Natura Impact Statement

Letter Wind Farm

DEC Ltd.

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Letter Wind Farm

Co. Leitrim

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 Letter 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:

- 4 turbine wind farms at Letter, Co. Leitrim.
- grid connection route between the proposed wind farm site and the existing ESB substation at Corderry, Co. Leitrim.
- a turbine delivery route (TDR) from Killybegs Port, Co. Donegal to the proposed development site via the N56, N15, N4, R285 and R280 before turning left onto the local road L-4282 towards the Wind Farm Site entrance. Widening of the existing haul route will be required at six no. locations.

Figure 1.1 shows the location of the proposed wind farm site; the location of the proposed grid connection route and the six no. TDR 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, was likely to have a significant effect on any European Sites. The screening exercise for Appropriate Assessment was completed by DEC Ltd. on behalf of Letter 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 five European sites. These sites are:

- Lough Gill SAC: screened in on the basis of a hydrological pathway connecting the project to this SAC.

- Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC: screened in on the basis of a hydrological pathway connecting the project to this SAC.

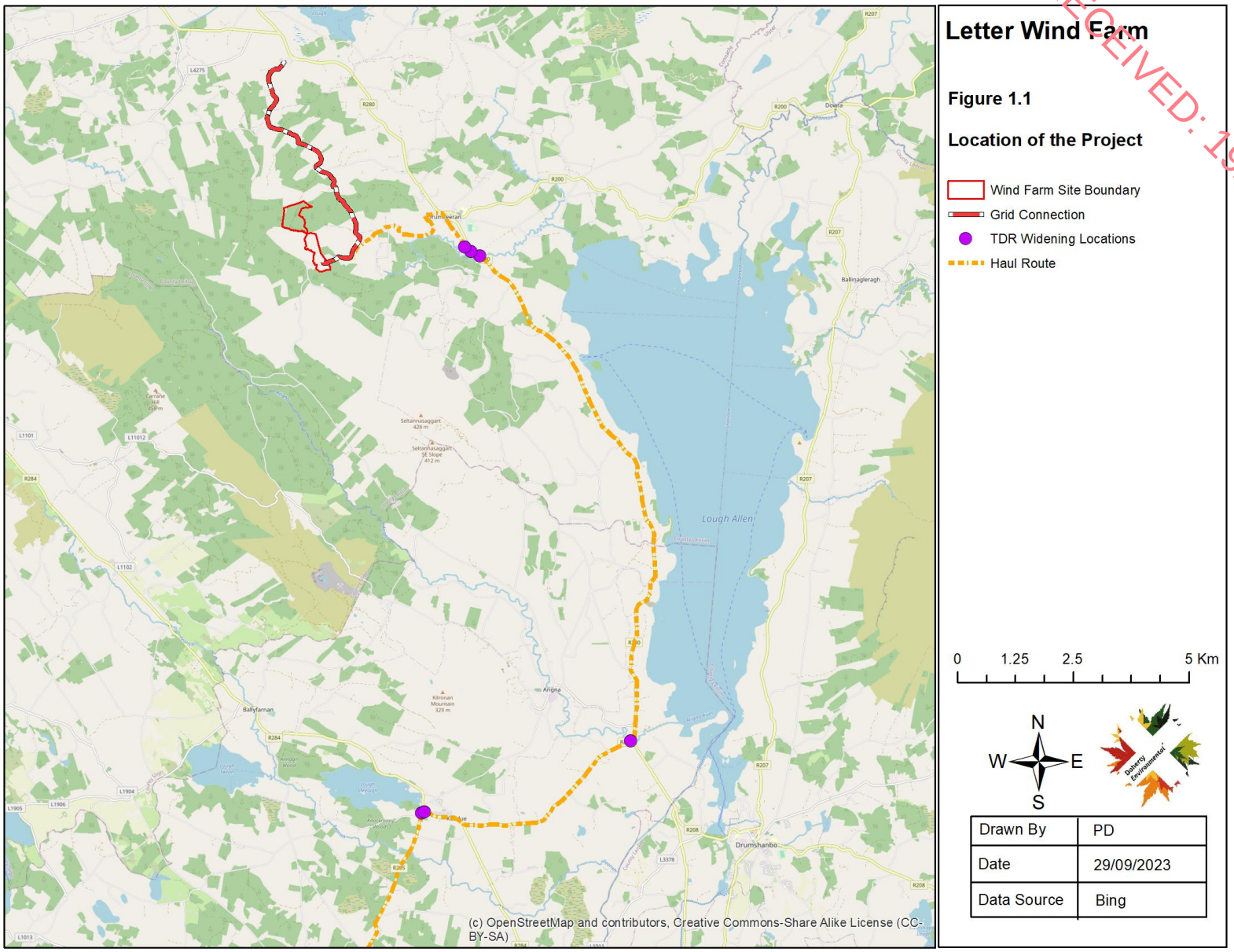
- Lough Forbes SAC: screened in on the basis of a hydrological pathway connecting the project to this SAC.

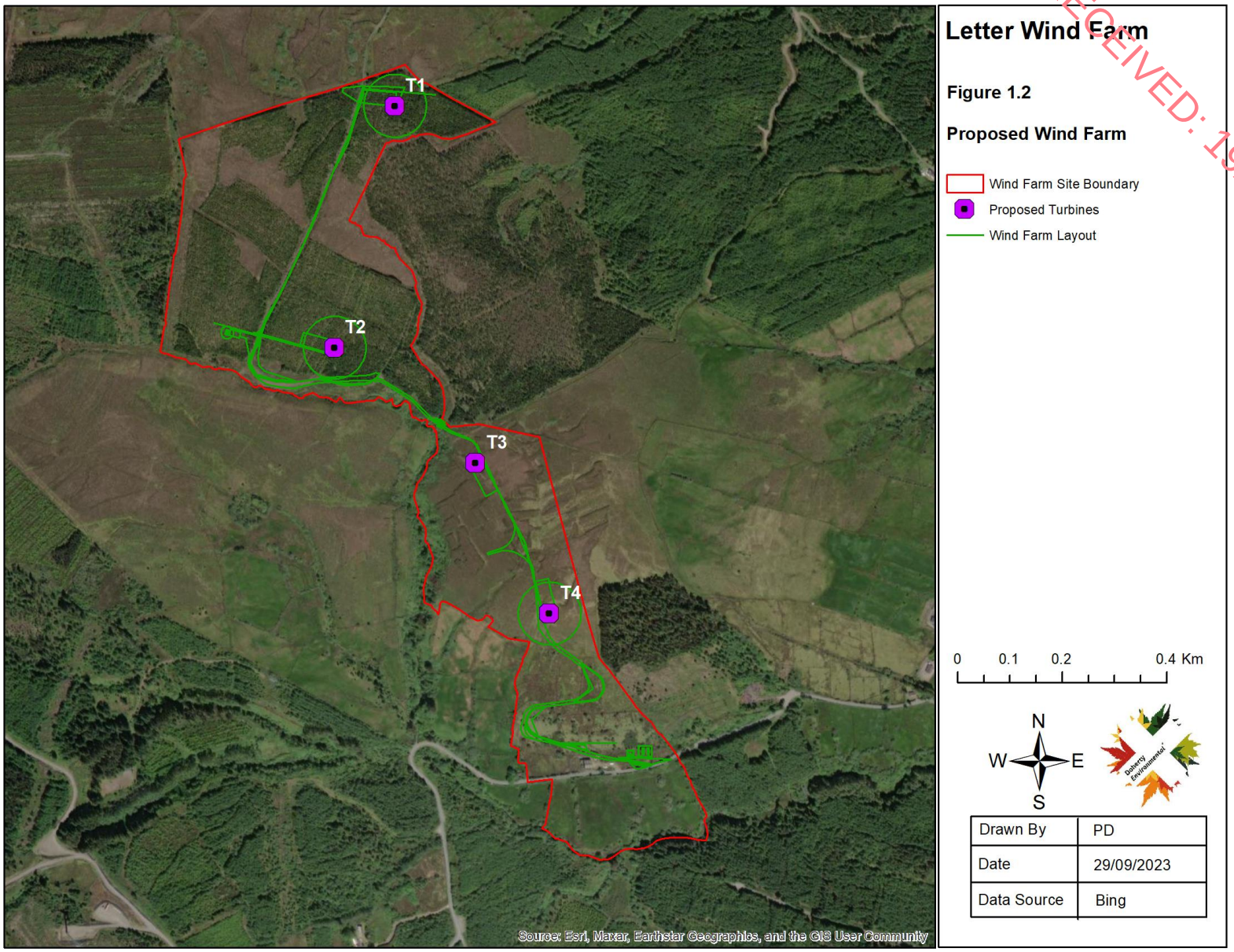
- Unshin River SAC: screened in on the basis of a mobile species pathway, with respect to otters, connecting the project to this SAC.

- Cummeen Strand SPA: screened in on the basis of a hydrological pathway connecting the project to the wetland habitats of this SPA.

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 above listed five European Sites. 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 Leitrim 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.





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.

1.2 METHODOLOGY

1.2.1 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.

1.2.2 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.

1.2.3 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.

1.3 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 season vantage point surveys and transect surveys completed between the breeding seasons of 2019 and 2022.
- Bat surveys over spring, summer and autumn during the 2020 bat activity season and during the early autumn of the 2023 bat activity season.
- Aquatic surveys including habitat assessment, fish habitat suitability assessment surveys, biological water quality surveys and physio-chemical water sampling.

Detailed soils and geological investigations were completed between February and July 2023 with detailed hydrological investigations taking place during March and April 2023.

With respect to the soils and geological investigations of particular relevance to this Natura Impact Statement, on foot of the findings of the screening exercise, is the assessment of peat slide risk associated with the proposed wind farm site. The methods used during the completion of a ground failure and peat slide risk assessment of the proposed wind farm were based on a detailed desk study, walk over surveys and flied assessments. These assessments were completed by Whiteford Geoservices Ltd. (WGS). The desk study and walk over survey involved the following components:

- Acquire and compile all available maps of the proposed wind farm development.
- Study any geotechnical reporting available within the public domain for the locality (*www.gsi.ie Geological Survey Ireland Spatial Resources*).
- Study and assess the proposed locations of turbines with regard to available data on site topography and slope gradients (*www.osi.ie Ordnance Survey Ireland*).
- Study and assess the proposed locations of turbines with regard to available data on site soils, sub-soils and bedrock geology (*www.gsi.ie Geological Survey Ireland Spatial Resources*).

- Study and assess the proposed locations of turbines relative to aerial photographs.
- Overlay Geological Survey of Ireland (GSI) online data to determine site bedrock geology and the presence of any major faults or other anomalies.
- Use of Geological Survey Ireland (GSI) Quaternary mapping to determine soil classification on the site.
- Review Met Eireann Office meteorological records pertaining to the site.
- Review Water Service of Ireland data to identify water supply sources in the vicinity of the wind farm.
- Conduct peat slide risk assessment to identify any potential hazards at proposed turbine positions and substation control building.

Following completion of the desk study, a preliminary scoping assessment was carried out as follows: -

- A site visit and walkover assessment of the main wind farm infrastructure and grid connection route.
- Determination of soil and peat characteristic at each turbine consisting of probing and trial pitting to determine soil / peat thickness, shear vane testing and an assessment of peat decomposition according to Von Post.
- Reconnaissance to identify sensitive receptors with respect to potential peat, soils landslide.
- Identification of potential pre-failure indicators, failure preconditions and potential triggers within the vicinity of the main infrastructure.
- Preliminary determination of superficial soils at the main infrastructure

These site investigation works consisted of:

- Bedrock and sub-soils outcrop logging and characterisation at proposed turbine locations.

- 7 No. machine excavated trial holes at proposed turbine / substation's locations to a maximum depth of 4.00m below existing ground level.

- Peat depth probing at 10m x 10m centres within the footprint of the wind turbine foundation and hardstand. Additional peat depth probing was also carried out at the substation, temporary compound and battery compound. The access track network was probed for peat depth at 25m intervals along the centre-line and 10m either side.

- Further gouge core samples of the peat and superficial soils were recovered along with additional shear strength and peat decomposition data.

- A further 2 No. machine excavated trial holes undertaken at a proposed Borrow Pit location within the development boundary.

- Following a review of environmental constraints, the location of Turbine T2 was amended. A further 3 No. trial holes were undertaken to identify the new position.

Methods used for the soils, geology and peat slide risk assessment investigations are also described in full in **Chapter 8: Soils and Geology** of the Letter Wind Farm EIAR (Jennings O'Donovan, 2023)**.**

The Hydrology and Hydrogeology investigations that have been completed for the project and that inform this Natura Impact Statement include a desk top study and field surveys. The desk top study involved the following components:

- Acquisition and compilation of all available and relevant maps of the Development.

- Study and assessment of the proposed locations of turbines and access roads relative to available data on site topography and slope gradients.

- Study and assessment of the proposed locations of turbines, access roads and other associated infrastructure units relative to available data on hydrology and hydrogeology.

- Study of geospatial data obtained from various sources including, Environmental Protection Agency (EPA), Geological Survey Ireland (GSI), Teagasc, Ordnance Survey Ireland (OSi), National Parks and Wildlife (NPWS) overlain with the Development plan drawings using a Graphic Information System (GIS). Data was assessed at a regional, local and site-specific scale.

- Assessment of relevant additional data was obtained where relevant, for example, rain data obtained from Met Eireann, and river discharge rates and synoptic data sets obtained from the EPA.

- Assessment of site-specific aerial data (Topo survey data (1m)).

The field work surveys consisted of the following:

- Site walk over including recording and digital photography of significant features.

- Drainage distribution and catchment mapping.

- Field hydrochemistry of the drainage network (electrical conductivity, pH and temperature).

- Recording of GPS co-ordinates for all investigation and monitoring points in the study.

- Baseline sampling of surface water for analytical laboratory testing. Two baseline sampling events were carried out i.e., targeting low and high flow conditions.

- Baseline sampling and estimating of surface water flow and discharge rates during baseline surface.

Methods used for the hydrology and hydrogeology investigations are also described in full in and **Chapter 9: Hydrology and Hydrogeology** of the Letter Wind Farm EIAR (Jennings O'Donovan, 2023).

2 PROJECT DESCRIPTION

2.1 PROJECT OVERVIEW

The Project will comprise of the following main components:

- Construction of 4 No. wind turbines with an overall ground to blade tip height ranging from 149.85m to 150m inclusive. The wind turbines will have a rotor diameter ranging from 115.7m to 117m inclusive and a hub height ranging from 91.5m to 92m inclusive.
- Construction of permanent turbine hardstands and turbine foundations.
- Construction of a bottomless bridge culvert across a minor stream on site (EPA River Segment Code: 26_4053).
- Construction of one temporary construction compound with associated temporary site offices, parking areas and security fencing.
- Installation of one (35-year life cycle) meteorological mast with a height of 50m and a 4m lightning pole on top.
- Construction of new internal site access tracks and upgrade of a section of existing internal Site track, to include all associated drainage.
- Improvement of existing site entrance with access via the L4282.
- Development of an internal site drainage network and sediment control systems.
- Construction of 1 no. permanent 20kV electrical substation
- All associated underground electrical and communications cabling connecting the wind turbines to the wind farm substation.
- All works associated with the connection of the wind farm to the national electricity grid, which will be via 20kV underground cable connection approximately 6.4km in

length to the existing ESB Corderry 110kV Substation in the townlands of Letter, Greaghnadarragh, Stangaun, Corralustia, Turpaun, Gortnasillagh West, Lugmeeltan, Leckaun, Lisgaveen, Treannadullagh, Drumcashlagh and Corderry.

- Ancillary forestry felling to facilitate construction of the development.
- All associated site development works including berms, landscaping, and soil excavation.
- Installation of battery arrays located within container units (2 no. units) and associated electrical plant for grid stabilisation adjacent to the substation building.
- Development of one on-site borrow pit.
- A 10-year planning permission and 40-year operational life from the date of commissioning of the entire wind farm is being sought. This reflects the lifespan of modern-day turbines.

2.2 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 foundation-to-tip height will range from 149.85m to 150m.

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 4.2MW giving an overall capacity of 16.8MW. 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.

The assessment considers and assesses all scenarios within the range of turbine parameters. The range of turbine parameters can be seen in **Table 2.1**.

Table 2.1: Turbine Parameters

Turbine Parameter	Assessment Envelope
Turbine Blade Tip Height	149.85m to 150m
Rotor Diameter	115.7to 117m
Hub Height	91.5m to 92m
Turbine Foundations	22m to 25m

2.3 TURBINE FOUNDATION AND TURBINE HARDSTANDS

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, operational and maintenance and for decommissioning. The Turbine Hardstands will be constructed first and used to facilitate Turbine Foundation construction, such as steel reinforcement delivery and pouring of concrete.

The Turbine Hardstand areas will be 3,842m2. Construction of the Turbine Hardstand and met mast hardstand will require the excavation of soils, the laying of a geotextile material on the formation surface and placing engineered stone and a top dressing. The Turbine Hardstands will be 1.7-2.8m in depth.

The Turbine Foundations will range between 22m to 25m in diameter and will depth to formation of 3.5m. The Turbine Foundation design will depend on the turbine type and will be decided by the structural engineers at detailed design stage and will be within these design parameters. The central part of the foundation (plinth) will be 6m in diameter and will be raised from the main Turbine Foundation below ground level. It will encompass a cast-in insert of bolts to connect to the bottom of the turbine tower and reinforced bar structural elements.

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

Further site investigations will be undertaken post consent to confirm that conditions do not vary from those encountered when baseline investigations took place. This will confirm that the mitigation measures to be implemented remain accurate in protecting the environment. Traditional gravity foundations are to be used. These are concrete structures that depend on their own weight to achieve sufficient stability against overturning and sliding.

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

A typical method of construction for turbine foundation is described as follows:

- Install temporary drainage around the perimeter of the excavation area.
- Excavate peat, soil and rock.
- Back fill the foundation with excavated rock.
- Form a level working area to build the foundation.
- Install formwork and reinforcement.
- Pour the concrete.

- Once the concrete has set and the earthing system is in place, backfill the foundation with suitable excavated material.

- Use the soil to build up the area around the turbine foundation.

2.3.1 Access to the Site

The proposed site entrance is located to the south of the Site on the L-4282. The Turbine Delivery and Construction Haul Route will utilise this site entrance.

It is proposed that the turbine nacelles, tower hubs and rotor blades will be landed at Killybegs Harbour, Co. Donegal. From there they will be to the N56 some 4.0 km northeast of the harbour. The Turbine Delivery Route primarily follows the national road network namely the N56, N15, N4, R285 and R280 before turning left onto the local road L-4282 towards the Wind Farm Site entrance.

For abnormal loads between Killybegs Harbour and the Site, works will be required to facilitate the delivery of turbine components. These will be relatively minor in nature, for example, temporary removal of street furniture and signage.

2.3.2 Site Access Track

The Site Access Tracks are necessary to allow access for cranes and delivery trucks during construction of the Development and also during servicing/repairs to the wind turbines. The existing access track will be upgraded and used to minimise additional land take. The Site Access Tracks will be upgraded and constructed so that the minimum width will be 4m-5m but will be wider at bends and at passing bay locations. Gradients will generally, be limited to 1 in 7 (approximately 14%) and a stone layer provided, so as to provide a good grip during wet weather. Gradients of Site Access Roads will not exceed this value.

Table 2.2: Estimated Excavation for Road Construction

Road Section	Length (m)	Width (m)	Relevant Trial Pits	Average Peat Depth (m)	Depth to firm Sub-soil(m)	Depth to Rock(m)	Depth of Sub-soil to be excavated	Total Volume to be excavated (m^3)	Vol of peat to be excavated (m^3)	Vol of Sub-Soil to be excavated (m^3)	Vol of Rock to be excavated (m^3)
Upgraded Site Access Road	828	2	na	2.3	2.6	-	0.3	4305.6	3808.8	496.8	-
New Site Access Road (Floated)	1,745.5	5	na	>1.20	-	-	-	-	-	-	-
							Totals	**4,306**	**3,809**	**497**	**-**

As set out in **Table 2.2**, 828m of existing Site Access Road will be upgraded. This will involve widening the roads to cater for larger vehicles and loads..

There will be also 1,746m of new Site Access Roads required for the Development. These will be constructed to provide a width of 5m .

The Site Access Roads will facilitate a minimum 12 tonne axle construction loading.

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

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

There is one proposed crossing of a natural stream within the Site. This crossing will be a bottomless bridge culvert. The bridge culvert will be reinforced with concrete and will join to

the gravel Site Access Tracks. A 1.2m timber and rail fence with a galvanised chainlink fence to the internal face will be provided.

2.3.3 Met Mast

As part of the grid code[1] requirements, all wind farms with an installed capacity of greater than 10MW 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 Development will be provided by a dedicated meteorological mast 50m in height with a 4m lightning mast.

The Met Mast will be located on the west of the Site and will be a free-standing lattice type structure. The Met Mast foundation will be approximately 12m by 12m, with a depth of 2.25m 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. The Met Mast will be linked to the 20kV Substation via buried Internal Cabling for power and communication and will be required for the full operational duration of the Development.

2.3.4 Electrical Substation, Control Building and Associated Compound

It is proposed to construct a 20kV electricity substation on the Site. This will provide a connection point between the wind farm and the grid connection point at the existing Corderry 110kV substation. Electricity transmitted between the turbines and the substation on the Site will be at 20kV.

The substation will serve two main functions:

[1] **EirGrid Grid Code Version 10**

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. The substation building will be c. 9.98m by 5.37m with an overall height of 4.7m from ground to ridge level and will be constructed from engineered stone material using similar construction techniques as for the crane hardstands.

The control building will be a single story pitched roof structure with traditional rendered finishes. The 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, wind turbine suppliers, and ESB networks. The final external render of the control building will be an off-white or grey colour, and the final details will be agreed in writing with the planning authority prior to the commencement of development.

Warning / health & safety signage will be displayed as is normal practice for such installations. Motion sensitive lighting only will be used.

The Development will comprise the installation of two battery storage units positioned within the Site. These units will house lithium-ion (li-ion) battery arrays. These batteries will be used due to their proven track record with high life cycle, with an expected life cycle of 4,500 cycles equating to 15 years of use.

The two battery units will be enclosed by a 2.65m high palisade fence with the provision of two gates for access.

The battery storage units will be equipped with control features to monitor and respond to temperature variations and voltage protection. They are the energy storage method of choice within the renewable energy sector due to their track record in safety and wide array of uses in sectors such as:

- Integration of renewable energy

- Area regulation
- Reduction of grid congestion

The internal batteries are fixed into cabinet arrays within locked container units. Monitoring systems relating to the performance of the batteries are remotely monitored, within the on-site control building and externally to the Site via remote access. Any loss in battery capacity is notified immediately to the system controllers and will trigger a site inspection.

2.3.5 Internal Cabling

The power generated by each wind turbine will be transmitted via underground Wind Farm Internal Cabling to the new electrical Substation at 20kV, as will the communication signals whose cables will be installed in the same trench. There will be circa 2,178m of internal cabling. Fibre-optic cables will also connect each wind turbine to the wind turbine control system located within the Control Building. The electrical and fibre-optic cables running from the turbines to the substation compound will be run in cable ducts 1m below the ground surface within the Site Roads and/or their verges.

2.3.6 Grid Connection

Connection will be sought from the grid system operators by application to the ESB. The substation will connect via underground 20kV cables. At the existing Corderry 110kV substation, the cable will connect into existing infrastructure within the confines of the substation and its compound. The Grid Connection will be constructed to the requirements and specifications of the ESB.

The route of this underground grid connection is provided in **Figure 1.1.** The overall length of the grid connection between the substation and the existing Corderry 110kV GIS substation is 6.4km, of which, 0.098km is within the site of the Development, and 6.30km is located along the public road corridor.

The proposed grid route is largely independent of the haul routes (see **Figure 1.1**). Leaving the wind farm site, the grid route will follow the L4282 in an easterly direction for a distance of approx. 652m, before veering left to join the L8280. From here the grid connection will continue in a general northerly direction for approx. 5.6km before joining the existing Corderry

110kV Substation. The grid connection route will traverse seven existing bridges and water crossings along the L8280. All cables will be buried within the existing roadway. Of the 6.3km, some 6.260km will be buried within the existing roadway with the remaining 40m consisting of overhead lines.

Underground Grid Connection

The Grid Connection will be constructed to the requirements and specifications of the ESB. The three conductors will be laid in separate ducts which will be laid in accordance with the ESB functional specifications for 20kV Networks Ducting/Cabling (Minimum Standards). The width of a 20kV cable trench with a trefoil formation will be 600mm. The depth of the trench for 20kV cables is 1.22m. 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, Gas Networks Ireland, Eir, Leitrim County Council, Irish Water etc. will be contacted and up to date drawings for all existing services will be sought.

- 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 600mm wide by 1.22m deep.

- Once the trench is excavated, a 50mm depth base layer of sand (in road trench) or 15 Newton 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 300mm 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, 300mm 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.

- Precast concrete cable joint bays (junction boxes) will be installed within the excavated trench.

- The junction boxes 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 substation and the existing 110kV substation at Corderry.

- 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 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.

Overhead Line

The proposed Grid Connection will be constructed by ESBN to the requirements and specifications of ESB Networks. The 20kV overhead line conductor construction type is 150mm2 AAAC (All Aluminium Alloy Conductor) designed according to ESB Networks 'Functional Design Specification for MV Overhead Lines2'. Two new standard 20kV single poles, with a distance of 40m is required. The wooden poles are standard ESB Networks 20kV wooden poles which vary in length on this project between 11 and 13 metres. The top of pole diameter varies between 200mm and 220mm. The actual height of pole above ground will vary

[2] **ESB Networks (2013 reviewed 2018).** ***Functional Design Specification for MV Overhead Lines*****.**

between 8.8m and 10.7m and between 2.2 to 2.3m of the pole will not be seen as it will be buried in the ground.

Pole and line installation works will be standard for a 20kV ESB overhead line:

- Poles are carried from adjacent roadways to each erection site and placed into an excavated hole using a wheeled or tracked excavator fitted with a pole grab attachment.

- The pole hole is manually backfilled and tamped down to a minimum depth of 1.0m until the backfill is capable of supporting the pole; the excavator then continues the backfilling and tamping.

- Where rock is encountered, the pole hole is formed using a hydraulic rock-breaker attachment mounted on the excavator.

- Where the line changes direction and at pole set locations with poor ground conditions, stay wires will be required. These wires are supported by means of stay blocks, which are made of wooden sleepers and are buried underground.

- Stringing of the conductor involves pulling out polypropylene rope along the route by hand, attaching the conductors and then pulling into position with stringing machine.

2.3.6.1 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 typically will be 2.9m long x 1.6m x 1.3m deep. A reinforced concreted slab will be constructed on top of the bay.

The joint bay locations have been dictated by suitable terrain and access to facilitate the operation of cable pulling equipment at any phase of the development and future operation of the installation in accordance with the ESB specifications.

2.3.6.2 Trench Layout

The trench layout will be as per the appropriate ESB Specifications. The specification of Leitrim County Council will be followed for the excavation and reinstatement of the ducted cable trenches which is expected to be in accordance with the requirements of the Guidelines for Managing Openings in Public Roads, 2017.

2.3.6.3 Joining Ducts

All joining ducts shall be laid in straight lines to even gradients. Once the ducts have been installed and backfilled with lean-mix concrete and with Clause 804 stone the duct run will be thoroughly cleaned by pulling the appropriate size of EirGrid approved duct brush through the duct.

Details of the construction methodology are summarised below:

- Preparatory Works
  - Preparatory Trial Pit Survey along the cable route
  - Access to the start point and setting out
  - Access to joint bays
  - Silt Attenuation Features and watercourse set back buffer
  - Joint Bay Excavation
- Trenching Works
  - Storage of Materials
  - Trench Operations
  - Managing excess material from trench works

2.3.7 Borrow Pit

There is evidence of disused borrow pits (possibly used for the construction of the existing forest roads) south-west of T2 (Letter Wind Farm EIAR: **Chapter 8: Soils and Geology**). Borrow pit 01 is described as being moderate quality while borrow pit 02 is low quality. Only borrow pit 01 will be utilised as construction fill. The borrow pit will provide excavated material to provide fill for the roads, hardstands, upfill to foundations and the temporary compound. The borrow pit will be excavated only as required. Where rock and fill material is

available from the excavation of the turbine foundations, this material will be used first. The use of an on-site borrow pit will reduce the need to transport material to the Site.

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

2.3.8 Onsite Drainage

The surface water runoff contained within natural and artificial drainage channels includes stream and river waterbodies, drainage ditches, and other minor natural and artificial manmade drainage features. Drainage measures will be provided to attenuate runoff, guard against soil erosion, soil compaction, and safeguard local water quality. Details of the drainage system are outlined in detail in the Surface Water Management Plan, part of the CEMP attached as **Appendix 2.1** to the EIAR of the proposed development (Jennings O'Donovan, 2023)**.**

Drainage measures will be provided to attenuate runoff, guard against soil erosion, soil compaction, and safeguard local water quality. There is a total of 12 No. stilling ponds located throughout the Site. Details of the drainage system and outlined in detail in the Surface Water Management Plan, part of the CEMP (**Appendix 2.1** to the EIAR of the proposed development (Jennings O'Donovan, 2023).

A buffer zone of at least 50m will be in place for natural streams, except at locations where culvert crossing over watercourses are required for the proposed access track.

Sustainable Drainage System (SuDS) principles namely separation of overland flow from construction areas, the mimicking of diverted overland flow around construction areas and treatment trains to treat water from construction areas. Associated controls are listed below:

Source controls for surface water

Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sandbags, oyster bags filled with gravel, filter fabrics, and other similar/equivalent or appropriate systems.

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. When heavy rainfall is predicted, then works will be suspended or scaled back. It is proposed that all drainage will be left in place upon completion of the construction phase.

2.3.9 Table of Key Development Infrastructure Metrics

The Key Development Infrastructure Metrics are contained in **Table 2.3**.

Table 2.3: Key Development Infrastructure Metrics

Description	Length (m)	Width (m)	Depth (m)	No.	Area (m^2)	Volume of Excavation (m^3)
New Site Access Road	1,746	5	-	1	8,730	-
Upgraded Site Access Road	828	2	2.6	1	1,656	4,306
Turbine Hardstands	-	-	2.3	4	3,824	33,968
Turbine Foundations (up to 25m diameter)	-	-	3.5	4	491	7,689
Met Mast foundation	12	12	2.25	1	144	324

Electrical Substation	-	-	0.3	1	54	38
Construction Compound	-	-	0.3	1	1,500	600
20kV Cable Trench	6,425	0.6	0.925	1	3,855	3,566
Joint Bays	2.9	1.6	1.3	13	60	1,000
Internal Cabling	2,178	0.45	1	1	980	980
Drainage	-	-	1	1	558	1,786
Borrow Pit 01				1	5,000	25,000

Table 2.4: Summary of Re-Use of Excavated Material

Storage / Reuse Areas	Volume of storage (m^3)	Peat	Sub soil
Side cast adjacent to new access roads (2m high berm, both sides, 5m wide along 40% of the route)	6,980	6,980	0
Spoil Storage Areas 1 - 4	32,019	20,775	11,244
Re-use as fill on top of completed turbine bases	1,884	0	1,884
Used to infill borrow pit	11,499	9,231	384
Apron spreading within other areas of felled forestry (max. height 1m)	4,000	1,542	
Total Available (m^3)	**56,382**		
Spoil Generated (m^3)	**54,236**		
Storage Utilisation (%)	**96.2%**		

2.4 CONSTRUCTION

The first phase of the Project 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 14-15 months. An indicated construction programme is set out at **Table 2.5**.

Table 2.5: Indicative Construction Programme

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

2.4.1 Removal of Forestry & Replant Lands

The Site contains 19.83 hectares of commercial forestry. Turbines T1 and T2 are surrounded by forestry. Subsequently, tree felling will be required as part of the project. To facilitate the access roads, civil works, site compounds, borrow pits and Turbine Hardstands, 2ha coniferous forestry will need to be clearfelled. The felling area proposed is the minimum necessary to construct the Development and to comply with any environmental mitigation.

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

Forestry and Water Quality Guidelines (2000) and Forest Harvesting and Environmental Guidelines (2000).

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

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

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

All construction of tracks, including the creation of buffer zones and roadside drainage, will take into consideration the appropriate edition of the following specifications, which have been developed by the Forest Service:

- Forest Protection Guidelines
- Forestry and Water Quality Guidelines
- Forest Harvesting and Environmental Guidelines
- Forestry and Freshwater Pearl Mussel Requirements - Site Assessment and Mitigation Measures
- Forest Biodiversity Guidelines
- Forestry and The Landscape Guidelines

- Forestry and Archaeology Guidelines

This forestry to be clearfelled is mostly consisting of mixed quality, semi-mature Lodgepole pine and Sitka spruce and is expected to take up to 1 week. This forestry will need to be replaced.

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

2.4.2 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.

2.4.3 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 to the south of T4. This will be for the

wash-out of the chutes only after the pour. Concrete trucks will then exit the Site and return to the supply plant to wash out the mixer itself.

The main concrete pours at the turbine locations will be planned in advance and potential mitigation measures will be as follows:

- Avoiding large concrete pours, for Turbine Foundations for example, on days when heavy or prolonged rainfall is forecast i.e., 25mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or rainfall depth greater than monthly average in seven days (prolonged heavy rainfall over a week). Concrete pouring will be avoided during a period in which a Met Éireann Status Red weather event has been implemented.

- Ensuring that all concrete pour areas are dewatered prior to pouring concrete and while the concrete is curing.

- Making covers available so that areas can be covered if heavy rain arrives during the curing process which will prevent runoff of concrete which has a high pH.

2.4.4 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 will be required in this instance to see that dust does not become friable. This is most likely to occur during periods of dry and/or windy weather. This requires wetting the material and ensuring water is supplied at the correct levels for the duration of the work activity.

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

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

2.4.5 Construction Hours

The Development will have approximately 50 construction workers during the peak of the construction phase. Working hours for construction will be from 07:00 to 19:00 on weekdays, with reduced working hours at weekends, from 08:00 to 13:00 on a Saturday. It should be noted that during the turbine erection phase, operations will need to take place outside those hours with concrete pours commencing at 05:00 and continuing until 16:00, to facilitate Turbine Foundation construction and so that lifting operations are completed safely. Hours of working for Turbine Foundation construction will be agreed with Leitrim County Council prior to the commencement of Turbine Foundation construction.

2.4.6 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 south of T4**.** The compound will be 12m by 6m by 4.7m [338m³]. The compound will be used as a secure storage area for construction materials and to contain temporary site accommodation units for staff welfare facilities. The compound will contain cabins for offices space, meeting rooms, canteen area, a drying room, parking facilities, and similar personnel facilities.

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

During the construction phase, water will be supplied by water bowser. The maximum wastewater production is estimated to be the same as the maximum water consumption (2,000 litres per day)[3]. The project will include an enclosed wastewater management system at the

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

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 weekly, by a licensed wastewater disposal company and disposed at an appropriate licenced facility, likely to be in Drumkeeran.

2.4.7 Construction of Crane Hardstands and Foundations

The construction method for all the crane hardstands will be via excavated approach. Each crane hardstand will be 3,824m^2. Foundations will be taken down to competent bearing strata by excavating through the soil, subsoil, and rock if necessary.

The method of construction for turbine foundation is 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.

2.4.8 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 e.g., Wind Gust Speed Threshold of less than 6ms-1. The bottom tower section will be bolted onto the concrete foundations. The mid tower section will then be lifted into position and bolted to the bottom tower section. Finally, the top tower section will be lifted into position and bolted to the mid tower section. Three methods can be used to attach the blades:

1. The blades can be attached to the nacelle and hub on the ground. The hub and blades are then lifted as one. The nacelle of a wind turbine houses the drive train and other tower-top components. The hub of the wind turbine connects the blades to the main shaft and ultimately to the rest of the drive train.

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

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

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

2.4.9 Construction Traffic

It is estimated that during civil construction, approximately 2,432 fully loaded Heavy Goods Vehicle trips will be required for the Project. This breaks down to 447 loads per month or an average of 22 to 23 loads per day.

The peak number of deliveries per day will occur during the concrete pour for Turbine Foundation construction. An estimated 140 concrete deliveries will be required per Turbine Foundation. Other materials will also be delivered on such days, so a realistic estimation of peak deliveries is 300 deliveries per day (for 14 separate days in the construction programme when the Turbine Foundations will be poured). On these concrete pour days, 14-18 deliveries per hour will be required.

2.4.10 Reinstatement and Monitoring

Following completion of construction, all plant and machinery will be removed from the Site. The temporary works/assembly areas needed for the construction period such as blade laydown areas (A cleared, greenfield, flat area to store the blades. It is positioned adjoining the main crane hardstand.), 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 2m 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 upgraded local roads along the Turbine Delivery Route will be reinstated (temporary and permanent) in accordance with "Guidelines for Managing Openings in Public Roads", Department of Transport, Tourism and Sport, Second Edition (Rev. 1), April 2017. This will involve full width resurfacing as part of the permanent reinstatement to be carried out once commissioning of the wind farm substation is complete.

The grid route will be completed as described in Section 2.5.9 of **Chapter 2: Project Description.**

The on-site installed drainage network will be left in place. This will be monitored on a quarterly basis to see that it is operating to its stated design purpose. Water monitoring on nearby natural watercourses will be undertaken during and post construction.

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

2.4.11 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.

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.

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

The potential exists for the presence of unrecorded, sub-surface archaeological features within green field locations in proposed construction areas within the Site. A series of 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 ensuring that potential archaeological features are protected should any be discovered during excavations. The site will be accessible to the appointed archaeologist at all times during working hours and the nominated archaeologist will monitor all invasive works.

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

A Water Quality Management Plan has been prepared as part of **Appendix 2.1** to the EIAR of the proposed development (Jennings O'Donovan, 2023) and will be implemented prior to commencement of construction. Regular 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.

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

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

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

The local road network near the Site is used to transport construction materials and will be monitored during construction, so that any damage caused by construction traffic associated with the Project can be identified and repaired, as local roads are more prone to damage than national roads. This monitoring will be undertaken on the L-4282, L8082 and R280. Readymix concrete will be sourced from local quarries when required (see locations in **Table 2.3**) and monitoring, such as visual inspections, will also be undertaken on the route as required.

2.4.12 Construction Sequencing

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

1. Site Preparation including felling and drainage
2. Site Roads
3. Contractor Compound and Welfare Facilities
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 20 kV substation will be constructed in parallel with Turbine Hardstands, foundations and ducting.

The first step will be to prepare the Site for construction. This will include felling and implementing the designed drainage measures. The Site Access Roads will then be constructed and/or upgraded. The next step will be to construct the Temporary Construction Compound and Welfare Facilities. Access to the area will be 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, the relevant environmental buffer zones.

Following the site preparation, construction of the crane hard-standing areas for the 4 No. turbines will occur. The 4 No. Turbine Foundations will then be excavated and foundations constructed using reinforcing bar (rebar) and imported concrete. No concrete batching will take place on site.

Following the construction of the Turbine Foundations, internal cable ducting from the turbine locations to the on-site 20 kV substation will be laid in trenches along the constructed access roads.

The grid connection will then be constructed. For the underground grid connection there will be 6.3km of trenches for underground cabling (UGC) to Corderry110kV substation. The ducts to be installed in an excavated trench will be 600mm wide and 1m deep. For the overhead portion of the grid connection two new standard 20kV single poles, with a distance of 40m is required. The wooden poles are standard ESB Networks 20kV wooden poles which vary in length on this project between 11 and 13 metres.

The last step will be to erect the 4 No. wind turbines on the foundations using two cranes. Commissioning and testing of the turbines can then proceed.

2.4.13 Construction Employment

It is estimated that between 35 and 60 direct and indirect jobs could be created during the construction phase of the Project. It is not expected that all of these jobs will be based at the Site.

2.5 COMMISSIONING

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

2.6 OPERATION AND MAINTENANCE

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

2.7 DECOMMISSIONING

The Applicant is applying for a consent for a period of 40 years for the operation of the wind farm. The full description of the decommissioning is as follows:

- Removal of 4 No. wind turbines and concrete plinths.
- Removal of permanent meteorological mast.
- Removal of all associated underground electrical and communications cabling connecting the wind turbines to the wind farm substation. Ducting is to remain *in-situ*
- Removal of 2 No. battery storage units.

All other elements of the proposed development will remain in-situ. The Site Access Roads and associated drainage systems will serve ongoing forestry and agriculture activity in the area. All other hard surfaced areas will be allowed to revegetate naturally. Based on the experience

of the project team monitoring operational wind farm sites throughout the country, the approach of allowing these areas to revegetate naturally has proven to be very successful.

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

Turbines will be cut on site so as to fit on articulated trucks, therefore allowing the use of the civil construction delivery route to the south for removal. There will be no need to reinstate the bottomless bridge culvert.

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

The battery storage units will have a lifespan of circa 15 years, which is the usable life of the battery technology proposed for the Site. Decommissioning of the battery storage units will include the removal of the units from the Site. This will require the use of a fixed crane and articulated Heavy Goods Vehicles (HGVs). Removal will enable the recycling of the units on the open market, or the repositioning to an alternative site.

Given the nature and small amount of infrastructure required for the battery storage units, it is considered unlikely that any impacts would occur from the decommissioning works. All decommissioning works will be carried out in accordance with best practice and legislation at the time of decommissioning.

A decommissioning plan is included as part of the CEMP in **Appendix 2.1** to the EIAR of the proposed development (Jennings O'Donovan, 2023). Prior to the decommissioning works, a plan will be submitted to the planning authority for written agreement. The plan will take account of contemporary best practice.

3 DESCRIPTION OF THE PROJECT SITE

3.1 LOCATION OVERVIEW

The proposed wind farm Development is located within a cutaway peatland landscape near the Corry Mountains, Co. Leitrim. The Site is located approximately 2.9km west of Drumkeeran Village, Co. Leitrim and approximately 21km southeast of Sligo Town.

The Site is located within the townlands of Letter, Boleybaun and Stangaun.

The proposed grid connection is located in the townlands of Letter, Greaghnadarragh, Stangaun, Corralustia, Turpaun, Gortnasillagh West, Lugmeeltan, Leckaun, Lisgavneen, Treannadullagh, Drumcashlagh and Corderry.

Temporary works will be required to accommodate the delivery of the turbine components. These temporary works are not included as part of the planning application but are assessed a part of this EIAR and are located on the R263, N56, N15, N4, R285, and R280.

The Site extends to c. 45ha and has a mixed use as both commercial forestry and upland grazing.

The closest inhabited dwelling (H3) is located 710m from the nearest turbine. There are 17 houses within 1.5km of the proposed turbines.

3.2 TOPOGRAPHY

The Site is characterised by relatively complex (hilly) topography with associated elevations ranging between c. 170 to 260 metres above datum (mAOD). The site can be broken up into two sections, the north-western section is mostly forestry and has elevations around 250-260mAOD, the south-eastern section is mostly peatland and ranges from 170 – 240mAOD.

3.3 SOILS & GEOLOGY

The Site consists of lands characterised as blanket bog peatland that has been subject to turbary, mature forestry and areas of semi-improved grassland. Superficial soils, consisting of blanket peat are recorded to mantle the majority of Letter Wind Farm and have been confirmed during fieldwork to be the case at all significant infrastructure. The mean peat depth encountered across

the proposed Letter Wind Farm site was 1.98m, with a corresponding median value of 1.68m, whilst the peat thickness displayed a range from 0.10m to 5.50m within the proposed development area. The average peat depth at the proposed wind farm infrastructure ranges from 0.10m at the temporary construction compound to 4.7m at the proposed substation 2.

Underlying mineral soils are consistent with tills derived from Namurian Shales recorded in the vicinity, where blanket peat is absent.

Preliminary ground investigation data records that peat is underlain by a natural sequence of glacial soils overlying shale rock. Intact bedrock was encountered during the intrusive investigations at proposed Turbine T1, approximately 2.80m below existing ground level.

Land in the vicinity of the proposed Letter Wind Farm site is predominantly underlain by the Dergvone Shale Formation. The Dergvone Shale Formation contains four main shale facies, arranged in rhythmical order: primarily a dark pyritic, sometimes calcareous shale. In the northern portion of the site the forestry roads have been constructed using this shale rock recovered from existing borrow pits located on site.

The Carraun Shale Formation underlies the Deryvone Formation. This formation consists of grey black shale with minor limestone. The Bricklieve Limestone Formation, consisting of bioclastic cherty limestone is recorded in GSI online mapping to be the uppermost sequence approximately 3km west of the site. This formation is potentially present at significant depth below Letter Wind Farm.

Consultation with the Geological Survey of Ireland indicates that there are no active quarries within a 5 km radius of the proposed site. Kerrigan Quarries, a limestone quarry supplying a range of crushed stone, sand and chippings, ready-mix concrete and concrete blocks, is located approximately 6km north of the proposed site.

The closest recorded shafts or adits pertain to historic coal mining approximately 4km to the southwest of the site.

GSI records indicate a significant number of historic soils movements within the lands surrounding the proposed development site. In total 59 No. landslide events have been mapped within a 5km radius of the centre of Letter Wind Farm. 29 No. of these are part of a “GSI Pilot

Project" and relate to locations where a scar / soil detachment is visible on the hillside. These do not generally have any date of occurrence, whereas the other landslide events record an approximate date of the landslide along with other details.

One mapped area of soil detachment is recorded within the landholding of Letter Wind Farm. The location of this mapped landslide is approximately 75m north-west of the proposed turbine T4. No actual event marker is included for this mapped feature, neither is a year of occurrence recorded. WGS considers it to be of "natural" occurrence, i.e. triggered by heavy rainfall / surface water flow on thin soils in a steep valley. The actual mechanism behind this event does not appear to have been observed.

GSI landslide susceptibility mapping also indicates that this landslide event is within lands designated as Moderately High landslide susceptibility. Comparison of the wind farm layout to GSI mapping indicates that the vast majority of the wind farm infrastructure coincides with low to moderately low landslide susceptibility. Where the Substation, Compound and access track impinge on moderately high susceptibility the risk of instability is offset by low average peat thickness of < 0.5m.

3.4 HYDROLOGY

The Site is characterised by a network of non-mapped natural and artificial drainage channels which are often found in forestry plantations and peat turbary areas. Commercial forestry inherently possesses extensive drainage networks. Historic peat cutting activities have left drains present on the site. These can be categorised as both non-mapped significant drains (which feed into the mapped river for example) and minor drains. While some drains were generally dry during site visits, the Site is considered to have a flashy regime with low permeability soils and standing water in some areas. A flashy regime is where intense rainfall periods will raise the levels of the rivers significantly as the groundwater recharge will reach capacity quickly.

The Letter Wind Farm Project and the southern part of the and Grid Connection Route are situated within the Upper Shannon Catchment (ID:26A; Area: 604.47km2). The Northern part of the Grid Connection Route is situated in the Sligo Bay Catchment (ID:35, Area: 1605.94km2). there are 7 no. watercourse crossing associated with the proposed grid connection route.

The Turbine Delivery Route passes through the Donegal Bay North Catchment (ID:37, Area: 807km2), the Erne Catchment (ID:36, Area: 3440.55km2) the Sligo Bay Catchment (ID:35, Area: 1605.94km2), the Upper Shannon Catchment (ID:26B, Area: 674.13km2), the Upper Shannon Catchment (ID:26; Area: 604.47km2) near the red line boundary of the Site.

Surface water runoff associated with the Site drains into two sub catchments and/or three river sub basins, or three no. rivers, 1 no. lough:

- Sub Catchment: Owengar (Leitrim)_SC_10, River Sub Basins: Owengar (Leitrim)_SC_010 and Diffagher_10, Rivers: Owengar (Leirtim)_010, Owengar (Leitrim)_020, Diffagher_010

- Sub Catchment: Shannon Upper_SC_020; River Sub Basin: Shannon Upper_040, Lough: Lough Allen

All of the above sub-catchments are located within the Upper Shannon catchment (Catchment ID26A). The surface waters draining from the Site eventually combine into Lough Allen, from which waters eventually flow to the Upper Shannon, Lough Corry, Tap North and Lough Boderg, Lough Forbes, Lough Ree, the Lower Shannon, Lough Derg, and Shannon Estuary through to the mouth of the Shannon and into the Southwestern Atlantic Seaboard.

The WFD status (2016-2021) for surface water bodies / rivers and streams directly draining the Site range are Good.

3.5 BIODIVERSITY

3.5.1 Designated Sites

The proposed wind farm site is not located within any designated sites. As set out in Section 3.4 above there is hydrological connectivity between the proposed wind farm site and turbine delivery route widening locations 3 to 6 inclusive and the Lough Forbes SAC and Ballykenny-Fisherstown Bog SPA. There is hydrological connectivity between the proposed grid connection route and Lough Forbes SAC and Ballykenny-Fisherstown Bog SPA via watercourse crossing WCC1 to WCC5 and between the route and the Lough Gill SAC via watercourse crossing WCC6 and WCC7.

All other European Sites are located at more remote distances and are not connected to the project site.

3.5.2 Habitats

3.5.2.1 Proposed Wind Farm Site

The habitats occurring within the project site are dominated by conifer plantation and previously cutover blanket bog to the north. Moving south through the site peat depths decrease and blanket bog gives way to wet heath, which in turn gives way to semi-improved agricultural grassland. The upper Owengar River, which is characterised as an upland eroding stream, flows along the boundary of the wind farm site and is crossed at one location by the proposed access track. Other linear habitats in the form of hedgerows occur to the south of the site in conjunction with semi-improved grassland field boundaries. A Habitat Map of the proposed wind farm site is provided as **Figure 3.1**

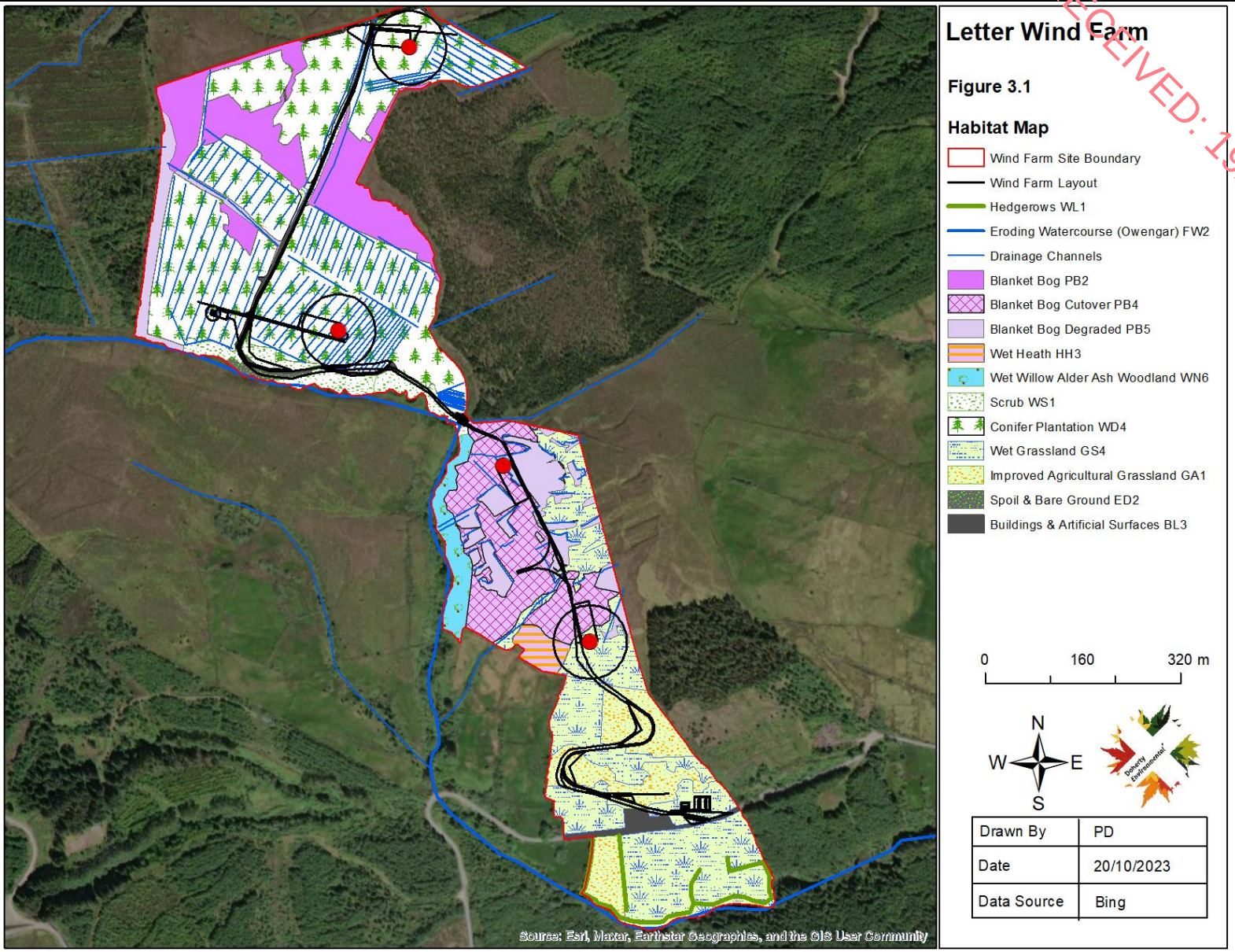
3.5.2.2 Proposed Grid Connection Route

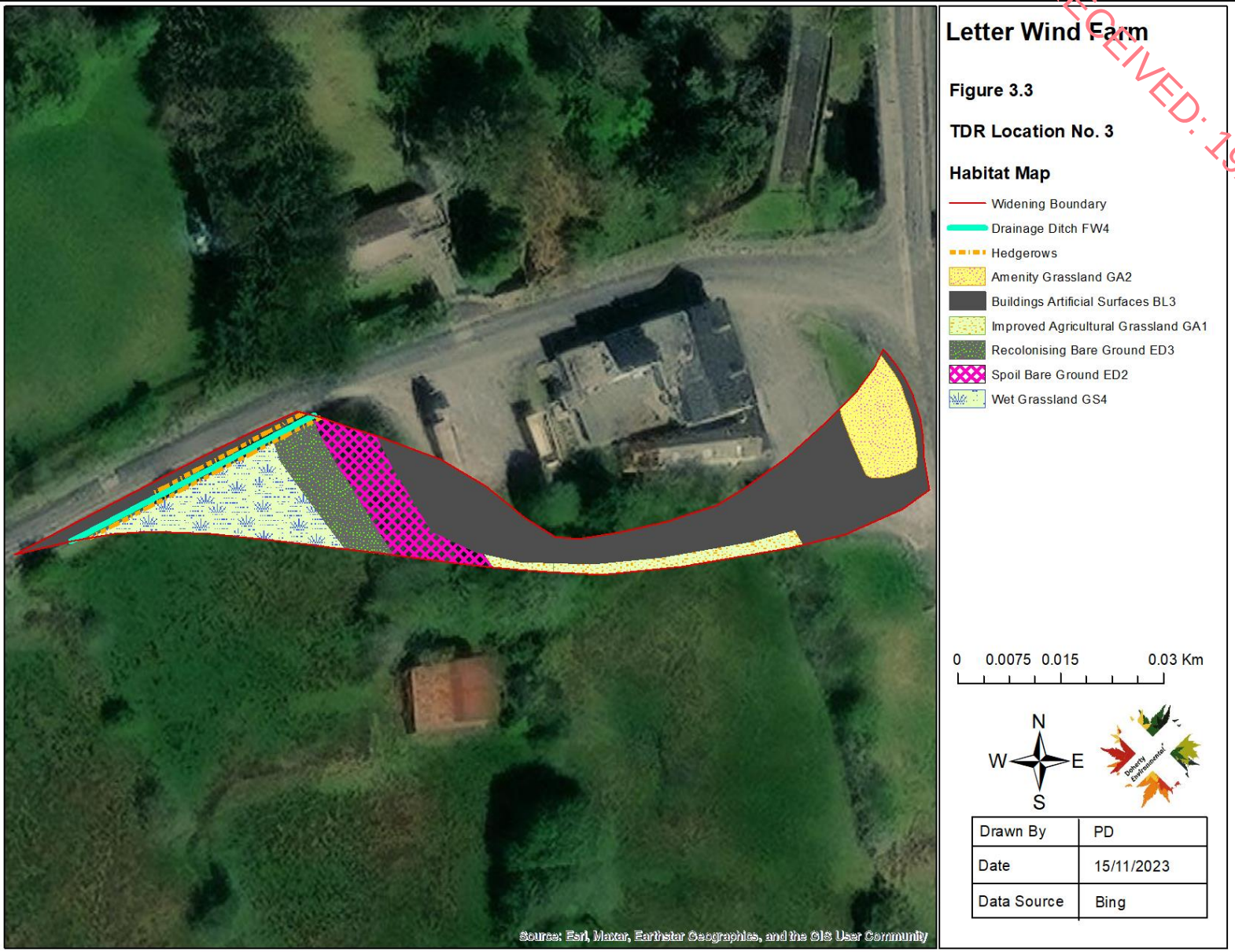
The entire stretch of the grid connection route from the proposed wind farm site to the existing ESB substation at Corderry will be located within the footprint of existing public road corridors.

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

3.5.2.3 Proposed TDR Widening Locations

The habitats occurring at the six no. TDR route widening locations comprise improved agricultural grassland, buildings and artificial surfaces, drainage ditch, rank wet grassland and hedgerows. Habitat maps for these locations are presented as Figures 3.2 to 3.4 below.





3.5.3 *Non-volant mammals*

Irish hare was observed at the proposed wind farm site during field surveys and evidence 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 Owengar River draining the proposed wind farm site. The Owengar River downstream of the project site provides suitable foraging habitat for otters. No otter activity was recorded along this stretch of the river during field surveys.

No evidence of non-volant mammals was recorded at the 6 no. TDR widening areas along the turbine delivery route.

3.5.4 *Bat Species*

In general, the landscape that the development is a part of, is of low to moderate suitability for bats where the turbines are located in the upland areas. The landscape is of moderate to high suitability for bats where the turbines are located in the lowland agricultural areas.

Eight 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.

No lesser horseshoe bats have been recorded at the project Site and the project Site is located outside of the known distribution range of this species in Ireland.

3.5.5 *Bird Species*

Bird surveys completed for the proposed Site recorded a total of 4 target species, one of which, namely hen harrier, is considered to be an ecologically sensitive species with respect to wind farm (Percival, 2003); two of which are Red-list status under the BoCCI (Gilbert et al., 2021), namely kestrel and snipe; and one of which, namely buzzard, is of low conservation concern.

During bird surveys no hen harrier roost was observed but suitable habitat exists on and near the Site. During breeding wader surveys, no waders were observed breeding on Site.

Table 3.2 lists the bird species that have been identified as key ornithological receptors for the assessment of ornithological impacts (see **Chapter 7: Ornithology**). The sensitivity of species as outlined on **Table 3.2** are as per Percival (2003).

Table 3.2: Key Ornithological Receptors

Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low Sensitivity
None Recorded: Any bird species that were recorded during bird surveys that are listed as special conservation interests of SPA are not considered to form part of an SPA population.	Hen harrier	Kestrel Snipe	Buzzard

3.5.6 Invertebrates

There are records held for the presence of marsh fritillary near the northern end of Lough Allen within the hectad G92 approximately, approximately 8km to the east of the proposed wind farm site.

A dedicated survey examining the suitability of the site for supporting marsh fritillary was completed during baseline surveys between 2020 and 2023. The presence of the marsh fritillary larvae foodplant *Succisa pratensis* is rare on site and the site is not considered to offer suitable habitat for this species. Where Succisa pratensis does occur, it was searched during the autumn (September 2020; 2021 & 2023) for the presence of marsh fritillary larvae. No larvae were found during such searches.

3.5.7 Aquatic Fauna

The Owengar River and the Diffagher River are the principal watercourses draining the wind farm site. The Diffagher River is a salmonid watercourse with its upper reaches traditionally supporting important wild brown trout spawning grounds whilst its lower reaches are trout

nursery areas. The fish stocks of the Diffagher River were affected by the landslide near its source at Greaghnaglogh in June 2020. The Owengar River is known to support stocks of brown trout. This river has also been adversely affected by a past landslide event arising at the Garvagh Glebe Wind Farm site in September 2008. This landslide impacted the Owengar River from its source downstream to its lower reaches near Lough Allen. The IFI (IFI, 2021) noted that the landslide severely undermined the water quality and instream habitats along this watercourse and the fisheries supported by it. A fisheries rehabilitation programme along the Owengar River was initiated by the IFI in 2010 and subsequent surveys indicated the recovery of trout numbers within the watercourse (IFI, 2013). EPA monitoring of the Owengar River during 2008, subsequent to the landslide recorded a Q-value of Q1 ('Bad' biological water quality status) along the Gowlaunrevagh Stream tributary of the Owengar, immediately downstream of the landslide. However, the 2008 EPA monitoring completed along the lower reaches of the Owengar River at Annaghgerry Bridge was assigned a Q-value of Q4*, indicative of good biological water quality status. The asterix assigned to the Q4 rating by the EPA is almost certainly related to sedimentation (peat mass) in the channel (RPS, 2020).

The Owengar River draining the wind farm site is representative of a high-energy eroding small stream with cascading sequences flowing over siliceous rock. The meandering channel is dominated by small boulder substrata with large cobble. The cobble is characterised by a more slate-like form which was largely unstable. The channel is 0.5m to 0.75m wide. The channel is shallow at 0.2m deep with the deepest areas c. 0.3m. The stream flows through a steep V-shaped valley with a bankful height of 2.5-3m. The instream river habitat is dominated by fast riffle with occasional glide and pools.

The upper reaches of the Owengar flowing through the wind farm site offers poor salmonid nursey habitat given the shallow, small nature of the channel. The high energy upland environment and dominance of large substrata reduces the spawning value of this stretch of the river to poor. Localised pockets of coarse gravel may provide some spawning habitat for trout. Recent fisheries surveys of the upper Owengar River (to the southwest of the proposed turbine T4) recorded an absence of salmonids along this stretch of the river. There is a general absence of suitable pool holding habitat along the upper stretch of the river. The river is of no importance for lamprey species and is of low potential habitat value for European eel.

Fisheries habitat further downstream along the Owengar improves from low to moderate with riffle habitat occurring along a stream substrate characterised by boulder, cobble and coarse

gravel. Recent fisheries surveys completed along this section of the Owengar recorded an absence of Atlantic salmon with only brown trout being recorded.

No field signs indicating the presence of otters were recorded along the Upper stretches of the Owengar River flows through the wind farm site and downstream of the wind farm site. Similarly, no field signs indicating the presence of otter were recorded along the Diffagher River downstream of the project site. The upper stretches of both watercourses in the vicinity of the Site offer sub-optimal foraging habitat for otters. Notwithstanding this both watercourses offer suitable commuting habitat for otters.

4 EUROPEAN SITES

4.1 OVERVIEW OF EUROPEAN SITES & FEATURES OF INTEREST

The five no. European Sites that are the subject of this Natura Impact Statement are listed again in Table 4.1 and a synopsis of the site is provided.

Table 4.1: Site Synopsis of European Sites under Examination

European Sites	Site Synopsis
Lough Gill SAC	This site includes Lough Gill, Doon Lough to the north-east, the Bonet River (as far as, but not including, Glenade Lough), and a stretch of the Owenmore River near Manorhamilton in Co. Leitrim. Lough Gill is a large lake, being 8 km long, and has steep limestone shores and underwater cliffs. It is over 20 m deep in places. The lake appears to be naturally eutrophic. The aquatic macrophyte flora is very limited, probably due to the rapid increase in depth around most of the margin. Species such as pondweeds (Potamogeton spp.) are present, as well as Shoreweed *(Littorella uniflora*). Where the lake shore has a shallow gradient, some swamp vegetation occurs, mainly dominated by Common Reed (*Phragmites australis*), with Common Club-rush (*Scirpus lacustris*) and sedges (Carex spp.).

European Sites	Site Synopsis
	The Old Oak Woodlands within this site are dominated by oak (Quercus spp.), Rowan (*Sorbus aucuparia*) and willows (Salix spp.). A number of interesting tree species occur. Strawberry Tree (*Arbutus unedo*) is found in its most northerly site in the world. Yew (*Taxus baccata*) occurs in abundance. Bird Cherry (*Prunus padus*), a Red Data Book species, is also found, as is the nationally scarce Rock Whitebeam (*Sorbus rupicola*). Orchid-rich Calcareous Grassland, a priority habitat listed on Annex I of the E.U. Habitats Directive, has been reported from Clogher Beg, according to the Irish Semi-natural Grasslands Survey, 2010. Heath-covered hillsides above the woods are dominated by Heather (Calluna vulgaris). The site also supports several rare plant species, including Yellow Bird's-nest (*Monotropa hypopitys)*, the lady's-mantle species *Alchemilla glaucescens*, Ivy Broomrape (*Orobanche hederae*), Black Bryony (*Tamus communis*), Intermediate Wintergreen (*Pyrola media)* and Bird's-nest Orchid (Neottia nidus-avis). There is also an unconfirmed record for Melancholy Thistle (*Cirsium helenioides*) from the eastern side of the site. The site is of considerable importance for the presence of four Red Data Book fish species that are listed on Annex II of the E.U. Habitats Directive - Brook Lamprey (*Lampetra planeri*), River Lamprey (*Lampetra fluviatilis*), Sea Lamprey (*Petromyzon marinus*) and Atlantic Salmon (*Salmo salar*). White-clawed Crayfish (Austropotamobius pallipes), Otter and Pine Marten are well established on this site, the first two are both Annex II species.
Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC	This large coastal site extends from Cullamore in the north-west to Killaspug in the south-west, and from Sligo town in the south-east to Drumcliff village in the northeast. It encompasses two large, shallow bays, Drumcliff Bay and Sligo Harbour, and both Ardboline and Horse Island. Sand dunes and sand hills at Rosses Point, Killaspug, Yellow Strand and Coney Island are included, as are

European Sites	Site Synopsis
	grasslands at Ballintemple and Ballygilgan (Lissadell), along with a variety of other habitats such as woodland, saltmarsh, sandy beaches, boulder beaches, shingle, fen, freshwater marshes, rocky sea cliffs and lakes. The dominant habitats on the site are estuaries and intertidal sand and mud flats. At low tide extensive areas of intertidal flats are exposed in both of these sheltered estuarine bays. The intertidal flats support a diverse macrofauna. Sand dune habitats are rare and threatened in Europe and three types are found in this site - embryonic dunes, Marram (*Ammophila arenaria*) dunes and fixed dunes. Embryonic dunes occur at the southern end of the sand spit at Rosses Point. Shifting Marram dunes are found in a number of locations, including Rosses Point, Strandhill, Coney Island and Yellow Strand. In the latter three areas, the areas of shifting dunes are linked at least to some extend to recent disturbance (e.g. erosion, storm breaches, etc.). Fixed dune grassland is found behind Yellow Strand. An area with Juniper (*Juniperus communis*) scrub is found on a gravel hill with species-rich fixed dune vegetation. An area of approximately 3.7 hectares of Orchid-rich Calcareous Grassland, a habitat listed with priority status on Annex I of the E.U. Habitats Directive, is reported to occur near Rosses Point, according to the Irish Semi-natural Grasslands Survey, 2010. The site has a good example of petrifying springs with tufa formations, with several species of bryophyte typical of the Cratoneurion. The springs occur along seepage zones in clay sea cliffs on the northern side of Sligo Harbour. At least five species listed on Annex II of the E.U. Habitats Directive are found within this site. Drumcliff Bay is important for the presence of a breeding population of Common Seal. Ardboline and Horse Islands on the western side of the site are also important as haul-out areas for this species. A minimum

European Sites	Site Synopsis
	population of 12–15 individuals was estimated from counts made in various month in 2007 and 2008. Sea Lamprey and River Lamprey have been recorded in the Garavogue River, and River Lamprey are also known from further upstream in the tributaries of Lough Gill. The Marsh Fritillary butterfly is found at Rosses Point, while the rare snail Vertigo angustior has recently been recorded from sand dunes at Killaspugbrone.
Lough Forbes SAC	This site consists of a number of different habitats, and is centred around Lough Forbes, a lake formed by a broadening of the River Shannon. Active raised bog comprises areas of high bog that are wet and actively peat-forming. Degraded raised bog corresponds to those areas of high bog whose hydrology has been adversely affected by peat cutting, drainage and other land use activities, but which are capable of regeneration. The Rhynchosporion habitat occurs in wet depressions, pool edges and erosion channels where the vegetation includes White Beak-sedge (*Rhynchospora alba*) and/or Brown Beak-sedge (R. fusca). The raised bogs, located on the south-eastern shore of Lough Forbes, are known as the Ballykenny-Fishertown complex. These bogs are of international importance as unique examples of Shannon River edge bogs and they are also the most northerly intact bogs adjacent to the River Shannon. Lough Forbes is a medium sized lake underlain by limestone. These areas contain a good diversity of aquatic and emergent vegetation, comprised of species such as sedges (Carex vesicaria, C. rostrata and C. acuta), Bogbean, Common Spike-rush (*Eleocharis palustris*), Fine-leaved Waterdropwort (*Oenanthe aquatica*), Water Plantain (Alisma plantago-aquatica), Cowbane (*Cicuta virosa*), Common Club-rush (*Scirpus lacustris*) and Reed Canary-grass (*Phalaris arundinacea*). The wet woodland types present include willow woodland, Ash-Alder woodland on slightly higher ground, Ash-oak woodland at the highest levels and birch woodlands on dried-out or cut-away bog. The willow woodland stands are generally found fringing the rivers and lake and are usually quite narrow due to

European Sites	Site Synopsis
	the hilly/boggy landscape which tends to rise steeply from the river. Alder-Ash woodland is the most extensive type of alluvial woodland at this site. This community occurs behind the willow woodland on slightly more elevated land that nonetheless is regularly flooded. The main canopy species are Alder and Ash, with occasional Pedunculate Oak, birch and Sycamore. Rusty Willow and Hawthorn are the principal shrub species, with a small amount of Guelder-rose (*Viburnum opulus*), Bird Cherry and Hazel.
Unshin River SAC	The Unshin River runs from Lough Arrow north to Ballysadare Bay, Co. Sligo. The river is largely undrained and unaltered along much of its course. The marginal vegetation associated with the river is also included in the site, along with other semi-natural habitats adjacent to the river (included in order to enhance its protection). The Unshin River supports an excellent example of floating river vegetation. The diversity of aquatic macrophytes is exceptional, and to a certain extent the unusual combinations and richness of species can be accounted for by the good quality water being discharged from Lough Arrow upstream. There are a number of areas of woodland, many of which flood, included within the site. These wet alluvial woodlands are found on water-logged soils and species such as Alder (Alnus glutinosa), Ash (Fraxinus excelsior), willows (Salix spp.), Pedunculate Oak (Quercus robur) and birch (Betula spp.) are common. Areas of grassland, ascribable to the E.U. Habitats Directive Annex I types: Orchidrich Calcareous Grassland and Molinia Meadows, have been reported at Cloonmacduff, according to the Irish Semi-natural Grasslands Survey, 2010. There are also extensive wetlands within this site, and one area contains the Red Data Book plant Swamp Meadow-grass (Poa palustris). The Unshin and its tributaries form a very important system for Atlantic Salmon, a species that is listed on Annex II of the E.U. Habitats Directive. The Owenboy/

European Sites	Site Synopsis
	Owenbeg river is the principle spawning and nursery tributary for the system's salmon fishery. The Unshin and its tributaries is the most important salmon producing river in Co. Sligo. The system also supports a good population of Trout. The Annex II species Otter has been recorded in and near this site. The trophic status of the river increases downstream indicating that some enrichment is taking place. However, the quality of the Unshin River and particularly its aquatic macrophyte communities, make it rare in both an Irish and European context, and it is considered one of the most pristine rivers in the country.
Cummeen Strand SPA	Cummeen Strand is a large shallow bay stretching from Sligo Town westwards to Coney Island. It is one of three estuarine bays within Sligo Bay and is situated between Drumcliff Bay to the north and Ballysadare Bay to the south. At low tide, extensive sand and mud flats are exposed. These support a diverse macro-invertebrate fauna which provides the main food supply for the wintering waterfowl. Cummeen Strand supports important concentrations of wintering waterfowl, including an internationally important Light-bellied Brent Goose flock (223) and nationally important populations of Oystercatcher (680) and Redshank (408). Other species occurring include Shelduck (86), Wigeon (149), Teal (54), Mallard (145), Redbreasted Merganser (15), Golden Plover (428), Lapwing (695), Knot (165), Sanderling (14), Dunlin (539), Bar-tailed Godwit (85), Curlew (430), Greenshank (13) and Turnstone (62) - all figures are mean peak counts for 4 of the 5 winters between 1995/96 and 1999/2000. Whooper Swan (7) also uses the site, though not regularly. Cummeen Strand SPA is of high ornithological importance with one species, Light-bellied Brent Goose, occurring in numbers of international importance. In addition, the site supports nationally important populations of a further two species. The regular presence of Golden Plover and Bar-tailed Godwit is of particular note as these species are listed on Annex I of the E.U. Birds Directive. The site is also important as a

European Sites	Site Synopsis
	component of the much larger Sligo Bay complex. Cummeen Strand is a Ramsar Convention site.

Likely significant effects to five European Sites were identified during the screening for Appropriate Assessment. The potential for likely significant effects to these European Sites is based upon the potential impacts that could arise as a result of the proposed development, the presence of a hydrological pathway and/or mobile species pathway (with respect to otters) connecting the source of impact to qualifying features of interest of these five European Sites and the sensitivity of these qualifying features of interest to these impacts. The five European Sites identified as occurring within the zone of influence of the project and their qualifying features of interest are listed in **Table 4.2** below. The qualifying features of interest of each of these European Sites that are connected via pathways to the proposed development and are potentially at risk of impact from the project are identified in **Table 4.2**. A rationale is provided for each qualifying features of interest that underpins its exposure to impacts, or lack thereof, that could arise as a result of the project. The qualifying features of each of the European Sites that have been identified as being at risk of impact are highlighted in yellow in **Table 4.2**

Table 4.2: 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	Is the qualifying features of interest at risk of impact	Source
Lough Gill SAC (Site Code: 001976)	5.5km from the proposed grid connection route. 8.3km from the proposed wind farm site 11km from the nearest turbine delivery route widening location.	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150]	Hydrological pathway	A hydrological pathway connects the section of the proposed grid connection route and particularly the works associated with the watercourse crossing no. WCC6 & WCC7	Proposed grid connection route
		Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]	No pathway	The is a terrestrial habitat and there are no pathway connecting the project to examples of this qualifying habitat.	Not applicable
		Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	No pathway	The is a terrestrial habitat and there are no pathway connecting the project to examples of this qualifying habitat.	Not applicable
		Alluvial forests with Alnus glutinosa and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae, Salicion albae*) [91E0]		A hydrological pathway connects the section of the proposed grid connection route and particularly the works associated with the watercourse crossing no. WCC6 & WCC7	Not applicable

European Sites	Distance	Qualifying features of interest	Pathway	Is the qualifying features of interest at risk of impact	Source
		Austropotamobius pallipes (White-clawed Crayfish) [1092]	Hydrological pathway	A hydrological pathway connects the section of the proposed grid connection route and particularly the works associated with the watercourse crossing no. WCC6 & WCC7	Proposed grid connection route
		Petromyzon marinus (Sea Lamprey) [1095]	Hydrological pathway	A hydrological pathway connects the section of the proposed grid connection route and particularly the works associated with the watercourse crossing no. WCC6 & WCC7	Proposed grid connection route
		Lampetra planeri (Brook Lamprey) [1096]	Hydrological pathway	A hydrological pathway connects the section of the proposed grid connection route and particularly the works associated with the watercourse crossing no. WCC6 & WCC7	Proposed grid connection route
		Lampetra fluviatilis (River Lamprey) [1099]	Hydrological pathway	A hydrological pathway connects the section of the proposed grid connection route and particularly the works associated with the watercourse crossing no. WCC6 & WCC7	Proposed grid connection route
		Salmo salar (Salmon) [1106]	Hydrological pathway	A hydrological pathway connects the section of the proposed grid connection route and particularly the works associated with the watercourse crossing no. WCC6 & WCC7	Proposed grid connection route
		Lutra lutra (Otter) [1355]	Hydrological pathway mobile species pathway	A hydrological pathway connects the section of the proposed grid connection route and particularly the works associated with the watercourse crossing no. WCC6 & WCC7	Proposed grid connection route; proposed wind farm

European Sites	Distance	Qualifying features of interest	Pathway	Is the qualifying features of interest at risk of impact	Source
Cummeen Strand/Drumcliff Bay SAC (Site Code: 000627)	20km from the proposed grid connection route 21.5km from the proposed wind farm site 25km from the nearest turbine delivery route widening location	Estuaries [1130]	Hydrological pathway	A hydrological pathway connects the section of the proposed grid connection route and particularly the works associated with the watercourse crossing no. WCC6 & WCC7	Proposed grid connection route
		Mudflats and sandflats not covered by seawater at low tide [1140]	Hydrological pathway	A hydrological pathway connects the section of the proposed grid connection route and particularly the works associated with the watercourse crossing no. WCC6 & WCC7	proposed grid connection route
		Embryonic shifting dunes [2110]	No pathway	The is a terrestrial habitat and there are no pathway connecting the project to examples of this qualifying habitat.	Not applicable
		Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	No pathway	The is a terrestrial habitat and there are no pathway connecting the project to examples of this qualifying habitat.	Not applicable
		Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	No pathway	The is a terrestrial habitat and there are no pathway connecting the project to examples of this qualifying habitat.	Not applicable
		Juniperus communis formations on heaths or calcareous grasslands [5130]	No pathway	The is a terrestrial habitat and there are no pathway connecting the project to examples of this qualifying habitat.	Not applicable

European Sites	Distance	Qualifying features of interest	Pathway	Is the qualifying features of interest at risk of impact	Source
		Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]	No pathway	The is a terrestrial habitat and there are no pathway connecting the project to examples of this qualifying habitat.	Not applicable
		Petrifying springs with tufa formation (Cratoneurion) [7220]	No pathway	The is a groundwater habitat and there are no pathway connecting the project to examples of this qualifying habitat.	Not applicable
		Vertigo angustior (Narrow-mouthed Whorl Snail) [1014]	No pathway	The habitats upon which this species occurs and relies within this SAC are not hydrologically connected to the project.	Not applicable
		Petromyzon marinus (Sea Lamprey) [1095]	Hydrological pathway	A hydrological pathway connects the section of the proposed grid connection route and particularly the works associated with the watercourse crossing no. WCC6 & WCC7	Proposed grid connection route
		Lampetra fluviatilis (River Lamprey) [1099]	Hydrological pathway	A hydrological pathway connects the section of the proposed grid connection route and particularly the works associated with the watercourse crossing no. WCC6 & WCC7	Proposed grid connection route
		Phoca vitulina (Harbour Seal) [1365]	Hydrological pathway	A hydrological pathway connects the section of the proposed grid connection route and particularly the works associated with the watercourse crossing no. WCC6 & WCC7	Proposed grid connection route

European Sites	Distance	Qualifying features of interest	Pathway	Is the qualifying features of interest at risk of impact	Source
Lough Forbes Complex SAC (Site Code: 001818)	45km from the proposed wind farm site and the proposed grid connection route. 34km from the nearest turbine delivery route widening location.	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150]	Hydrological pathway	A hydrological pathway connects the proposed wind farm site and section of the proposed grid connection route and particularly the works associated with the watercourse crossing no. WCC1 & WCC5.	Proposed wind farm site; proposed grid connection route; TDR widening
		Active raised bogs [7110]	No pathway	The is a terrestrial habitat and there are no pathway connecting the project to examples of this qualifying habitat.	Not applicable
		Degraded raised bogs still capable of natural regeneration [7120]	No pathway	The is a terrestrial habitat and there are no pathway connecting the project to examples of this qualifying habitat.	Not applicable
		Depressions on peat substrates of the *Rhynchosporion* [7150]	No pathway	The is a terrestrial habitat and there are no pathway connecting the project to examples of this qualifying habitat.	Not applicable
		Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae, Salicion albae*) [91E0]	No pathway	A hydrological pathway connects the proposed wind farm site and section of the proposed grid connection route and particularly the works associated with the watercourse crossing no. WCC1 & WCC5.	Not applicable
Unshin River SAC (Site Code: 001898)	13.6km from the proposed wind farm site and the proposed grid connection	Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation [3260]	No pathway	There is no hydrological pathway connecting the project to this qualifying habitat.	Not applicable

European Sites	Distance	Qualifying features of interest	Pathway	Is the qualifying features of interest at risk of impact	Source
	route. 14km from the nearest turbine delivery route widening location.	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]	No pathway	There is no hydrological pathway connecting the project to this qualifying habitat.	Not applicable
		Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]	No pathway	There is no hydrological pathway connecting the project to this qualifying habitat.	Not applicable
		Alluvial forests with *Alnus glutinosa* and Fraxinus excelsior (Alno-Padion, *Alnion incanae, Salicion albae*) [91E0]	No pathway	There is no hydrological pathway connecting the project to this qualifying habitat.	Not applicable
		Salmo salar (Salmon) [1106]	No pathway	There is no hydrological pathway connecting the project to the freshwater habitats relied upon by the populations of Atlantic salmon supported by this SAC.	Not applicable
		Lutra lutra (Otter) [1355]	Mobile species pathway	The wind farm site is located within the maximum foraging range of the otter population associated with this SAC. There is potential for otters of this population to use and rely upon freshwater habitats downstream of the wind farm site and watercourse	Proposed wind farm

European Sites	Distance	Qualifying features of interest	Pathway	Is the qualifying features of interest at risk of impact	Source
				crossings associated with the grid connection route.	
Cummeen Strand SPA (Site Code: 004035	20km from the proposed grid connection route 21.5km from the proposed wind farm site 25km from the nearest turbine delivery route widening location	Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]	No pathway	This species does not occur at the wind farm site and there is no pathway connecting this species to the project.	Not applicable
		Oystercatcher (*Haematopus ostralegus*) [A130]	No pathway	This species does not occur at the wind farm site and there is no pathway connecting this species to the project.	Not applicable
		Redshank (*Tringa totanus*) [A162]	No pathway	This species does not occur at the wind farm site and there is no pathway connecting this species to the project.	Not applicable
		Wetland and Waterbirds [A999]	Hydrological pathway	There is no hydrological pathway connecting the project to this qualifying habitat.	Proposed grid connection route

4.2 SUMMARY OF FEATURES OF INTEREST AT RISK OF IMPACTS

Following the examination of pathways or lack thereof, connecting the project to the individual features of interest of the five no. European Sites occurring within the zone of influence of the project a list of these features is as follows:

Natural eutrophic lakes, of the Lough Gill SAC and the Lough Forbes SAC.

Estuaries of the Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC.

Tidal mudflats and sandflats of the Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC.

Wetlands of the Cummeen Strand SPA. It is noted that the wetlands of the Cummeen Strand SPA are the same as the estuaries and tidal mudflats and sandflats of the Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC.

Alluvial woodland of the Lough Gill SAC and the Lough Forbes SAC.

White-clawed crayfish, of the Lough Gill SAC.

Sea lamprey, of the Lough Gill SAC and the Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC.

River lamprey of the Lough Gill SAC and the Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC.

Brook lamprey of the Lough Gill SAC.

Atlantic salmon, of the Lough Gill SAC.

Otters, of the Lough Gill SAC and the Unshin River SAC.

Harbour seal of the Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC.

4.3 DESCRIPTION OF FEATURES OF INTEREST UNDER EXAMINATION

4.3.1 Natural Eutrophic Lake

Little is known about the characteristics or ecology of Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation in Ireland. This lake habitat is considered likely to occur in lowland, base-rich lakes in the midlands and north-east of Ireland, where it is characterised by high abundance and diversity of pondweeds (Potamogeton spp.), such as *Potamogeton lucens, P. praelongus, P. perfoliatus, P. obtusifolius, P. berchtoldii* and *P. pectinatus.* Examples of this habitat are associated with catchments dominated by mineral soil and, hence, some of the most intensive agricultural lands in Ireland. Consequently, the habitat has been under pressure from eutrophication since the 1970s or before.

The surface area of natural eutrophic lakes in Ireland is estimated to be approximately 144km^2 to 394km^2. The natural eutrophic lake habitat of the Lough Gill SAC and the Lough Forbes SAC occurring downstream of the project are shown on **Figure 4.1.**

The short-term conservation status trend of this habitat is stable while the long-term trend has not been reported by the NPWS in their 2019 Article 17 Reporting. The range and extent of this habitat in Ireland have been classified as favourable, however the structure and function and future prospects for this habitat have been classified as inadequate. The Overall Conservation Status of this habitat has been assessed to be Stable.

The threats and pressures to this habitat are numerous and include agricultural activities, forestry activities, discharges from urban wastewater, modifications of hydrological flow, physical alterations to waterbodies, peat extraction, and pollution arising from urban runoff.

4.3.2 Estuaries, Tidal mudflats and sandflats & Cummeen Strand SPA Wetlands

The Annex I habitat estuaries is a large physiographic feature that may wholly or partly incorporate other Annex I habitats including mudflats and sandflats and the wetland habitats of the Cummeen Strand SPA within its area. Within Cummeen Strand/Drumcliff Bay, nine benthic community types have been recorded. These communities and their association with the Annex 1 qualifying habitat estuaries and tidal mudflats and sandflats are outlined in **Table 4.3** below. reasonable

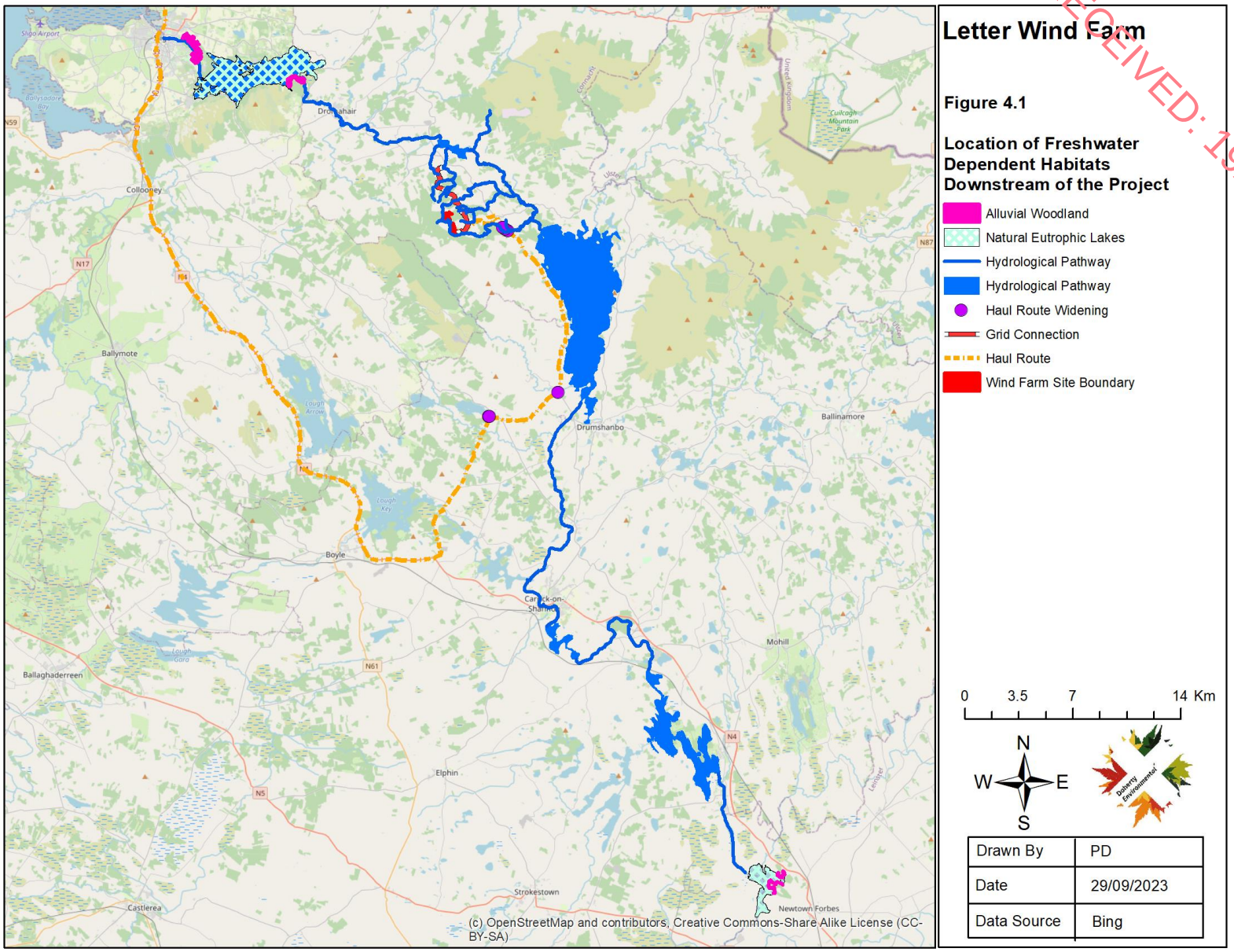
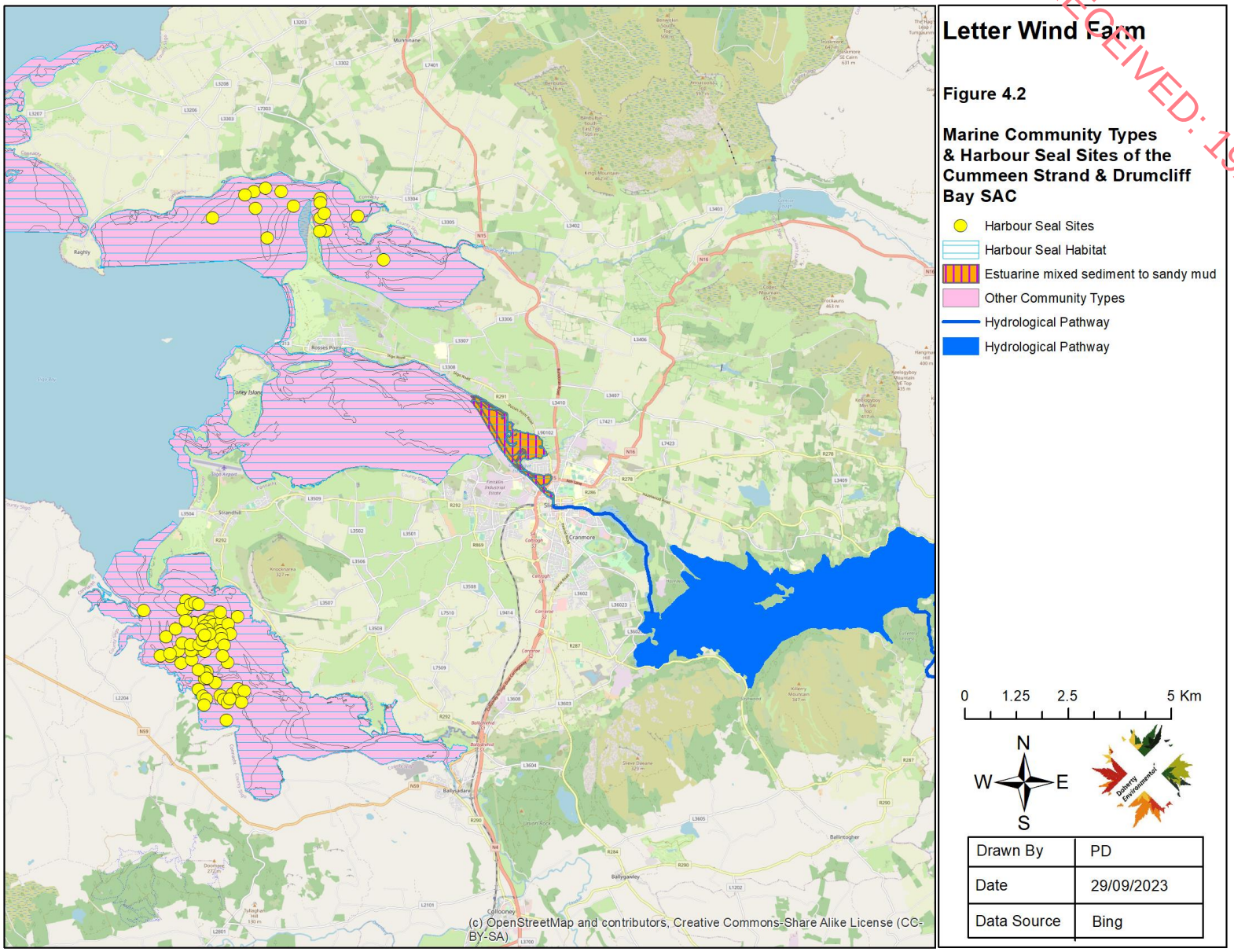


Table 4.3: Benthic Community Types of the Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC

Community Type	SAC Annex I Habitats		SPA
	Estuaries (1130)	Mudflats and sandflats not covered by seawater at low tide. (1140)	
Intertidal fine sand with *Peringia ulvae* and *Pygospio elegans* community complex	✓	✓	✓
Estuarine mixed sediment to sandy mud with *Hediste diversicolor* and oligochaetes community complex	✓	✓	✓
Fine sand with crustaceans and *Scolelepis (Scolelepis) squamata* community complex		✓	✓
Zostera-dominated community	✓	✓	
Mytilidae-dominated community complex	✓	✓	✓
Fine sand with *Angulus* spp. and *Nephtys* spp. community complex	✓	✓	✓
Sand to mixed sediment with amphipods community	✓		✓
Intertidal reef community	✓		✓
Subtidal reef community			✓

Of these nine communities, only one occurs downstream of the project at the mouth of the Garavogue River. This is the Estuarine mixed sediment to sandy mud with *Hediste diversicolor* and oligochaetes community complex. This community type stretches from the mouth of the river approximately 2km into Cummeen Bay. The extent of this marine community type downstream of the project at the mouth of the Garavogue River is shown on **Figure 4.2**. Given the buffer distance of approximately 2km between the mouth of the Garavogue and the other 8 marine community types it is considered that these other communities lie outside the zone of influence of the project. As such the only marine community type of this SAC to be considered for the purposes of this Natura Impact Statement is the Estuarine mixed sediment to sandy mud with *Hediste diversicolor* and oligochaetes community complex.



Letter Wind Farm

Figure 4.2

Marine Community Types & Harbour Seal Sites of the Cummeen Strand & Drumcliff Bay SAC

- Harbour Seal Sites
- Harbour Seal Habitat
- Estuarine mixed sediment to sandy mud
- Other Community Types
- Hydrological Pathway
- Hydrological Pathway

0 1.25 2.5 5 Km

N W E S

Drawn By	PD
Date	29/09/2023
Data Source	Bing

The range and extent of estuaries in Ireland have been classified as favourable, however the structure and function and future prospects for this habitat have been classified as inadequate. The Overall Conservation Status of this habitat has been assessed to be Deteriorating.

The range and extent of tidal mudflats and sandflats in Ireland have been classified as favourable, however the structure and function and future prospects for this habitat have been classified as inadequate. The Overall Conservation Status of this habitat has been assessed to be Deteriorating.

4.3.3 Alluvial woodland

Lough Gill is designated for Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae, Salicion albae*). Significant areas of the habitat occur along the Garavogue River and at the mouth of the River Bonet. As part of the National Survey of Native Woodlands (NSNW), the sub-sites Conaghil (NSNW site code 371), Cleaveragh Demesne (1408) and Hazelwood Demesne (1409) were surveyed by Perrin et al. (2008). The conservation assessment scores of Hazelwood Demesne and Cleaveragh Demesne were ranked as joint first and joint second respectively in Co. Sligo. Hazelwood Demesne (site code 1409) was also included in a national monitoring survey (O'Neill and Barron, 2013; Daly et al., in prep.). SSCO mapping for the SAC shows the minimum area of alluvial forests within the SAC, which is estimated to be 55.3ha. Periodic flooding is essential to maintain alluvial woodlands along river and lake floodplains, but not for woodland around springs/seepage areas. Drain blocking has been undertaken to reinstate natural hydrological functions at Hazelwood as part of a LIFE Project (LIFE05 NAT/IRL/000182). Parts of the alluvial forest habitat at Cleaveragh Demesne (NSNW site code 1408) and Hazelwood Demesne (1409) have been categorised as Long-established Woodland (I) i.e. they appear on the 1830s 1st edition Ordnance Survey maps, but no further evidence of antiquity could be found in older documentation (Perrin and Daly, 2010). The notable species bird cherry (*Prunus padus*) is abundant at Hazelwood Demesne (Perrin et al., 2008). At Cleaveragh Demesne (1408), the non-native red-osier dogwood (*Cornus sericea*) forms thickets in the northern part of the site, and Rhododendron (*Rhododendron ponticum*) forms dense stands in western parts of the site. At Hazelwood Demesne (1409), Rhododendron and cherry laurel (*Prunus laurocerasus*) are dominant in a central part of the site and scattered elsewhere. Red-osier dogwood is frequent in wetter areas (Perrin et al., 2008). Horse-chestnut (*Aesculus hippocastanum*) is present and regenerating

(Daly et al., in prep.). Substantial invasive species control work was undertaken to restore 24ha of alluvial forest at Hazelwood as part of the above referenced LIFE Project.

The location of areas of Alluvial woodland downstream of the project are shown on **Figure 4.1.**

The range of this habitat in Ireland is favourable whilst the area under cover of Alluvial woodland is classified as bad. The structure and function of examples of this habitat making up the known extent of Alluvial woodland in Ireland is classed as inadequate and the future prospects of the habitat is classed as bad. The Overall Conservation Status of this habitat has been assessed to be Deteriorating.

4.3.4 White-clawed crayfish

The SSCO maps for the Lough Gill SAC do not indicate the location of records for the white-clawed crayfish population supported by the SAC. However, the Article 17 distribution mapping of this species (NPWS, 2019) indicates the location of records for this species downstream of Belhavel Lough along the Cashel River and along the Bonet River near its confluence with the Cashel River.

In Ireland it utilises a much broader spectrum of habitats extending from the smallest streams and drains to large rivers and medium-sized lakes wherever there is sufficient lime. The species prefers relatively cool temperatures and adequate dissolved oxygen and lime, although tolerating significant fluctuations in these parameters (Lyons & Kelly-Quinn, 2003; Demers et al., 2006; Reynolds et al., 2002; Souty-Grosset et al., 2006). Habitat heterogeneity is important (Smith et al., 1996); juveniles live among submerged tree roots, gravel or macrophytes, while larger crayfish must have stones to hide under, or an earthen bank in which to burrow (Holdich & Rogers, 2000; Demers et al., 2003; Gallagher et al., 2006). Brooding females in particular require undisturbed shelter over a prolonged winter-spring period. The species is omnivorous, with juveniles more reliant than adults on animal foods (Reynolds & O'Keeffe, 2005). Indicating its keystone status, A. pallipes had a marked impact on stands of charophytes and on most macroinvertebrates in caged experiments in an Irish lake (Matthews et al., 1993). White-clawed crayfish faces an existential threat from twin impacts of non-indigenous crayfish species (NICS) and Crayfish Plague which is a water-borne disease specific to freshwater crayfish caused by the oomycete *Aphanomyces astaci* (NPWS, 2019b).

4.3.5 Atlantic Salmon & Lamprey Species

The Lough Gill system gets a very early run of spring salmon, while the Bonet holds stocks of salmon from spring right through to the end of the season. Atlantic Salmon and lamprey species are obstructed from migrating to the upper Garavogue catchment along the River Bonet, upstream of Dromahair. A significant bedrock outcrop is located along the River Bonet in the vicinity of Dromahair Village. This outcrop forms a series of cascades, some up to 9m and these represent a high impact barrier to the upstream migration of Atlantic Salmon and an impassable barrier to the upstream migration of sea and river lamprey (IFI, 2016). Atlantic salmon have been recorded upstream of this barrier in the Bonet catchment but at low-numbers. Juvenile lamprey species, most likely brook lamprey, have also been recorded in the Bonet catchment upstream of the cascade at Dromahair. As such both Atlantic salmon and lamprey species have been identified as occurring in the zone of influence of the project. The basis of the finding that these qualifying features are located within the zone of influence of the project is founded upon the direct pathway established by the Skeanada Stream between the proposed wind farm site and the Lough Gill SAC, the presence of mobile qualifying species of this SAC within the upper Bonet catchment, that includes the Skeanada Stream and the recently reported issues of siltation in the Belhavel Lough and the likelihood of silt outflows from the lough to the downstream section of the Garavogue catchment (see *catchments.ie*[4], 2019). The *catchments.ie* report published as part of the Water Framework Directive monitoring references the occurrence of a landslide in the lake catchment in the recent past and states that since this landslide it is likely that silt outflows have been discharged downstream from Belhavel Lough. This report suggests that Belhavel Lough has little remaining attenuation capacity for silts and potentially other pollutants and as such is not likely to be representative of a depositing environment that could function as a hydrological break between the project site and the Garavogue catchment downstream.

[4] see https://www.catchments.ie/wp-content/files/subcatchmentassessments/35_6%20Bonet_SC_020%20Subcatchment%20Assessment%20WFD%20Cycle%202.pdf

4.3.6 Otters

Lough Gill SAC is designated for Otter. Otter's need lying up areas throughout their territory where they are secure from disturbance (Kruuk, 2006; Kruuk and Moorhouse, 1991). The Overall Status of otter in Ireland considered to be Favourable, unchanged since the previous reporting period. The main pressure affecting this species in Ireland is pollution, particularly from organic pollution resulting in fish kills and accidental deaths as a result of road traffic and fishing gear (NPWS, 2019b). The NPWS also list diffuse and point source pollution of freshwaters as a likely indirect impact to otters through changes in prey abundance. However, the NPWS conclude that these threats are considered to produce local impacts only and are not of significance for the national otter population.

4.3.7 Harbour Seal

Harbour seal occurs in estuarine, coastal and offshore waters but also utilises a range of intertidal and terrestrial habitats for important life history functions such as breeding, moulting, resting and social activity. Harbour seals in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC occupy both aquatic habitats and intertidal shorelines that become exposed during the tidal cycle. Known and suitable habitats for resting by the species are indicated in the SSCO mapping for this species and are broadly in the following areas: sandbanks to the north of Rosses Point, south of Ballygilgan Strand and Lissadell Strand.

The species is present at the site throughout the year during all aspects of its annual life cycle which includes breeding (May to July approx.), moulting (August to September approx.) and non-breeding foraging and resting phases (October to April). Harbour seals are vulnerable to disturbance during periods in which time is spent ashore or in shallow waters by individuals or groups of animals. This occurs immediately prior to and during the annual breeding season which takes place predominantly during the months of May to July.

The range and population size of this species in Ireland is favourable. The structure and function and future prospects of the species is classed as favourable. The Overall Conservation Status of this species has been assessed to be Favourable.

5 EXAMINATION OF IMPACTS

5.1 DIRECT EFFECTS

During the screening exercise for Appropriate Assessment completed for the project the potential for it to result in direct effects to European Sites and their qualifying features of interest was ruled out. This is based on the remote distance of the project from any European Sites and the absence of potential for direct habitat loss or physical disturbance to Annex 1 habitats of European Sites or the habitats relied upon by Annex 2 species/special conservation interest bird species of European Sites. No otters rely on the wind farm site or sections of watercourses crossed by the proposed grid connection route for breeding or resting and there will be no potential for direct loss or physical disturbance to otter holts or couches. Baseline ornithological surveys have confirmed that no bird species associated with special conservation interest populations of surrounding SPAs rely on the wind farm site and as such there will be no potential for interaction with such species.

In view of the above it can be concluded that the project does not have the potential to result in direct effects to European Sites and features of interest.

5.2 INDIRECT EFFECTS

5.2.1 Surface Water Quality

The potential indirect effects that could arise as a result of the project relate to the emission of contaminating substances from activities associated with the project to the receiving aquatic environment. Such emissions will have the potential to perturb water quality and contribute to a diminution in the condition of freshwater dependent/influenced qualifying habitats, namely natural eutrophic lake and Alluvial woodland habitat as well as the receiving coastal Annex 1 habitats estuaries and tidal mudflats and sandflats. The release of such contaminants will also have the potential to result in a diminution of conditions for the freshwater dependent Annex 2 species that are connected to the project via hydrological pathways (i.e. white-clawed crayfish, freshwater Annex 2 fish species and otter) or mobile species pathway (i.e. otters).

5.2.1.1 Hydraulic Loading

Changes in hydraulic loading will represent a potential operation phase impact of the proposed wind farm development. Once constructed the wind farm infrastructure will have 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.

Water balance calculations indicate that the worst-case net increase in surface water runoff volumes will be approximately 30.06l/s/ha, or 2.61% relative to the area of the Site. This is considered an imperceptible impact representative of a non-significant impact (see EIAR Chapter 9, Jennings O'Donovan, 2023).

Notwithstanding this it is noted that 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 upper Shannon catchment, within which is located the Lough Forbes SAC and associated freshwater dependent habitat of natural eutrophic lakes.

5.2.1.2 Peat Slide Risk

As noted in Section 3.3 above the GSI have mapped the occurrence of a historical landslide event within less than 100m to the northwest of the proposed turbine T4 in lands that have been designated by the GIS as being of Moderately High landslide susceptibility. Comparison of the wind farm layout to GSI mapping indicates that the vast majority of the wind farm infrastructure coincides with low to moderately low landslide susceptibility. Where the Substation, Compound and access track impinge on moderately high susceptibility the risk of instability is offset by low average peat thickness of < 0.5m. It is also noted in **Chapter 8 Soils & Geology** of the EIAR (Jennings O'Donovan, 2023) that this area of historic erosion is currently at high risk of further soil movement because of the slopes present.

An assessment of the project's potential to result in ground failure and a peat slide has been completed as part of the soils and geology assessment of the project (see Chapter 6 Soils and Geology of the EIAR prepared for the project and provided under separate cover). This assessment has been based upon the Scottish guidance document *Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments,* prepared for Energy Consents Unit Scottish Government, Second Edition, April 2017.

In the event of a peat slide event, the potential will exist for the conveyance of significant quantities of peat materials to the Owengar River and associated sub-catchment. The hazard ranking for a peat slide event at each of the infrastructure elements of the proposed wind farm has been examined in Chapter 8. This examination has assigned the following hazard rankings and associated risk to infrastructure element:

T1: hazard ranking of 3 which places the turbine construction at this location in the negligible risk category.

T2: hazard ranking of 8 which places the turbine construction at this location in the low-risk category.

T3: hazard ranking of 8 which places the turbine construction at this location in the low-risk category.

T4: hazard ranking of 6 which places the turbine construction at this location in the low-risk category.

Substation 1: hazard ranking of 9 which places the substation construction at this location in the low-risk category.

Substation 2: hazard ranking of 4 which places the substation construction at this location in the negligible risk category.

Substation 3: hazard ranking of 3 which places the substation construction at this location in the negligible risk category.

Site Track between T1 – T2: hazard ranking of 4 which places the site track construction at this location in the negligible risk category.

Site Track between T2 – T3: hazard ranking of 6 which places the site track construction at this location in the low-risk category.

Site Track between T3 – T4: hazard ranking of 6 which places the site track construction at this location in the low-risk category.

Site Track between Substation – T4: hazard ranking of 9 which places the site track construction at this location in the low-risk category.

In summary all infrastructure elements associated with the proposed wind farm will result in a negligible to low risk of a peat slide occurring. Whilst the possibility of a peat slide at the wind farm site has been assessed to be representative of a low risk, poorly managed construction activities (including traffic movement) can increase the risk. Any peat slide or slope failure which occurs will have the potential to result in medium to long-term significant negative effects to the water quality, habitats and fisheries supported by the Owengar River. Such an event would also have the potential to undermine the significant efforts invested by the IFI in rehabilitating this watercourse and its fisheries since the 2008 landslide.

5.2.1.3 Forestry Felling

Felling of forestry at the wind farm site will be necessary for the development of the proposed wind farm. Turbines T1 and T2 are within afforested areas and tree felling will be required for the provision of site infrastructure associated with both turbines. Approximately c.2ha coniferous forestry will need to be clear-felled. The likely felled area of approximately c.2ha will represent approximately 4.4% of the proposed wind farm site (Redline Boundary of c.45ha). In a spatial or land use context this is considered a slight effect.

It is noted that the clear fell of afforested areas is in line with baseline conditions and future activities as part of Do-Nothing impact. Therefore, in the context of the project, the clear fell of forestry overall is considered neutral. Notwithstanding this the clearfelling of forestry will pose a range of potential adverse impacts associated with the activity which will include.

- Soil erosion, compaction and degradation: The removal of trees and underbrush during clear-felling can expose soils to wind and water erosion, leading to soil loss, compaction and degradation. This is mainly caused by vehicular movements.

- Geology: Clear-felling can cause changes in the geology of an area, leading to soil instability, landslides, and other geological hazards.

- Hydrology & Hydrogeology: The removal of trees and vegetation can lead to changes in hydrological processes, causing changes in water flow rates and patterns, such as the lowering of water tables.

- Water quality: Clear-felling can cause increased sediment runoff and nutrient pollution in waterways, which can impact water quality, negatively affecting aquatic ecosystems and downstream water users.

    - Soil nutrient loss and nutrient loading of receiving waters: Clear-felling removes vegetation and leaves soil bare, exposing it to weathering, which can cause the entrainment of solids and/or the loss of soil nutrients, essential for plant growth. This in turn will lead to an increase in nutrients i.e., Nitrogen and Phosphorous compounds, dissolved organic carbon, potassium etc. in receiving waters flowing from the Site, which is considered a negative impact of the Development.

5.2.1.4 Release of Suspended Solids

Earthworks associated with the construction phase of the wind farm, the widening of the TDR route and the installation of the electrical cable at and adjacent to watercourse crossings will require the denuding of surface vegetation and/or existing hardstanding surfaces. 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 receiving watercourses which ultimately drain to the Lough Gill SAC, Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, Cummeen Strand SPA or Lough Forbes SAC downstream.

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 contribute 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.

5.2.1.5 Release of Hydrocarbons

Plant equipment and vehicles associated with works to be undertaken at the proposed wind farm site 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 which will likely include fuel storage on site or will be supplied by fuel tanker scheduled to refuel the plant machinery directly.

Similar to suspended solids arising from the activities at the proposed wind farm site described above, hydrocarbons accidentally introduced to the environment will likely be intercepted by drainage features occurring at the wind farm site.

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. They burn most living organic tissue, such as vegetation, due to their volatile chemistry. They are also a nutrient supply for adapted micro-organisms, which can then deplete dissolved oxygen at a rapid rate and thus kill off water-based vertebrate such as Atlantic salmon and lamprey species.

Potential incidents or accidental release of contaminants will likely be short lived or temporary, however the potential impacts to downstream receptors such as Annex 2 fish species, white-clawed crayfish and otter can be long lasting, or permanent.

5.2.1.6 Release of Construction or Cementitious Materials

The proposed wind farm 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.

5.2.1.7 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 Owengar 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.

5.2.1.8 Surface Water Crossings

The proposed wind farm will comprise 1 no. crossing of the upper Owengar River as well as the crossing of artificial drainage channels. The upper Owengar River, at the crossing point is representative of a small upland eroding stream within the wind farm site and at the crossing point. The remaining crossings at the wind farm site will comprise the crossing of artificial drainage channels.

The crossing of the upper Owengar River will consist of a 4m high bridge and 14m wide infrastructure, with material fill required to bring the track to the elevated height.

The construction of any new watercourse crossing will have an inherent risk of resulting in adverse effects to surface waters due to the required ground disturbance through excavations and the movement of heavy plant and machinery and the proximity to the primary sensitive receptor which is the watercourse itself. Release of elevated suspended solids to surface waters due to excavations or other earthworks etc., or the accidental release of any form of anthropogenic contaminant such as fuels or chemicals during construction of new watercourse crossings are both potential significant adverse effects. The effects relating to the release of contaminants during earthworks is addressed in the preceding subsections above.

Furthermore, it is noted that poor planning, design and construction methodology of new watercourse crossings can potentially result in significant changes in flow, erosion and deposition patterns and rates associated with the surface water feature. This in turn can potentially lead to flow being restricted leading to increased risk of flooding locally.

5.2.1.9 Instream Works

In stream works will be avoided as far as possible, however, infrastructure such as the crossings of artificial drainage channels will require instream works during the installation of culverts.

In stream works have the potential to cause significant disturbance within the river bed, or introduce contaminants directly to the surface water feature, potentially leading to significant effects to water quality, and potentially catastrophic effects to downstream ecological attributes (such as Annex 2 fish species) sensitive to contaminant loading, including suspended solids. Works associated with the diversion, or enhancement of existing drainage features will also have similar effects.

Poor design of drainage features, including culverts, can also lead to gradual effects such as erosion, or changing of hydro morphological characteristics, including bottle necks or small diameter culverts, and elevated to rapid velocity discharge in areas with no attenuation features.

5.3 POTENTIAL EFFECT OF WATER QUALITY IMPACTS FOR QUALIFYING FEATURES OF INTEREST

5.3.1 Qualifying Fish Species

The discharge of contaminated surface water runoff to the Sligo Bay and Upper Shannon Catchments will have the potential to contribute towards negative impacts to invertebrates, plant life and on all life stages of salmonid and lamprey fish supported by both these catchments. The potential adverse effects of contaminated runoff to fish species including salmon and lamprey species 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 riverbeds 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.

5.3.2 White-clawed Crayfish

The threats and pressures to white-clawed crayfish in Ireland relate to the spread of pathogens and invasive crayfish species (NPWS, 2019b). The NPWS (2019b) do not list negative impacts to water quality of freshwater bodies as a pressure or threat to this species. However, they do include water quality as an attribute defining the favourable conservation status of this species and have set a biological water quality target of a minimum of Q3-4 for the white-clawed crayfish population of the Lough Gill SAC. Demers & Reynolds (2002) suggested that white-clawed crayfish can occur in water that is rated as moderately polluted, while Holdich (2003) pointed to poor water quality as a limiting factor in achieving the favourable conservation status of this species. Overall, it is considered that any perturbations to water quality as a result of the project will have the potential to contribute towards impeding the achievement of favourable conservation condition of the Lough Gill SAC white-clawed crayfish population.

5.3.3 Otters

The main pressure affecting this species in Ireland is pollution, particularly from organic pollution resulting in fish kills and accidental deaths as a result of road traffic and fishing gear (NPWS, 2019b). The NPWS also list diffuse and point source pollution of freshwaters as a likely indirect impact to otters through changes in prey abundance. However, the NPWS conclude that these threats are considered to produce local impacts only and are not of significance for the national otter population. Nevertheless, such impacts have the potential to be of local significance in the context of a population supported by the Lough Gill SAC and the Unshin River SAC. As such, in the event of pollution arising from construction activities migrating to suitable otter foraging habitat downstream of the project, the potential will exist for indirect impacts to the conservation status of otters within the SAC, by way of reductions in the abundance of prey species and a diminution of foraging habitat.

It is reiterated (as identified in the screening exercise for Appropriate Assessment of the project) that no otter breeding sites are located in the vicinity of the proposed grid connection route watercourse crossings and, given the low levels of noise and vibration predicted to be generated during the installation of the electrical cables within the existing road and bridge formations, there will be no potential for significant disturbance to otters during this element of the project.

5.3.4 Harbour Seal

The potential effect of the project for harbour seals relates to it capacity to contribute towards the emission of deleterious material to the Sligo Bay catchment and in turn the discharge of perturbed water quality to the Cummeen Strand/Drumcliff Bay estuaries. It is noted that works associated with the proposed grid connection route represent the only source of potential impacts to water quality draining to the lower Garavogue and the Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC. While it is noted that the uncontrolled release of contaminated surface drainage waters from the works associated with the grid connection route to these estuarine waters are likely to be diluted, distributed and attenuated within the Sligo Bay catchment and the coastal waters of the estuary, any contribution towards the deposition of contaminants such as hydrocarbons or cement material to intertidal habitats in the estuary could combine with existing sources of pollution to result in the contamination of benthic fauna and epifauna which function as the primary trophic level underpinning the estuarine habitat food-chain upon which harbour seal rely. The toxic effect of such contaminants, particularly hydrocarbons, on feeding, growth, development and reproduction are known to cascade and bioaccumulate throughout the

food chain affecting not only the lower trophic levels characterised by benthic fauna but also species occupying higher trophic levels such as fish, birds and mammals (Ferrando, 2015).

The significance of the impact of the uncontrolled release of contaminants from the project to the estuary and the intertidal habitats and harbour seal populations will depend upon the frequency of the release and the concentration of contaminating materials in surface water discharging from the site. In respect of this it is also noted that the works associated with the grid connection route will be temporary in nature and that the risk posed by these works to water quality will cease following the completion of the electrical cable installation works.

Notwithstanding the above, in light of a precautionary approach and in the absence of appropriate design safeguards, the discharge of such contaminated surface water from activities associated with the project could represent a source of contamination to surface drainage waters being discharged to the Cummeen Strand estuary and Drumcliff Bay.

5.3.5 Alluvial Woodland

The NPWS (2019a) 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, 2019a), an accidental pollution event arising from works associated with the project, 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.

5.3.6 Natural eutrophic lake

The deposition of sediment to natural eutrophic lake habitat of Lough Gill SAC and Lough Forbes SAC is a natural process that varies throughout the year depending on precipitation rates and flow rates in discharging watercourses. However, additional sediment, nutrient or other contaminant loss to the catchments draining to these SAC lake habitats, from activities associated with the project. will have the potential to contribute towards a diminution in habitat

conditions associated with changes in lake substratum quality, transparency, nutrient concentration, water colour, turbidity and phytoplankton and algal composition and biomass.

5.3.7 Estuaries, Tidal mudflats and sandflats & Cummeen Strand SPA Wetlands

The significance of the impact of the uncontrolled release of contaminants from the project to the Cummeen Strand/Drumcliff Bay estuary, associated habitats and the marine community type "Estuarine mixed sediment to sandy mud with *Hediste diversicolor* and oligochaetes community complex" will depend upon the frequency of the release and the concentration of contaminating materials in surface water discharging from the site and the sensitivity and/or resilience of this marine community types occurring at and in the vicinity of the surface water pathway outfall.

As noted above the volume of surface water runoff draining the work areas associated with the grid connection route will represent a miniscule fraction of the overall volume of water within the coastal estuarine water and with the wider Sligo Bay catchment and will be diluted, distributed and attenuated within the catchment and tidal waterbody downstream of the project. In a worst-case scenario the ongoing discharge of waters with high concentrations of contaminating substances could over time lead to the deposition of such contaminants in tidal mudflats and sandflats and estuarine habitat in the immediate vicinity of the Garavogue River outfall. However, in the context of the Sligo Bay catchment given the very low volumes that could be discharged to the estuary from the project along the hydrological pathway, the potential for any continuous deposition and accumulation of contaminants within tidal mudflat and sandflat and estuarine habitats will be, at worst, restricted to a small area surrounding the outfall location.

As noted above Estuarine mixed sediment to sandy mud with *Hediste diversicolor* and oligochaetes community complex is the only marine community type occurring within the zone of influence of the project. The species associated with the community include *Hediste diversicolor, Tubificoides benedii, Heterochaeta costata* and *Tubificoides pseudogaster*. The sensitivity and resilience of these species to disturbance has been examined by the Marine Institute (2015, 2019). The results of this examination with respect to the impact of potential inputs associated with the project, namely the input of silt or siltation, changes to sediment composition with an increase in fine sediment proportion and the introduction of hydrocarbons to the species of this marine community type has been found to be either not significant or low.

Furthermore, the implication of any disturbance to marine communities is dependent on whether or not the community is representative of a keystone community. The NPWS (2013) has adopted a prioritized approach to conservation of structure and function in marine Annex I habitats. Those communities that are representative of keystone communities are afforded the highest degree of protection and any significant anthropogenic disturbance should be avoided. For other marine communities that are constituents of an Annex 1 marine habitat significant continuous or ongoing disturbance should not exceed an approximate area of 15% of the interpolated area of each community type. The keystone communities of intertidal marine habitats have been identified by Scally *et al.* (2020) and the Estuarine mixed sediment to sandy mud with *Hediste diversicolor* and oligochaetes community complex has not been included as a keystone community. Therefore, for the purposes of this NIS a significant effect to this marine communities type will arise in the event that there is continuous or ongoing disturbance to greater than 15% of the area of these communities. Given that the works associated with the grid connection route will be temporary and will not represent a continuous and ongoing source of potential impact to water quality, and in light of the significant dilution and attenuation factor provided by the Sligo Bay catchment and the coastal waters of Cummeen Bay it is concluded that the discharge of potentially contaminated waters to the Sligo Bay catchment during the installation of the grid connection route will not result in negative impacts to this marine community type or the estuarine and intertidal habitats of this SAC.

Given the conclusion of the examination of potential impacts to the estuaries and tidal mudflats and sandflats of the Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC and the wetland habitats of the Cummeen Strand SPA the potential for the project to result in adverse impacts to these habitats can be ruled out from further consideration as part of this Natura Impact Statement.

Notwithstanding the above examination and conclusion, it is noted that the mitigation measures that will be implemented as part of the project's construction phase and operation phase to avoid the potential for the discharge of contaminated surface water runoff from the project site to the Sligo Bay catchment will further eliminate the potential for adverse impacts to these coastal habitats.

5.4 IN-COMBINATION EFFECTS

5.4.1 In-Combination Effects During the Construction Phase

5.4.1.1 Interaction with Other Wind Farms

Other established and planning approved wind farms occur in the wider area surrounding proposed wind farm site. These wind farms are listed in **Table 5.1** below.

Table 5.1: Other Wind Farms in the wider surrounding area

Wind Farm	Status	No. of Turbines	Approximate Distance to the Site Boundary	Direction from the Development
Altagowlan	Operational	9	4.6km	South-East
Black Banks (I & II)	Operational	12	1.4km	South-West
Carrane Hill	Operational	4	4.0km	South-West
Carrickeeny	Operational	4	18.9km	North-West
Corrie Mountain	Operational	8	3.2km	South-East
Derrysallagh (Kilronan II)	Operational	10	6.2km	South-West
Faughary	Operational	3	19.1km	North
Garvagh Glebe	Operational	13	920m	South-West
Geevagh	Operational	6	5.7km	South-West
Kilronan	Operational	10	9.3km	South
Moneenatieve I & II	Operational	5	2.9km	South-East
Seltannavenny	Operational	2	6.7km	South-East
Spion Kop	Operational	2	4.2km	South-East

Wind Farm	Status	No. of Turbines	Approximate Distance to the Site Boundary	Direction from the Development
Tullynahaw	Operational	11	5.7km	South-East
Tullynamoyle I, II & III	Operational	15	7.1km	North-East
Tullynamoyle (V)	Consented under planning application P19/26	4	6.9km	North-East
Tullynamoyle (V)	Consented by An Bord Pleanála under case reference (Pl12.312895)	4	6.6km	North-East

The operational wind farms listed in Table 5.1 above are located within the Sligo Bay and Upper Shannon Catchments. The Water Framework Directive 3rd Cycle catchment report for the Shannon (Lough Allen) catchment (EPA, 2021a) provides a summary of water quality and associated anthropogenic pressures within the catchment. The EPA note that there are issues with sedimentation from a wind farm development upstream of Meelagh Lake. The wind farm is not named by the EPA in the 3rd cycle report. However, following a review of the EPA national rivers and streams shapefile layer it is noted that only one watercourse drains into Meelagh Lake. This watercourse is fed by two upland streams, one of which is mapped by the EPA as rising at Kilronan Mountain, approximately 90m from the nearest wind turbine associated with the Kilronan Mountain Wind Farm. As such it is likely that the wind farm identified as a source of pressure by the EPA is the Kilronan Mountain Wind Farm, which is located approximately 9.3km from the proposed Letter Wind Farm. As no hydrological pathways connect the proposed Letter Wind Farm site or any elements of the project to Meelagh Lake there will be no potential for the project to combine with the Kilronan Wind Farm to result in cumulative negative effects to the water quality of this lake.

No other pressures to water quality associated with wind farm developments are noted by the EPA in their 3rd Cycle catchment report for the Upper Shannon.

The Water Framework Directive 3rd Cycle catchment report for the Sligo Bay & Drowes catchment (EPA, 2021b) provides a summary of water quality and associated anthropogenic pressures within the catchment. No other pressures to water quality associated with wind farm developments are noted by the EPA in their 3rd Cycle catchment report for this catchment.

Given that no other operational wind farms that drain to the same receiving waterbodies as the project have been identified as a source of pressure to water quality there will be no potential for these operation phase wind farms to combine with the project to result in cumulative negative effects to the water quality, freshwater habitats and species of waterbodies downstream of the project.

With respect to the consented Tullynamoyle Wind Farm projects listed above it is noted that detailed measures for the protection of water quality have been set out in the planning application documentation for these projects and that an Appropriate Assessment has been completed. These assessments have concluded that provided all m set out in the planning application documentation that aim to protected water quality are implemented, there will be no potential for these consented projects to result in adverse effects to European Sites. In view of the findings of these assessments, there will be no potential for the project to combine with these other consented projects to result in cumulative adverse effects to European Sites downstream of the project.

5.4.1.2 Interaction with Other Projects

A search of Leitrim County Council planning portal was completed in October 2023 to identify any other projects in the area surrounding the proposed wind farm site, along the proposed grid connection route and in the vicinity of the proposed TDR widening locations. In terms of other projects in the vicinity of the proposed wind farm site, with the exception of the Croagh Wind Farm planning application, there are no other recent (i.e. within the last 5 years) planning applications for the wider area surrounding the wind farm site.

One recent planning application, Planning Reference No. 21152, has been identified along the proposed grid connection route. This planning application is located in the townland of Cloonagh, approximately 200m to the east of the Corderry Substation. This planning

application relates to the development of a new slatted shed together with all associated site works. 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. Given this determination, the current project will not combine with this other project to result in cumulative adverse effects to downstream European Sites.

A search the Roscommon County Council planning portal was completed in October 2023 to identify the presence of any other recent (i.e. within the last 5 years) planning applications for the wider area surrounding the TDR widening locations no. 1, 2 and 3. No planning applications were identified in the vicinity of these three locations.

A search the Leitrim County Council planning portal was completed in October 2023 to identify the presence of any other recent (i.e. within the last 5 years) planning applications for the wider area surrounding the TDR widening locations no. 4, 5 and 6. No planning applications were identified in the vicinity of these three locations.

5.4.1.3 Interaction with Harvesting of Conifer Plantation

The existing stands of conifers within and surrounding the site do not appear to be negatively affecting water quality through acidification or excessive nutrients. **Chapter 9: Hydrology and Hydrogeology** of the EIAR documents low nutrient levels in the watercourses surrounding the site.

Furthermore, there are no proposals in place to fell conifer plantation remaining within the project site during the construction phase of the project. As such no overlap between the construction phase of the project and felling operations associated with remaining and adjacent conifer plantation is expected to occur..

5.4.2 In-Combination Effects During the Operation Phase

It is anticipated that, in the absence of mitigation, the key cumulative impacts upon European Sites during the operation of the proposed development will relate to the European Sites and relevant receptors occurring downstream of the proposed development. In the absence of an adequate operational phase drainage design, the drainage at the wind farm site could contribute towards water quality pressures downstream within the Sligo Bay and Upper Shannon

catchment with related pressures to the downstream European Sites of Lough Gill SAC, Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, Cummeen Strand SPA and Lough Forbes 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 contribute towards adverse effects to the conservation status of the freshwater dependent qualifying habitats and qualifying species of these European Sites occurring downstream of the project site.

5.4.3 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 Annex 1 habitats occurring downstream of the proposed wind farm site. The potential effects of pollution derived from construction phase and decommissioning phase activities to water quality have been set out in Section 6.2.1. 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 4 no. European Sites occurring downstream of the project. 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 receiving catchment and the 4 no. European Sites occurring downstream.

5.5 DECOMMISSIONING PHASE

Decommissioning effects are likely to be of a similar or lower magnitude to the construction phase effects, with potential for works to combine with other land use activities over the temporary timeframe of decommissioning works.

5.6 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 within Natura 2000 sites 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 5.2 lists the Conservation Objectives attributes and targets for each of qualifying features of interest of the five European Sites occurring within the zone of influence of the proposed development and examines how the project, in the absence of mitigation, will have the potential to result in adverse effects to these attributes and targets.

Site-specific conservation objectives have been published for the 5 no. European Sites that are examined in this Natura Impact Statement and these are used in **Table 5.2** below.

Table 5.2: Examination of Potential Impacts to the Conservation Objectives of qualifying features of interest/special conservation interests

No. Ref	Attribute	Target	Assessment	Mitigation Required
Natural eutrophic lake of the Lough Gill SAC and Lough Forbes SAC				
1	Habitat Area	Area stable or increasing, subject to natural processes.	The project will not result in the loss of a natural eutrophic lake habitat. The lake is buffered from the nearest area of active works associated with project by a significant distance which will ensure no change to the area of this habitat within the SAC.	No
2	Habitat Distribution	No decline, subject to natural processes.	For the reason outlined for attribute no. 2 above, the project will not have the potential to result in changes to the distribution of this habitat.	No
3	Typical Species	Typical species present, in good condition, and demonstrating typical abundances and distribution.	For the reason outlined for attribute no. 2 above and given that no non-native invasive plant species have been identified within the area of works associated with the project, the project will not have the potential to result in changes to the community of typical species associated with this habitat.	No
4	Vegetation composition: characteristic zonation	All characteristic zones should be present, correctly distributed and in good condition.	In the event that the project results in the release of polluted surface water with elevated concentrations of SS, TP or ammonia to the Sligo Bay or the Upper Shannon catchment, it could combine with other sources of such contaminant in these catchments and result in an increase in sediment and nutrient deposition within Lough Gill and Lough Forbes. Increases in	Mitigation measures provided in Section 6

No. Ref	Attribute	Target	Assessment	Mitigation Required
			sedimentation and/or nutrient could in turn change lake depths with consequent effects on the zonation of vegetation communities.	
5	Vegetation distribution: maximum depth	Maintain maximum depth of vegetation, subject to natural processes.	For reasons outlined for attribute no 4 above the project could combine with other sources of silt in the catchment and lead to an increase in sedimentation within the lake with the potential for resultant changes to lake depth.	Mitigation measures provided in Section 6
6	Hydrological regime: water level fluctuations	Maintain appropriate natural hydrological regime necessary to support the habitat	The potential for increased hydaulic loading is examined in Section 6.2.1.1 above. In the absence of mitigation measures such increases in loading will have the potential to undermine the achievement of the targets for this attribute.	Mitigation measures provided in Section 6
7	Lake substratum quality	Maintain appropriate substratum type, extent and chemistry to support the vegetation	For reasons outlined for attribute no. 4 above the project could combine with other sources of silt in the catchment and lead to an increase in sedimentation within the lake with the potential for resultant changes to composition of the lake substrate.	Mitigation measures provided in Section 6
8	Water quality: transparency	Maintain appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	For reasons outlined for attribute no. 4 above the project could combine with other sources of silt in the catchment and lead to an increase in sedimentation within the lake with the potential for resultant changes to transparency in the water column.	Mitigation measures provided in Section 6
9	Water quality: nutrients	Maintain the concentration of	As outlined in Section 6.2.1.2 and 6.2.1.3 above in the event of the discharge of sediment and suspended solids to lake habitats,	Mitigation measures

No. Ref	Attribute	Target	Assessment	Mitigation Required
		nutrients in the water column at sufficiently low levels to support the habitat and its typical species	nutrients associated with such solids will have the potential to become mobilised in these habitats with resultant impacts to trophic status.	provided in Section 6
10	Water quality: phytoplankton biomass	Maintain appropriate water quality to support the habitat, including good chlorophyll a status	For reasons outlined for attribute no. 9 above the project will have the potential to combine with other sources of nutrient inputs to result in excessive growth of phytoplankton biomass within the natural eutrophic lake habitat of Lough Gill SAC and Lough Forbes SAC.	Mitigation measures provided in Section 6
11	Water quality: phytoplankton composition	Maintain appropriate water quality to support the habitat, including good phytoplankton composition status	For reasons outlined for attribute no. 9 above the project will have the potential to undermine the achievement of this conservation objective.	Mitigation measures provided in Section 6
12	Water quality: attached algal biomass	Maintain trace/absent attached algal biomass (<5% cover) and good phytobenthos status	For reasons outlined for attribute no. 9 above the project will have the potential to undermine the achievement of this conservation objective.	Mitigation measures provided in Section 6

No. Ref	Attribute	Target	Assessment	Mitigation Required
13	Water quality: macrophyte status	Maintain good macrophyte status	The principal parameter influencing macrophyte status in the lake is nutrient status. For reasons outlined for attribute no. 9 above the project will have the potential to undermine the achievement of this conservation objective.	Mitigation measures provided in Section 6
14	Acidification status	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	A limit of a pH of <9 has been assigned by the NPWS for this attribute. Any release of excess peat-derived silts to the natural eutrophic lake of the Sligo Bay and Upper Shannon catchments could combine with other sources of peat-derived siltation in these catchments to result in an increase in the discharge of low pH silt material to the natural eutrophic lake of Lough Gill SAC and Lough Forbes SAC.	Mitigation measures provided in Section 6
15	Water colour	Maintain appropriate water colour to support the habitat	For reasons outlined for attribute no. 4 above the project could combine with other sources of silt in the catchment and lead to an increase in sedimentation within the lake with the potential for resultant changes to transparency in the water column.	Mitigation measures provided in Section 6
16	Dissolved organic carbon (DOC)	Maintain appropriate organic carbon levels to support the habitat	The release of excess peat-derived silts to the Sligo Bay and Upper Shannon catchments could combine with other sources of peat-derived siltation in these catchments could combine with other sources of peat-derived siltation in the catchment to result in an increase in DOC within the catchment and downstream within the natural eutrophic lake of Lough Gill SAC and Lough Forbes SAC.	Mitigation measures provided in Section 6

No. Ref	Attribute	Target	Assessment	Mitigation Required
17	Turbidity	Maintain appropriate turbidity to support the habitat	In the event that the project results in the release of polluted surface water to the Sligo Bay and Upper Shannon catchments, the project could combine with other sources of silt in these catchments and result in an increase in sedimentation deposition within the natural eutrophic lake habitat of Lough Gill SAC and Lough Forbes SAC. Increases in sedimentation could in turn increase turbidity within the lake.	Mitigation measures provided in Section 6
18	Fringing habitat: area and condition	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of the lake habitat.	Any changes to pH levels within the lake habitat as outlined for attribute no 14 above could result in a change to the structure of fringing habitats.	Mitigation measures provided in Section 6
19	Distribution: extent of anadromy	100% of river channels down to second order accessible from estuary	The proposed development does not involve any instream works in watercourses with potential to support Atlantic salmon or suitable Atlantic salmon habitat. Furthermore, the only instream works associated with the project will occur at the wind farm site, which is not located within the Sligo Bay catchment, within which the Lough Gill SAC occurs. In light of this the project will not have the potential to result in barriers to the movement of Atlantic Salmon.	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
20	Adult spawning	Conservation Limit (CL) for each system consistently exceeded	Suitable spawning habitat for Atlantic salmon occurs downstream of the section of the proposed grid connection route within the Sligo Bay catchment. In the event that the project results in the release of polluted surface water to the receiving Sligo Bay catchment, during either the construction or decommissioning of the grid connection route, the conditions of these spawning habitats could be undermined with adverse effects for achieving the target of this attribute.	Mitigation measures provided in Section 6
21	Salmon fry abundance	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value.	In the event that the works associated with the grid connection route results in the release of polluted surface water downstream, during either the construction or decommissioning phase, it could contribute towards excessive sedimentation within suitable spawning habitat. Any negative impacts to spawning habitat within the lower stetches of the Sligo Bay catchment downstream of the proposed grid connection route will, over time, have a resultant effect on the abundant of salmon fry.	Mitigation measures provided in Section 6
22	Out-migrating smolt abundance	No significant decline	In the event of a decrease in suitable spawning habitat as a result of the potential impact identified in attribute no. 20 & 21 above, there will be a potential population effect such that in subsequent years the number of smolt within the catchment could decrease.	Mitigation measures provided in Section 6

No. Ref	Attribute	Target	Assessment	Mitigation Required
23	Number and distribution of redds	No decline in number and distribution of spawning redds due to anthropogenic causes	For reasons outlined for attribute no. 20 & 21 above the project will have the potential to impede the achievement of the target set out for this attribute.	Mitigation measures provided in Section 6
24	Water quality	At least Q4 at all sites sampled by EPA	In the event that the works associated with the proposed grid connection route results in the release of polluted surface water to the Sligo Bay catchment, during either the construction or decommissioning phase, the resulting pollution could contribute towards a negative impact to biological water quality status downstream within the Lough Gill SAC and the waters relied upon by Atlantic salmon.	Mitigation measures provided in Section 6
Lamprey Species of the Lough Gill SAC				
25	Distribution (extent of anadromy for sea lamprey) &/or barriers to movement	Access to all watercourses down to first order streams for brook lamprey. Greater than 75% of main stem length of rivers accessible from the estuary.	In light of the findings set out for attribute no. 19 above, the works associated with the proposed grid connection route will not have the potential to undermine the target of this attribute.	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
26	Population structure of juveniles	At least three age/size groups of river/brook lamprey 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 and estuarine environments where the substratum supports areas of sandy silt. Suitable spawning and juvenile habitat for lamprey species does occur downstream of the proposed grid connection route works. In the event of negative effects to instream habitats downstream as a result of water quality impacts, the potential will exist for indirect impacts to the juvenile stage of this species.	Mitigation measures provided in Section 6
27	Annual run size for sea lamprey	Annual run size should reflect that expected under near-natural conditions	In light of the findings set out for attribute no. 19 above the works associated with the proposed grid connection route will not have the potential to undermine the target of this attribute.	No
28	Juvenile density in fine sediment	Mean catchment juvenile density of at least 2/m^2 for brook lamprey and 1/m^2 for sea lamprey	As set out for attribute no. 26 above, in the event of negative effects to juvenile lamprey habitat, the potential will exist for impacts to the density of juveniles occurring within suitable juvenile habitat downstream.	Mitigation measures provided in Section 6

No. Ref	Attribute	Target	Assessment	Mitigation Required
29	Extent and distribution of spawning habitat	No decline in distribution and extent of spawning beds.	Suitable spawning habitat for lamprey species occurs downstream of the proposed grid connection route works. In the event of negative effects to instream habitats downstream as a result water quality impacts, the potential will exist for impacts to the extent of spawning habitat available for this species within the Lough Gill SAC.	No
30	Extent and distribution of spawning and nursery habitat	No decline in extent and distribution of spawning and nursery beds	As set out for attribute no. 29 above suitable spawning habitat for lamprey species occurs downstream of the proposed grid connection route works. In the event of negative effects to instream habitats downstream as a result water quality impacts, the potential will exist for impacts to the extent and distribution of spawning habitat available for this species within the Lough Gill SAC.	Mitigation measures provided in Section 6
31	Population structure of larvae	More than 50% of sample sites positive	Suitable juvenile habitat occurs downstream of the proposed grid connection route works and any deleterious inputs to this watercourse could have adverse implications for the status of juvenile habitats.	Mitigation measures provided in Section 6
32	Larval lamprey density in fine sediment	Mean density of brook/river larval lamprey in sites with suitable habitat at least 5/m²	In the event that the works associated with the proposed grid connection route results in the release of polluted surface water to the Sligo Bay catchment, during either the construction or decommissioning phase, the resulting pollution could contribute	Mitigation measures provided in Section 6

No. Ref	Attribute	Target	Assessment	Mitigation Required
			towards a negative impact to the density of larval lamprey occurring within the Lough Gill SAC.	
White-clawed crayfish of the Lough Gill SAC				
33	Distribution	No reduction from baseline.	In the event that the project causes or contributes to pollution in the Sligo Bay Catchment downstream, it could undermine the status of this catchment and the Lough Gill SAC to support crayfish.	Mitigation measures provided in Section 6
34	Population structure: recruitment	Juveniles and/or females with eggs in all occupied tributaries.	In the event that the construction and/or decommissioning phase of the project causes or contributes to pollution in the Sligo Bay Catchment downstream it will have the potential to undermine the population structure of crayfish occurring within this catchment and the Lough Gill SAC.	Mitigation measures provided in Section 6
35	Negative indicator species	No alien crayfish species.	The proposed development will not have the potential to result in the introduction of alien crayfish species. The proposed development will not result in any instream works or the use of any machinery, watercraft etc instream within the Sligo Bay Catchment that could result in the spread of these non-native invasive species downstream to the Lough Gill SAC.	No
36	Disease	No instances of disease.	As per attribute no. 35 the project is not predicted to have the potential to result in the spread of crayfish disease within the catchment.	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
37	Water quality	At least Q3-4 at all sites sampled by EPA.	In the event that the construction and/or decommissioning phase of the project causes or contributes to pollution in the Sligo Bay Catchment downstream, it will have the potential to adversely affect water quality downstream within the Lough Gill SAC.	Mitigation measures provided in Section 6
38	Habitat quality: heterogeneity	No decline in habitat heterogeneity or habitat quality.	In the event that the construction and/or decommissioning phase of the project causes or contributes to pollution in the Sligo Bay Catchment downstream, it will have the potential to undermine crayfish habitat heterogeneity.	Mitigation measures provided in Section 6
Otters of the Lough Gill SAC and the Unshin River SAC (where individuals from the latter SAC population use/rely upon surface waters within the Owengar sub-catchments downstream of the project				
39	Distribution	No significant decline	Adverse effects to water quality in the Sligo Bay Catchment downstream of the project will have the potential affect the distribution of otters using this catchment for foraging.	Mitigation measures provided in Section 6
40	Extent of terrestrial habitat	No significant decline	The project will not result in the loss of any terrestrial habitat used by otters.	No
41	Extent of freshwater habitat (river)	No significant decline	As per attribute no. 39 above adverse impacts to water quality will have the potential to undermine the potential for waterbodies downstream of the project to support otters.	Mitigation measures provided in Section 6

No. Ref	Attribute	Target	Assessment	Mitigation Required
42	Extent of freshwater habitat (lakes)	No significant decline	As per attribute no. 39 above adverse impacts to the water quality downstream of the project will have the potential to undermine its potential to support otters.	Mitigation measures provided in Section 6
43	Couching sites and holts	No significant decline	No breeding or resting habitat for otters occurs in the vicinity of the project. As such the project will not have the potential to undermine this target.	No
44	Fish biomass	No significant decline	As per attribute no. 39 above the project will have the potential to undermine water quality downstream project likely to be used by the otter population of the Lough Gill SAC and the Lough Forbes SAC. Any adverse impacts to these waterbodies could result in a decrease in fish biomass (i.e. through mortalities resulting from a major pollution event) and undermine the target for this attribute.	Mitigation measures provided in Section 6
45	Access to suitable habitat	Species range within the site should not be restricted by artificial barriers to site use	The project will not result in any barriers to the movement harbour seals within the SAC.	No
46	Breeding behaviour	Conserve the breeding sites in a natural condition	No breeding sites for harbour seals occur downstream of the project (see **Figure 4.2** above).	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
47	Moulting behaviour	Conserve the moult haulout sites in a natural condition	No moult haulout sites for harbour seal occur downstream of the project (See **Figure 4.2** above).	No
48	Resting behaviour	Conserve the resting haulout sites in a natural	No resting haulout sites for harbour seal occur downstream of the project (see **Figure 4.2** above).	No
49	Disturbance	Human activities should occur at levels that do not adversely affect the harbour seal population at the site	The project will not result in any changes in human activity levels within the SAC.	No
83	Habitat area	Area stable or increasing, subject to natural processes.	The project is located at a remote distance from examples of this habitat within the Lough Gill SAC or the Lough Forbes SAC and will not have the potential to result in changes to the extent of alluvial wet woodland within it.	No
84	Habitat distribution	No decline.	The project is located at a remote distance from examples of this habitat and will not have the potential to result in changes to its distribution within the Lough Gill SAC and Lough Forbes SAC.	No
85	Woodland size	Area stable or increasing.	The project is located at a remote distance from examples of this habitat and will not have the potential to result in changes to woodland size within the Lough Gill SAC or Lough Forbes SAC.	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
86	Woodland structure: cover and height	Diverse structure with a relatively closed canopy containing mature trees; sub-canopy layer with semi-mature trees and shrubs; and well-developed herb layer	The project is located at a remote distance from examples of this habitat and will not have the potential to result in changes to canopy structure of examples of this habitat within Lough Gill SAC or Lough Forbes SAC.	
87	Woodland structure: community diversity and extent	Maintain diversity and extent of community types	The project is located at a remote distance from examples of this habitat and will not have the potential to result in changes to canopy structure of examples of this habitat within the Lough Gill SAC or the Lough Forbes SAC.	
88	Woodland structure: natural regeneration	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	By virtue of the remote distance between the project and examples of this habitat within the SAC there will be no potential for it to result in changes to the natural regeneration of woodland within Lough Gill SAC or Lough Forbes SAC.	
89	Hydrological regime: flooding depth/height of water table	Appropriate hydrological regime necessary for	The project will not result in potential changes to the hydrological regime of waterbodies within the Sligo Bay Catchment or the Upper Shannon catchment that will be	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
		maintenance of alluvial vegetation	perceptible at the distant locations of Alluvial woodland downstream.	
90	Woodland structure: dead wood	At least 30m^3/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)	By virtue of the remote distance between the project and examples of this habitat within the SAC there will be no potential for it to result in changes to the extent of dead wood within the Lough Gill SAC or Lough Forbes SAC.	No
91	Woodland structure: veteran trees	No decline	The project will not have the potential to result in a decline in the abundant of veteran trees associated with this habitat.	No
92	Woodland structure: indicators of local distinctiveness	No decline	The project is located at a remote distance from examples of this habitat within the Lough Gill SAC or the Lough Forbes SAC and will not have the potential to result in changes to indicators of local distinctiveness.	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
93	Vegetation composition: native tree cover	No decline. Native tree cover not less than 95%	By virtue of the remote distance between the project and examples of this habitat within the Lough Gill SAC or the Lough Forbes SAC there will be no potential for it to result in changes to the extent of native tree cover within these SACs	No
94	Vegetation composition: typical species	A variety of typical native species present, depending on woodland type, including alder (*Alnus glutinosa*), willows (*Salix* spp) and, locally, oak (*Quercus robur*) and ash (*Fraxinus excelsior*)	By virtue of the remote distance between the project and examples of this habitat within the Lough Gill SAC or the Lough Forbes SAC there will be no potential for it to result in changes to the vegetation composition of examples of this habitat within these SACs.	No
95	Vegetation composition: negative indicator species	Negative indicator species, particularly non-native invasive species, absent or under control	By virtue of the remote distance between the project and examples of this habitat and the absence of any instream works at the project site, the project will not have the potential to result in the spread of negative indicator species downstream	No

6 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 5.2** above. The measures to be implemented to protect the water quality, in stream and coastal habitats and associated fauna populations downstream of the proposed development and within European Sites 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 Leitrim 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 Letter Wind Farm Habitat Management Plan (provided as part of the EIAR) and will be implemented throughout the lifetime of the proposed wind farm.

6.1 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[5], 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 (**Letter Wind farm EIAR Appendix 2.1**) 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.

[5] 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.

These responses will 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, such as along the upper Owengar River and other first order streams and drainage channels 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. These include the provision of settlement/stilling ponds, silt traps, check dams and interceptor drains where surface water runoff will be inercepted and diverted away from open excavations towards the nearest gulley or settlement/stilling ponds.

- Open excavations, where practical, will be covered and sidewalls supported, if these are to remain open for periods in excess of one day.

6.2 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. 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.

6.3 MEASURES TO PROTECT AGAINST THE RISK OF LANDSLIDE

6.3.1 Avoidance & Design – Floating Roads

During the design of the project, the design process has been informed by soils and geological investigations that identified areas of deep peat and potential deep bedrock as specific geotechnical constraints. The infrastructure design has sought to avoid such areas as much as possible.

Floated roads will only be constructed in areas of deeper peat (>1.5m depth with a crossfall of less than 1 in 10). The floated roads will be laid directly on the existing peat using geogrid and crushed stone. Pipes will be installed at intervals to allow the existing runoff regime on the site to continue. The aim during floating road construction is to load the road slowly, to achieve a slow and steady settlement as the peat changes volume and water is forced out of the peat mass. This permits the peat to gradually compress and consolidate allowing time for it to gain in strength and take up the new load. Sufficient time must be allowed for the loading phases of the floating road and these loading phases must be carefully controlled in order to keep the stresses induced in the peat below the strength of the peat at the time. This prevents rapid peat failure which has been the cause of the creation of unsuccessful 'sinking' roads in the past.

In recent years a vast amount of experience on constructing floating roads has been gained from methods used in Scandinavian countries (e.g. Munro and MacCulloch, 2006) reporting on experience from the Roadex III Project), and from the experience of construction contractors working in difficult peatland habitats in Ireland and northern Scotland. These methods have been set out in the FCS and SNH (2006) guidance.

Floating roads will also serve to minimise potential effects on peat hydrology. Excavating and cutting into peat severs hydrological flow routes and cuts off the sources of water required to maintain peat bog vegetation communities. Well designed and constructed floating roads, with frequently spaced cross-drainage, permit diffuse drainage through the structure of the road throughout the life of the wind farm. It is important that vegetation communities on the upslope side of the road, supported by aerobic acrotelmic peat conditions, are not saturated, and lose their character, while vegetation communities on the downslope side of the road are not dried out through lack of water supply. Incorporation of diffuse drainage also prevents turbulent point sources which can cause erosion and damage vegetation communities.

When properly implemented these methods produce robust engineering and drainage solutions that cause minimal impact on peat hydrology and mitigate against the risk of landslide.

6.3.2 Pre-Construction Phase Confirmatory Ground Investigation Work

Prior to the Construction Phase it will be necessary to undertake confirmatory pre-construction phase ground investigation works to confirm an absence of change to baseline condition that have informed the proposed wind farm design.

The works are required for this ground investigation contain both intrusive and non-invasive elements. The intrusive investigative works will consist of the following main elements:

- Excavation and sampling of trial holes within soils to depths of up to 5m below existing ground level.
- Drilling and sampling of boreholes within soils and bedrock to depths of up to 30m below existing ground level.
- Carrying out of in-situ testing using mechanical and man-portable equipment to depths of up to 20m below existing ground level.
- These works, although of lesser significance are similar to the type of activities undertaken during the Construction Phase. As such mitigation as detailed in **Section 8.6.2** will be applied to reduce the effect from these activities to slight impact.
- The non-invasive investigative works will consist of the following main elements: -
- Geophysical Surveys
- Topographic Surveys
- Laboratory Testing

These non-invasive activities will have a much lesser effect on soils and geology, based on the lack of requirement for heavy plant and machinery. Where possible the pre-construction Ground Investigation will prioritise the use of non-invasive methods over intrusive methods.

The pre-construction Ground Investigation programme will be designed so as to collect sufficient information on soils and geology across the entire development area in order to confirm the continued validity of the following measures, which are proposed based on the baseline investigations and impact assessment with respect to soils and geology. The mitigation measures, that are considered, based on the findings of the baseline investigations, to provide protection against significant impacts to soils and geology comprise:

- Determine ground water table at the location of significant excavations. This will allow appropriate design of excavations and groundwater control ahead of construction.

- Assess soil thickness, type and competence to inform excavation stability, suitable methods for protecting soil structure and permeability and minimise excavation for foundations.

- Test soils and subsoils to determine reusability of soils on site for "cut" and "fill" purposes.

- Assess the suitability of existing roads, footpaths and hardstanding areas for re-use and / or inclusion in the proposed design, without the need for removal and new construction.

6.4 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.

6.5 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.

6.6 WATERCOURSE CROSSINGS

6.6.1 Wind Farm Site

At the wind farm site, one new watercourse crossing will be constructed. The required crossing will be a crossing of a small stream that is representative of the headwater of the Owengar River. 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 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.

The following measures will be implemented during the installation of culverts for artificial drainage channel crossings:

- All plant to be used for the installation of culverts will be required to have in place a valid GA1 inspection certification. All plant will be in good working order. Weekly recorded GA2 inspections will be carried out as well as daily recorded visual inspections. Refuelling of plant will be carried out in designated refuelling area within the site compound and away from the stream and instream works locations. Spill kits will be available at the drainage channel works location.

- A trained, experienced operative will control the construction works. Any deep excavations required for the works will be fenced off. Vehicles required to access the works location will be controlled by an operative who will ensure vehicle movements are all carried out in a safe manner. Any reversing of site dumpers will be supervised and controlled by operatives on the ground guiding drivers to the required locations.

- Works will be carried out in the following phases:

- **First:** installation of temporary measures to control the flow of the drainage channel water during the works that will comprise the installation of a flume pipe away from the excavation during the works. The flume pipe will be installed upstream and downstream of the proposed culvert section with temporary diversion of any flowing water within the drainage channel into the flume pipe. This will effectively separate the drainage channel from the works and allow the installation of the culvert to be completed in dry condition.

- **Second:** Completion of culvert installation works with the provision of new culverts and crossing. The culverts to be installed will comprise embedded pipe culverts.

- **Third**: Reinstatement of the original drainage channel. The culvert will be embedded such that the invert level is slightly below ground level. This design will facilitate the provision of a natural stream bed along the channel section within the culverted section of the drainage channel.

- All works associated with the installation of culverts will be undertaken in accordance with the Inland Fisheries Ireland (IFI) Guidelines on the Protection of Fisheries during Construction Works in and Adjacent to Waters.

- A detailed method statement will be required to be prepared by the contractor in advance of the commencement of bridge crossing and culverting works. The contractor will be required to liaise with the IFI and provide them with a copy of the method statement. The contractor will only proceed with the culverting and bridge crossing works when IFI have indicated their satisfaction with the approach to the bridge and culverting works as set out in the method statement.

- The implementation of these measures will ensure that the bridge and culverting works required for the project will be completed in a sensitive manner that will avoid impacts to water quality and will ensure the full and effective management of the instream conditions along the Owengar River during bridge crossing works and the reinstatement of drainage channels upon completion.

6.6.1.1 Culverting of Historical Peat Slide

The drainage channel that conveys surface water along the depression that formed following the historic peat detachment to the northwest of the proposed turbine T4 will be culverted under the wind farm access road. The culvert will be installed in line with the approach set out above.

6.6.2 Grid Connection Route

The proposed grid connection route includes the crossing of 7 no watercourse. The crossings will be via existing bridge formation.

The following mitigation measures will be implemented during the installation of the grid connection route over the existing bridge formation:

- Excavated road and soil will be stored in an area at least 10m from the crossing structure and watercourse, and preferably down gradient of the watercourse crossing but up-gradient of the excavated trench so that, after rainfall, material in run-off is contained in the trench.

- Silt fencing and silt capture structures such as straw bales will be deployed along either side of a watercourse crossing beyond the full width of the pipe, culvert or bridge structure. Silt fencing will be installed so that the wooden posts and attached fence is buried at least 300mm below the surface of road-side vegetation.

- Gullies that lead directly to a watercourse either side of a structure are key pathways for run-off conveyance, and these will be blocked to ensure that the direction of potential run-off is conveyed to vegetated verges to allow for infiltration and trapping.

- A pre-emptive site drainage management plan will be applied to take account of predicted rainfall so that large excavations adjacent to watercourse crossing can be suspended or scaled back when heavy rain is forecast.

These measures will prevent the run-off of excess sediments via the key watercourses intersecting the cable route to key adjoining downstream watercourses that connect the crossing points to European Sites and sensitive aquatic receptors. The mitigation measures also will apply to any small drains that represent a pathway for conveyance of sediment to watercourses and qualifying habitats of the Lough Gill SAC or the Lough Forbes SAC downstream of this watercourse crossing.

6.7 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 the Owengar River and all other small streams or drainage channels occurring at the wind farm site.

- 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).

6.8 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.

6.9 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.

6.10 TDR ROUTE WIDENING

All mitigation measures set out in Section 6.1 to 6.8 above with respect to the control of suspended solids, hydrocarbons and cementitious materials will be implemented in full, wherever applicable, during the construction works associated with the widenings along the TDR at the six no. locations.

Management of spoil arising at the widening locations will be undertaken in accordance with the approach to spoil management set out for the wind farm site (Section 6.1 & 6.2) and grid connection route (Section 6.3), as applicable to the widening location.

6.11 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 Leitrim 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 Leitrim 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 2.3.2 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 Leitrim 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.

6.12 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 Leitrim 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.

6.13 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. However, water balance calculations indicate that the worst-case net increase in surface water runoff volumes will be approximately 30.06l/s/ha, or 2.61% relative to the area of the Site. Therefore, this is considered an imperceptible impact representative of a non-significant impact.

As a consequence of the estimated low significance of the impact of hydraulic loading during the operational phase and in light of the issues relating to increases in hydraulic loading as set out in Section 5.2.1.1 above, mitigation measures to facilitate a reduction in surface water runoff are limited 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 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 Letter 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.

8 CONCLUSION

This Natura Impact Statement presents an analysis of the potential for the project to result in adverse impacts to five European Sites and their relevant qualifying features of interest as set out in Section 1 and Section 5 above. 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.

During the evaluation of potential impacts associated with the Project it was found that the Project will not have the potential to undermine the conservation objectives of 5 number European Sites and their relevant qualifying features of interest occurring within the zone of influence of the development.

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 Leitrim 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.

9 REFERENCES

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Appendix 1: CEMP

Appendix 2: Watercourse Crossing Drawings