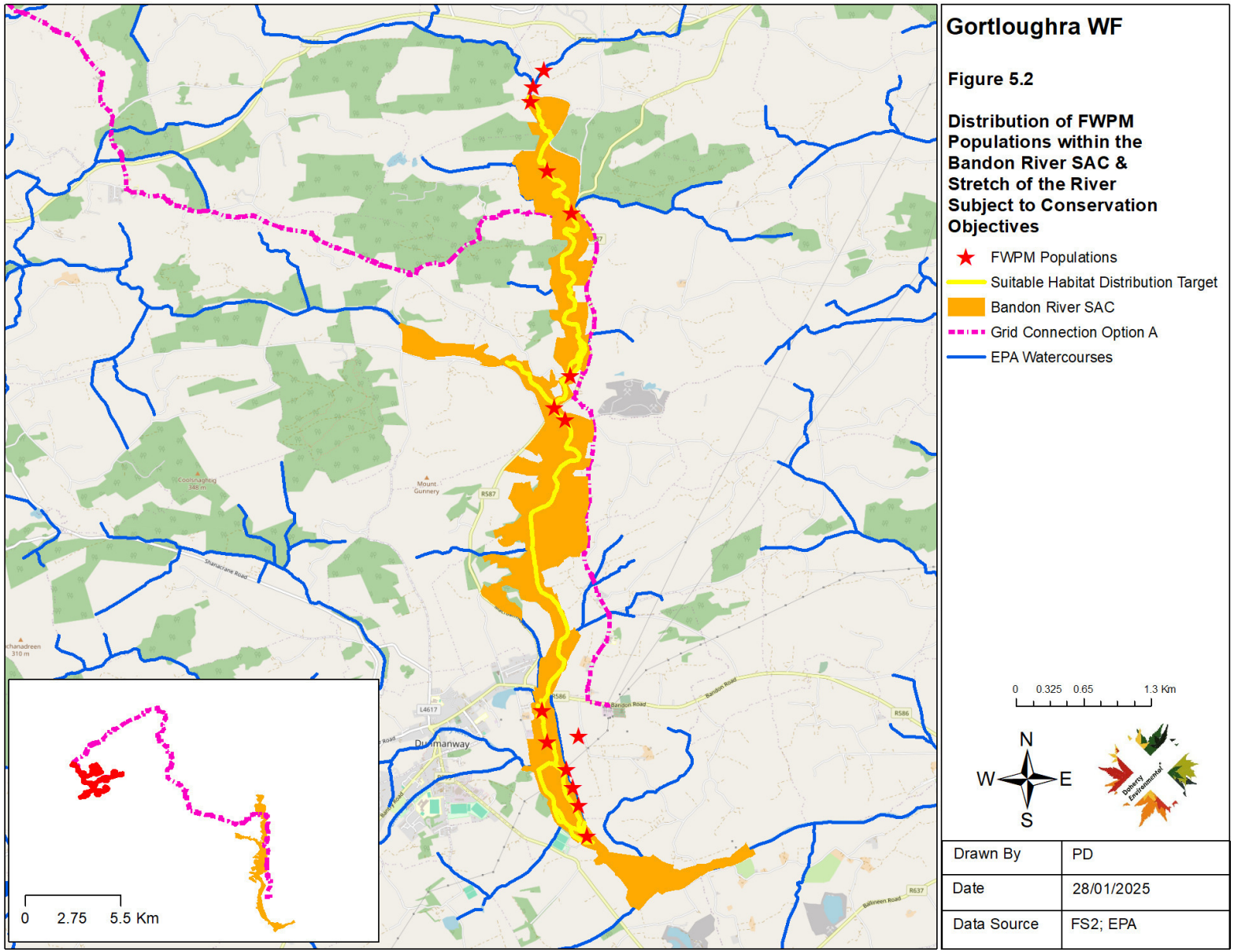
Known juvenile lamprey sites are located along the main channel of the Bandon River. Large numbers of juvenile lamprey were recorded along the braided channels of the Bandon River to the east of Dunmanway, during survey work for the Dunmanway Flood Relief scheme (King et al. 2008). This area corresponds to the area of alluvial wet woodland described below.

5.1.3 Floating River Vegetation

Floating river vegetation occurs throughout the Bandon River catchment. Species associated with the floating river vegetation community within the catchment include Water Crowfoot *Ranunculus* spp., Milfoil *Myriophyllum alterniflorum*, Pondweed *Potamogeton natans*, four varieties of Starworts *Callitriche hamulata*, *Callitriche obtusangula*, *Callitriche platycarpa* and Callitriche stagnalis and the aquatic moss Fontinalis antipyretica. Ranunculus sp. is reported to be the dominant floating river vegetation on the Bandon River.

It is noted that current research is being undertaken to further define the characteristics of Annex 1 floating river vegetation communities in an Irish context. High status rivers can support abundant Ranunculus vegetation, however rivers artificially enriched with nutrients can also support species-poor examples of floating river vegetation, dominated by Ranunculus sp. (particularly R. fluitans). Examples of the latter are not likely to be representative of the Annex 1 community.


Gortloughra WF
Figure 5.1
Distribution of FWPM Populations within the Bandon River Catchment
Gortloughra Wind Farm
Grid Connection Option A
Grid Connection Option B
Bandon River Catchment
FWPM Populatons
EPA Watercourses
Cork
Ballincollig
0 2.25 4.5 9 Km
N
W
E
S
Drawn By PD
Date 28/01/2025
Data Source FS2; EPA


Gortloughra WF
Figure 5.2
Distribution of FWPM Populations within the Bandon River SAC & Stretch of the River Subject to Conservation Objectives
FWPM Populations
Suitable Habitat Distribution Target
Bandon River SAC
Grid Connection Option A
EPA Watercourses
0 2.75 5.5 Km
0 0.325 0.65 1.3 Km
N
W
E
S
Drawn By PD
Date 28/01/2025
Data Source FS2; EPA

In 2006 detailed surveys of the extent of floating river vegetation was undertaken within the Bandon Catchment for the OPW arterial drainage schemes. Ten sampling points were surveyed for the presence of floating river vegetation within the catchment upstream and downstream of Dunmanway. Floating river vegetation was recorded at four of the sampling points.

The floating river vegetation recorded during the 2006 survey along the main channel of the Bandon River was more diverse with two *Ranunuculus* sp. and three *Callitriche* sp. being recorded.

The Bandon River SMBP also recorded the presence of macrophyte vegetation dominated by *Ranunculus* or *Callitriche* sp. during macroinvertebrate water quality surveys in 2009. At each of the SMBP sampling points *Ranunculus* cover ranged from 10% to 80% and was mainly dominated by *Ranunculus fluitans*.

5.1.4 Alluvial woodland

Extensive area of alluvial woodland occurs along the main channel of the Bandon River. The extent of this woodland stretches from the Long Bridge south to the confluence of the Kealrootha and Bandon River. As shown on Figure 1.3 above, no example of this habitat occurs in the vicinity of the proposed grid line.

5.1.5 Bandon River Water Quality

The Bandon_SC_10 subcatchment area, in which the southern extent of the proposed wind farm site is located, has been assigned "*Moderate*" status under the 2016 – 2021 cycle of the WFD. This sub-catchment represents the section of the Bandon River, upstream of Dunmanway and comprises the upper stretches of the Bandon River and the Caha river. The majority of the Bandon River SAC boundary falls within this sub-catchment. The *Moderate* status under the 2016 – 2021 cycle of the WFD represents a status decrease from "*Good*" which was assigned to the same river waterbodies for the 2013 – 2018 cycle of the WFD.

Six no. EPA water quality monitoring stations occur along the River Bandon catchment downstream, between the proposed wind farm and the Dunmanway ESB substation to which grid connection route Option A will connect. These stations are listed in Table 5.2 below.

Table 5.2: EPA Water Quality Monitoring Stations between the proposed wind farm site and the Dunmanway ESB Substation

Station Name	Watercourse	Survey Year	Q-Value Score	Q-Value Status	Relationship to Project
Br N of Coolcaum	Caha	2021	4 – 5	High	Station crossed by grid connection route Option A
Poulnaberry Br	Caha	2006	4	Good	Station not crossed by grid connection route. Approximately 2.3km east of Option A route
BANDON - Br u/s Ardcahan Br	Bandon	1989	3 – 4	Moderate	Station not crossed by grid connection route. Approximately 500m south of Option A route
Caha Bridge	Caha	2021	4	Good	Station not crossed by grid connection route. Approximately

Station Name	Watercourse	Survey Year	Q-Value Score	Q-Value Status	Relationship to Project
					120m west of Option A route
Ardcahan Bandon River	Bandon	2020	3 – 4	Moderate	Station not crossed by grid connection route. Approximately 216m west of Option A route
BANDON - Br near River View	Bandon	1989	4	Good	Station not crossed by grid connection route. Approximately 400m west of Option A route

Of the six no. EPA water quality monitoring stations between the proposed wind farm site and the ESB substation at Dunmanway only 3 provide recent water quality monitoring information. These are at Br N of Coolcaum, Caha Bridge, and Ardcahan Bandon River. The data for the two monitoring stations along the Caha River indicate good to high water quality along this watercourse. The results from Ardcahan Bridge indicate a deterioration downstream along the main channel of the Bandon River.

5.1.6 Bandon River Fisheries

There is a significant salmon population in the Bandon River that is of both conservation and recreational angling interest. Within the Bandon River SAC, Brook lamprey species are listed as a

selection feature of the designation. Brook lamprey spawn amongst clean pebbles and gravel in moderate flows with the periodicity dependent on water temperatures reaching a threshold of 10-11°C, from April to June (Maitland, 2003).

As part of a pre-survey baseline of fish species in the lower Bandon River in relation to the then proposed flood relief, both river and brook lamprey were recorded from as far downstream as Innishannon to below the old weir at Bandon (Ecofact, 2011). River lamprey densities were considered high and informed the opinion that the river was one of the best examples in Ireland for the species. However, Brook lamprey was considered the dominant lamprey species captured at up to 2km upstream of the weir in Bandon, which was deemed impassable to migratory river lamprey (Ecofact, 2011). Since the upgrading of the weir, it is not known whether river lamprey have been able to access upstream although there are reports that flounder (previously unable to pass the old weir) are now able to move upstream of Bandon. In the survey of the lower Bandon River conducted by Ecofact (2011), eel were considered common, and were distributed from 2km upstream of Bandon to Innishannon at the downstream tidal limit of the river; both bootlace and older individuals were recorded. While there is no specific distributional data for the upper and middle river in the vicinity of the cable route, eel are highly likely to be present given the habitat observed.

Inland Fisheries Ireland (IFI) (Gordon et al., 2021) completed a catchment-wide survey of the Bandon River between August and September 2021. A total of 35 no. sites were surveyed as part of the catchment-wide survey. Of these survey sites 4, 5 and 6 occur in the vicinity of the project. Survey sites 5 and 6 are located along the Shanacrane East Stream approximately 3.5km and 5.5km downstream of the proposed wind farm site. Survey site 4 is located along the Caha River at Coolmountain Bridge, which is crossed by the proposed grid connection route Option A. Other survey sites occurring in the local catchment area upstream of the project include survey site 2, 3, 9 and 10. The location of these 2021 IFI survey sites are shown on Figure 5.3. Table 5.3 lists the fish species recorded during surveys at these 7 no. survey sites in terms of minimum density (no. fish/m^2). Results for the 2021 survey are compared with results from a previous round of IFI survey completed during 2019.

Site No.	**4**		**5**		**6**		**2**		**3**		**9**		**10**	
Species	**2019**	**2021**	**2019**	**2021**	**2019**	**2021**	**2019**	**2021**	**2019**	**2021**	**2019**	**2021**	**2019**	**2021**
Brown Trout	0.257	0.201	0.086	0.248	0.175	0.228	0.352	0.098	0.228	0.144	0.083	0.032	0.237	0.273
0+ brown trout	0.227	0.139	0.023	0.053	0.123	0.176	0.253	0.098	0.114	0.096	0.083	0.019	0.113	0.196
1+ & older brown trout	0.031	0.061	0.063	0.195	0.052	0.053	0.1		0.114	0.048		0.013	0.124	0.077
Salmon	0.082	0.017	0.161	0.318	0.362	0.217	0.253	0.106	0.053		0.609	0.263		
0+ salmon	0.082		0.103	0.239	0.349	0.205	0.253	0.098	0.053		0.595	0.236		

Site No.	**4**		**5**		**6**		**2**		**3**		**9**		**10**	
Species	**2019**	**2021**	**2019**	**2021**	**2019**	**2021**	**2019**	**2021**	**2019**	**2021**	**2019**	**2021**	**2019**	**2021**
1+ & older salmon		0.017	0.057	0.08	0.013	0.012		0.008			0.014			
European Eel			0.04					0.041	0.011	0.018				
Minnow			0.092	0.027										
Three-spinned Stickleback								0.008	0.061	0.222				

Colour Code: Blue = High Fish Ecological Status; Green = Good Fish Ecological Status; Yellow = Moderate Fish Ecological Status

As per Table 5.3 above the IFI have recorded a decline in fish ecological status at Site No. 4 and 3, no improvement from moderate status at Site No. 9 and 10; no change in Good status at Site No. 5; and an improvement in status at Site No. 5.

In terms of the wider all catchment-area survey Site No. 2, 3 and 4 as set out in Table 5.3 were the only sites where a deterioration in fish ecological status was recorded. Of the 35 survey sites, 13 sites improved whilst 16 site remained unchanged in the wider catchment area survey.

The IFI offered likely causes for the deterioration at Site No. 2, 3 and 4 as being related to pressures caused by nutrient enrichment, habitat modification and fish passage issues.

In addition to the IFI surveys summarised above baseline fisheries surveys were completed for the project along the three principal watercourses draining the Site, namely the Gortloughra Stream, Shanacrane Stream and the Shehy Beg Stream. The Gortloughra Stream is situated within the Ilen catchment and is not hydrological connected to the Bandon River SAC. The Shanacrane Stream and the Shehy Beg are headwater streams within the Bandon River catchment. The morphology of the Shanacrane East and Shehy Beg Stream at the Site is representative of high-gradient upland A/B-type zone (Rosgen, 1996) which are characterised by first order streams over high gradients, with steps and pools boulder strewn beds with cobbles and gravels and a straight profile. Shading occurs along the Shanacrane East and Shehy Beg Streams downstream of the proposed wind farm site caused by adjacent broad-leaved woodland.

The overall evaluation of the Shanacrane Stream and Shehy Beg Stream for their potential to support salmonids and lamprey species is set out in **Table 5.3** below.

Table 5.3: Summary of Salmonid & Lamprey Habitat downstream of the proposed wind farm site and within the Bandon River catchment

Watercourse	Salmonid Habitat	Lamprey Habitat
Shanacrane Stream	Upstream sections of stream within and near proposed wind farm site not used by salmonids. Supports	Lamprey species absent but suitable habitat occurs along

Watercourse	Salmonid Habitat	Lamprey Habitat
	important salmonid spawning and nursery habitat downstream of Site.	this stream downstream of the Site.
Shehy Beg Stream	Upstream sections of stream within and near proposed wind farm site not used by salmonids. Supports important salmonid spawning and nursery habitat downstream of Site.	Lamprey species absent but suitable habitat occurs along this stream downstream of the Site.

As outlined in **Table 5.3** above, the three primary streams draining the Site support conditions at the Site that are overall not representative of optimal spawning or nursery habitat for salmonids. These findings are supported by McGinnity et al. (2003) and Hendry et al. (2003) who note that salmonid watercourses are generally restricted to 2nd order and higher watercourses, whilst 1st order streams are unsuitable for spawning and the early life stage of salmonids. The 1st order nature of these streams within the Site, along with their propensity for variable flow rates and the drying out of sections of river bed during periods of drier weather conditions are identified as the principal factors reducing the potential to support salmonids.

All three streams draining the Site, downstream of the Site, are representative of salmonid watercourses and provides suitable spawning and nursery habitat for salmonids.

5.2 CONSERVATION OBJECTIVES

5.2.1 Generic Conservation Objectives

Generic conservation objectives have been published for the Bandon River SAC. The generic conservation objective for this SAC is to maintain and/or restore the favourable conservation condition of the qualifying habitats and qualifying species for which these sites have been designated.

Favourable conservation status of wetland habitats is achieved when:

- its natural range, and area it covers within that range, are stable or increasing
- the conservation status of its typical species is favourable

The favourable conservation status of these species will be achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats.
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future.
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

The generic conservation objectives for Bandon River SAC seek to **maintain** favourable conservation condition of brook lamprey, **restore** the favourable conservation condition of the Annex 1 habitats vegetation of flowing waters and alluvial woodland and the Annex 2 species freshwater pearl mussel.

5.2.2 Site-Specific Conservation Objectives

Site-specific Conservation Objectives for the Bandon River SAC have been published by the NPWS (NPWS, 2019a). The SSCOs for the qualifying features of interest of the Bandon River SAC that are the subject of this Natura Impact Statement examination are outlined in Table 5.4 below.

Table 5.4: Site-Specific Conservation Objectives for the Bandon River SAC Qualifying Features examined as part of this Natura Impact Statement

Qualifying Feature	Attribute	Target
Brook Lamprey	Distribution (extent of anadromy for sea lamprey) &/or barriers to movement	Access to all watercourses down to first order streams
	Population structure of juveniles	At least three age/size groups present

	Juvenile density in fine sediment	Mean catchment juvenile density of at least 5/m^2
	Extent and distribution of spawning habitat	No decline in distribution and extent of spawning beds.
	Availability of juvenile habitat	More than 50% of sample sites positive
Freshwater pearl mussels	Distribution	Maintain at 12.2km
	Population size	Restore to 50,000 adult mussels
	Population structure: recruitment	Restore to least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length.
	Population structure: adult mortality	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution.
	Habitat extent	Restore suitable habitat in more than 12.2km and any additional stretches necessary for salmonid spawning
	Habitat Condition	Restore condition of suitable habitat
	Water quality: macroinvertebrate and phytobenthos (diatoms)	Restore water quality- macroinvertebrates: EQR greater than 0.90 (Q4-5 or Q5); phytobenthos: EQR greater than 0.93.
	Substratum quality: filamentous algae (macroalgae), macrophytes (rooted higher plants)	Restore substratum quality- filamentous algae: absent or trace (<5%); macrophytes: absent or trace (<5%).
	Substratum quality: sediment	Restore substratum quality- stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment.
	Substratum quality: oxygen availability	Restore to no more than 20% decline from water column to 5cm depth in substrate.
	Hydrological regime: flow variability	Restore appropriate hydrological regimes.
	Host fish	Maintain sufficient juvenile salmonids to host glochidial larvae.
	Fringing habitat: area and condition	Restore the area and condition of fringing habitats necessary to support the population
Vegetation of Flowing Waters	Habitat area	Area stable or increasing, subject to natural processes
	Habitat distribution	No decline, subject to natural processes.
	Hydrological regime: river flow	Maintain appropriate hydrological regimes
	Hydrological regime: groundwater discharge	Maintain natural tidal regime
	Substratum composition: particle size range	The substratum should be dominated by the particle size ranges, appropriate to the habitat sub-type (frequently sands, gravels and cobbles)
	Water quality	Maintain appropriate water quality to support the natural structure and functioning of the habitat
	Typical species	Typical species of the relevant habitat sub-type should be present and in good condition
	Floodplain connectivity	The area of active floodplain at, and upstream of, the habitat, necessary to support all sub-types of the habitat, should be maintained.
	Fringing habitat: hectares and condition	Maintain the area and condition of fringing habitats necessary to support the habitat and its sub-types

These site-specific conservation objectives for the qualifying features of interest of the SAC are used in Section 5 below to facilitate an examination of the project's potential to undermine these objectives and thereby result in adverse effects to the conservation objectives of the SAC.

5.2.3 Documented Threats & Pressures

The NPWS have documented threats and pressures to the Bandon River SAC in their Natura 2000 Data Return Form for this SAC (dated October, 2020). The threats and pressures to this SAC have been ranked in terms of low, medium and high impacts. The medium to high impact threats and pressures and their associated are as follows:

- E03 (inside the site) Discharges (high impact)
- J02.04 (inside the site) Flooding modifications (high impact)
- C01.01.01 (outside the site) Sand and gravel quarries (medium impact);
- B02 (both inside and outside the site) Forest and Plantation management & use (low impact)
- D02.01(inside the site) Electricity and phone lines (low impact)
- F02.03 (inside the site) Leisure fishing (low impact)
- G01.08 (inside the site) Other outdoor sports and leisure activities (low impact)

6 EXAMINATION OF IMPACTS

The following subsections provide an examination of the impacts that could arise as a result of the elements of the proposed development during the construction, operation and decommissioning phases and adversely affect the European Sites and relevant qualifying features of interest occurring within the zone of influence of the proposed development.

6.1 SURFACE WATER 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[10].

The proposed wind farm will comprise 3 no. crossing of natural stream along the proposed Access Track. The 3 no. crossings are located within the Bandon_SC_10 sub-catchment and are associated with the Shehy Beg Stream and its first order tributaries.

The crossings will comprise the use of clear span c. 4m wide bottomless culverts and will not result in any modifications to the watercourse channels at the crossing locations. In addition, no instream works will be required during the construction of this watercourse. As such there will be no direct physical impacts to the three no. minor watercourses to be crossed as a result of the proposed wind farm.

Notwithstanding the absence of instream works, potential impacts on hydrology and water quality associated with the construction or upgrading of water course crossings include:

- Alteration of flow regime potentially leading to erosion and/or flooding and
- Harmful discharges during construction and operation, in particular the release of suspended solids.

Unmitigated, the alteration of watercourse crossings and the discharge of harmful substances to streams is considered to be a direct, negative, potentially moderate to significant impact to the aquatic environment and aquatic receptors downstream.

[10] *'Guidelines for the crossing of watercourses during the construction of national road schemes'*

(*National Roads Authority*, 2008)

6.2 SURFACE WATER RUNOFF

The potential impacts that may arise as a result of the project relate to the discharge of contaminated surface water from the project site during the construction phase to the Bandon River catchment. These are detailed below. Please refer to **Section 7** for the associated mitigation measures.

The discharge of such pollutants will have the potential to result in reductions in water quality in sub-catchments in which the wind farm is located and through which the proposed grid route Option A runs with consequent negative impacts to sensitive species such as Atlantic salmon, freshwater pearl mussel and brook lamprey. In addition, the discharge of such poor-quality surface water to these river systems will have the potential to compromise the conservation objectives of the SAC, which is to restore the condition of these rivers for freshwater pearl mussels[11].

6.2.1.1 Hydraulic Loading

The proposed wind farm development has the potential to result in increased volumes of runoff during the operational phases of the wind farm relative to baseline conditions. This is a function of the progressive excavation and removal of vegetation cover and replacement with hardstanding surfaces (effectively or assumed impermeable) associated with turbine hardstands and access tracks and the installation of constructed drainage around the wind farm footprint and thus removing the hydraulic absorption/buffer control from areas of hardstand within the project site.

Increased runoff, or an increased hydrological response to rainfall has the potential to exacerbate flooding events and exacerbate flooding and erosion within the boundary of the wind farm site. This in turn will have the potential to generate increased rates of suspended solids within waters draining the project site and for their conveyance downstream to the Bandon River SAC. Further discussion of the release of suspended solids are set out below.

[11] As noted in Section 5.2.1 above for the purposes of this NIS it is taken that an objective of the SAC is to restore the favourable conservation status of watercourse that are suitable for support freshwater pearl mussel.

6.2.2 Release of Suspended Solids

Earthworks associated with the construction phase of the wind farm will require the denuding of surface vegetation within the proposed wind farm site. In the absence of an appropriate design and mitigation measures, such activities will have the potential to generate silt-laden runoff from the works area and for this runoff to be discharged via first order streams to the Bandon River and contribute to the loading of contaminants within the upper catchment draining to the Bandon River SAC downstream.

Earthworks and excavations associated with the construction phase of the wind farm and the proposed grid route Option A will have the potential to generate particulate/silt-laden runoff from the works area and for this runoff to be discharged via surrounding watercourses to the Bandon River (with respect to the wind farm) and the Caha and Bandon River (with respect to proposed grid connection route Option A). The degree to which inorganic solids are entrained in runoff is related to the particle sizing of the soil components. Smaller inorganic particles (e.g., clay) will be easily entrained and will remain in suspension for a longer period than larger particles (silt / sand) and will require lower flow rates and longer retention rates to settle out of the water column when given the opportunity.

Runoff contaminated with suspended solids will add turbidity to the receiving surface water body. Nutrients that are associated with the solids (inorganic nutrients such as phosphorus and organic such as hydrocarbons, and sewage if present) can lead to eutrophication of the water environment.

The degree to which inorganic solids are entrained in runoff is related to the particle sizing of the soil components. Smaller inorganic particles (e.g. clay) will be easily entrained and will remain in suspension for a longer period than larger particles (silt / sand), and will require lower flow rates and longer retention rates to settle out of the water column when given the opportunity.

Release of suspended solids can be attributed to enhanced nutrient enrichment. This is highly dependent on the type of soil, for example; peat released in water will disintegrate and most of the constituents of the peat material (carbon) will eventually dissolve in to the water column and / or be consumed by micro-organisms. However, peat and other soils / subsoils will contribute varying degrees of loading of various compounds and nutrients, including Nitrogen (N) and Phosphorous (P) compounds, which are attributed to Nutrient Enrichment, or excessive loading of N and P in waters leading to eutrophication and potentially profound adverse impacts on ecological attributes

6.2.3 Release of Hydrocarbons

Plant equipment and vehicles associated with excavation, material transport, and construction activities introduce the risk of hydrocarbon (fuel and oil) spillages and leaks, particularly in relation to regular refuelling which in turn implies the requirement of a fuelling station or will be supplied by fuel tanker scheduled to refuel the plant machinery directly. Similar to suspended solids arising from excavation activities, hydrocarbons accidentally introduced to the environment will likely be intercepted by surface water networks associated with the proposed wind farm and proposed grid connection route Option A.

Hydrocarbons are a pollutant risk due to their toxicity to all flora and fauna organisms. Hydrocarbons chemically repel water and sparingly dissolve in water. The majority of hydrocarbons are light non-aqueous phase liquids (L-NAPL's) which means that they are less dense than water and therefore float on the water's surface (whether surface water or groundwater). Hydrocarbons adsorb ('stick') onto the majority of natural solid objects they encounter, such as vegetation, animals, and earth materials such as soil.

From a land and soils perspective, the naturally occurring chemical in crude oil and gasoline products-Polycyclic Aromatic Hydrocarbons or (PAHs), can burn most living organic tissue, such as vegetation, due to their volatile chemistry. From a hydrological standpoint, they are also a nutrient supply for adapted micro-organisms, which can deplete dissolved oxygen at a rapid rate and thus kill off water-based vertebrate and invertebrate life.

Potential incidents or accidental release of contaminants will likely be short lived or temporary, however the potential impacts to downstream receptors such as Floating River Vegetation Habitat, freshwater pearl mussel and brook lamprey species can be long lasting, or permanent.

6.2.4 Release of Construction or Cementitious Materials

Works associated with the proposed wind farm and proposed grid connection route Option A has the potential to result in the accidental spillage or deposition of construction waste into soils and in turn impact on surface water runoff, or accidental spillages directly intercepted by drainage or surface water networks associated with the wind farm site.

Depending on the material in question, the introduction of such materials can lead to a local change in hydrochemistry and impact on sensitivities such as ecology. For example, the introduction of cementitious material (concrete/cement/lean mix etc.) can lead to changes in soil and water pH, and increased concentrations of sulphates and other constituents of concrete. Fresh or wet concrete is a much more significant hazard when compared to old or set concrete which is considered inert in comparison, however it should also be noted that any construction materials or non-natural materials deposited, even if inert, are considered contaminants.

Surface water runoff coming into contact with concrete structures will be impacted to a degree. However, water percolating through lean mix will be impacted significantly.

6.3 RELEASE OF WASTEWATER OR SANITATION CONTAMINANTS

Temporary sanitation facilities will be provided at the temporary construction compound during the construction phase. The presence of these facilities will introduce the potential for the accidental leakage of wastewater or sanitation chemicals associated with wastewater sanitation onto soils, and into the local receiving sub-catchment and downstream to the Bandon_SC_010 sub-catchment during the construction phase of the project.

Wastewater and wastewater sanitation chemicals are pollutant risks due to their potential impact on the ecological productivity or chemical status of surface water systems, and toxicity to water-based flora and fauna.

The level of risk posed by such facilities is dependent on the condition and upkeep of the facilities that are put in place, and the chemical agents used if applicable.

The potential impacts associated with wastewater sanitation is the potential for sanitation chemicals, particularly related to porta-loos, accidentally spilling or leaking and being intercepted by surface water drainage features and in turn surface water networks associated with the proposed development. Please refer to **Section 7** for associated mitigation measures

6.4 HORIZONTAL DIRECTIONAL DRILLING RIGS & WORKING AREAS

All 22-no. crossing required along the proposed grid connection route Option A will be crossed using horizontal directional drilling. The crossing of the Caha River and other minor watercourses, streams will be via directionally drilling under these watercourses. The Caha River crossing is

located within the Bandon River SAC along the local road at the townland boundary of Neaskin and Ardcahan. The locations of the crossings is shown on **Figure 4.1** above. The following provides an examination of the potential impacts that could arise during the crossing of the Caha River as well as other tributary watercourses of the Caha and Bandon Rivers via horizontal directional drilling.

The following provides a brief overview of the horizontal directional drilling to inform the identification of potential adverse impacts associated with this element of the project.

Drill rigs and working areas will be required for horizontal directional drilling under the main channel of the Caha River within the Bandon River SAC and the other 21 no. crossings along the route Option A. The drill rigs and working areas will be established in the vicinity of watercourse, a minimum distance of 20m from the watercourse corridor in order to achieve the required angle for drilling. The locations of the drill rig launch and receptor pits at the Caha River crossing within the Bandon River SAC are shown on **Figure 3.1**. To permit the horizontal drilling, pits will be excavated at either end of the crossing so that the entry point (the launch pit) and an exit point (the reception pit) are at the required depth for the borehole to be drilled. As the drilling head for horizontal directional drilling can be steered, large pits will not be required, and it is estimated that the pits will be 1m x 1m x 2m. The sides of the pits will be battered back to prevent slippage. There will be no requirement for sheet piling.

The provision of rigs, pits, associated spoil arisings and the presence of site operatives will result in the denuding of existing surfaces at the pit locations. These excavations will create the potential for the generation of silt-laden surface runoff to adjacent watercourses. In the event that such runoff is entrained in surface water runoff and conveyed to receiving watercourses it will present a risk of sedimentation and perturbations to water quality. The release of sediment associated with pit excavations will have greatest potential for impact at the crossing of the main channel of the Caha River, which is known to support freshwater pearl mussel and brook lamprey. It is noted that the pits for the Caha River crossing will be located approximately 20m (west) and 20m (east) from the riverbank, which provides for a buffer zone between the pits and the river.

6.5 BREAK-OUT DURING HORIZONTAL DIRECTIONAL DRILLING

During horizontal directional drilling fluid is pumped down the drill bore under pressure. The drilling fluid to be used during horizontal directional drilling for the project will be Clearbore.

Clearbore is a polymer-based product that is designed to instantly break down and become chemically destroyed in the presence of small quantities of calcium hypochlorite. The product is not toxic to aquatic organisms and is biodegradable.

The drilling fluid will become mixed with material drilled in the borehole to form a drilling mud. As the drilling is completed under pressure any blockages in the pilot-hole during the pilot drill or reaming can result in the inadvertent breakout of drilling mud within the pilot-hole. Such breakouts can occur where an alternative path of less resistance through the overburden is present during a blockage. The breakout of drilling mud can result in contamination in the vicinity of the breakout. The locations where a breakout would present the greatest risk to the Bandon River SAC is during drilling under the main channel of the Caha River. Populations of the Nore freshwater pearl mussel are known to occur in the main channel of the Caha River, at the proposed grid connection route crossing, as well as brook lamprey. Brook lamprey are also likely to occur in the tributaries of the Caha and Bandon River crossed by the proposed grid connection route Option A. The breakout of drilling muds to the main channel of the Caha River crossed by the proposed grid connection route will have the potential to undermine the status of instream habitats within these watercourses with resultant adverse effects to populations of these species.

6.6 DISTURBANCE DURING HORIZONTAL DIRECTIONAL DRILLING

Noise and vibration will be generated during the horizontal directional drilling under watercourses along the proposed electrical cable route.

Horizontal directional drilling will generate noise and vibration during drilling operations. The primary noise sources would consist of the elevated diesel-powered hydraulic drill drive, a diesel driven electricity generator, and electrically driven spoil treatment plant for mechanical separation of solids from working fluid.

Table D.6 in BS5228: Part 2: 2009 +A1:2014 shows that vibration from activities associated with drilling, which will be characterised by augering, boring, mudding and spinning (with no hammering, drinving or striking) falls to below 1mm/s within a distance of approximately 10 to 15 metres.

6.7 IMPLICATION OF WATER QUALITY IMPACTS FOR RELEVANT QUALIFYING FEATURES OF INTEREST

6.7.1 Brook lamprey

The negative impacts of silt-laden runoff to fish species such as brook lamprey include:

- The settlement of silt on spawning redds resulting in the infilling of intra-gravel voids and the smothering of eggs and newly hatched fish.
- The settlement of silt on river beds can smother and displace macroinvertebrates, reducing the prey resource for fish species.
- Suspended solids can settle in pool and riffle habitats resulting in a reduction in the availability and quality of rearing habitat for fish.
- Silt-laden runoff can result in a reduction in transparency, impairing the ability of fish and otters to find food.
- Suspended solids can abrade or clog salmonid fish gills. Whilst high concentrations of suspended solids are required to clog fish gills, small concentrations can result in abrasion to gills and create the potential for infection.

The negative impacts of silt-laden runoff to otters include a reduction in suitable foraging habitat and prey availability.

Inputs of suspended solids can also contribute to nutrient enrichment in receiving waters as a result of the release of nutrient bound to sediments following mobilisation (Sharpley et al., 1992; Ballatine et al. 2006). The degree to which sediment loss contributes to nutrient enrichment is dependent on the type of soil, for example, peat released in water will disintegrate and most of the constituents of the peat material (carbon) will eventually dissolve in to the water column and/or be consumed by micro-organisms. However, peat and other soils/subsoils will contribute varying degrees of loading of various compounds and nutrients, including Nitrogen (N) and Phosphorous (P) compounds, which are attributed to nutrient enrichment, or excessive loading of N and P in waters. The release of such sediment in silt-laden surface water runoff from works at locations

along the proposed grid connection route and at the haul route widening locations noted above will have the potential to contribute to nutrient inputs to watercourse that are sensitive to nutrient inputs, increases in primary productivity and ultimately the adverse effects of eutrophication.

6.7.2 Freshwater Pearl Mussel

Pearl mussels require specific habitat conditions for the survival of viable populations. The principal habitat requirements are oligotrophic, well-oxygenated waters of high-water quality with low levels of sedimentation and a firm substrate of gravels and sand. Pearl mussels also require a healthy stock of juvenile salmonids to host glochidia during the larval stage of their life cycle. Pearl mussels are very sensitive to any changes or perturbations to these habitat requirements. Mussels use their gills for feeding and respiration and high levels of suspended solids within watercourses can significantly affect mussel respiration and feeding by clogging gills. Persistent exposure to high levels of suspended solids can result in starvation or respiratory stress resulting in asphyxiation.

Silt accumulation on riverbeds also significantly affects recruitment and the viability of a population. During the juvenile stage mussels will spend several years buried beneath the course riverbed. A constant flow of oxygen through the riverbed to the juvenile mussels is required for survival. The deposition of silt material over mussel beds will clog the interstice and reduce or prevent the penetration of oxygen to juveniles resulting in death.

The growth of instream vegetation including algae and macrophytes can also affect mussels by increasing the biological oxygen demand within the watercourse, thereby reduces the levels of oxygen available for mussel respiration. Macrophytes can also entrain sediment and lead to the build-up of silt.

The ingress of silt-laden waters to watercourses can lead to the alteration of physical, chemical and biological properties of a waterbody (Bilotta & Brazier, 2008). Physical alterations caused by sedimentation include reduced penetration of light, temperature changes and infilling of channels when solids are deposited. This latter effect is particularly relevant for juvenile pearl mussels and their survival, as the infilling of substrate interstices will reduce the availability of oxygen for juvenile mussels and eventually undermine recruitment to the population. Chemical alterations caused by sedimentation include the release of contaminants such as heavy metals and pesticides (Kronvang *et al.,* 2003; Miller, 1997), and nutrients such as phosphorous (Harrod & Theurer, 2002;

Haygarth *et al.* 2006) into the waterbody from adsorption sites on the sediment. The biological effects of sedimentation vary between organisms. Impacts to invertebrates include increased rates of drift, reductions in density and population size, and reductions in abundance and species richness. Impacts to fish and salmonids, the host fish of the pearl mussel larval stage, include damage to gills leading to increased susceptibility to disease; reduction in foraging activity, degradation of redds and reduced survival rates for early-stage life cycles.

Any migration of excessive silt-laden water and suspended solids from the project to the Bandon catchment or the inadvertent breakout of bentonite muds to the main channel of the Caha River during horizontal directional drilling of this watercourse could exacerbate the already critically endangered conditions for this population.

Sedimentation resulting from such effects could also contribute to change of the status of the Bandon catchments to support pearl mussels. Such an effect would undermine the conservation objective for both freshwater pearl mussel's species of the SAC, which is to "restore" this population to favourable conservation condition.

The potential for noise and vibration associated with horizontal directional drilling has been considered in Section 6.6 above and it has been found that this element of the project will not have the potential to result in disturbance to the Bandon freshwater pearl mussel beds along the Caha River, above the location of the proposed horizontal directional drilling and will not compromise the conservation objectives of the SAC to restore the favourable conservation status of the SAC for freshwater pearl mussel species.

6.7.3 Floating River Vegetation

Examples of Floating River Vegetation are likely to occur downstream of the project along the Bandon and Caha Rivers and within the Bandon River SAC.

The instream Floating River Vegetation habitat generally requires conditions along stream beds to be low in silt content, except for localised deposits at channel margins and along the channel bed where macrophytes can take root (Hatton-Ellis et al. 2003). High concentrations of suspended solids can also reduce transparency in the water column and perturb photosynthesis and plant growth (Mainstone et al. 2000).

6.7.4 Alluvial woodland

The NPWS (2019b) have identified the presence of non-native invasive species and other problematic and undesirable species as a threat to this habitat. Soil pollution and overgrazing were also identified as a threat to this habitat. As this habitat is periodically inundated by the annual rise of river levels (NPWS, 2019b), an accidental pollution event during construction and/or operation, of a sufficient magnitude, could potentially negatively affect the water quality of this habitat, impacting the vegetation within the habitat, and therefore impacting habitat area, habitat distribution, woodland size and woodland structure. In addition, in the event that the project results in the dispersal of non-native invasive species the potential will exist for the project to contribute towards the existing threat posed by non-native invasive species establishment in examples of this habitat.

6.8 IN-COMBINATION EFFECTS

6.8.1 In-Combination Effects During the Construction Phase

In terms of other projects there are no recent significant projects permitted in the vicinity of the Site. Those that do occur within the area surrounding the proposed development relate to small scale projects associated with amendments to residential dwellings and the construction of residential dwellings.

Other specific live or recently approved projects in the vicinity of the Site, that are considered to be minor in scale, are listed below and an examination of potential cumulative effects between these other projects and the Development is provided for each.

Planning Reference No. 24552: planning permission for the construction of a residential dwelling. A screening for Appropriate Assessment for this project was completed by the Planning Authority and it was determined that this project, alone or in-combination with other plans or projects, would not have the potential to result in likely significant effects to European Sites or the environment. Given this determination, the Development will not combine with this project to result in cumulative adverse effects to European Sites.

Planning Reference No. 2374: planning permission or facilitating works for the provision of access to existing hill-walking routes at Shehy Mountain as follows: (i) construction of parking area for

bicycles, cars and small buses at Shehy Beg, Dunmanway, Co. Cork, (ii) installation of 5 no. road signs along public roads in Glanycarney, Dunmanway, Co. Cork. (iii) installation of 1 no. road sign along public road at Derragh, Dunmanway, Co. Cork and (iv) ancillary site works at Shehy Beg, Dunmanway, Co. Cork. This development is small in scale and is not connected to any European Sites. The works associated with the development are complete with all facilities now in place. Given the absence of any pathway between this development and European Sites in the wider surrounding area and the absence of overlap between works associated with this development and the Gortloughra Wind Farm development there will be no potential for both to combine to result in cumulative adverse effects to European Sites.

Planning Reference No. 22329: planning permission for an extension to an existing residential dwelling. A screening for Appropriate Assessment for this project was completed by the Planning Authority and it was determined that this project, alone or in-combination with other plans or projects, would not have the potential to result in likely significant effects to European Sites or the environment. Given this determination, the Development will not combine with this project to result in cumulative adverse effects to European Sites.

Planning Reference No. 20108: planning permission for the construction of a residential dwelling. A screening for Appropriate Assessment for this project was completed by the Planning Authority and it was determined that this project, alone or in-combination with other plans or projects, would not have the potential to result in likely significant effects to European Sites or the environment. Given this determination, the Development will not combine with this project to result in cumulative adverse effects to European Sites.

Planning Reference No. 20599: : planning permission for the construction of a residential dwelling. A screening for Appropriate Assessment for this project was completed by the Planning Authority and it was determined that this project, alone or in-combination with other plans or projects, would not have the potential to result in likely significant effects to European Sites or the environment. Given this determination, the Development will not combine with this project to result in cumulative adverse effects to European Sites.

Planning Reference No. 23751: planning permission for the construction of a residential dwelling. A screening for Appropriate Assessment for this project was completed by the Planning Authority and it was determined that this project, alone or in-combination with other plans or projects, would not have the potential to result in likely significant effects to European Sites or the environment.

Given this determination, the Development will not combine with this project to result in cumulative adverse effects to European Sites.

Planning Reference No. 2180: : planning permission for an extension to an existing residential dwelling. A screening for Appropriate Assessment for this project was completed by the Planning Authority and it was determined that this project, alone or in-combination with other plans or projects, would not have the potential to result in likely significant effects to European Sites or the environment. Given this determination, the Development will not combine with this project to result in cumulative adverse effects to European Sites.

Planning Reference No. 23654: : planning permission for the uprate of the existing Bandon to Dunmanway 110Kv overhead line. an extension to an existing residential dwelling. A screening for Appropriate Assessment for this project was completed by the Planning Authority and it was determined that this project, alone or in-combination with other plans or projects, would not have the potential to result in likely significant effects to European Sites or the environment. Given this determination, the Development will not combine with this project to result in cumulative adverse effects to European Sites.

Maintenance of Dunmanway Flood Relief Scheme 2023: OPW are required under the Arterial Drainage Acts to maintain scheme channels and bridge/culvert structures that form part of the Arterial Drainage Scheme. This Scheme consists of 5.4km of watercourse and 0.8km of emhankment and 11 bridges located along the section of the Bandon River to the east of Dunmanway. The scheme overlaps with the Bandon River SAC. An Natura Impact Statement has been completed for the maintenance of the scheme in 2023. The Natura Impact Statement identified the potential for adverse effects to the Bandon River SAC and set out a suite of mitigation measures that, upon implementation will avoid such effects to the SAC. The Natura Impact Statement has concluded that, with the implementation of the mitigation measures, there will be no potential for the project to result in adverse effects to the Bandon River SAC. On the basis of this conclusion it can be concluded that the Gortloughra Wind Farm development will not have the potential to combine with this scheme to result in cumulative adverse effects to the Bandon River SAC.

A number of other wind farms occur within a 20km area of the project. This 20km distance is considered to be adequate for the purposes of this Natura Impact Statement and the examination of the potential for the proposed wind farm to combine with other wind farm sites in the wider

surrounding area to result in cumulative adverse construction phase impacts. This is based on the fact that all wind farms listed in Table 6.1 represent all those occurring within the Bandon_SC_010 sub-catchment in which the project is located and that could potential have links to the Bandon River SAC.

The wind farms identified in this 20km area are listed in Table 6.1.

Table 6.1: Consented & Operational Wind Farms within 20km of the proposed wind farm

	Wind Farm	Status	No. of Turbines	Approximate Distance to Nearest Turbine [km]	Direction from the Proposed Development
1	Ballybane WF	Operational	21	18km	South-west
2	Barnadivane WF	Consented / Permitted	6	18.7km	East
3	Carrigarierk WF	Operational	5	5.22km	East
4	Carrigarierk 2 WF	Consented / Permitted	3	5.74km	East
5	Cleanrath WF	Operational	11	9.8km	North-east
6	Coomatallin WF	Operational	4	16.61km	South-east
7	Currabwee WF	Operational	7	13.05km	South-east
8	Derragh WF	Operational	6	9.79km	North
9	Derreenacrinnig WF	Proposed	7	7.08km	South-west
10	Garranareagh WF	Operational	4	19.58km	East
11	Gortyrahilly WF	Consented / Permitted	14	11.72km	North
12	Grousemount WF	Operational	38	9.89km	North-west
13	Inchamore WF	Consented / Permitted	5	18.49km	North
14	Kilgarvan II WF (Sillahertane)	Operational	10	11.75km	North
15	Kilgarvan I WF (Coomagearlahy)	Operational	15	16.63km	North-west
16	Kilgarvan II WF (Inchincoosh)	Operational	6	18.27km	North-west
17	Kilgarvan II WF (Lettercannon)	Operational	7	17.21	North-west
18	Kilgarvan Repower WF	Consented / Permitted	11	16.78km	North-west
19	Killaveenoge WF	Operational	10	12km	South-east
20	Kilvinane WF	Operational	3	17.7km	South-east

21	Midas WF (Coolknoohil)	Operational	11	14.02km	North
22	Lahanaght Hill WF	Operational	5	13.55km	South
23	Midas WF (Glanlee I)	Operational	6	15.39km	North
24	Midas WF (Inchee)	Operational	6	15.74km	North-west
25	Milane Hill WF	Operational	9	9.2km	South
26	Shehy More WF	Operational	11	0.56km	North-east
27	Maughanaclea Wind Farm	Proposed	14	1.99km	South-west

The operational wind farms occurring within the Bandon_SC_010 catchment upstream of the Bandon River SAC have not been identified as a source of pressure or threat to the water quality of this catchment as per the latest Water Framework Directive cycle reporting for the sub-catchment. It is further noted that these operational wind farms as well as the proposed wind farms listed in Table 6.1 above have been subject to Appropriate Assessment and it has been determined that, upon the implementation of all mitigation measures set out in Appropriate Assessment documentation for these projects, these other wind farms will not have the potential, alone or in-combination with other plans or projects, to result in adverse effects to European Sites. On this basis it can be concluded that the current project will not have the potential to combine with these other wind farm projects to result in cumulative adverse effects to the Bandon River SAC.

In terms of existing pressures to water quality and fisheries of the Bandon_SC_010 sub-catchment it is noted that, as per Gordon et al. (2021) and the documented list of threats and pressures to the SAC as per Section 5.2.3 above, in the event that project results in the emission of deleterious substances to this sub-catchment, the potential will exist for the project to combine with these other existing pressures to result in cumulative adverse effects to the Bandon River SAC.

6.8.2 In-Combination Effects During the Operation Phase

In the absence of an adequate operational phase drainage design, the drainage at the wind farm site could contribute towards water quality pressures downstream along the Bandon River SAC. Under such a scenario the potential will exist for the operation phase of the proposed development to combine with other sources of water pollution in the surrounding sub-catchment areas to result in adverse effects to the conservation status of the Annex 1 habitat Floating River Vegetation and the Annex 2 qualifying species supported by the SAC.

6.8.3 In-Combination Effects During the Decommissioning Phase

Given that the decommissioning phase of the proposed development will not take place until the termination of the operation phase of the proposed wind farm it is not possible at this time to identify other plans or projects with which activities associated with the decommissioning phase could combine to result in adverse effects to European Sites. Notwithstanding this, it is noted that the activities associated with the decommissioning phase will be similar to those that will be required for the construction phase and will have the potential to result in similar impacts. With respect to the European Sites occurring in the zone of influence of the proposed development, these impacts will relate to pollution of receiving watercourses and qualifying features of the Bandon River SAC occurring downstream of the proposed wind farm site. The potential effects of pollution derived from construction phase and decommissioning phase activities have been set out in Section 6. In the event that other land use activities occurring within the local receiving sub-catchments are known to, or have the potential to, result in threats or pressures to this catchment during the decommissioning phase, then the potential will exist for this phase of the proposed development to combine with these other sources of pollution to result in cumulative adverse effects to the conservation status of the Bandon River SAC downstream of the proposed wind farm. It is noted that mitigation measures are set out in Section 7 below and their full implementation will provide safeguards such that the decommissioning phase of the proposed wind farm site will not have the potential to combine with other land use activities that pose a threat/pressure to the water quality of the local receiving sub-catchments catchment and the Bandon River SAC during this phase of the proposed development.

6.9 EXAMINATION OF EFFECTS TO CONSERVATION OBJECTIVES

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. The maintenance of habitats and species of the Bandon River SAC at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level. Favourable conservation status of a habitat is achieved when:

- its natural range, and the area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and

- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and

- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and

- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

A NIS is required to assess the potential for impacts to the integrity of a European Site, with respect to the site's structure and function and its Conservation Objectives. The structural and functional elements of a European Site to maintain the favourable conservation status of qualifying features of interest are embedded into the list of detailed site-specific conservation objectives (SSCO) attributes and targets for each of the site's interest features. As such, a European Sites' SSCOs represent the parameters against which a project's potential to adversely affect the integrity of a European Sites should be considered.

Table 6.2 lists the Conservation Objectives attributes and targets for each of qualifying features of interest of the Bandon River SAC and examines how the project, in the absence of mitigation, will have the potential to result in adverse effects to these attributes and targets.

Table 6.2: Examination of Potential Impacts to the Conservation Objectives of qualifying features of interest/special conservation interests

Attribute No.	Attribute	Target	Consideration of likely significant effects
Brook Lamprey			
1	Distribution (extent of anadromy for sea lamprey) &/or barriers to movement	Access to all watercourses down to first order streams	Activities associated with the construction phase of the proposed wind farm and the proposed grid connection route Option A, will not have the potential to undermine this attribute. The project will not result any barriers to the movement of lampreys throughout the Bandon River catchment. Given the absence of any physical interactions with watercourses of this catchment there will be no potential for the project to result in a reduction in the distribution of lamprey species within the Bandon River catchment and the Bandon River SAC.
2	Population structure of juveniles	At least three age/size groups present	The preferred spawning habitat for lamprey is gravel-dominated substratum typical of eroding watercourses in the upper reaches of catchments. After hatching the larvae swim or are washed downstream and settle in areas of preferred juvenile habitat. The juvenile stage of the lifecycle of lamprey species is generally restricted to depositing freshwater environments where the substratum supports areas of sandy silt. Such habitats are considered present within the Bandon River sub-catchment downstream of the proposed wind farm site and grid connection route Option A. In the event of negative impacts to lamprey spawning habitat downstream as a result of the release of excessive siltation or other pollutants, the potential will exist for indirect impacts to the later life-cycle juvenile stage of this species.
3	Juvenile density in fine sediment	Mean catchment juvenile density of at least 5/m^2	As set out for attribute no. 2 above in the event of negative impacts to lamprey spawning habitat, the potential will exist for an indirect and temporally delayed impact to the density of juveniles occurring within suitable juvenile habitat downstream. Such an impact will be derived from a reduction in suitable spawning habitat and lamprey larvae moving downstream to juvenile habitats.
4	Extent and distribution of spawning habitat	No decline in distribution and extent of spawning beds.	Works associated with the construction phase of the proposed wind farm and grid connection route Option A will have the potential to result in the release of excessive silt-laden surface water runoff to the Bandon River catchment. The discharge of such waters to the catchment upstream of the Bandon River SAC will have the potential to undermine the condition of lamprey spawning habitat in these watercourses. Brook lamprey show a preference for gravel-dominated substratum for spawning and the

			release of silt to such habitat will clog pore spaces and undermine the status of such habitat to support spawning lamprey.
5	Availability of juvenile habitat	More than 50% of sample sites positive	Given that the watercourses occurring downstream of the proposed wind farm and grid connection route Option A are optimal for juvenile brook lamprey there will be potential for the project to result in significant adverse effects to this habitat through the result of excessive silt-laden runoff or other pollutants to the Bandon catchment.
Freshwater pearl mussel & Bandon freshwater pearl mussel			
6	Distribution	Maintain at 12.2km	The emission of pollutants, such as silts, cement based-products and hydrocarbons to the Bandon River, during works associated with the wind farm site and particularly works associated with the excavation of horizontal directional drilling pits and during drilling operations have the potential to adversely affect the status of the Bandon River and its potential to support freshwater pearl mussels in stretches of suitable habitat downstream of works areas that comprise the distribution target of this attribute. Given that the target stretch for the distribution of freshwater pearl mussel in the SAC is located at the crossing of the Caha River section occurring within the SAC at the boundary of the townland of Neaskin and Ardcahan the potential impact to this attribute will be mediated by negative impacts to water quality, deterioration of mussel bed habitat and potential consequent impacts to host fish which are relied upon by freshwater pearl mussel.
7	Population size	Restore to 50,000 adult mussels	For the reasons outlined for attribute no. 6 above, the emission of such pollutant will have the potential to undermine recruitment within the Bandon River with consequent adverse implications for the achievement of this target.
8	Population structure: recruitment	Restore to least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length.	As outlined for Attribute No. 6 above, the emission of pollutants during works associated with proposed grid connection route and the Wind Farm will have the potential to undermine recruitment within the Bandon River, with consequent adverse implications for the achievement of this target.
9	Population structure: adult mortality	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution.	Given that the populations of freshwater pearl mussel associated with the SAC are located along the section of the Caha River that will be crossed by the proposed grid connection route option A, a pollution incident arising from horizontal directional drilling works under the river, could have the potential to undermine adult mussel health and lead to mortalities.

			It is noted that there will be no instream works (with potential to generate impact[12]) required for the construction phase of the proposed grid connection route as the crossing of the Caha River section within the SAC (as well as all other crossing along the proposed grid connection route) will be completed via horizontal directional drilling.
10	Habitat extent	Restore suitable habitat in more than 12.2km and any additional stretches necessary for salmonid spawning	In the event of the emission of pollutants to the Bandon River during works associated with proposed grid connection route and the wind farm the potential will exist for the project to result in a reduction of suitable habitat for freshwater pearl mussel within the SAC.
11	Habitat Condition	Restore condition of suitable habitat	The area of suitable habitat occurring within the SAC for freshwater pearl mussel is located downstream of the wind farm site, whilst the proposed grid connection route option A will cross under a section of the Caha River that support mussel bed associated with the Bandon River SAC mussel population. In the event of a pollution incident arising from horizontal directional drilling works under the river, could have the potential to undermine adult mussel health and lead to mortalities.
12	Water quality: macroinvertebrate and phytobenthos (diatoms)	Restore water quality-macroinvertebrates: EQR greater than 0.90 (Q4-5 or Q5); phytobenthos: EQR greater than 0.93.	Any emission of pollutants to the Bandon River during works associated with proposed grid connection route and the wind farm will have the potential to undermine water quality and compromise the achievements of the targets set out for this attribute.
13	Substratum quality: filamentous algae (macroalgae), macrophytes (rooted higher plants)	Restore substratum quality-filamentous algae: absent or trace (<5%); macrophytes: absent or trace (<5%).	In the event that works associated with the works associated with proposed grid connection route and the wind farm leads to the discharge of silts, or other pollutants to the bed of the Bandon River, conditions within the river could be enhanced for the growth of macrophytes. For instance, the NPWS (NPWS, 2019a) have reported an increase in the abundance of water crowfoot in rivers as a result of the input of fine

[12] Note that the only instream works that may arise is the wading of the river by a crew member should the rope for the overhead cable be brought from one side of the river to the other manually.

			sediments to river beds which provide a suitable rooting medium for macrophytes, such as water crowfoot. An increase in macrophytes will in turn have the potential to result in increases in sedimentation through the trapping of fines in macrophytes and settling in the river bed.
14	Substratum quality: sediment	Restore substratum quality- stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment.	For the reasons outlined for Attribute no. 13 above, the proposed grid connection route in combination with the wind farm and other sources of water quality pressures such as forestry and agriculture, will have the potential to compromise the targets for this attribute.
15	Substratum quality: oxygen availability	Restore to no more than 20% decline from water column to 5cm depth in substrate.	The emission of silt-laden runoff, or other pollutants to the bed of the Bandon River will have the potential to clog pore spaces and lead to a reduction in oxygen levels in substrates which will in turn have adverse effects for juveniles and mussel recruitment.
16	Hydrological regime: flow variability		The wind farm will have the potential to result in increase hydraulic loading to the upper Bandon River catchment owing to the increase in areas of hardstanding associated with the wind farm. In the absence of an appropriate surface water management design increased runoff and loading could result in an increase in sediment loss to headwaters with potential to contribute to elevated sediment losses to the Bandon River and associated impacts to mussel habitat downstream such as siltation of mussel beds. .
17	Host fish	Maintain sufficient juvenile salmonids to host glochidial larvae.	Adverse effects to water quality will have the potential to reduce the density of host fish along the Bandon River. Such reductions will have the potential to undermine this target.
18	Fringing habitat: area and condition	Restore the area and condition of fringing habitats necessary to support the population	The project will not result in impacts that have the potential to undermine the target of this attribute. No semi-natural riparian habitat, that contribute to the favourable conservation condition of lotic habitats, will be affected by the proposed grid connection route, alone or in-combination with the wind farm or other projects.
Vegetation of Flowing Waters			
19	Habitat area	Area stable or increasing, subject to natural processes	Any adverse effects to the water quality of the headwaters of the Bandon River catchment draining the wind farm site or the main channel of the Caha River and Bandon River downstream of the proposed grid connection route will have the potential to result in a reduction in the extent of suitable riverine habitat within the SAC to support this qualifying habitat.

20	Habitat distribution	No decline, subject to natural processes.	For the reasons outlined for Attribute no. 19 here, the project, in combination with other sources of water quality pressures such as forestry and agriculture, will have the potential to result in a decline in the distribution of this habitat within the Bandon River sub-catchment and Bandon River SAC downstream of the project.
21	Hydrological regime: river flow	Maintain appropriate hydrological regimes	The wind farm will have the potential to result in an increase hydraulic loading to the upper Bandon River catchment owing to the increase in areas of hardstanding associated with the wind farm. In the absence of an appropriate surface water management design increased runoff and loading could result in an increase in sediment loss to headwaters with potential to contribute to elevated sediment losses to the Bandon River and associated impacts to stands of vegetation of flowing waters at are representative of this Annex 1 habitat. . .
22	Hydrological regime: tidal influence	Maintain natural tidal regime	The project will not have the potential to influence the tidal regime of this SAC.
23	Hydrological regime: freshwater seepages	Maintain appropriate freshwater seepage regimes	The project will not have the potential to influence input of freshwater seepage to examples of tall herb habitat occurring upstream and downstream of the project site.
24	Substratum composition: particle size range	The substratum should be dominated by the particle size ranges, appropriate to the habitat sub-type (frequently sands, gravels and cobbles)	The release of silt during the construction phase from the footprint of the project will have the potential to undermine the quality of substratum in watercourse downstream to support this habitat. As noted under Attribute No. 13 the potential for the discharge of sediment fines to river beds to result in the abundant growth of commonly occurring and species poor stands of crowfoot vegetation has been identified by the NPWS (NPWS, 2019a)
25	Water quality: nutrients	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition	Any inadvertent discharge of pollutants to the Bandon River catchment during construction works will have the potential to undermine this target.
26	Vegetation composition: typical species	Typical species of the relevant habitat sub-type should be present and in good condition	Any emission of pollutants to the Bandon River catchment as a result of the project will have the potential to undermine this target.
27	Floodplain connectivity	The area of active floodplain at and upstream of the habitat should be maintained	The project will not result in any changes to the existing river floodplain habitat within the Bandon River catchment.

28	Riparian habitat	The area of riparian woodland at and upstream of the bryophyte-rich sub-type should be maintained	No riparian woodland occurs in the vicinity of the project. No semi-natural riparian habitats will be adversely affected by the project.

7 MITIGATION MEASURES

The mitigation measures required to safeguard European Site qualifying features of interest from adverse effects have been identified in Section 5 above and relate to mitigating the potential for the proposed development to result in perturbations to water quality and downstream effects to qualifying feature receptors.

Targeted mitigation measures are provided to safeguard against the potential adverse effects to the Annex 1 habitats and the Annex 2 species identified as requiring mitigation in Table 5.3 above. The measures to be implemented to protect the water quality, instream habitats and associated fauna populations downstream of the proposed development and within the Bandon River SAC are outlined in the following sub-sections. These measures shall be implemented by the contractor appointed for the construction and decommissioning phase, in consultation with the appointed Ecological Clerk of Works (ECoW) so that the sensitive receptors of these European Sites are safeguarded and pathways connecting the project site to these receptors are eliminated as potential impact pathways.

The Ecological Clerk of Works (ECoW) will be appointed to supervise the works and to ensure that all biodiversity receptors are protected during the construction and decommissioning phase. The ECoW will be appointed to ensure that habitat restoration and enhancement activities are implemented as planned, and to advise on any environmental or ecological aspect of the works. The ECoW will inspect habitat and ditches/water courses during the construction phase and during habitat restoration works and will be in charge of water quality monitoring throughout the construction phase. The ECoW will be the first point of contact with the Planning Authority, namely Cork County Council for all matters relating to ecology and biodiversity.

All operation phase mitigation measures will be required to be implemented by site management during the operation phase of the proposed development. A project ecologist will be appointed for the operation phase to supervise the ongoing implementation, management and monitoring of peatland habitat management and enhancement measures. These measures are set out in Gortloughra Wind Farm Habitat Management Plan (provided as part of the EIAR) and will be implemented throughout the lifetime of the proposed wind farm.

7.1 WIND FARM SITE EARTHWORKS

Mitigation measures to avoid the potential for adverse impacts arising from earthworks and management of spoil will comprise:

- Management of excavated material will adhere to the measures related to the management of temporary stockpiles as set out in Section 6.2 below.

- No permanent or semi-permanent stockpiles will remain on the Site during the construction, decommissioning or operational phase of the Development. Any surplus spoil remaining at the end of the construction phase will be taken off site and disposed of at a licence waste facility.

- Construction activities will not be carried out during periods of sustained heavy rainfall events[13], or directly after such events. This will allow sufficient time for work areas to drain excessive surface water loading and discharge rates to be reduced.

- Following heavy rainfall events, and before construction works recommence, the Site will be inspected to confirm that conditions are suitable for construction activities to recommence.

- An emergency response plan (ERP) has been prepared as part of the CEMP and SWMP for the project, both of which are provided under separate cover as part of the planning application documentation associated with the EIAR. All measures outlined in the ERP will be implemented throughout the construction phase of the project. This plan includes for 24-hour advance meteorological forecasting linked to a trigger-response system. When a pre-determined rainfall trigger level is exceeded such as a very heavy rainfall at >25mm/hr, planned responses will be undertaken. These responses will

[13] As per the Met Office National Meteorological Library and Archive Fact Sheet 3 – Water in the atmosphere (Met Office, 2012) a heavy rainfall event for: rain (other than in showers) is assigned to an event where rates of accumulation are greater than 4mm/hour; and for rain showers is assigned to an event where rates of accumulation are >10mm/hour.

include cessation of construction until the storm event, including storm runoff has ceased.

- Sediment fencing will be erected along proximal and paralleling areas of watercourses, occurring within the proposed wind farm site, channels and drains spanned by the works to reduce the potential for sediment laden run-off to reach sensitive receptors.

- No direct flow paths between stockpiles and watercourses will be permitted at the Site.

- Excavated material will be backfilled and transported to the spoil storage area as soon as is reasonably practicable to prevent long duration storage at the Site which increases the risk of adverse effects on aquatic environments.

- All mitigation measures related to surface water quality will be implemented before excavation works commence.

7.2 TEMPORARY STOCKPILE MANAGEMENT FOR WIND FARM SITE WORKS

Whenever possible, soil and rock will be re-used on the Site immediately, thereby reducing the need for double handling, which will also reduce the requirement to stockpile soils. Generally excavated rock will be used immediately for Site Access Track construction. Whenever possible stockpiles will be avoided. Where stockpiling is required, it will be stored in the designated temporary spoil stockpile area located to the east of the proposed turbine T9. This location for stockpiling has been selected due to its location on relatively flat ground that is well buffered (in excess of 100m) from any surrounding watercourses or drains and the presence of low value habitats in the form of intensively managed improved agricultural grassland.

7.3 EXCAVATION REQUIREMENTS FOR THE PROPOSED GRID CONNECTION ROUTE

The following mitigation measures will be implemented during excavations for the proposed grid connection route:

- The timing of grid connection cable laying will be carried out during metrologically dry seasons/periods.

- An Ecological Clerk of Works (ECoW) will be onsite in order to lessen environmental disruption and ensure site integrity is maintained. The ECoW will also be responsible for routine environmental monitoring and report writing.

- excavated material will be temporarily stockpiled adjacent to the section of trench, with appropriate material used as backfill.

- Excess/unsuitable material will be immediately removed and disposed of at a licenced waste disposal facility.

- Appropriate siltation measures, as per the measures set out in the subsequent sections below will be put in place prior to excavations.

- Stockpiles will be temporarily stored a minimum of 25m back from rivers/streams on level ground with a silt barrier installed at the base.

- For all grid connection trenching along the local road, any unsuitable backfill material excavated will be immediately taken away from the works area in trucks and disposed of under license to an authorised waste disposal facility. This will prevent any contaminated run-off to roadside drains during heavy rainfall.

7.4 EXCAVATION DEWATERING REQUIREMENTS FOR THE WIND FARM SITE

The following mitigation measures will be implemented for dewatering activities at the wind farm site:

- Areas of subsoils to be excavated will be drained ahead of excavation works. This will reduce the volumes of water encountered during excavation works and will therefore reduce the volume of water that is required to be dewatered whilst excavations are being carried out.

- Engineered drainage and attenuation features outlined in the Surface Water Management Plan attached in Appendix 1 will be established ahead of excavation works.

- Dewatering pumping rates will be controlled by an inline gate valve or similar infrastructure which will facilitate a reduction of loading on the receiving environment, thus enhancing the attenuation and settlement of suspended solids.

- The direct discharge of dewatered loads to surface waters will not be permitted under any circumstances.

- All dewatering will follow a strict procedure of pumping to a settlement tank and then to a dewatering bag, or settlement ponds prior to discharging to receiving environment for overland flow.

- Geofabric lined settlement ponds will buffer the run-off discharging from the drainage system which will reduce the hydraulic loading to watercourses. Settlement ponds will be designed to reduce flow velocity to 0.3 m/s at which velocity silt settlement generally occurs. In areas of the Site where the placement of settlement ponds is not feasible, other mitigation measures described below will be implemented

- Check Dams will be constructed across drains and will reduce the velocity of run-off which will, in turn, promote settlement of solids upstream of potential surface water receivers. An additional benefit of check dams is that they will reduce the potential for erosion of drains. Rock filter bunds may be used for check dams, wood or hay bales can also be used if properly anchored. It is recommended that multiple check dams are installed, particularly in areas immediately down gradient of construction areas.

- Overland flow paths of the final dewatered discharge will be maximised to the greatest practical extent to avoid prematurely draining to drainage channels or surface waters. This approach will allow for enhanced settling out of suspended solids entrained in the run-off.

- All pumps, tanks, settlement ponds, dewatering bags and check dams used in the dewatering process will be regularly inspected and maintained as necessary to ensure surface water run-off is appropriately treated.

- Sediment fencing will be installed up gradient of water courses which may receive the final overland flow.

- The final treated dewatered discharge will be directed towards heavily vegetated areas to allow for further natural filtration of suspended solids.

- A programme of water quality monitoring will be implemented during the construction phase which is outlined in detail in CEMP presented as Appendix 1 of this Natura Impact Statement.

- No extracted or pumped water will be discharged directly to the surface water network associated with the Site (this is in accordance with Local Government (Water Pollution) Act 1977 as amended).

- Any discharges of sediment treated water will meet the requirements of the Surface Water Regulations 2009, as amended.

7.5 WATERCOURSE CROSSINGS

7.5.1 Wind Farm Site

At the wind farm site, three no. new watercourse crossing will be constructed. The required crossing will be a crossing of the small stream headwater of an Un-named Stream, one crossing of the second order Shehy Beg Stream and one crossing of a first order tributary of the Shehy Beg. The following measures provide for the planning and consideration of this watercourse as part of the overall approach to watercourse crossing to ensure potential impacts are adequately mitigated.

The proposed crossing location will be situated relatively near the headwaters of the Shehy Beg Stream and two no. minor first order tributaries. As a result, bridge/culvert specification and construction are envisaged to be of relatively low significance in terms of expected flow and

culvert diameter. The following design measures have been implemented for the watercourse crossing to ensure any potential impacts of the proposed watercourse crossing are minimised:

- The design of the proposed crossing and a method statement for the proposed construction will be agreed in advance with Inland Fisheries Ireland (IFI)

- Crossings have been designed to minimise, in so far as practical, the disturbance or alteration of water flow, erosion and sedimentation patterns and rates

- Vehicles and plant used in the construction of the proposed crossing will only be refuelled at the Site's bunded and designated refuelling area, no refuelling will be permitted within 50m of any watercourse at the Site

- To mitigate against the potential risk of accidental leaks or spillages from plant and equipment the following measures will be implemented: Multiple spill kits will be maintained on the Site at all times within the cabs of vehicles and placed strategically at environmentally sensitive locations across the Site. Spill kits will be routinely inspected to ensure that they are fully stocked with oil absorbent booms and pads at all times. Oil absorbent booms will be installed downstream of channel crossing work areas within 25m of the works location prior to the commencement of works.

7.5.2 Grid Connection Route

The proposed grid connection route includes the construction of 22 no. watercourse crossings. The crossings will be via horizontal directional drilling. The mitigation measures to be implemented during horizontal directional drilling are set out in **Section 7.6** below.

7.6 HORIZONTAL DIRECTIONAL DRILLING

The following mitigation measures to reduce potential impacts associated with horizontal directional drilling (HDD) will be implemented:

- Clearbore, which is not toxic to aquatic organisms and is biodegradable will be the drilling fluid used.

- Mud mixing will be monitored to suit the ground conditions encountered.

- The drilling fluids will be constantly monitored, any changes required to the mix will be performed on site by a specialised HDD Contractor upon consultation with the drilling fluid supplier and Environmental Clerk of Works.

- Mud testing equipment will be available at all times during drilling operations to monitor key mud parameters.

- All equipment will be carefully checked on a daily basis by the Site Supervisor prior to use to ensure plant and machinery is in good working order with no leaks or potential for spillages.

- Spill kits, including an appropriate hydrocarbon boom will be available on the site in the event of any unforeseen hydrocarbon spillages and all staff shall be trained in their use.

- All plant, materials and wastes will be removed from site following the HDD works.

- The launch pit will be reinstated to the original land surface condition and the normal duct trench will continue from this point.

- Should any dewatering be required, it will be carried out in accordance with the CEMP provided in Appendix 1.

- Test pits and boreholes will not be located directly on, or extend through, the proposed alignment, as these weak points may serve as conduits where inadvertent fluid returns or frac outs could occur. At least a 3m offset will be provided between the boreholes and pipe alignment.

The following measures will be implemented at launch and receptor pits to ensure that the excavation, preparation and works undertaken at these pits do not pose a risk to the water quality of the Caha River and other watercourses to be crossed via horizontal directional drilling:

- All launch pits and reception pits for horizontal directional drilling under watercourses will be buffered back from watercourses at a minimum distance of 20m.

The launch pit for the proposed electrical cable route crossing under the Caha River will be located under the existing local road and bridge crossing at the townland boundary of Neaskin and Ardcahan. The reception pit will be positioned along the road 20m to the east of the river. The location of the launch and receptor pits on level ground a minimum distance of 20m from the Caha River will provide sufficient buffering between the reception pit and the river to ensure that there is no potential for the discharge of silt-laden or otherwise contaminated materials from the reception pit to the river.

All spoil arisings from all launch pits and reception pits at the proposed grid connection route Option A watercourse crossings will be stored in bunded areas to prevent the runoff of silt-laden runoff from the spoil to watercourses. All spoil material will be reused to reinstate the launch pits and reception pits.

Pumps will be available at the launch and receptor pits. The pumps will be powered by diesel fuel and will be stored in a secure bunded area. The pumps will be used to pump any standing water from the pits during works. A lay flat will be positioned within the pit and pooling surface water will be pumped from the pit via the lay flat over adjacent vegetated surfaces. Under no circumstances will the lay flat outfall be directed to an existing drainage ditch or the watercourse being crossed via horizontal directional drilling. The discharge of the surface water to vegetated ground will allow for discharge to ground and will retard overland flows in the direction of the watercourse being crossed.

Continuous monitoring of drilling fluid/mud pressure will be undertaken by the drill technician during all drilling. The drill technician in turn will be supervised by the drill supervisor and all horizontal directional drilling will be monitored by the project Ecological Clerk of Works (ECoW). The continuous monitoring will ensure that in the event of a change in pressure due to a blockage the technician will be immediately alerted to this change and will cease drilling operations. This will prevent drill fluid/mud from breaking out through an alternative path of least resistance and will prevent such materials from breaking out to the river. The avoidance of a breakout depends primarily on the experience of the drilling personnel and reliable, accurate drilling records interpreted in relation to the geotechnical information available. The drilling personnel will be suitably qualified and experienced to complete the works. Boreholes

will be completed at all HDD locations as part of the Site Investigations works to be completed during the detailed design phase. Trends during the pilot drilling will be monitored and tracked so as to maximise the chances of accurately establishing a point where the formation is causing drilling fluid losses. The volume of drilling mud entering and returning from the bore will be constantly monitored by the drill operating staff. Staff will be especially vigilant for any loss of volume of drill mud returns, which would indicate the escape of drilling mud from the bore.

At the location a number of measures can be implemented as follows:

- Pump drilling fluid with a higher density into the formation.
- Circulate and pump organic lost circulation materials (LCM) into the loss zone to physically seal the fracture. Lost circulation occurs when drilling fluid, flows into one or more geological formations instead of returning to the launch area.
- Grout the loss zone; and/or
- Launch a packer before the loss zone. A packer is a mechanical device sent down the hole to the area of concern. It is designed for blocking the system for sealing grout to set.

All of the above options will be prepared and made available for application during the HDD works.

All equipment will be carefully checked on a daily basis by the Site Supervisor prior to use to ensure plant and machinery is in good working order with no leaks or potential for spillages. In order to minimise any risk of pollution in the first instance. Spill kits, including an appropriate hydrocarbon boom will be available on the site in the event of any unforeseen hydrocarbon spillages and all staff shall be trained in their use. It is noted that, given the separation distances between the launch pit and reception pit for the crossing under the Caha River that the potential for the release of hydrocarbons to the Caha River will be extremely unlikely.

In addition to the supervision of drilling the project ECoW will be required to supervise the set-up and reinstatement of all launch pits and reception pits at all watercourse crossings to ensure that all measures required to protect water quality and instream habitats are properly implemented.

In addition to the horizontal directional drilling method provided under separate cover, a detailed method statement for the crossing of watercourses will be prepared in advance of all crossings and will be submitted to the NPWS and IFI for agreement prior to the commencement of works.

All drilling fluids and spent drill mud will be prepared and returned within a closed drilling train. All spent mud will be discharged from the closed drilling train to an impermeable bunded container and will be removed from site for disposal at an appropriately licenced facility.

All fuels, lubricants and hydraulic fluids for equipment used during horizontal directional drilling will be stored in securely bunded containers and will not be carried to within 10m of any watercourse.

All measures detailed in the SWMP and CEMP prepared for the project to protect water quality will be implemented during horizontal directional drilling works.

An Emergency Response Plan has been prepared as part of the project's CEMP and all measures detailed therein will be implemented in the event of an emergency.

7.7 RELEASE & TRANSPORT OF SUSPENDED SOLIDS

The following mitigation measures will be implemented at the wind farm site during the construction and decommissioning phase to prevent the release and transport of silt-laden surface water runoff:

- Collector drains and soil berms will be implemented to direct and divert surface water runoff from construction areas such as temporary stockpiles into established settlement ponds, buffered discharge points and other surface water runoff control infrastructure. This planning and placement of these control measures will be of fundamental importance, especially for the areas where works within the 50m buffer zone of surface waters and significant drainage features.

- Sediment control fences will be implemented significantly upgradient of potential receiving waters and as part of the drainage network. Sediment control fences will also be established upgradient of the Site's pre-existing natural and artificial drains in addition to degraded areas of peat that are likely to receive surface water runoff. This

practice will reduce the potential for elevated suspended solids entrained in surface water runoff to discharge to surface waters.

- Multiple silt fences will be used in drains discharging to the surface water network. This will be especially important for the areas where works occur within the 50m buffer zone of surface waters and significant drainage features.

- A dedicated silt fence will be established along all sections of the wind farm access track that are within the 50m buffer zone of watercourses.

- The drainage, attenuation and other surface water runoff management systems will be installed prior to the commencement of construction activities. Whenever possible, drainage and attenuation control measures will be installed during seasonally dry conditions to limit the potential for sediment laden run-off to discharge to surface waters during the installation of these measures.

- Surface water runoff will be discharged to land via buffered drainage outfalls that will contain hardcore material of similar composition to the geology of the bedrock at the Site. This mitigation measure will promote the capture and retention of suspended sediment.

- Buffered drainage outfalls also promote sediment percolation through vegetation in the buffer zone, reducing sediment loading to adjacent watercourses and avoiding direct discharge to the watercourse.

- Buffered drainage outfalls will be placed outside of the 50m buffer zone and will not be positioned in areas with extensive erosion and degradation.

- A high number of discharge points will be established to decrease the loading on any one particular outfall. Discharging at regular intervals mimics the natural hydrology by encouraging percolation and by decreasing individual hydraulic loadings from discharge points.

- A CEMP has been developed which will mandate regular inspections and maintenance of pollution control measures. Contingency measures outlining urgent protocols to

repair or backup any breaches of designed mitigation measures are also incorporated into the CEMP (**Appendix 1**).

- In the event that mitigation measures are failing to reduce suspended solids to acceptable levels, construction works will cease until remediation works are completed.

- Fine solids or colloidal particles are very slow to settle out of waters. Therefore, coagulant or flocculant will be used as appropriate to promote the settlement of finer solids prior to discharging to surface water networks. Flocculant gel blocks can be placed in drainage channels. These are passive systems that are self-dosing, self-limiting and are environmentally friendly. Flocculant gel blocks bind elevated levels of silt and associated contaminants into masses that are easily separated, captured and then removed from the water.

- Surface water runoff controls will be checked and maintained on a daily basis. Check dams and settlement ponds will be maintained and emptied prior to the build-up of excessive sediment. The frequency of maintenance and emptying will be dictated by levels of sediment accumulation.

The adoption of precautionary principles and the implementation of mitigation measures listed above will ensure that the risk of elevated suspended solids to surface waters is low. This in turn will ensure that potential risks to sensitive receptors is also low. Nevertheless, should a significant discharge of suspended solids to surface waters occur, the absence of immediate proximity to designated sites and the assimilative capacity of the localised surface waters will act as a natural hydrological buffer in terms of suspended solids loading. Should such a discharge occur, the dilution and retention time of suspended solids in the localised surface water network will reduce potential impacts on highly sensitive downstream designated sites. It should be noted that this natural mitigation measure is not to be adopted as a first principle and will not be relied upon to prevent adverse impacts on designated sites.

A detailed design of required drainage, collector drainage, stilling ponds and other listed mitigation infrastructure is contained in the Surface Water Management Plan contained in the CEMP (**Appendix 1**).

7.8 RELEASE OF HYDROCARBONS

The following mitigation measures will be implemented during all construction and decommissioning phase works for the proposed development to prevent the release and transport of hydrocarbons to receiving surface waters:

- Refuelling of vehicles will be carried out off site to the greatest practical extent. This refuelling policy will mitigate the potential for impacts by avoidance. Due to the remote location nature of the Site, it is unlikely that implementation of this refuelling policy will be practical in all circumstances. In instances where refuelling of vehicles on Site is unavoidable, a designated and controlled refuelling area will be established at the Site. The designated refuelling area will enable low risk refuelling and storage practices to be carried out during the works. The designated refuelling area will contain the following attributes and mitigation measures as a minimum requirement:
    - The designated refuelling area will be located a minimum distance of 50m from any surface waters or Site drainage features.
    - The designated refuelling area will be bunded to 110% volume capacity of fuels stored at the Site.
    - The bunded area will be drained by an oil interceptor that will be controlled by a pent stock valve that will be opened to discharge storm water from the bund.
    - Management and maintenance of the oil interceptor and associated drainage will be carried out by a suitably licensed contractor on a regular basis.
    - Any oil contaminated water will be disposed of at an appropriate oil recovery plant or licensed tip site.
    - Any minor spillage during this process will be cleaned up immediately.
    - Vehicles will not be left unattended whilst refuelling.
    - All machinery will be checked regularly for any leaks or signs of wear and tear.

- Containers will be properly secured to prevent unauthorised access and misuse. An effective spillage procedure will be put in place with all staff properly briefed. Any waste oils or hydraulic fluids will be collected, stored in appropriate containers and disposed of offsite in an appropriate manner.

Notwithstanding the management of refuelling and fuel storage at the designated refuelling area, the potential risk of hydrocarbon spills from plant and equipment or other general chemical spills at other areas of the Site remains. To mitigate against potential spills at other areas of the Site, the following mitigation measures will be implemented:

- Oil absorbent booms and spill kits will be available adjacent to all surface water features associated with the Development. The controls will be positioned downstream of each construction area and at principal surface water drainage features. Oil booms deployed will have sufficient absorbency relative to the potential hazard.

- Spill kits will also be available at construction areas such as at turbine erection locations, the temporary site compound, on-site substation, spoils storage areas and met mast location etc.

- Spill kits will contain a minimum of oil absorbent pads, oil absorbent booms, oil absorbent granules, and heavy-duty refuse bags for collection and appropriate disposal of contaminated matter.

- Should an accidental spill occur during the construction or operational phase of the Development, such incidents will be addressed immediately. This will include the cessation of works in the area of the spillage until the issue has been resolved.

- Spill kits will be kept in each vehicle at the Site and will be readily available to all operators.

- No materials, contaminated or otherwise will be left on the Site.

- Suitable receptacles for hydrocarbon contaminated materials will also be available at the Site.

- A detailed spill response plan is provided as part of the CEMP.

Implementation of the above mitigation measures will significantly reduce the risk of hydrocarbon contamination being released to the surface water network. Nevertheless, the potential risk cannot be entirely eradicated. Therefore, precautionary measures and emergency response protocols have been prepared and are provided as part of the CEMP.

7.9 RELEASE OF CEMENTITIOUS MATERIALS

The following mitigation measures will be implemented during all construction and decommissioning phase works for the proposed development to prevent the release and transport of cementitious material to receiving surface waters:

- The procurement, transport and use of any cement or concrete will be planned fully in advance and supervised by appropriately qualified personnel at all times.

- Vehicles transporting cement or concrete to the Site will be visually inspected for signs of excess cementitious material prior to being granted access to the Site. This will prevent the likelihood of cementitious material being accidentally deposited on the Site Access Tracks or elsewhere at the Site.

- Drivers of such vehicles will be instructed to ensure that all vehicles are washed down in a controlled environment prior to the departure of the source site, such as at concrete batching plants.

- Precast concrete will be used wherever possible. However, the use of pre-cast concrete is not viable option for large structures such as Turbine foundations and so concrete will be delivered to the Site.

- Concrete will not be poured during periods of rainfall or if any kind of precipitation is forecast. This policy will limit the potential for freshly poured concrete to adversely impact on surface water runoff.

- Raw or uncured waste concrete will be disposed of by removal from the Site.

- Washout of concrete trucks shall be strictly confined to the batching facility and shall not be located within the vicinity of watercourses or drainage channels. Only the chutes will be cleaned prior to departure from Site and this will take place at a designated area at the Temporary Site Compound.

- Spill kits will be readily available to Site personnel, and any spillages or deposits will be cleaned up as soon as possible and disposed of appropriately.

- Pouring of concrete into standing water within excavations will be avoided.

- Excavations will be prepared before pouring of concrete by pumping standing water out of excavations to the buffered surface water discharge systems in place.

- Any surplus concrete will not be stored or deposited anywhere on Site and will be returned to the source location or disposed of appropriately at a suitably licensed facility.

- Any required shuttering installed to contain the concrete during pouring will be fully secured around its perimeter to minimise any potential for leaks.

7.10 WATER QUALITY MONITORING

The following water quality monitoring will be implemented to mitigate against potential impacts on the surface water receiving environment:

- A programme of water quality monitoring outlining the selected parameters and monitoring frequency will be agreed with Inland Fisheries Ireland and Cork County Council prior to the commencement of construction.

- In order to assist in the detection of any deviations from the baseline hydrochemistry conditions at the Site, regular periodic monitoring of the Site's surface waters will be carried out prior to and during construction.

- It is proposed that a programme of operational phase water quality monitoring is also implemented at a monitoring frequency agreed with Cork County Council in order to aid the detection of any potential operational phase impacts on surface water quality.

- As a minimum requirement, field measured parameters such as pH, conductivity, total dissolved solids (TDS), temperature, dissolved oxygen (DO) and turbidity will be included in the water quality monitoring programme. The results will be compared to the applicable EQS to determine if adverse impacts on water quality are occurring.

- Water quality will be monitored for trace metal concentrations prior to, during and after the construction phase.

- Water quality monitoring locations will include both upstream and downstream points relative to the works locations. The locations of the water quality monitoring points will be flexible and will be moved as the construction phase progresses so that monitoring points remain representative of the most likely construction impact receptor points.

- The watercourses within and adjacent to the proposed spoil storage area will be included within the water quality monitoring programme.

- The downstream monitoring locations will be positioned as close as possible downstream of the works location and another positioned further downstream. This approach will allow for an assessment of the dilution of potential contaminations (if present) as the distance from the point of diffuse source location increases.

- Watercourses which do not have year-round flows such as artificial drains, ditches or ephemeral streams will be avoided as water quality monitoring locations.

- During the construction phase, daily visual inspections of excavations, dewatering procedure, settlement ponds, silt traps, buffered outfalls and drainage channels etc. will be carried out by a suitably qualified person. Any excess build-up of sediment at settlement ponds, drains or at any other drainage features that may decrease the effectiveness of the drainage feature will be promptly removed.

- During the construction phase of the Development, all development areas will be monitored on a daily basis for evidence of groundwater seepage, water ponding and wetting of previously dry spots.

- Following the completion of the construction phase, inspection of silt traps, buffered outfalls and drainage channels will be periodically inspected during maintenance visits to the Site when the operational phase water quality monitoring will also be carried out.

- The proposed watercourse crossings discussed in **Section 3.4.11** will be monitored daily during construction and during each Site visit during the operational phase. The water course crossings will be monitored in terms of their impacts (if any) on the receiving watercourses and in terms of their structural integrity to identify any signs of erosion or potential for sediment release.

- It is proposed that a handheld turbidity meter is available at the Site to accurately measure the quality of water discharging from the Site. The meter will be maintained and calibrated frequently.

- A detailed inspection and monitoring regime to be agreed with Inland Fisheries Ireland and Cork County Council will be included in the CEMP.

- Any discharges of sediment treated water will meet the requirements of the Surface Water Regulations 2009, as amended.

7.11 EMERGENCY RESPONSE

Mitigation measures outlined in the previous sections of this chapter will significantly reduce the potential for contamination of surface water or groundwater associated with the Development. Nevertheless, as is the case with all construction projects, a risk of accidental chemical spillages, sediment overloading of control measures or leaks of contaminants from plant or equipment remains a possibility. Emergency response procedures to potential contamination incidents have been prepared as part of the CEMP and will be implemented at the Site prior to the commencement of the construction phase. The following is a non-exhaustive list of potential emergencies and respective emergency responses:

- Spill or leak of hazardous substances (less than 20 litres);
    - All spill incidents will be dealt with immediately as they arise
    - Spill kits will be prepared and available in vehicles associated with the construction phase of the Development
    - Spill kits will also be prepared and made available at primary work areas such as at proposed turbine, hardstand, substation, met mast and construction compound locations
    - Disposal receptacles for hydrocarbon contaminated materials will also be available at the Site
- Major spill of hazardous or toxic substance off Site or to environmentally sensitive areas:
    - Immediate escalation measures will be implemented for all major spill events
    - Escalation measures may include installation of temporary sumps or drains to control the flow or migration of hydrocarbons or other chemicals
    - Attempts to be made to limit or contain the spill using sandbags to construct a bund wall, use of absorbent material, temporary sealing of cracks or leaks in containers, use of geotextile or silt fencing to contain the spill
    - Excavation and disposal of contaminated material will be immediately carried out following any such incidents
    - Evacuation procedures will be implemented to remove non-essential personnel from the area
    - Data gathering and an investigation will commence immediately after the emergency is contained

- If a significant hydrocarbon spillage does occur, the contractor on behalf of the developer will have an approved and certified clean-up consultancy available on 24-hour notice to contain and clean-up the spill

- All major spills of this nature will be reported to Cork County Council immediately following such instances.

- Flooding of low-lying areas of the Site:

  - Immediately remove all chemicals, fuels and other hazardous substances from low lying areas of the Site

  - Immediately remove plant and equipment from low lying areas

  - Recover materials washed from Site including sediment and other waste

  - Review and address the potential for excess water entering the Site

  - Review and maintain erosion and sedimentation controls.

- Spills of cementitious material:

  - Cement / concrete contamination incidents will be cleaned up immediately as they arise

  - Spill kits will also be established at key construction areas and they will also be readily available in the cabs of plant and equipment

  - Suitable receptacles for cementitious materials will also be available at the Site.

7.12 HYDRAULIC LOADING DURING THE OPERATION PHASE

The proposed wind farm will lead to an increase in impermeable surface area through the construction of hard stand areas within the Site. This in turn will lead to an increase in hydraulic loading by surface water runoff. Water balance calculations indicate that the proposed wind farm

will lead to a net increase of surface water runoff of approximately 7,431 m^3/month (or 3.25% relative to the area of the Site) during the wettest month of the year.

As a consequence of the estimated hydraulic loading during the operational phase, mitigation measures to facilitate a reduction in surface water runoff comprise measures to ensuring that pre-existing and newly established drainage infrastructure is sufficiently maintained for the discharge rates associated with all areas of the Site. Once identified, any and all blockages which may adversely impact upon the drainage regime at the Site will be immediately removed during the operational phase of the proposed Development. No other additional impacts are anticipated during the operational phase of the Development.

7.13 MEASURES TO PREVENT THE INTRODUCTION OF NON-NATIVE INVASIVE SPECIES

7.13.1 Site Hygiene

7.13.1.1 Cleaning of Plant & Equipment Prior to Arrival On site

Prior to use on site, the Contractor's vehicles and equipment must be thoroughly cleaned. High-pressure steam cleaning, with water > 40 degrees C, is recommended for vehicles and equipment where reasonably feasible. Many roadside garages provide these facilities. If it is not possible to steam clean the equipment, a normal power hose must be used. After cleaning, a visual inspection of the equipment will be carried out to ensure that all adherent material and debris has been removed.

Cleaning should not be undertaken on the site or near watercourses. Each field vehicle must carry a 'disinfection box'. This should contain Virkon Aquatic or another proprietary disinfectant, a spraying mechanism, cloths or sponges, a scrubbing brush and protective gloves. Protective gloves must be worn when using any disinfectant solution.

It is recommended to apply disinfectant to the undercarriage and wheels of any vehicles used after cleaning, if the vehicles have been used in streams or rivers (this does not apply to vehicle or machinery use in wetlands or peatland areas). Disinfectants must be used strictly in accordance with the manufacturer's instructions. They must be disposed of safely, and never close to open waters such as drains etc.

Footwear should be dipped in or scrubbed with a disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product) and thoroughly dried afterwards if used in streams or rivers. This does not apply to footwear for use in wetlands or peatland areas. Please note that it is not intended that any vehicles will enter water courses in the course of the construction or operation of the Project. Accordingly, this measure is precautionary only. Disinfectants must be used strictly in accordance with the manufacturer's instructions. They must be disposed of safely and never close to open waters such as drains etc.

7.13.1.2 Cleaning and Decontaminating Vehicles and Equipment Onsite

Pre cleaning Methods

Brushing (Physical Removal)

Used in conjunction with another physical removal method such as vacuuming, or when in the field, this method is moderately effective in removing the majority of plant material from equipment and gear. Brushing will remove most surface soil, plant material, and foreign matter. If there is a nap to fabric, such as upholstery or carpeting, brush with the nap rather than against it. Brushing against the nap could further embed small seeds into the material.

A combination of soft and stiff bristles of varying length is recommended for use on carpeting or components made of rubber, nylon, or plastic. Bristles of medium length and stiffness are desired for removal of soil and other matter from fabrics and upholstery. Stiff bristles are recommended for the tread of wheels that become encrusted with soil and mud. Metal bristles may also be used to remove soil or concrete in treads, but heavier wear and tear to the equipment will result.

High-pressure compressed air blasting may be used to assist soil removal.

Follow up with vacuuming, high-pressure air blasting, or high-pressure wash is recommended, as applicable.

Vacuuming (Physical Removal)

Vacuuming equipment with a brush attachment is suggested to remove most loose particle matter, but care should be taken because small seeds may become further embedded in materials. To prevent contained plant and soil matter from being re-deposited or re-dispersed following the

cleaning process, collected matter should be double bagged and disposed of in a sanitary landfill. Follow up with water washing, high-pressure air blasting, or high-pressure wash is recommended as applicable.

Water Washing with High-Pressure Wash and With or Without Thermal Treatment

General water washing with high-pressure wash or thermal treatment is the most effective method for removing residual foreign materials, although small and embedded seeds are capable of persisting. Where known invasive materials are present, wastewater can be treated or filtered, and the waste materials double bagged and disposed of in a sanitary landfill.

High-Pressure Wash

Improvement in the design of high-pressure washing makes it the most effective means of cleaning heavily soiled and contaminated items. Not all items are capable of withstanding the pressure of this treatment, and it should only be used where applicable.

There are many models of high-pressure washers, from simple hand-held nozzles to laser guided, robotic control systems. In some cases, containment and operation sheds are portable. The water systems can be fresh or recycled and use hot or cold water.

Selecting a Wash down Location

To avoid re accumulation of soil on cleaned vehicles, a paved area for washing, off-loading, and staging vehicle cleaning operations, with paved roads between should be used. This type of facility will often not be a viable option for activities in remote areas. Elevating the washing area enables cleaning personnel to access the underside of vehicles and equipment, where contaminants are otherwise difficult to reach.

Water runoff, potentially carrying soil, seeds, animals and petroleum contaminants, must be managed with the use of berms or other containment. Silt fence installed along perimeters of work areas can also aid in preventing spread of contaminated materials outside of the washdown location.

The area must be large enough to safely accommodate all vehicles and personnel before, during, and after cleaning operations.

7.13.1.2.1 Best Management Practice

Do not locate the cleaning site adjacent to storm water drains that allow untreated effluent to enter surface water bodies.

General Considerations:

- Set up the best staging area possible for cleaning operations. A paved area with accommodations to elevate vehicles or otherwise allow easy access to the undersides of vehicles and equipment is the best setting. Otherwise, using geotextile access and exit areas, bermed water recovery areas, and portable vehicle lifts are the next best option.
- Equipment of all types should be cleaned at the location of last use. If this is not possible, arrange for cleaning at a facility that is specially designed for equipment cleaning.
- Preclean equipment that contains heavy accumulations by hand to reduce water demand.
- Make pressurized water available with pressure and nozzles capable of removing all soil and debris.
- Recapture invasive materials by using fine-mesh filters and dispose of invasives in a manner that ensures no spread. Do not allow wash waters to flow into storm drains because these drains often directly flow untreated into surface water bodies.
- At remote sites, install silt fence or otherwise contain materials left behind. Monitor sites closely and eradicate exotic species.
- Clean vehicles and equipment thoroughly and ensure that they remain clean when leaving the site. Follow up cleaning operations with final inspections.
- Clean, drain, and dry all equipment.

Plant Inspection

All plant leaving site will be inspected to ensure it is clean. A record of all inspections will be maintained by the main contractor's Site Agent.

Inspections will focus on identifying the presence or otherwise of fragment in the following locations of plant equipment.

Rubber Tyred Vehicles

- Crevices in upper surface and panels
- Tyres, rims
- Spare tyre mounting area.
- Bumpers
- Front and rear quarter panels
- Around and behind grills
- Bottom of radiator vent openings
- Brake mechanisms
- Transmission
- Stabiliser bar
- Shock absorbers
- Front and rear axles
- Beds
- Suspension units
- Exhaust systems
- Light casings and mirrors

Tracked Vehicles

- Crevices in upper surface and panels
- Top of axles and tensioners
- Support rollers

- Between rubber or gridded areas
- Beneath bumpers
- Hatches
- Under casings
- Grills
- Beneath seats
- Beneath floor mats
- Upholstery
- Beneath foot pedals
- Inside folds of gear shift cover

8 EVALUATION OF MITIGATION MEASURES

The mitigation measures and environmental safeguards outlined above for the construction phase of the project are taken from established best practice guidelines that have been successfully implemented for a wide range of project-level infrastructural developments. These measures have undergone extensive and rigorous monitoring for their effectiveness at development sites where they have previously been applied to ensure adverse environmental impacts are avoided.

It is further noted that the range of mitigation measures outlined in this NIS and the associated Gortloughra Wind Farm EIAR to avoid impacts to European Site receptors occurring within the zone of influence of the project have been successfully implemented for a range of other wind farm development projects in Ireland.

The results of this monitoring and the proposal of these measures as standard best practice guidelines is based upon their high degree of success in ensuring negative environmental impacts are avoided.

The best practice guidance that have informed the mitigation measures and environmental safeguards proposed in this NIS and that will be adhered to throughout the construction, operation and decommissioning of the proposed development include:

- The Good Practice Guidance notes proposed by EA/SEPA/EHS:
- PPG 1: Understanding your environmental responsibilities - good environmental practices
- GPP 2: Above ground oil storage tanks
- PPG 3: Use and design of oil separators in surface water drainage systems
- GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer
- GPP 5: Works and maintenance in or near water
- PPG 6: Working at construction and demolition sites
- PPG 7: Safe storage - The safe operation of refuelling facilities
- GPP 8: Safe storage and disposal of used oils
- GPP 8: Safe storage and disposal of used oils
- GPP 19: Vehicles: Service and Repair
- GPP 21: Pollution incident response planning
- GPP 22: Dealing with spills
- GPP 26 Safe storage - drums and intermediate bulk containers
- PPG 27: Installation, decommissioning and removal of underground storage tanks
- CIRIA Environmental Good Practice on Site.
- CIRIA Control of Water Pollution from Construction Sites. Technical Guidance C648.
- CIRIA SuDS Manual Technical Guidance C697.
- Development on Unstable Land. Department of Environment (DOE), UK.

9 CONCLUSION

This Natura Impact Statement presents an analysis of the potential for the project to result in adverse impacts to the Bandon River SAC and its qualifying features of interest. An evaluation of the potential impacts that could arise as a result of the project to these qualifying features of interest and their conservation objectives has been completed.

The project has been identified as having the potential to result in adverse effects to the relevant qualifying features of interest of the Bandon River SAC.

A range of mitigation measures have been prescribed that, once implemented in full, will remove the risk of adverse effects posed by the proposed development to these qualifying features of interest.

Based upon the information provided in this NIS, it is the considered view of the authors of this NIS that it can be concluded by Cork County Council that the project will not, alone or in-combination with other plans or projects, result in adverse effects to the integrity and conservation status of European Sites in view of their Conservation Objectives and on the basis of best scientific evidence and there is no reasonable scientific doubt as to that conclusion.

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Appendix 1: CEMP

Appendix 2: Watercourse Crossing Drawings