FEHILY TIMONEY

DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

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

Appropriate Assessment Screening and Natura Impact Statement

Prepared for:

RWE Renewables Ltd

RWE

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Core House, Pouladuff Road, Cork, T12 D773, Ireland

T: +353 21 496 4133 | E: info@ftco.ie

CORK | DUBLIN | CARLOW

www.fehilytimoney.ie

TABLE OF CONTENTS

LIST OF APPENDICES (See EIAR Volume III)

Appendix 2.1 Construction Environmental Management Plan

Appendix 2.3 Grid Connection Construction Methodology

Appendix 9.1 Biodiversity Enhancement and Management Plan (BEMP)

Appendix 9.2 Bat Assessment

Appendix 9.3 Aquatic Surveys

Appendix 10.1 Ornithology Report

Appendix 11.1 Geotechnical & Peat Stability Assessment

Appendix 11.2 Karst Assessment Report

Appendix 11.4 Peat and spoil Management plan

Appendix 12.1 Hydrology field observations

Appendix 12.2 P20306-FT-EN-XX-RP-EN-0021 Surface Water Management PLan

Appendix 12.3 Flood Risk Assessment

Appendix 14.1 Pell F. Turbine Delivery Route Assessment

Appendix 14.2 Traffic Management Plan

LIST OF TABLES

Page

LIST OF PALTES

Page

LIST OF IMAGES

Page

1. INTRODUCTION

Fehily Timoney and Company (FT) has prepared this Screenign for Appropriate Assessment (AA) and Natura Impact Statement (NIS) on behalf of RWE Renewables Ireland Ltd., who intend to apply to An Coimisiún Pleanála for planning permission to construct a wind energy development (the Proposed Development) in County Galway, c. 8.5km north-west of Tuam, County Galway and c. 4km north-east of Shrule, County Mayo (which is the closest settlement to the Proposed Development).

The Proposed Development, the Shancloon Wind farm, for which consent is being sought, as assessed in this AA screening and NIS comprises the following elements:

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

An Coimisiún Pleanála ("the Commission"), as part of pre-application consultation under section 37B of the Planning and Development Act 2000 (as amended) (case ref. ABP-321507-24) has indicated that a NIS will need to be provided in support of the planning application in order to allow the Commission to complete their statutory obligations in relation to Appropriate Assessment.

This report is a Natura Impact Statement and presents a focused and detailed examination, analysis and evaluation of the implications of the Proposed Development, alone and in-combination with other plans and projects, on the integrity of a European site in view of that site's conservation objectives. This report has been prepared to inform the competent authority in completing their statutory obligations in relation to Appropriate Assessment, as required by Article 6(3) under Council Directive 92/43/EEC (as amended) (Habitats Directive) and under planning law.

This NIS should be read in conjunction with the following documents as presented in Volume III of the EIAR/NIS submission:

- Appendix 2.1 Construction Environmental Management Plan
- Appendix 2.3 Grid Connection Construction Methodology
- Appendix 9.2 Bat Assessment
- Appendix 9.3 Aquatic Surveys
- Appendix 10.1 Ornithology Report (which includes the Collision Risk Model)
- Appendix 11.1 Geotechnical & Peat Stability Assessment
- Appendix 11.2 Karst Assessment Report
- Appendix 11.4 Peat and spoil Management plan
- Appendix 12.1 Hydrology field observations
- Appendix 12.2 P20306-FT-EN-XX-RP-EN-0021 Surface Water Management PLan
- Appendix 12.3 Flood Risk Assessment
- Appendix 14.1 Pell F. Turbine Delivery Route Assessment
- Appendix 14.2 Traffic Management Plan

This NIS should also be read in conjunction with the figures presented in Volume IV of the EIAR/NIS submission.

1.1 Legislative Context

Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive) provides legal protection for habitats and species of European importance. The Directive requires that where a plan or project is likely to have a significant effect on a European Site, while not directly connected with or necessary to the nature conservation management of the site, it will be subject to 'Appropriate Assessment' to identify any implications for the European site in view of the site's Conservation Objectives. Specifically, Article 6(3) of the Habitats Directive states:

"*6(3) Any plan or project not directly connected with or necessary to the management of the site (Natura 2000 sites) but likely to have significant effect thereon, either individually or in combination with other plans or projects, shall be subject to Appropriate Assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public*."

Note: The provisions of Article 6(3) do not apply where the proposed plan or project is 'connected with or necessary to the management of the site'. In this case, the Proposed Development not directly connected with or necessary to the management of any European site(s).

1.2 Methodology

The purpose of appropriate assessment is to assess the implications of a plan or project on European site in view of that site's conservation objectives, individually and in combination with other plans or projects.

This Natura Impact Statement presents the data and information on the project and provides an analysis comprising the scientific examinations of the project and its implications for the European sites in view of their conservation objections. Potential adverse effects are assessed in view of best scientific knowledge, based on objective information in relation to the Proposed Development including the proposed avoidance, reduction and preventive measures.

This NIS was prepared in accordance with the following guidance:

- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin (2009, updated 2010) (Environment Heritage and Local Government, 2009).
- Managing Natura 2000 sites. The provisions of Article 6 of the Habitats Directive 92/43/EEC. European Commission (2019). Brussels, (2019/C 33/01). OJ C 33, 25.1.2019.
- Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC. Commission Notice (2021) Brussels, 28.9.2021 C(2021) 6913 final (European Commission, 2021).
- OPR Practice Note PN01 Appropriate Assessment Screening for Development Management, (Office of the Planning Regulator, 2021).
- Atkinson, S., Magee, M., Moorkens, E.A. & Heavey, M. (2024). Guidance on Assessment and Construction Management in Margaritifera Catchments in Ireland. https://e-mussels.eu/europe/conservation-guidelines.

1.3 Statement of Authority

This Natura Impact Statement has been prepared by Fehily Timoney Principal Ecologist and Associate Director Rita Mansfield. Rita holds a BSc.(Hons) in Applied Ecology and a H. Dip Environmental Protection and Pollution Control. Rita is experienced as a technical ecology lead within the environmental and planning services sector. She is a qualified ecologist with responsibility for environmental impact assessment, planning applications (conventional and strategic infrastructure development), Appropriate Assessment, foreshore licensing, and stakeholder engagement for large scale plans and projects in Ireland, including for renewable energy developments. Rita has undertaken and managed a wide range of ecological field assessments including mammal, herpetofauna, bird, fishery, invertebrate and habitat assessments. Rita has held numerous licences under the Wildlife Act and Habitats Directive for disturbance to species which included mitigation (e.g. construction of artificial otter holt, bat exclusion). Rita has provided advice on ecological / environmental design to various private and public sector clients.

2. DESCRIPTION OF THE PROJECT

2.1 Project Location

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

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

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

The development application area (i.e. the red line boundary depicting the land to which the application relates) encompasses a land area of 154 ha (1.54km^2) and the infrastructure footprint within the application area of the Proposed Development is 19.6 ha (0.196 km^2).

2.2 Existing Land use

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

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

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

The Togher and Black Rivers are part of the Corrib Headford Arterial Drainage Scheme, which is maintained by the Office of Public Works. Historically, these benefiting lands have flooded, although the Galway County Development Plan Strategic Flood Risk assessment (2022 – 2028) does not assign a flood zone class to the area. The Proposed Development will require a number of drain and watercourse crossings within the catchment of these watercourses.

Ground investigation (GI) at the Site confirms that the underlying geology comprises is Dinantian Pure Bedded Limestones (Ardnasillagh Formation) with varying depths of overburden comprising topsoil / peat (with depths varying between 1.3m to 5.5m below ground level (BGL), typically underlain by sandy/gravelly clay and granular gravel deposits. The depth to rock varies within the Site, with GI indicating rockhead at between 5.20m BGL to 17.00m BGL. Surface karst features (collapse dolines) are present throughout the Site. These features are believed to form along unmapped fault lines that create zones of weakened and fractured rock beneath the overlying Quaternary deposits (predominantly Glacial Till).

2.3 Site Infrastructure

2.3.1 Wind Farm

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

2.3.1.1 Wind Turbine Description

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

- ground to blade tip height range of 178 m to 180 m
- rotor diameter ranging from 149.1 m to 155m
- hub height ranging from 102.5m to 105m

The turbine model will be a conventional three-blade horizontal axis turbine. Schematic drawings of the design parameters accompany the planning application. The plans and particulars are precise and provide specific dimensions for the turbine structures which have been used in this assessment.

2.3.1.1.1 Turbine Layout

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

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

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

Table 2-1: Turbine Coordinates

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

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

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

It is proposed to install lighting on the turbines in accordance with the Irish Aviation Authority (IAA) requirements for aviation visibility purposes. The lighting configuration and type will be in accordance with the International Civil Aviation Organisation (ICAO) obstacle light requirements and IAA will be notified of the intention to commence crane operations with at least 30 days prior notification of their erection, noting IAA as part of scoping consultation made the following statement:

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

2.3.1.1.2 Turbine Tower and Foundation

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

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

Turbine foundations will be designed to Eurocode Standards. Foundation loads will be provided by the wind turbine supplier, and factors of safety will be applied to these in accordance with European design standards:

- EN 1992-1-1: Eurocode 2: Design of concrete structures.
- BS EN 61400-1:2005: Wind Turbines Design Requirements.

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

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

Gravity Foundation

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

- The extent of the excavation will be marked out.
- Around the perimeter of the foundation formation a shallow interceptor drain will be formed and settlement pond / swale constructed.
- The base of the foundations will be excavated to competent bearing strata. This will typically be within the upper 5 m but will be confirmed on-site by the Site Engineer.
- Excavated soil will be managed in accordance with the Soil Management Plan Appendix 11.4.
- Where necessary, temporary pumps and sumps may be required to maintain a dry, clean formation. Pumped water will be directed to the settlement ponds prior to entering the drainage system.

- A layer of concrete blinding (lean mix) will be laid 75 mm thick directly on top of the newly exposed formation to provide a level platform.
- Formwork and reinforcement will be fixed.
- Ductwork will be installed as required for cables, and formwork erected around the steel cage.
- Concrete will be placed using a concrete pump in accordance with the requirements of the Structural Engineer and compacted using vibrating pokers.
- Concrete (nominally 800 m3 per foundation) would typically be in two pours, the first pour being the main base, which is approximately 90% of the foundation; the second and remaining 10% forming the plinth section which sits on the top of the main base.
- Upon completion of the concreting works the foundation base will be covered against precipitation.
- Steel shutters will be used to pour the upper plinth section.
- Once the concrete is set the earthing system is put in place and the foundation is backfilled with suitable material to tie in with the required level of the hardstanding.
- The foundation will be backfilled with a cohesive material, where possible using the material arising during the excavation.

Piled Foundations

The piled turbine foundations will be constructed using standard reinforced concrete construction techniques. Detailed construction methodologies for turbine foundations are provided in the CEMP in Appendix 2.1 of Volume III.

While load bearing resistances may be achievable in the subsoils, the piles will be extended into the bedrock in order to provide certainty on stability given the occurrence of dolines[1] in the area. For the piled foundations it will be necessary to embed the piles directly into the bedrock using rock sockets. The pile toe level will depend on the depth to bedrock (see Appendix 11.1 – Geotechnical and Peat Stability Report for founding depths). These will be further established by detailed ground investigations prior to the construction of the Proposed Development. The piles to be constructed will be large diameter reinforced concrete piles and will range in the order of 600mm to 1200mm diameter. Between 14 and 16 piles will be used at each piled turbine foundation. Concrete volumes required for piled foundations averages as 733 m3 per foundation, which has been rounded up to 800 m3 for the purpose of this impact assessment (assuming 900mm diameter piles and 16no. per turbine foundation and based on indicative founding depths of piles at each turbine as listed in Table 9-1 of the Peat Stability Assessment Report, Volume III).

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

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

Preparatory work for piling will include the following:

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

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

Note that for piled foundations the water level within the pile shaft will be maintained at or above the surrounding ground water level to ensure that there is no differential head encouraging piping/boiling[2] of the soil at the base of the excavation.

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

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

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

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

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

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

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

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

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

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

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

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

The first (base) section is bolted to a steel frame, which is cast into the turbine concrete foundation. The upper sections of the tower are bolted to the lower ones in sequence. The first floor of the tower is 3 m above ground level it is accessed by a galvanised steel staircase and a steel hatch door which will be kept locked except during maintenance. Access to the top platform in the tower is by a ladder or service lift. Access to the nacelle from the top platform is by ladder. Access to the transformer room in the nacelle is controlled with an interlock.

2.3.1.1.3 Turbine Blades and Hub/Nacelle

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

- Blade length ranging from 72.4m to 76m (rotor length of 74.55m to 77.5m);
- Blade width (maximum chord length) ranging from 4.2m to 4.5m;
- Blade swept area of ranging from 17,460 m2 to 18,869 m2.

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

The cast iron hub supports the three blades and transfers the reaction loads to the nacelle which houses the generating components of the wind turbine including the generator and gearbox, electrical components and control unit. These convert the rotation of the blades to generator rotation.

A yaw mechanism turns the nacelle and blades into and out of the wind. A wind vane on the nacelle controls the yaw mechanism.

The blade bearings allow the blades to operate at varying pitch angles. Based on the prevailing wind conditions (determined by the wind vane), the blades are continuously positioned to optimise the pitch angle with the pitch range being -5° to 95°.

The turbines are equipped with an aerodynamic brake. Stopping the turbine is done by full feathering the three blades (individually turning each blade).

A glass fibre reinforced polyester hood covers the nacelle. The turbines are equipped with a Lightning Protection System (LPS) earthing and isolation to help protect the wind turbine against the physical damage caused by lightning strikes. Additionally, the turbines will be equipped with a Fire Suppression System. The turbine will also be equipped with an Ice Detection and Anti-Icing System.

2.3.1.1.4 Turbine Transformer and Wind Farm Power Output

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

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

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

where:

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

B = The capacity factor, which takes into account the intermittent nature of the wind, the availability of wind turbines and array losses etc. A capacity factor of 35 % is applied here3.

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

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

The electricity produced by the proposed wind farm would be sufficient to supply between approximately 44,968 – 52,998 Irish households with electricity per year (depending on MEC), based on the average Irish household using 4.2 MWh of electricity (this figure is taken from the March 2017 Commission for Energy Regulation (CER) Review of Typical Consumption Figures Decision Paper and Commission for Regulation of Utilities Energy and Water Monitoring Report for 2021).

The turbine will have a transformer located within the tower. The turbine transformer will step up the voltage to either 20kV or 33kV to reduce the electrical loss on the cabling connector circuits that connect to the site substation via a network of underground medium voltage cable circuits to be located adjacent to the proposed site track network.

[3] EirGrid in their All-Island Generation Capacity Statement (2017-2026) estimates a capacity factor of approximately 31% for onshore wind. The capacity factor applied for the proposed wind farm is greater than the EirGrid estimation as a result of improvements in turbine technology and the good wind flows at the site. The proposed turbine type allows for the use of fewer, taller turbines with an increased efficiency and in return greater economic benefit to the consumer.

2.3.2 Site Access and Internal Road Infrastructure

2.3.2.1 Site Access

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

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

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

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

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

Locations of passing bays along the TDR and haul routes have been identified.

2.3.2.1.1 Wind Farm Internal Access Tracks

The internal access tracks serving the wind farm will incorporate existing roads and tracks (which will be upgraded) and new access roads (which will be constructed). The proposed internal site track layout will permit access for vehicles during the construction phase, for maintenance during the operational phase and for vehicles to decommission the turbines at the end of the life of the Proposed Development. The internal road layout has taken into account the following key factors:

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

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

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

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

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

Floating road design will be in accordance with the following:

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

This sequence of construction is as follows:

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

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

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

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

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

The stone required for the construction of the internal access roads will be sourced from licenced quarries in the vicinity of the Proposed Development. The location of licensed quarries and haulage routes are identified in EIAR Figure 14.3, Volume IV.

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

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

A drainage system will be installed adjacent to the internal access tracks. Existing drainage infrastructure will be maintained and upgraded where necessary. Existing drainage channels will be upgraded to the same standard as the proposed drainage infrastructure in accordance with the drainage design and Surface Water Management Plan (EIAR Appendix 12.2). SuDS design approach will ensure that existing drainage patterns will be maintained. Drainage ditches will be formed within the excavated width and along the sides of the internal access tracks. Drainage infrastructure will be constructed in parallel with the access track construction.

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

2.3.2.2 Hardstand and Laydown Area

Each wind turbine will have an associated turbine hardstand area and temporary laydown area adjacent to the foundation to accommodate the delivery and temporary storage of the turbine components prior to their erection and to support the cranes during erection (see Planning Drawings P20-306-0300-0001 to P20-306-0300-0011).

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

A turbine hardstanding area consists of a main crane pad hardstanding with a number of additional smaller hardstandings that act as set down and assembly areas, located as shown on the accompanying planning drawings P20-306-0300-0001 to P20-306-0300-0011. This area will accommodate a main crane and an assist crane during the assembly of the turbine, as well as during occasional maintenance periods during operation. It will also facilitate parking for operation and maintenance staff.

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

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

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

2.3.2.3 Watercourse Crossings Within the Site

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

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

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

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

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

The Proposed Development will include new watercourse crossings, as set out in Table 2-4 below. It is proposed to install one single-span bridge and 14 culvert crossings. In addition to Section 50 requirements, the proposed crossings will be designed in line with Inland Fisheries Ireland (IFI) requirements for salmonid watercourses as included in their 2016 'Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters' and TII 2008 'Guidelines for the Crossing of Watercourses During the Construction of Road Schemes'. Locations proposed crossing structures are presented in 0100-Series planning application drawings and details are presented in drawing P20-306-0300-0015 and P20-306-0501-0002.

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

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

Table 2-3: River Crossings within the Wind Farm Site

Watercourse Crossing Ref	ITM Coordinates		Width at Base (m)	Width at top of bank (m)	Bank Height (m)	Depth of Water (m)	Type of Crossing
WC01	533089.53,	754307.53	8.83	17.28	3.84	0.74	18.5m slab length clear-span bridge on Togher River
CV01	532044.8643	753994.955	2.8	3.5	4.0	3.2	Upgrade of existing piped culvert on land drain used for turbary access
CV02	532051.1549	753526.061	0.9	1.0	0.2	0	piped culvert on land drain
CV03	533228.5454	754414.8103	1.42	2.8	1.8	0.62	Upgrade existing farm access piped culvert on land drain
CV04	533543.7619	754815.8888	0.8	4.1	1.5	0.44	piped culvert on land drain
CV05	533324.1022	755645.1961	0.46	1.4	1.33	0.52	piped culvert on land drain
CV06	533874.0242	754968.9821	1.14	3.64	1.53	0.48	Upgrade existing farm access piped culvert on land drain
CV07	534245.0059	754535.1195	0.54	2.87	0.8	0.35	piped culvert on land drain
CV08	534419.3487	755076.0733	0.78	3.5	1.82	0.38	piped culvert on land drain
CV09	534699.8902	755083.9407	0.51	0.51	0.1	0	piped culvert on land drain
CV10	534787.3713	755074.1173	1.2	1.2 – 4.5	0.2	0	piped culvert on land drain
CV11	534764.4714	755050.5955	1.27	4.07	1.25	0.42	piped culvert – replace existing 600mm diameter culvert on land drain
CV12	534932.3086	755031.4635	0.6	4.17	1.2	0.34	piped culvert – upgrade of

Watercourse Crossing Ref	ITM Coordinates		Width at Base (m)	Width at top of bank (m)	Bank Height (m)	Depth of Water (m)	Type of Crossing
							existing drain crossing on land drain
CV13	535338.3095	755225.2358	2.2	4.53	1.97	0.75	piped culvert on land drain
CV14	535417.3152	755371.7636	2.6	4.01	1.82	0.7	dual piped culvert on BLACK (SHRULE)_010 river

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

The bridge will be installed on-line (i.e. on the existing channel without the need for waterbody diversion) and the works will be carried out under dry conditions in accordance with IFI (2016) 'Guidelines on protection of fisheries during construction works in and adjacent to waters'. The watercourse flow will be flumed in order to facilitate construction in dry conditions. The flume installation will take place in low flow conditions. Mitigation for the protection of sensitive biological receptors when fluming / overpumping are presented in Chapter 9 – Biodiversity.

Foundations: The bridge will be constructed using three bridge abutments (one on the northern side and two on the southern side of the river). Abutments will be pre-cast concrete sections. The abutments for the bridge will be founded on reinforced concrete pad footings. An excavator will be used to reach the subgrade on which the concrete pads will be founded. The excavations will be set back a minimum of 2.5m from the banks of the BLACK (SHRULE)_010 River. Dewatering of the excavations as per the Surface Water Management Plan will likely be required through sump pump or alternative means until completion of the footings. A layer of Class 6N2 fill will be laid as a regulating layer on top of the subgrade. A 75mm thick blinding concrete will be placed over the full extent of the rectangular foundation to produce a clean flat surface for the wet structural foundation concrete. The reinforcement cage for the pad footing will be fixed and tied with bars protruding vertically for subsequent concrete pours. Formwork will be placed around the perimeter of the footing ensuring sufficient concrete cover to the reinforcement. It is calculated that 18m3 of concrete will be required for each abutment bank seat pad and will be delivered to site by ready mix trucks. The concrete will be placed in the formwork using a hopper or concrete pump and vibratory poker used to remove air bubbles.

Abutments: Once the pad footing has achieved sufficient strength, the reinforcement for the abutment upstands will be cut, tied and fixed into position. A vertical formwork will be placed around the perimeter of the abutment wall. Each abutment upstand will require approximately 13m3 of concrete which will be placed using a hopper or concrete pump. A vibratory poker will be used to remove any air pockets. Once the formwork has been removed and the concrete has cured, a waterproofing membrane will be applied to the concrete. At the top of the upstands, seatings for the precast deck beams will be prepared at the correct levels.

Deck: The bridge deck will be set above the 1% AEP flood height (100-year event plus climate change). The modelled peak 1% AEP + CC water level at the upstream face of the proposed bridge is 28.4m OD. Therefore, in compliance with the OPW Section 50 minimum freeboard requirements, the soffit level the bridge will be constructed to a minimum level of 28.7m OD. The bridge will be made up of precast concrete beams with a span of 18.5 m (see Planning Drawing P20-306-0300-0015). The beams will be precast off site and delivered to site on a flatbed truck. A crane will be used to lift the beams into position onto the seatings formed on top of the abutment upstands. When in place, cable ducts will be placed in the voids between each of the beam webs and mesh reinforcement placed above them. Cement Bound Granular Mixtures B (Cl 822) will surround the ducts and be compacted in accordance with Cl813.10 and Table 8/4 of TII Specification of Roadworks. Side forms for the edge parapet beams will be secured and reinforcement for the deck slab and parapet edge beams will be cut, tied and fixed into position with bars protruding vertically from the edge beams for subsequent concrete pours for the concrete parapets. The bridge deck slab and edge beams will be concreted to the finished level. Once the deck slab has reached sufficient strength the abutment walls will be backfilled with a granular fill to road formation level.

Parapets and Deck Topping: The bridge deck parapets will be constructed from reinforced concrete. Reinforcement for the parapets will be fixed to lap with the starter bars from the edge beams. Vertical formwork will be erected and secured in place. An in-situ pour will be carried out to cast the parapets to the design height and vibratory poker used. Once the parapets have reached sufficient strength the formwork will be stripped. The deck surfacing is to be formed using an ST1 concrete mix. This will be placed on top of the deck slab with a minimum thickness of 100mm and with a crossfall from the centre of the deck to the parapet to allow water to drain.

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

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

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

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

Culvert Construction Methodology

Culverts will be made of precast units which will be sized specific to the hydraulic capacity required relative to the characteristics of the watercourse to be crossed. The crossing angle for the culverts will be set out in relation to road alignment and the existing watercourse channel. The project engineer will determine the required gradient of the culvert. Standard details for piped culverts are provided in Planning Drawing P20-306-0501-0002.

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

The culverts will be installed on-line (i.e. within the existing channel) and the works will be carried out under dry conditions in accordance with IFI (2016) 'Guidelines on protection of fisheries during construction works in and adjacent to waters'. The watercourse flow will be diverted by overpumping or by fluming the flow as appropriate in order to facilitate construction of the culvert in dry conditions. The installation of the culvert will take place in low flow conditions. Mitigation for the protection of sensitive biological receptors when fluming / overpumping are presented in Chapter 9 – Biodiversity.

The bed of the watercourse will be taken down to the desired levels to create a suitable platform for laying the culvert. The pipe culvert will be lifted into place with an excavator with a lifting mechanism / crane and will have an invert level 500 mm below the existing watercourse bed level. The embedded section will be allowed to fill naturally unless otherwise specified in Chapter 9 – Biodiversity.

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

Minor Stream / Drain Crossing Construction Methodology

All other minor streams or drains within the Site (which are not identified as Rivers by the EPA in their reporting under the Water Framework Directive) which are crossed by the wind farm infrastructure will be collected by interceptor drains and carried under the road by cross drains. Further details on the locations of such cross drains are provided in the Surface Water Management Plan and in the Drainage Drawings presented in 0100-Series planning application drawings. The cross drains will be an appropriately sized pipe buried in the sub-base of the road at the necessary invert level to ensure ponding or pooling doesn't occur above or below the cross drain and water can continue to flow as necessary.

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

- All environmental mitigation measures, described in detail in Chapter 12 - Hydrology and Water Quality and Chapter 9 - Biodiversity, will be implemented locally in advance of the works, in accordance with the measures outlined in the Surface Water Management Plan (SWMP).
- The pipe is laid in one lift or in sections using a lifting mechanism attached to an excavator.
- Rock armour headwalls will be constructed where necessary to protect pipe ends and the base of slope embankments on either side of the track.

2.3.3 Meteorological Mast

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

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

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

- An access track will be extended towards the mast location as shown on EIAR Figure 2.2a and in accordance with detail presented in Planning Drawing P20-306-0300-0012. The access track will be 3.5m in width. Temporary and permanent drainage infrastructure will be extended, and underground cable power supply will be provided along the new access.
- A small aggregate crane pad of 10m x 10m in size will be constructed in front of the proposed mast location.
- General construction methods for the above access track and hard standing will match those described for wind farm access tracks and hard standings.
- The foundation will be excavated followed by shuttering, steel fixing and finally concrete pouring by ready mix truck. Excavation and concrete operations will be carried out in accordance with the CEMP. The foundation will be 10m x 10m x 1.8m in size.
- Following crane setup, the mast sections will be delivered and unloaded by truck.

- In accordance with an agreed lifting plan, mast sections will be lifted by crane into place. Wind speeds will be monitored at all times during lifting operations by the lead climber and crane operator.
- Mast sections will be bolted together by climbers.
- Following erection of main mast sections, lightning protection and other ancillary components will be fixed to the mast.

2.3.4 Peat /Spoil Deposition Areas

Civil engineering assessment of the Proposed Development indicates the requirement for 217,541m3 of stone fill across the Site to provide fill for the internal access roads, hardstands, upfill to foundations and the temporary compounds. Further details are provided in Appendix 11-4: Peat and Spoil Management Plan, Volume III of the EIAR.

2.3.5 Spoil and Overburden Management

The predicted overburden volumes generated during construction (191,201 m3) have been calculated and are outlined in Table 2.5. All spoil and overburden will be stored within the Site, as shown on EIAR Figure 2.2a, Figure 2.2b and Figure 2.2c, Volume IV. Further details are provided in the Peat and Spoil Management Plan.

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

Table 2-4: Summary of Excavated Peat and Spoil Volumes on Site

Infrastructure Element (1)	Proposed Development Dimensions	Peat Volume (m3) (2)	Spoil (non-peat) Volume (m3) (2) and (3)	Comment
11 no. Turbines and Hardstands	27m diameter excavation footprint for turbine foundation with hardstand area.	97,731	39,470	Hardstanding area and foundation footprint
Access Roads	Assumed 5m running surface with 6m wide development footprint.	2,443	19,726	
Temporary Construction Compound 1 (East)	1 no. Hardstanding areas (total area 12,400m2).	0	13,640	
Temporary Construction Compound 2 (West)	1 no. Hardstanding areas (total area 3,600m2).	0	3960	
Substation	Hardstanding area of (14,725m2)	0	9,094	

Infrastructure Element (1)	Proposed Development Dimensions	Peat Volume (m3) (2)	Spoil (non-peat) Volume (m3) (2) and (3)	Comment
Met Mast	12 x 12m foundation footprint and 40 x 40m hardstanding area (met mast).	0	990	
Doline	Surface karst Feature approx. 4 no. 20m diameter	0	4,147	
	Total =	100,174m3	91,027m3	Total = 191,201m3 (peat and spoil volume) (4)

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

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

Note (4) It should be noted that the excavated rock volume is not included in the total volume quoted above in Table 2.4. It is assumed that the excavated rock volume will be re-used on site as part of the construction works for the development and hence will not require reinstatement on site.

A summary of the potential peat and spoil placement/reinstatement areas at the Shancloon wind farm site are given in Table 2.5. Note in order to limit the requirement to cross the local road network for the purposes of peat and spoil movement, the Site has been delineated into a western and eastern parcel for spoil management.

Table 2-5: Summary of Peat and Spoil Placement/Reinstatement Areas on Site

Location (1)	Peat and Spoil Volume (m3)	Comment
Peat placement alongside designated access roads	0	No Peat shall be placed along access roads.
Designated Peat storage area West (A)	11,625	See Drawing P20-306-0100-0011 to P20-306-0100-0073 for further details
Designated Peat storage area West (B)	27,875	
Designated Peat storage area West (C)	37,625	
Designated Peat storage area West (D)	16,750	

Location (1)	Peat and Spoil Volume (m3)	Comment
Designated Peat storage area West (E)	7,400	
Designated Peat storage area West (F)	6,875	
Designated Peat storage area East	50,000	
Designated Peat storage area near T11	3,150	
Landscaping (2)	22,000	It is estimated that approximately 2,000m3 of peat will be required for landscaping purposes at each of the 11 no. turbine locations.
Total =	192,550m3	

2.3.6 Biodiversity Management / Enhancement

RWE has pledged that it will strive to leave a living legacy behind, not just in the development of clean renewable energy, but also by increasing biodiversity and habitats under its control while helping reduce the country's carbon emissions. RWE will work with local landowners and ecologists to develop areas within the wind farm that can be rewilded or otherwise enhanced and improved for the benefit of wildlife, delivering positive biodiversity elements in its wind farm development. To that end a Biodiversity Enhancement and Management Plan (BEMP) has been prepared which prescribes land management practices to be employed as part of the Proposed Development (see Appendix 9.1, Volume III and accompanying Figures in Volume IV) as summarised in Table 2-6.

Table 2-6: Summary of BEMP Measures

BEMP ID	Enhancement Measure	Objective	Area
WP1, WP2 WP3 and WP4	Native woodland tree planting	To offset for the loss of mixed woodland at TDR accommodation works location POI16 and to provide new areas of planting to enhance native and local biodiversity and to improve structure and landscape connectivity for fauna.	49653.72 m2
SW1, SW2 and SW3	Dry Stone Wall	To increase diversity of habitat in the development area: dry stone walls will be constructed provide a specific natural	310m

BEMP ID	Enhancement Measure	Objective	Area
		ecosystem for many species including reptiles, bees, invertebrates, birds and mammals, along with specialist vegetation including algae, fungi, mosses and lichens.	
HT1, HT2 and HT3 AND TP1, TP2, TP3, TP4 and TP5 AND RV1 to RV4	Treeline and hedgerow planting	The objective of hedgerow and treeline planting is to provide more natural planting to compensate for the intensity of hedgerow management in the wider environment (and indeed within Site), as associated with agricultural practices. The locations of the planting have been specifically identified to provide landscape connectivity for mammals and birds. Planting is also proposed to offset against the loss of hedgerow as required to be removed as bat buffers from the wind turbines.	2,454m
MF1 and MF2	Management of wet grassland for Marsh Fritillary	This existing wet grassland is heavily grazed. This area will be managed and enhanced by the exclusion of livestock, to transform this area into a more species-diverse wetland habitat.	41,760.50 m2
PR1 (restoration area) and DB1, DB2 and DB3 (associated drain blocking locations)	Rehabilitation of cutaway peatland	The drains adjacent to the facebank of the cutover bog near T11 and parallel drains within the raised bog, east of T11, will be blocked. Peat from within the footprint of the Proposed Development will be mounded against the facebank, the objective of which will be to re-establish water levels at the bog surface of the adjacent intact raised bog, and to increase the extent of favourable conditions within the raised bog habitat. The site-specific drainage that is proposed for the wind farm infrastructure is entirely separate from the drain blocking and rewetting that is proposed as part of this habitat enhancement.	5201.16 m2

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

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

NOTE: None of the measures set out in the BEMP are relied upon in the NIS as measures to enhance / compensate for adverse effects on the conservation objectives / integrity of any European site. The NIS considers the BEMP in terms of the potential for its implementation to have effects on European Sites.

2.3.7 Felled Forestry

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

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

The Forest Service of the Department of Agriculture, Food & the Marine is Ireland's national forest authority and is responsible for all forest licensing. In light of the foregoing and for the purposes of this project, the developer commits that the location of any replanting (alternative afforestation) associated with the project will be greater than 10km from the wind farm site and also outside any potential hydrological pathways of connectivity i.e. outside the catchment within which the Proposed Development is located. On this basis, it is reasonable to conclude that there will be no more than imperceptible indirect or in-combination effects associated with this replanting In addition, the developer commits to not commencing the project until both felling and afforestation licences are in place and this ensures the afforested lands are identified, assessed and licensed appropriately by the relevant consenting authority.

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

The area of trees to be felled will be the minimum required to accommodate the Proposed Development. However, for the purpose of the assessment the area for felling has been identified as the maximum area that could conceivably be required to construct the Proposed Development.

2.3.8 Electrical Infrastructure / Grid Connection

2.3.8.1 On-Site Electrical Cabling

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

The electricity will be transmitted as a three-phase power supply so there will be three individual conductors (or individual cables) in each cable circuit and there will be three individual circuits servicing the Site. The three conductors will each be laid in separate ducts which will usually be laid in a trefoil formation but may also be laid in a flat formation where conditions require it, such as where the ducts need to cross an existing structure, drain, or underground service.

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

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

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

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

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

2.3.8.1.1 Trenching Methodology

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

- All existing underground services along the grid route will be confirmed prior to the commencement of construction works;
- At watercourse and drain crossings, the contractor will be required to adhere to environmental control measures as described in the Construction Environmental Management Plan (CEMP);
- Where the cable route intersects with culverts, the culvert will remain in place (where possible) and the ducting will be installed either above or below the culvert to provide minimum separation distances in accordance with EirGrid and Irish Water specifications;
- In the event that culverts require removal for ducting installation, a suitable method of damming the water source and pumping the water around the work area will be set out in a method statement and agreed with the relevant stakeholders. Once the ducts are installed the culvert will be reinstated to match existing levels and dimensions. If works of this nature are required, the contractor will liaise with Inland Fisheries Ireland in advance of works;
- Excavated material will be temporarily stockpiled onsite for re-use during reinstatement. Stockpiles will be restricted to less than 2m in height. Stockpiles will be located a minimum of 50m from surface water features and all stockpiling locations will be subject to approval by the Site Manager and Project Ecological Clerk of Works (ECoW);
- Excavated material will be employed to backfill the trench where appropriate and any surplus material will be transported off site and disposed of at a fully authorised soil recovery site;
- Any earthen (sod) banks to be excavated will be carefully opened with the surface sods being stored separately and maintained for use during reinstatement;
- The excavated trench will be dewatered if required, from a sump installed within the low section of the opened trench. Where dewatering is required, dirty water will be fully and appropriately attenuated, through silt bags, before being appropriately discharged to vegetation or surface water drainage feature;
- Where required, grass will be reinstated by either seeding or by replacing with grass turves;
- No more than a 50m section of trench will be opened at any one time. The second 50m will only be excavated once the majority of reinstatement has been completed on the first;
- The excavation, installation and reinstatement process will take approximately one day to complete a 100m section;
- Following the installation of ducting, pulling the cable will take approximately one day between each joint bay, with the jointing of cables taking approximately 1 week per joint bay location.

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

2.3.8.1.2 Ducting Installation Methodology

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

- Grade, smooth and trim trench floor when the required depth and width have been obtained.
- Place bedding layer of Cement Bound Granular Mixture B (CBGM B) material in accordance with its specification and compact it so that the compacted thickness is as per drawings.
- Lay the bottom row of ducts in trefoil or flat formation as detailed on design drawings. Use spacers as appropriate to establish horizontal duct spacing. Fit a secure cap / bung to the end of each duct run to prevent the ingress of dirt or water.
- Carefully surround and cover ducts with CBGM B in accordance with the design drawings and specifications and thoroughly compact without damaging ducts.
- Place cable protection strips on compacted CBGM B directly over the ducts.
- Lay the top row of ducts onto the freshly compacted CBGM B including the cable protection strips above the bottom row of ducts. Place a secure cap at the end of each duct to prevent the ingress of dirt or water.
- Carefully surround and cover ducts with CBGM B material in accordance with drawings and thoroughly compact without damaging ducts.
- Place red cable protection strip on top of compacted CBGM B over each set of ducts as shown on the drawings.
- Place and thoroughly compact CBGM B material or Clause 804 backfill, or soil backfill as specified and place warning tape at the depth shown on the drawings.
- For concrete and asphalt/bitmac road sections, carry out immediate temporary/permanent reinstatement in accordance with the specification and to the approval of the local authority or landowner, unless otherwise agreed with local authorities.
- For unsurfaced/grass sections, backfill with suitable excavated material to ground level leaving at least 100mm topsoil or match existing level at the top to allow for seeding or in areas of peat replace turves as per the specification of the local authority or landowner.

- Clean and test the ducts in accordance with the specification by pulling through a brush and mandrel. Install 12mm polypropylene draw rope in each duct and seal all ducts using robust duct end seals fitted with rope attachment eyes in preparation for cable installation at a later date. All the works should be witnessed by an EirGrid Clerk of Works (CoW) as required.

2.3.8.2 Surface Cable Markers & Marker Posts

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

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

2.3.8.2.1 Horizontal Directional Drilling (HDD)

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

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

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

- A launch and reception area is required for directional drilling: 180m2 for the HDD entry side, and circa 550m2 on the HDD exit side. These areas will be fenced on both sides of the river crossing which will be the locations of the entry and exit pits within the adjacent agricultural lands.
- Fuels, lubricants and hydraulic fluids for equipment use on Site will be carefully handled to avoid spillage, properly secured and provided with spill containment kits in case of incident.
- The timing of grid connection cable laying will be carried out during metrologically dry seasons/periods and HDD on the stream crossing will not be carried out during the salmonid spawning season.
- The depth of the bore will be at least 3m below the level of the river bed so as not to conflict with watercourse hydrology;
- Inert, biodegradable drilling fluid will be used;
- There will be no refuelling within 50m of the watercourse.
- The drilling rig and fluid handling units will be located on one side of the river and will be stored on double bunded 0.5mm PVC bunds which will contain any fluid spills and storm water run-off.

- Entry and exit pits (2m width x 3m length x 1m depth) will be excavated using an excavator. The excavated material will be temporarily stored within the works area and used for reinstatement or disposed of to a licensed facility.
- A steel box will be placed in each pit. This box will contain any drilling fluid returns from the borehole.
- The HDD pilot bore will be undertaken using a wireline guidance system. Assembly will be set up by the drilling team and steering engineer. The steering system will provide real time directional information to the surveyor at the driller's console and will be used to navigate the bores.
- A comprehensive monitoring system will be established to closely oversee any procedures involving bentonite, encompassing the careful observation of pumping pressure, the precise formulation of drilling mud (including drilling fluid volume, viscosity and weight), and the accurate measurement of mud returns and pH. A closed-loop drilling fluid mixing and circulation system with recycling capability will be utilised.
- Fluid return lines used in HDD process will be tested for leaks prior to use to check their reliability.
- The pilot bore will be drilled to the pre-determined profile and alignment under the watercourse crossing.
- The steering engineer and drill team will monitor the drilling works to ensure that modelled stresses and pressures are not exceeded.
- The drilled cuttings will be flushed back by drilling fluid to the entry and exist pits and re-cycled for re-use. The nature of the cuttings will be monitored to understand the ground conditions as the drilling progresses.
- Once the first pilot hole has been completed a hole-opener or back reamer will be fitted in the exit side which will then be pulled back to the entry side as part of the pre-reaming/hole opening process to enlarge the hole to the correct size.
- When the pre-reaming/hole opening/hole cleaning has been completed, a reamer of slightly smaller diameter than the final cut will be installed on the drill string to which the ducts will be attached for installation. The steel boxes will be removed, with the drilling fluid disposed of to a licensed facility.
- The ducts will be cleaned and proven, and their installed location surveyed.
- The entry and exit pits will be reinstated to the specification of the landowner.

2.3.8.2.2 Joint Bays

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

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

- The contractor will excavate a pit for joint bay construction, including for a sump in one corner.
- Grade and smooth floor; then lay a 50mm depth of thick sand for pre-cast concrete construction on 200mm thick Clause 804 granular material.
- Place pre-cast concrete sections on sand bedding.
- Where joint bays are located under the road surface the joint bay will be backfilled with compacted layers of Clause 804 and the road surface temporarily reinstated as specified by the local authority.

- For cable installation and jointing, the cable is supplied in pre-ordered lengths on large cable drums. Installing "one section" of cable normally involves pulling three individual conductors into three separate ducts. The cable pulling winch must be set at a predetermined cut off pulling tension as specified by the designer. The cable will be connected to the winch rope, using approved suitably sized and rated cable pulling stocking & swivel and a pulling head, fitted by the cable manufacturer. A sponge may also be secured to the winch rope to disperse lubricant through the duct. Lubrication is also applied to the cable in the joint bay before it enters the duct.
- Once the "two sections" of cable (total of 6 conductors) are pulled into the joint bay, a jointing container is positioned over the joint bay and the cable jointing procedure is carried out in this controlled environment.
- Following the completion of jointing and duct sealing works, place, and thoroughly compact cement-bound sand in the joint bay, in approximately 200mm layers to the level of the cable joint base to provide vertical support. Install additional layers of cement-bound sand and compact each layer until the cement-bound sand is level with the top of the joint. Install an additional 100mm cement-bound sand layer. Install cable protection strip. Backfill with cement-bound sand to a depth of 250mm below surface and carry out permanent reinstatement including placement of warning tape at 400mm depth below finished surface.

2.3.8.3 On-Site Electrical Substation and Loop-in Connection

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

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

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

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

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

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

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

The substation compound will also contain external electrical and ancillary infrastructure in the form of the following:

- Cable sealing ends;
- Surge arrestors;
- Cable disconnectors;
- Post insulators;
- Circuit breakers;
- Current and voltage transformers;
- Steel gantry's and cable chairs;
- Power transformers;
- Power quality compensation equipment;
- Concrete plinths and bunds;
- External lighting;
- Lightening protection masts;
- Telecommunications masts;
- Security cameras;
- Palisade fencing and gates.

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

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

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

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

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

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

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

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

2.3.9 Turbine Delivery

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

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

- Loads will exit the Galway docks and head northeast on Lough Atalia Road;
- Loads will take a slight right onto College Road / R339. They will then continue to follow R339;
- Loads will turn left at Connolly Avenue;
- Loads will then turn right onto Tuam Road / R336;
- Loads will turn right at the R386 / N6 junction and will proceed eastbound on the N6;
- Loads will continue on the N6 and the M6 eastbound;
- At Junction 18 loads would turn left onto the M17 northbound;
- Loads would follow the Tuam bypass onto the N17;
- Loads will turn left onto the R332;
- Loads will turn left onto the L6483 and continue west to the L-2234-24 and on to the proposed site entrance.

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

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

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

Temporary accommodation works will only be required during the operational phase in the unlikely event of a major turbine component replacement. The temporary accommodation works will not be required for the decommissioning phase as turbine components can be broken up on site and removed using standard HGVs.

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

Table 2-7: Accommodation Works on Delivery Route

POI Ref.	Location	Description of Works	Third Party Lands Required?	Included in this Planning Application
1	Exit from Galway Harbour	Loads will need to travel through the car park where parking should be suspended and the fences removed. All street furniture should be removed. Loads will over-sail the right-hand verge of Lough Atalia Road where one lighting column should be removed.	no	No – this element is assessed in the EIAR but is part of the wider project and will be subject to a separate consent as applicable
2	Lough Atalia Road Railway Overbridge	Loads will straddle the centre line of the road. The bridge clearance is 5.46m and loads should be set on a lower suspension to provide additional clearances to the structure. Recent studies have been completed by the port authority which confirmed that a blade of similar dimensions is able to exit the port via this route.	no	No – this element is assessed in the EIAR but is part of the wider project and will be subject to a separate consent as applicable
3	Lough Atalia Road / College Road Junction	Loads will merge onto the R339 northbound by undertaking a contraflow manoeuvre. Loads will over-sail both verges through the section. One traffic signal head should be removed from the right-hand verge and one traffic signal head, one road sign, and two bollards should be removed from the left-hand verge.	no	No – this element is assessed in the EIAR but is part of the wider project and will be subject to a separate consent as applicable

POI Ref.	Location	Description of Works	Third Party Lands Required?	Included in this Planning Application
4	R339 / R338 Junction	Blade tip will over-sail the left-hand verge on entry where one traffic signal should be removed. Loads will over-sail the exit splitter island where one traffic signal, one crossing signal and pedestrian guardrails should be removed.	no	No – this element is assessed in the EIAR but is part of the wider project and will be subject to a separate consent as applicable
5	R339 / Connolly Avenue Junction	Loads will turn left to join Connolly Avenue northbound. Blade tip will oversail the south eastern verge. Loads will overrun and oversail the footway on the inside of the left bend where a load bearing surface will be laid and one traffic signal and two lighting columns will be removed. Loads will overrun and oversail the eastern footway of the exit road where a load bearing surface should be laid and one traffic signal will be removed.	no	No – this element is assessed in the EIAR but is part of the wider project and will be subject to a separate consent as applicable
6	Connolly Avenue / R336 Junction	Loads will turn right at the junction to join the R336 eastbound. The blade will oversail the lefthand verge on the entry arm of the junction. Loads will over-run and over-sail the inside verge of the right turn where a load bearing surface should be laid and two lighting columns will be removed.	no	No – this element is assessed in the EIAR but is part of the wider project and will be subject to a separate consent as applicable
7	R336 / N6 Junction	Loads will turn right at the junction to join the N6 eastbound, undertaking a contraflow manoeuvre. The blade will over-sail the left-hand verge on entry where one road sign will be removed and vegetation trimmed. Loads will oversail the inside verge of the right turn where one traffic signal, one lighting column and the pedestrian guardrail will be removed.	no	No – this element is assessed in the EIAR but is part of the wider project and will be subject to a separate consent as applicable
8	N6 / R865 Junction	Loads will continue through the junction to remain on the N6 eastbound. No works required	no	No – this element is assessed in the EIAR but is part of the wider project and will be subject to a separate consent as applicable

POI Ref.	Location	Description of Works	Third Party Lands Required?	Included in this Planning Application
9	N6 / R339 Junction	Loads will continue through the junction to remain on the N6 eastbound. Loads will oversail the central reservation on the exit arm where one bollard should be removed.	no	No – this element is assessed in the EIAR but is part of the wider project and will be subject to a separate consent as applicable
10	N6 Coolagh Roundabout	Loads will take the first exit at the roundabout via the slip road to remain on the N6 eastbound. Blade will oversail the outside verge of the bend where four road signs should be removed. Loads will oversail the inside verge where four lighting columns and two road signs should be removed.	no	No – this element is assessed in the EIAR but is part of the wider project and will be subject to a separate consent as applicable
11	M6 Junction 18 Slip Road	Loads would leave the M6 and join the slip road for the M17. Escorts to ensure that the convoy can safely complete the manoeuvre.	no	No – this element is assessed in the EIAR but is part of the wider project and will be subject to a separate consent as applicable
12	M17 / N83 Roundabout	Loads will continue straight over the M17 roundabout. Loads will overrun and oversail through the centre of the roundabout island where a load bearing surface should be laid. Loads will oversail the western verge on approach to the roundabout.	no	No – this element is assessed in the EIAR but is part of the wider project and will be subject to a separate consent as applicable

POI Ref.	Location	Description of Works	Third Party Lands Required?	Included in this Planning Application
13	N17 / R332 Junction	Loads will turn left from the N17 onto the R332. Loads will oversail the junction entry splitter island where one chevron sign and one road sign should be removed. Bollards will be oversailed. Two lighting columns and three road signs should be removed from the western verge on entry. Loads will overrun the entry splitter island at the roundabout and the central island where load bearing surfaces should be laid. Five road signs should be removed. Loads will oversail the exit splitter island at the roundabout where one bollard and one road sign should be removed.	no	No – this element is assessed in the EIAR but is part of the wider project and will be subject to a separate consent as applicable
14	R332 Kilconly Left Bend	Loads will continue through the left bend. Loads will oversail the verge on the inside of the bend where one road sign should be removed and vegetation should be trimmed.	no	No – this element is assessed in the EIAR but is part of the wider project and will be subject to a separate consent as applicable
15	R332 Right Bend Castlegrove	Loads will continue through the right bend. Loads will oversail both verges where trees and vegetation should be trimmed through the inside verge. One utility pole should be removed.	no	No – this element is assessed in the EIAR but is part of the wider project and will be subject to a separate consent as applicable
16	R332 / L6483 Junction	Loads will turn left onto the L6483 at the junction. Loads will oversail and overrun into third party land on the inside of the left bend where a load bearing surface should be laid and the drainage ditch culverted. Trees and vegetation will be cleared and one utility pole removed.	Yes – see Declaration of Identity submitted as part of planning application.	Yes
17	L6483	Loads will continue west on the L6483. The road along this section will need to be widened to provide a minimum 4.5m running width and a 5.5m clearance width. Widening will be within local authority lands.	No	Yes

POI Ref.	Location	Description of Works	Third Party Lands Required?	Included in this Planning Application
18		Loads will turn left onto the L6483 towards the proposed site entrance. Loads will oversail and overrun into third party land on the inside of the left bend where a load bearing surface should be laid. Two road signs should be removed. Trees and vegetation should be cleared.	Yes – see Declaration of Identity submitted as part of planning application.	Yes

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

2.4 Construction

In the event that the Planning Authority decides to grant planning permission for the Proposed Development, tree felling, upgrading of existing site tracks and the provision of new site tracks will precede all other activities. Drainage infrastructure will be constructed in parallel with the track construction. This will be followed by the construction of the turbine hardstanding areas and foundations.

In parallel with these works the on-site electrical works i.e., the sub-station and internal cable network as well loop-in connection works to the national grid will be completed. Construction techniques are outlined in the CEMP.

The hours of construction activity for the Proposed Development will be limited to avoid unsociable hours as per the current code of practice for noise and vibration control on construction and open sites (BS 5228-1:2009+A1:2014). Construction operations will generally be restricted to between 08:00 hours and 19:00 hours Monday to Saturday. It should be noted that it may be necessary to commence turbine base concrete pours earlier due to time constraints incurred by the concrete curing process. Such works will be notified to and agreed with the Local Authority in advance. Work on Sundays or public holidays will only be conducted in exceptional circumstances or in an emergency. Additional emergency works may also be required outside of normal working hours as quoted above. Further details on working hours and restrictions of same are provided in the CEMP.

2.4.1 Construction Programme

The construction of the Proposed Development in its entirety is expected to take 24 months. The proposed construction programme upon which assessments in the EIAR and NIS have been based is presented hereunder.

Activity	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mobilisation and site setup	X	X																						
Site clearance and felling	X	X																						
Internal access tracks	X	X	X	X	X	X	X	X	X	X	X	X												
Turbine hard standings			X	X	X	X	X	X	X	X	X	X	X	X										
Turbine foundations								X	X	X	X	X	X	X	X									
TDR accommodation works											X													
Turbine Installation														X	X	X	X	X	X	X	X			
Met Mast																			X	X				
Onsite substation													X	X	X	X	X	X						
Cable Works (On-Site)															X	X	X	x	X	X	X			
Cable Works (In Public Road)															X	X	X	X	X	X	X			
Testing and Commissioning																					X	X	X	X
Landscaping, reinstatement, demobilisation																							X	X

2.4.2 Construction and Environmental Management Plan (CEMP)

A Construction and Environmental Management Plan (CEMP) is contained in Appendix 2.1 of Volume III of the EIAR.

The CEMP sets out the key environmental management measures associated with the construction, operation and decommissioning of the Proposed Development, to ensure that during these phases of the Proposed Development, the environment is protected, and any potential impacts are minimised. The CEMP will be developed further at the construction stage, on the appointment of the main contractor to the Proposed Development to address the requirements of any relevant planning conditions, including any additional mitigation measures that are conditioned.

The CEMP document is divided into six sections:

- Section 1: Introduction provides details on the existing site and the Proposed Development.
- Section 2: Existing Site Environmental Conditions provides details of the main existing geotechnical, hydrological, ecological and archaeological conditions onsite. These conditions will be considered by the Contractor in the construction, operation and decommissioning of this Proposed Development and the prescribed measures complied with.
- Section 3: Overview of Construction Works, this section provides an overview of the construction works proposed and drainage and sediment controls to be installed.
- Section 4: Environmental Management Plan (EMP), this section outlines the main requirements of the EMP and outlines controls for the protection of the environment for example soil management, waste management, traffic management, site drainage management, site reinstatement & decommissioning, habitat and archaeology management etc.
- Section 5: Safety & Health Management Plan, this section defines the work practices, procedures and management responsibilities relating to the management of health and safety during the design, construction and operation of the Proposed Development.
- Section 6: Emergency Response Plan contains predetermined procedures to ensure the safety, health and welfare of everybody involved in the Proposed Development and to protect the environment during the construction phase of the Proposed Development.

2.4.3 Traffic Management

A careful approach will be taken to planning the entirety of the works associated with the Proposed Development to ensure minimal impacts on road users and the public.

A Traffic Management Plan will be adopted, in consultation with Galway City and County Council, to provide a safe environment for road users and construction workers. A Traffic Management Plan is contained in the CEMP. In the event permission is granted for the Proposed Development the Traffic Management Plan will be finalised following the appointment of the contractor for the main construction works to address the requirements of any relevant planning conditions, including any additional mitigation measures that are conditioned and will be submitted to the planning authority for agreement.

2.4.3.1 Construction Haul Routes

The stone required for the construction of the internal access roads will be sourced from licensed local quarries.

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

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

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

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

2.4.3.2 Dust Suppression

In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. If necessary, water will be taken from stilling ponds in the site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and the construction compound to prevent the generation of dust. Silty or oily water will not be used for dust suppression, because this would transfer the pollutants to the haul roads and generate polluted runoff or more dust. Water bowser movements will be carefully monitored, as the application of too much water may lead to increased runoff. A site speed limit will also be adhered to which will assist in suppressing dust on the Proposed Development site.

2.4.3.3 Vehicle Washing

Wheels or vehicle underbodies are often washed before leaving sites to prevent the build-up of mud on public (and site) roads. A vehicle or wheelwash facility will be provided at the Proposed Development and will be used by vehicles entering and exiting the Site. The site roads will be well finished with non-friable, compacted hardcore, and so the public road-going vehicles will not be travelling over soft or muddy ground where they might pick up mud or dirt. A road sweeper will be available if any section of the public roads were to be dirtied by trucks associated with the Proposed Development.

2.4.4 Soil and Peat Management

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

2.4.5 Surface Water Management and Site Drainage

Site drainage at the Proposed Development will implement Sustainable Drainage Systems (SuDS). This design approach ensures that existing drainage patterns will be maintained throughout the Site.

An appropriate drainage design as proposed for this development is the primary mitigation measure for the protection of waterbodies, incorporating silt protection infrastructure and control measures to reduce the rate of surface water runoff from the wind farm site.

The drainage system will be constructed alongside all turbine hardstands, internal access tracks, substation and the temporary construction compounds. The drainage system for the existing tracks and roads will be retained. Where the roads require widening, this will involve the re-location of existing roadside swales to allow for widening.

As standard and best practice approach, surface water runoff attenuation and drainage management are key elements against impacts on surface water bodies and will be included as part of the Proposed Development as per the Surface Water Management Plan (EIAR Appendix 12.2).

Two distinct methods will be employed in the management of construction surface water runoff. The first method involves keeping clean water clean by avoiding disturbance to natural drainage features, minimising any works in or around drainage features, and diverting clean surface water flow around excavations and construction areas. The second method involves collecting any drainage waste from works areas within the site that might carry silt or sediment, and to route them towards settlement ponds prior to controlled diffuse release over vegetated natural surfaces. There will be no direct discharge to surface water.

'Clean' water is separated from 'dirty' water utilizing interceptor drains as illustrated in Image 2-1 below. The interceptor drains will be installed on the upslope side of the construction area. This will reduce the amount of water from the construction area that will need to be treated before it can be safely discharged into the environment. Collected clean water will be carried under wind farm infrastructures by cross drains at regular intervals to ensure the original hillside flow is not impeded. The cross drains will be connected to a diffuse outfall to allow collected water to disperse overland.

The proposed access tracks will be constructed from a permeable aggregate material which allows the runoff to infiltrate underground. The excess water will drain into the swales which will be connected, during the construction stage, to the settlement ponds. The settlement ponds will have a diffuse outfall which will disperse the flow across the site. On completion of the works the settlement ponds will be filled in and the swales will be connected to a diffuse outfall.

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

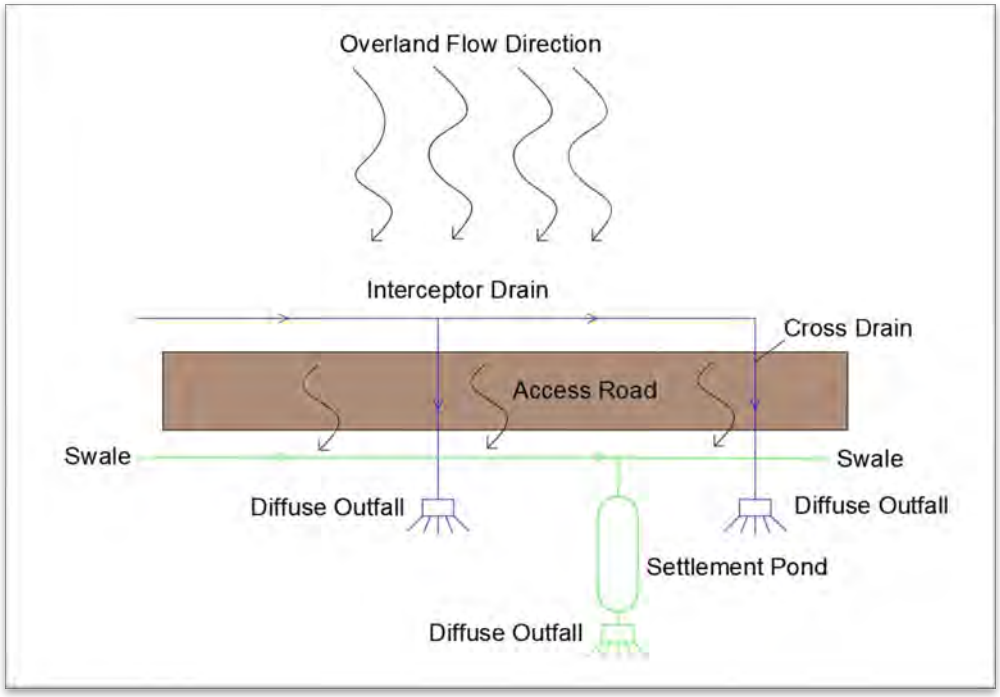

Image 2-2: Drainage Diagram

The settlement ponds will be designed in the accordance with CIRIA C648. The volume of a settlement pond is related to the area draining into it. Any upslope runoff from site will be diverted from ponds. This is achieved by interceptor drains as discussed above.

Suspended solids will settle out only when the water is still. It is necessary to retain the water in the settlement pond for several hours to allow the suspended solids to settle out. Retention time depends on the particle size, disturbance of the water, depth of water, temperature and particle density. Retention time of 2h is applied for designing the ponds as outlined in CIRIA C648. This will allow silts to settle out.

CIRIA C648 recommends designing the outfall from the ponds to accommodate 1 in 10 years storm event, for this Proposed Development the outfalls will be designed to accommodate flows associated with 1 in 100-year event. The settlement ponds will be 1.0m deep.

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

2.4.6 Waste Management

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

The Developer, in conjunction with appointed contractor, will prevent, reduce, reuse and recover as much of the waste generated on site as practicable and ensure the appropriate transport and disposal of residual waste to off-site licensed facilities. The location of these facilities are identified in Table 2-9. This is in line with the relevant National Waste Management Guidelines and the European Waste Management Hierarchy, as enshrined in the Waste Management Act 1996, as amended.

Any waste generated during the Proposed Development construction phase will be collected, source separated and stored in dedicated receptacles at the temporary compounds during construction. It will be the responsibility of the contractor for the main construction works (when appointed) to nominate a suitable site representative such as a Project Manager, Site Manager or Site Engineer as Waste Manager who will have overall responsibility for the management of waste.

Table 2-8: Licensed Waste Facilities in the Vicinity of Shancloon Wind Farm

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

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

Table 2-9: Anticipated Waste Quantities for Wind Farm Development

		Reuse		Recycle/Recovery		Disposal	
Waste Type	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	1200	10	120	80	960	10	120
Timber/Wood	1000	40	400	55	550	5	50
Plasterboard	360	30	108	60	216	10	36
Metals	300	85	255	10	30	5	15
Concrete	200	20	40	65	130	15	30
Other	540	20	108	60	324	20	108
Total	3600		1031		2210		359

2.4.7 Temporary Construction Compounds

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

- Compound 1 (east) near site entrance 12,400m2 in area
- Compound 2 (west) near T2 3,600m2 in area
- Compoun3 at substation 2,300m2 in area

Wheel wash facilities will be provided within the site near the site entrance point. Facilities to be provided in the temporary site compounds will include the following:

site offices, of Portacabin type construction;

Portaloos;

bottled water for potable supply;

a water tanker to supply water used for other purposes;

canteen facilities;

material/non-fuel storage areas;

employee parking;

bunded fuel storage

contractor lock-up facility;

diesel generator;

waste management areas.

The construction compounds will be established by removing topsoil down to a firm substrate, laying down geotextile material and then constructing a working surface of stone sourced from within the Site, and surrounded by security fencing. The topsoil will be removed and stored in accordance with the Spoil Management Plan contained within the CEMP.

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

2.5 Operation

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

During the operational period, the turbines will operate automatically on a day-to-day basis, responding by means of anemometry equipment and control systems to changes in wind speed and direction. The turbine manufacturer or a service company will carry out regular maintenance of the turbines. Scheduled services will occur twice a year.

The operation of the wind turbines will be monitored remotely, and an operative working from a remote headquarters will oversee the day to day running of the proposed wind farm.

The applicant is applying for permission for a 30-year operational period from the date of full operational commissioning of the wind farm. With permission for the onsite substation and grid connection sought in perpetuity given that the substation will form part of the national electricity network. Therefore, the substation will be retained as a permanent structure and will not be removed.

30 years is the anticipated minimum useful lifespan of wind turbines which are being produced for the market today. The lifespan of wind turbines has been increasing steadily in recent years and allowing this duration will improve the overall carbon balance of the development, therefore maximising the amount of fossil fuel usage that will be offset by the wind farm. Leaving the wind turbines in-situ until the end of their useful lifespan would be optimum from an environmental viewpoint, particularly in relation to carbon savings.

2.5.1 Routine Maintenance

Wind farms are designed to operate largely unattended and during the operational phase the wind farm will normally be unmanned. Each turbine will have its own in-built supervision and control system that will be capable of starting the turbine, monitoring its operation and shutting down the turbine in the case of fault conditions.

Supervisory operational and monitoring activities will be carried out remotely with the aid of computers connected via a telephone modem link.

Visits will be necessary to carry out routine inspection and preventive maintenance. A light vehicle will be required for routine access, occurring about once weekly, and in the event of any unscheduled fault conditions. In the unlikely event of a major component failure, a mobile crane will be required on site.

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

2.5.2 Community Gain

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

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

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

2.5.3 Risk of Major Accidents and Disasters

The CEMP includes an Emergency Response Plan (ERP). It provides details of procedures to be adopted in the event of an emergency relating to health & safety or environmental protection.

2.5.3.1 SEVESO

The Proposed Development is not connected with or in close proximity of any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations (SEVESO sites), therefore no significant effects associated with major industrial accidents involving dangerous substances are anticipated.

2.5.3.2 Fire

In accordance with Article 19 of the Safety, Health and Welfare at Work Acts 2005 (as amended), the Proposed Development shall be subject to a fire safety risk assessment which will assist in the identification of any major risks of fire on site.

2.5.3.3 Ground Conditions

Ground conditions within the Site were assessed against the Scottish Government's 2017 guidance document, 'Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments'. Intrusive ground investigation works were carried out as part of the peat stability assessment included peat depth probing, shear strength testing, ground augering/coring, trial pitting, geophysics and rotary core sampling. The findings of the peat assessment showed the minimum, maximum and mean peat depth on site to be 0.0m, 8.0m and 2.29m respectively.

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

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

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

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

2.5.3.4 Traffic

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

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

Traffic Management Plan (TMP) is provided specifying details relating to traffic management (Appendix 14.2, Volume III). Prior to the commencement of the construction phase of the Proposed Development a detailed Traffic Management Plan will be prepared by the Contractor for agreement with the relevant local authorities and An Garda Síochána.

2.5.3.5 Climate and Flooding

Design

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

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

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

Construction

The works programme for the construction stage of the development will take account of weather forecasts and work will be suspended in the case of extreme weather events. The following forecasting and weather warning systems are available and will be used on a daily basis at the site to direct proposed construction activities:

General Forecasts: Available on a national, regional and county level from the Met Eireann website (www.met.ie/forecasts). These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates;

Weather Warning or Advisories: Met Éireann's main suite of warnings are issued by the duty forecaster between 10am and midday and are updated as necessary as new information becomes available. In general, warnings will not be issued more than 60-hours ahead of the expected adverse weather but advisories on potential hazards are issued up to a week in advance. The three warning categories are:

- Yellow: Not unusual weather. Localised danger.
- Orange: Infrequent. Dangerous/disruptive.
- Red: Rare. Extremely dangerous/destructive.

MeteoAlarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale.

Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events;

Rainfall Radar Images: Images covering the entire country are freely available from the Met Eireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3-hour record is given and is updated every 15 minutes. Radar images are not predictive.

Consultancy Service: Met Eireann provide a 24-hour telephone consultancy service. The forecaster will provide interpretation of weather data and give the best available forecast for the area of interest.

2.6 Decommissioning

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

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

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

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

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

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

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

The key site targets are as follows;

- Ensure decommissioning works and activities have minimal impact/disturbance to local landowners and the local community;
- Ensure decommissioning works and activities have minimal impact on the natural environment;
- Adopt a sustainable approach to decommissioning; and,
- Provide adequate environmental training and awareness for all project personnel.

The key site objectives are as follows;

- Using recycled materials if possible, e.g. soil and overburden material for backfilling and reinstatement;
- Ensure sustainable sources for materials supply where possible;
- Avoidance of any pollution incident or near miss as a result of working around or close to existing watercourses and having emergency measures in place;
- Avoidance of vandalism;
- Keeping all watercourses free from obstruction and debris;
- Correct implementation of the sustainable drainage system (SuDS) drainage design principles;
- Keep impact of decommissioning works to a minimum on the local environment, watercourses, and wildlife;
- Correct fuel storage and refuelling procedures to be followed;

- Good waste management and housekeeping to be implemented;
- Air and noise pollution prevention to be implemented;
- Monitoring of the works and any adverse effects that it may have on the environment. Decommissioning methods will be altered where it is found there is the potential to have an adverse effect on the environment;

2.6.1 Wind Turbines

Prior to any works being undertaken on wind turbines, they will be disconnected from the grid by the site operator in conjunction with ESB Networks and EirGrid. The dismantling and removal of wind turbines of this scale is a specialist operation which will be undertaken by the turbine supplier that completed the installation where possible. Turbine dismantling will be undertaken in reverse order to methodology employed during their construction. A number of large-scale cranes will be brought back to site utilising the existing hard stand areas. The dismantling of turbines will be bound by the same safety considerations as was the case during construction in terms of weather conditions where works will not be undertaken during adverse weather conditions and in particular not during high winds.

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

The transport of disassembled turbines from the site will be undertaken in accordance with a Transport Management Plan which will be issued to and agreed with the competent authority at that time as part of a permit application for the delivery of abnormal loads using the local roads under the Road Traffic (Special Permits for Particular Vehicles) Regulations 2007. The Transport Management Plan will provide for all necessary safety measures, including a convoy and Garda escort as required, off-peak turning/reversing movements and any necessary safety controls.

2.6.2 Turbine Foundations

On the dismantling of turbines, it is not intended to remove the concrete foundation from the ground. It is considered that its removal will be the least preferred options in terms of having potential effects on the environment. Therefore, the turbine foundations will be backfilled and covered with soil material from areas of earthworks. The soil/peat will be spread and graded over the foundation using a tracked excavator and revegetation allowed to occur naturally.

2.6.3 On-site Underground Cabling (for Turbines)

The electrical and fibre optic cabling that connects each turbine will be removed from the cable ducting. The cabling will be pulled from the cable duct using a mechanical winch which will extract the cable and re-roll it on to a cable drum. This will be undertaken at each of the joint bays/pull pits along the cable. The road will be excavated using a mechanical excavator at each cable pulling pit location and will be fully re-instated once the cables are removed. The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance for an underground element that is not visible.

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

3. EXISTING ENVIRONMENT

3.1.1 Desktop Assessment

A desk study (last updated in May, 2025) was carried out to inform the AA screening and NIS and to collate available information on special conservation interests of SPAs and qualifying interests of SACs. Data referenced is as follows:

- Aerial imagery of the Site and surrounding lands (captured in 2022)
- Tailte Éireann National Land Cover Map
- OSI Aerial photography and 1:50000 mapping
- Geological Survey Ireland (GSI) maps and data
- OPW drainage and flood maps
- Baseline flood model prepared for the Proposed Development
- Flora (Protection) Order Map Viewer – Vascular Plants, Charophytes and Lichen
- Flora Protection Order Map Viewer – Bryophytes
- Article 17 GIS and Metadata - Terrestrial Habitats Storymap
- Article 17 GIS and Metadata - Terrestrial Species Storymap
- EPA website datasets (land, soil and water)
- Wetland survey Ireland wetland maps:
- North East Galway Wetland Field Survey 2022
- North East Galway Wetland Audit 2021
- Inland Fisheries Ireland open data portal4
- Galway County Development Plan 2022-2028
- Mayo County Development Plan 2022-2028
- The Botanical Society of Britain and Ireland (BSBI) does not hold any botanical data for 10km grid (M35) in which the Site is located.

3.1.2 Consultation

The Development Application Unit (DAU)/ National Parks and Wildlife Service (NPWS) (consultation reference G Pre00069/2023) - An informal meeting was held with NPWS on 10th October 2023 the aim of which was to present the findings of ecological field surveys to date and to focus on the road crossing of the Cloonbar Bog (raised bog habitat). NPWS advised that where feasible, as part of wind farm design, opportunity should be taken to block bog drains at Cloonbar bog. NPWS noted the proposed alignment of the road along the periphery of the bog, which will take a path through bog habitat which is subject to scrub encroachment and will be a floated road design. NPWS also advised that they anticipate a Natura Impact Statement would be required for the Proposed Development.

[4] https://opendata-ifigeo.hub.arcgis.com/

Inland Fisheries Ireland (IFI) - provided a consultation response in August 2023, noting that the site of the Proposed Development falls within the Lough Corrib catchment which supports salmonid species. IFI emphasised the need to ensure that the Proposed Development does not have an effect on water quality or on hydromorphology of the watercourses in the catchment and that natural flow paths on site are maintained. IFI recommended retention and maintenance of settlement ponds for the operational phase. IFI raised concerns about possible effects of soil instability on watercourses and recommended specialist geotechnical assessment. They also noted the need to manage and mitigate against impacts from peat and spoil management on site. IFI requested that the use of sedimentary rocks, such as shale, in road construction should be avoided. This type of material has poor tensile strength and is liable to be crushed by heavy vehicles thereby releasing fine sediment materials into the drainage system which are difficult to precipitate. IFI noted that clear-span bridges are the preferred option for all watercourse crossings. Instream works (and works adjacent to waters) should be confined to the open season which is from 1st July to 30th of September. The EIA/NIS should include proposals for monitoring all watercourses within the development boundary.

3.1.3 Hydrology, Hydrogeology and Geology

Hydrology

The Proposed Development is located within one waterbody catchment: the Corrib catchment (Hydrometric Area 30). The lands are highly channelised, characterised by an extensive network of field drains, ditches and first-order streams which have been straightened and deepened in places through land management practices, including through arterial drainage. The Proposed Development is located within the OPW's Corrib-Headford arterial drainage scheme. Site topography is relatively flat, resulting in generally smooth, laminar flow. There are no naturally occurring lakes or reservoirs within the Site. There are heavily modified surface waterbodies within the Site.

The Site is located within the Black[SHRULE]_010 sub-basin. The Site drains to the Togher River and its tributaries, which generally drain in a westerly direction. The Togher River drains into the Black River at the western extent of the Site. The Black River in turn drains in a south-westerly direction, until its terminus at Lough Corrib, approximately 10 km southwest of the Site boundary.

The Proposed Development is in the Corrib catchment and is drained by Black (Shrule) river and the Togher River and its' associated tributaries. The Black (Shrule) River flows into Lough Corrib SPA and SAC.

The Proposed Development includes three new infrastructure crossings of the BLACK (SHRULE)_010 (Togher River, IE_WE_30B020200):

- Culvert crossing near the source of the river (Culvert No CV14, ITM 535417.3152, 755371.7636): the river at this location has been historically drained and straightened. Flows are sluggish and river substrate comprises soft mud. Riparian vegetation comprises scrubby Willow, Alder and Gorse. Instream vegetation comprises Water Starwort (Callitiche stagnalis), Water Mint, Water Horsetail (Equisetum fluviatile), Yellow Marsh Marigold (Caltha palustris), Bulrush (Typha latifolia) and Broad-leaved Pondweed (Potamogeton natans).
- New bridge crossing (ITM 533089.53, 754307.53) on Togher River: This river has been historically drained, straightened and deepened. River substrate is soft peaty mud. Riparian vegetation comprises Willow and Alder, while instream vegetation comprises Water Mint, Watercress, Varigated Yellow Pond-Lily, European Bur-Reed, Common Reedgrass (Phragmites australis), Broadleaved Pondweed, Mare's-Tail.

- HDD crossing (ITM 529758.48,753338.06) on Togher River: This river has been historically drained, straightened and deepened. River substrate is dominated by cobbles which are heavily silted. Riparian vegetation included Ash, Hawthorn, Blackthorn, Willow and Alder. Instream vegetation includes Water Mint, Watercress, Water Starwort, Mare's-Tail (Hippuris vulgaris), Marsh Marigold, Long-Leaf Pondweed (Potamogeton nodosus), Varigated Yellow Pond-Lily, Common Water-Plantain (Alisma plantago-aquatica), Filamentous Green Algae, Water Forget-Me-Not, Water Dropwort, Water Horsetail (Equisetum fluviatile), Star Duckweed, European Bur-Reed, Common Clubrush (Schoenoplectus lacustris) The Third Schedule invasive species Water Fern (Azolla filiculoides) and Canadian Pondweed (Elodea canadensis) occur in this stretch of the river (noting that E. canadensis is not listed in the European Union (Invasive Alien Species) Regulations 2024).

Additionally, the existing OPW bridge crossing structure ref. 9664 B2 on channel C4/13 (Togher River) will be used to access lands in which turbines T1 to T4 will be constructed.

Water Quality

Within the Black(Shrule)_SC_010 sub-catchment, the WFD ecological status is assigned as 'Poor' for the largest waterbody - the BLACK(SHRULE)_10. The assigned status is based upon an assessment of 'Poor' Fish Status. All other monitored conditions (hydromorphological, invertebrate and supporting chemical conditions) are identified as representing at least 'Moderate' status.

The status improves downstream along the Black River, with the BLACK(SHRULE)_020 classed as 'Moderate' status' where the assigned status is driven by a moderate invertebrate status; and further downstream the BLACK(SHRULE)_030 classed as 'Good' status, before the river terminates at Lough Corrib.

The upstream sections of the Black River (BLACK[SHRULE]_010 and BLACK[SHRULE]_020) are identified as being 'At Risk' from agricultural pressures and hydromorphology. The further upstream section (BLACK[SHRULE]_010) is also 'At Risk' from extractive industry; which the BLACK[SHRULE]_020 is also 'At Risk' from domestic wastewater.

Flood Risk

A site-specific flood risk assessment (FRA) including justification test has been prepared for the Project in accordance with the 'Planning System and Flood Risk Management Guidelines' (DOEHLG, 2009) and Departmental Circular PL2/2014 and is provided in Appendix 12.3, Volume III.

The assessment and analysis undertaken has determined that the location of the proposed substation and the grid connection route and loop-in do not fall within a delineated predictive fluvial Flood Vulnerable Zones Flood Zone 'A' or Flood Zone 'B'. The location of the proposed sub-station and grid connection route therefore fall within Flood Zone 'C'.

The location of proposed turbines T01, T02, T03, T04, T05, T06, T08, T09, T10 and T11 do not fall within a delineated predictive fluvial Flood Zone 'A' or Flood Zone 'B'. The location of these proposed turbines therefore fall within Flood Zone 'C'.

The location of proposed turbine T07 falls within a delineated predictive fluvial Flood Zone 'A' and Flood Zone 'B'.

The following measures have been built in to the design of the wind farm in order to manage against flood risk and to ensure a robust and sustainable development:

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

Geology and Hydrogeology

The Site is predominantly underlain by the Ardnasillagh Formation comprising dark cherty calcarenites (limestone) and thin shales. The GSI groundwater karst mapping indicates there are no karst features located within 1km of the Site. A geotechnical site reconnaissance survey undertaken from 18th to 21st January 2022 and the 4th and 5th April 2023, identified surface karst features (predominantly collapse dolines) throughout the Proposed Development lands. These features are believed to form along unmapped fault lines that create zones of weakened and fractured rock beneath the overlying Quaternary deposits (predominantly Glacial Till). The fault zones allow for piping of the fine-grained portion of the Glacial Till, through fractured rock, resulting in voiding and eventual collapse of the soils overlying the limestone bedrock. The result is a broadly circular bowl-shaped depression of varying widths and depths.

The GSI's Groundwater Body (GWB) data sets indicate the Site lies within the Clare-Corrib GWB, which covers an area of approx. 1,422 km2. Karstification within the rock units of the Clare-Corrib GWB is described as being widespread. However, this is not the case for the Site, which is predominantly underlain by muddy limestone lithologies containing shale interbeds (Ardnasillagh Formation), which is less prone to dissolution due to its low Calcium Carbonate (CaCO3) content. Only surface karst features are recorded within the Site.

Groundwater at the Site flows in the general direction of the topography and surface watercourses, which is predominantly towards the southwest. The composition of the Ardnasillagh Formation indicates a low permeable bedrock. This is notable in relation to potential groundwater pathways from the Proposed Development to SACs and SPAs i.e. while the groundwater flow path is to the southwest, the nature of the bedrock geology (i.e. the Ardnasillagh Formation) indicates low transmissivity and low potential for connectivity to the groundwater dependent protected habitats located in the wider environment, the closest being Shrule Turlough SAC (000525) located 2.5 km northwest of the Site. Rather groundwater flow will be in a southwest and groundwater-surface water interaction will be at a local scale.

When in flood, surface water from the Shrule Turlough SAC flows in a southerly direction to Lough Lee via an arterial drainage channel. Flows from Lough Lee similarly flow in a southerly direction to the BLACK (SHRULE)_020 river. This hydrological connection is located downstream of the Proposed Development and given that flows are in the direction away from the turlough and away from the Proposed Development, there is no potential surface water connectivity between the Shrule Turlough SAC and the development.

3.1.4 Ecological Baseline

Ecological field assessments to inform the Appropriate Assessment were focussed on habitats and species protected under the habitats Directive and were designed following the consideration of the findings of the desk study and having regard to scoping consultation carried out as part of the EIAR. Chapter 9 - Biodiversity and Chapter 10- Ornithology of the EIAR sets out the dates and survey methods employed.

3.1.4.1 Habitats

Detailed botanical surveys and habitat classification was undertaken on the following dates: 06th, 07th and 08th October 2021, 19th and 20th January 2022, 26th September 2022, 22nd June 2023 and from 01st to 03rd May 2024. All habitats within the proposed development boundary and 500m thereof were classified based on desktop assessment and detailed aerial imagery. All lands within the development boundary were subject to detailed botanical assessment.

The methodology used during botanical survey was based on the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (2011) and CIEEM 'Good Practice Guidance for Habitats and Species' Version 3 May 2021. The classification of habitats recorded during the field survey is based on the 'A Guide to Habitats in Ireland' (Fossitt, 2000). 'The Interpretation Manual of European Union Habitats [EUR28]' and Article 17 reports were used to evaluate whether links with Annex I habitats exist.

A habitat map of the Proposed Development lands is provided in Figure 9.3a, Figure 9.3b and Figure 9.3d, Volume IV.

The Proposed Development is predominantly located within improved agricultural grassland habitat (GA1) (often in mosaic with wet grassland (GS4)) and within cutover bog (PB4), areas of willow scrub (WS1), conifer plantation (WD4), raised bog (PB1) and calcareous and neutral grassland (GS1) in mosaic with dry calcareous heath (HH2). There is also a large area of dry-humid acid grassland (GS3) associated with Cloonbar East Wetland. Waterbodies within the Site include a network of drainage ditches, small streams/watercourses classified as lowland depositing rivers, many of which are the subject of arterial drainage. The hedgerows and treelines within the Site are mainly associated with the agricultural lands and waterbody riparian areas.

Improved Agricultural Grassland GA1

Most of the turbines and access roads are located within agricultural lands. The turbines in the central parcel of the Site (T6, T8 and T9) and their associated hardstandings and access tracks are located within intensively managed agricultural grassland and sparsely vegetated treelines and hedgerows. Similarly, the 110 kV infrastructure (substation and loop-in) are located within intensively managed grasslands. The uniform sward is dominated by perennial rye-grass *Lolium perenne*, with Yorkshire-fog *Holcus lanatus*, and white clover *Trifolium repens*. The forbs component was species poor and consisted of species such as creeping buttercup (*Ranunculus repens)*, dandelion (*Taraxacum officinale* agg.), and ribwort plantain (*Plantago lanceolata)*. It is likely that regular reseeding and fertilisation of the grassland occurs. Soft rush (*Juncus effusus*) and thistles (*Cirsium* spp.) were present in damper areas of the grassland. Self-seeded herbs listed above increase the diversity of this habitat somewhat and the presence of clover is beneficial to pollinators. However, it is predominantly an intensive monoculture crop managed for grazing and as such is of limited biodiversity value.

Given the habitat is species poor and common in the area, it is assessed as being locally important, lower value.

Plate 3-1: Lands at T8: Improved grassland (GA1) with managed hedgerows (WL1)

Plate 3-2: Relevé at T9

Hedgerows WL1

A limited number of hedgerows are present predominantly bounding the improved grassland fields within the Site. The hedgerows are sparse, intensively managed, and frequently grade to stone walls. Species composition was dominated by Hawthorn (Crataegus monogyna) and Gorse (Ulex europaeus) with Crack-willow (Salix fragilis) present in wetter areas. Understory species included Common Nettle (Urtica dioica), lesser celandine (Ficaria verna), cleavers (Galium aparine), Brambles (Rubus fruticosus) and mosses including Rhytidiadelphus squarrosus.

The hedgerows may still provide commuting habitat for mammals, bats or birds despite intensive management regimes and were assessed to be of locally important, higher value.

Stone walls BL1

These low features help delineate improved grassland fields. The stonewalls are low and dominated by grasses of the agricultural fields.

The walls have low floristic diversity and limited habitat potential of these walls makes it locally important, higher value. No evidence of usage by mammals e.g. Pine Marten (Martes martes) was observed on site during field surveys.

Treelines WL2

Several treelines are present throughout the Site, with trees ranging from between 5m and 8m in height. Understory vegetation was sparse, and beech *(Fagus sylvatica*) and ash (*Fraxinus excelsior*) were a common component of the habitat. The habitat has the potential to offer roost sites for bats and breeding locations for birds as well as commuting opportunities for species. Therefore, it is locally important, higher value.

Mosaic of Wet Grassland GS4 and Improved Agricultural Grassland GA1

The turbines within the west of the Site (T2, T3 and T4), Construction Compound # 2, and the meteorological mast are located within improved grassland in mosaic with wet grassland. Management of the grassland is less intensive than the improved agricultural grassland towards the centre of the Site. The habitat mosaic is species poor with typical agricultural grassland species in mosaic with Rushes (Juncus spp.) and Yorkshire-fog, which dominate the species composition in the wetter areas. Creeping buttercup, marsh thistle (Cirsium palustre) and silverweed (Potentilla anserina) were also present. Evidence of grazing was apparent at the time of the surveys.

The wet grassland towards T2 has a greater species diversity than the adjacent grasslands in which T3 and T4 are proposed. The wet grassland fields do not correspond with the Annex 1 habitat '*Molinia meadows [6410]*' as they are species poor and often rank where grazing is lighter. As such they are locally important, lower value.

Plate 3-3: General View of Grassland Habitat from T4 Looking Northwest

Plate 3-4: Habitat at T2

Plate 3-5: Habitat at T3

Cutover Bog PB4

Cutover bog is present at T1, T5, T7, T10 and T11.

This habitat type covers a broad range of conditions from bare peat and dry but vegetated peat. The habitat frequently occurred in a mosaic alongside other habitats including scrub. The cutover varies in its characteristics throughout the site with active turf cutting evident in areas during the Site surveys. The vegetation communities associated with cutover bog are largely dominated by common cottongrass (Eriophorum angustifolium) on dry peats with little to no Sphagnum spp. present. Other typical species include black-bog-rush (*Schoenus nigricans*), deergrass (*Trichophorum cespitosum*) and ling (Calluna vulgaris), glaucous sedge (Carex flacca), bog-myrtle (*Myrica gale*), bog asphodel (Narthecium ossifragum) and red dead-nettle (*Lamium purpureum*) were also present. Encroaching willow (*Salix* spp.) scrub and grassland was common in many areas. Where this encroachment dominated, habitats were classified accordingly.

According to Smith and Crowley (2020) the cutover bog vegetation assemblages within the Site equate to 'Eriophorum angustifolium cutover bog type (LS2)', 'Eriophorum angustifolium–bare peat cutover bog (BP2)' and 'Molinia caerulea cutover bog (LS3)' which are defined by Smith and Crowley as habitat types of low conservation importance and generally low species richness (noting that the bare peat type cutover bog habitat has good restoration potential, especially if there is a seasonally high water table).

The vegetation communities associated with the cutover bog habitat within the Site do not conform to Annex I type habitats. As such the habitats are assessed as being of locally important, higher value.

Plate 3-6: Habitat at T1

Plate 3-7: Habitat at T5

Plate 3-8: Habitat at T7

Plate 3-9: Habitat at T11

Plate 3-10: Aerial View of Cutover Bog and Scrub Habitat Near T7, with Black (Shrule) Watercourse

Raised Bog PB1

The Proposed Development includes the construction of a piled and floated road along the periphery of Cloonbar Bog. Cloonbar Bog includes areas of Active Raised Bog (Annex I habitat type code 7110). Article 17 mapping for this habitat is based upon an assessment of aerial photography carried out in 2013. The mapped extent of the bog is 1.04km2 with the extent of active raised bog being mapped as 0.25ha (given as a minimum, based on Aerial Photographs). The proposed access track for the wind farm will traverse the periphery of the bog, in parallel with the Black (Shrule) river. Habitat characterisation of the lands to be traversed by the Proposed Development has been carried out as part of the EIAR and NIS for the Proposed Development. The peatland is heavily encroached by scrub at this location and does not correlate to active raised bog habitat.

The habitat within Cloonbar Bog, within the footprint of the proposed floated road, comprises a linear swath of lower ecological value scrub (WS1) which parallels the Black (Shrule) watercourse/arterial drainage channel. The vegetation is dominated by Gorse, Bog-myrtle (Myrica gale), Yorkshire-fog (Holcus lanatus) and Common Knapweed (Centaurea nigra). Additionally, the following species are occasional throughout: Sweet Vernal-grass (Anthoxanthum odoratum) Creeping Thistle (Cirsium arvense), Brambles (Rubus fruticosus), Broad-leaved Rush (Juncus planifolius), Purple Moorgrass, Daisy (*Bellis perennis*), White Clover, Ribwort Plantain (Plantago lanceolata), Heath Spotted orchid (Dactylorhiza maculata), Royal Fern (Osmunda regalis), Glaucous Sedge (Carex flacca), Rough Hawkbit (Leontodon hispidus), Devils-bit Scabious, Tormentil (Potentilla erecta) and Marsh Thistle (Cirsium palustre). Scattered in low numbers within the scrub habitat are Self-heal (Prunella vulgaris), Jointed Rush (Juncus articulates) and Alder (Alnus glutinosa).

Plate 3-11: Scrub Habitat (WS1) along Access Track Alignment

This scrub habitat gives way to more typical raised bog habitat as one moves further into Cloonbar Bog in a northwestern direction. The bog here is dry with patches of bare peat and is surrounded by facebanks and cutover bare peat to the south. There is no permanent infrastructure proposed within this raised bog habitat as part of the Proposed Development, however this habitat is within the red line boundary. The intact Annex I type degraded and active raised bog habitat within Cloonbar Bog is located beyond the footprint of the Proposed Development (Plate 3-12) and is assessed as being of National Importance.

Plate 3-12: Cloonbar Bog: High Bog Habitat Beyond the Red Line Boundary

Dry neutral grassland GS1

Dry neutral grassland occurs at T5 and at the proposed location of the access track to T6. These grasslands are not subject to the same intensive agricultural improvement as the surrounding grasslands. They are lightly grazed with frequent rush (Juncus spp.) present throughout. A range of typical species were present including bents (*Agrostis* spp.), meadow-grasses (*Poa* spp.) and Yorkshire-fog. A range of common boradleaved herbs were also present including clovers (*Trifolium* spp.), Common Knapweed (*Centaurea nigra*), Common Bird's-foot Trefoil (*Lotus corniculatus*) and Cat's-ear (*Hypochoeris radicata*).

Lands west of the proposed new bridge crossing and adjacent to T5 at Beagh More North Cutover are classified in Article 17 mapping as Dry Heath (Annex I habitat type code 4030). However, Article 17 mapping here is inaccurate as reflected in the Map of Irish Wetlands (WMI_GA566), and habitat survey carried out for the purpose of this EIAR/NIS which shows the habitat to the west of the bridge crossing as agricultural grassland and at Beagh More North Cutover as a mosaic of cutover bog and degraded raised bog habitat.

The main construction compound for the Proposed Development (Construction Compound 1), is located at the east of the Site within dry heath habitat (HH2) grading to dry calcareous and neutral grassland (GS1) with a high level of scrub encroachment by Crack-willow (Salix fragilis), Birch, (Betula pubescens), Hawthorn and Gorse (Ulex europaeus). Small areas of wet flushes containing bog cotton (less than 2-3 m) are sparsely dispersed within the heath habitat, with Bell Heather (Erica cinerea) comprising 35-40% of groundcover. Purple Moor-grass (Molinia caerulea) dominates.

The above grasslands do not correlate to Annex I type habitat 'semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometea) (*important orchid sites) (6210)', and the heath is not Dry Heath - Annex I habitat type code 4030, given the level of scrub encroachment. However, the grassland/heath offer value to pollinators and ground nesting bird species and as such is assessed to be of local importance, higher value.

Dry humid-acid grassland GS3

The habitat within the Cloonbar East Wetland comprises dry-humid acid grassland (GS3). The grassland was heavily grazed (horses and sheep, but also signs of hare and rabbits) with a very short sward and mosses evident in all areas. Species composition was dominated by red fescue (*Festuca rubra*), Yorkshire-fog and glaucous sedge. Other grasses present in abundance within the habitat included sweet-vernal grass (*Anthoxanthum odoratum*) and rough meadow grass (*Poa trivialis*) while field wood-rush (*Luzula campestris*) was also occasional. Forbs present consisted of cat's ear, daisy (*Bellis perennis*), red dead-nettle, ribwort plantain, common milkwort (*Polygala vulgaris*), and creeping thistle (*Cirsium arvense*).

While there are no turbines proposed within this habitat, a floated access road and turning head associated with T11 will be located within this habitat.

The heavily grazed nature of the habitat means it's of limited use to pollinators and ground nesting birds (albeit Skylark, Golden Plover, Curlew and Snipe have been recorded in this habitat during field survey). Proper management / grazing regime of these grasslands could allow a future evolution into a more species rich grassland.

This is a non-Annex type habitat with no links to '*species-rich Nardus grasslands on siliceous substrates in mountain areas (6230)' given the paucity of positive indicator species as per O'Neill et al. (2013). Therefore, the habitat was assessed as being locally important, lower value.

Cloonbar East Wetland is mapped as Dry Heath (Annex I habitat type code 4030) in Article 17 mapping. It is noted that the data to inform the mapping came from multiple sources and ranges in age from the years 1998 to 2010. The area was surveyed in 2021/22 and mapped as part of the Map of Irish Wetlands (site code: WMI_GA560) and is given a 'C Rating: Local conservation value (high value)'. The Map of Irish Wetlands describes the lands as follows: "Sward height particularly in the grassland is low due to grazing. Heath dominates in the south but grades into grassland throughout. It also has bog characteristics with abundant Calluna vulgaris, Eriophorum angustifolium and Narthecium ossifragum". The habitat characterisation of the lands to be traversed by the Proposed Development, as carried out as part of this EIAR/NIS similarly reflects the findings of the Map of Irish Wetlands studies, in that the heath habitat is present only to the south of the mapped extent of the Article 17 mapping.

Plate 9-13: Dry-humid Acid Grassland (GS3) at Cloonbar East Wetland

Scrub WS1

The Scrub habitat within the Site is predominantly a mosaic habitat of gorse/willow scrub that is relatively open in nature with patches of scilaceous heath and is associated with recolonised cutover peat with no sphagnum cover. Species assemblages tend to be dominated by gorse (*Ulex europaeus*) monoculture with willow, hawthorn (*Crataegus monogyna*) and birch (*Betula pubescens*) also present in patches. Hawthorn hedges which have grown outwards were also classified as scrub. The understory was comprised of bramble (*Rubus fruticosus* agg.), nettle (*Urtica dioica*), timothy (*Phleum pratense*), rough meadow-grass (*Poa trivialis*), Broad-leaved Rush (Juncus planifolius), Common Knapweed (Centaurea nigra), Wild Privet (Ligustrum vulgare), Common Nettle (Urtica dioica), and purple moor-grass. Willow and gorse were also present on recolonised areas of cutover peat with no *sphagnum* cover. Patches which were more open in nature showed characteristics more consistent with siliceous heath. Areas which had been grazed formed a mosaic with wet grassland.

At T1 a small patch of habitat within a linear section of scrub has graded beyond the characteristics of scrub and aligns more towards Bog woodland (WN7). It comprises semi mature trees with birch and willow species abundant. However, it does not align to Annex I type habitat, '*bog woodland (91D0)', as refers to woodland of intact raised bog, and this habitat is located on cutover peat.

The semi-natural character of scrub habitat makes it locally important, higher value.

Plate 9-14: Gorse scrub (WS1)/Wet grassland (GS4) mosaic

Broadleaved woodland WD1

The broadleaved woodland on site surrounds the farmyard buildings within the western land parcel (derelict house and cattle shed adjacent to occupied farmhouse). The understory is largely bare and species poor. Tree species include beech, ash, cypress spp. and sycamore (*Acer pseudoplatanus*). The derelict building is a confirmed bat roost and as such the trees surrounding the building provide foraging habitat and potentially opportunistic roosting habitat. These mature trees may also provide nesting habitat for birds. The majority of these trees (and farm buildings) will be retained as part of the Proposed Development. The habitat is assessed as being of locally importance, higher value given that it is known to support bats.

Conifer Plantation WD4 and (Mixed) Conifer Woodland WD3

The turbine accommodation works PoI ref. 16 will oversail and overrun into third party land where trees and vegetation will be cleared (1,355 m2 in area out of a planted area of 23,752 m2). These lands comprise mixed conifer woodland (WD3) dominated by Sitka Spruce (Picea sitchensis) with scattered Ash (Fraxinus excelsior) and Beech (Fagus sylvatica).

The 33 kV cable for the turbines will be routed through planted conifer forestry which comprises Sitka Spruce (Picea sitchensis) and Lodgepole Pine (Pinus contorta). An area of 4,085 m2 will be felled (out of a total planted area of 71,745 m2).

At T10, an area of 7,450m2 of an immature Douglas Fir (Pseudotsuga menziesii) forestry, with some intermittent Sitka Spruce will be removed to create a bat buffer around the turbine.

Ground flora in these habitats is underdeveloped and species poor (with ivy dominating) as is typical due to the lack of light able to penetrate the canopy. Monocultures offer little in the way value to biodiversity.

These habitat types are assessed as locally important, lower value.

Depositing/lowland rivers FW2

The watercourses within the Site were identified as Lowland/depositing rivers. Historic dredging and straightening were evident throughout. Flows varied from moderate to low at the time of surveying. In-stream habitat consisted predominantly of pool and glide. Substrates comprised of soft sediment with occasional hard substrates also present. Abundant growth of aquatic macrophytes were present at sections. The Togher River was assessed as suitable to support salmonid species and being of high fishery value while the upper sections of the Black (Shrule) river had low fishery value and the lower reaches being of high fishery value. Riparian vegetation varied from sparse to dense in areas. The watercourses are of suitability to otter (Lutra lutra) as signs (spraints & slide) were found during the site surveys. Additionally, Kingfisher (Alcedo atthis) was recorded on the Togher River.

The watercourses within the Site have been assessed as County Importance.

Plate 9-15: Togher River near HDD Crossing

Plate 9-16: Watercourse Near Culvert Crossing on Black (Shrule)

Drainage ditches FW4

The Proposed Development lands are extensively drained with drainage channels, many of which are part of the Corrib Headford Arterial Drainage Scheme, which others are associated with land drainage for turbary and agriculture. Where the Proposed Development interacts with these drains, they will be culverted, the locations of which are shown in the 100 series planning drawings.

The drains vary in character and scale, ranging from small swales/bog drains, some holding water and with low fishery potential through to larger arterial ditches with in-stream habitat suitable to provide moderate fishery value.

No significant areas of permanent open water are present within the Proposed Development Site.

The drainage ditches in the study area are locally important, higher value due to their potential to host breeding amphibians and to have some fishery value.

Plate 9-17: Example of Drains within the Study Area

3.1.4.1.1 Summary of Protected Habitats

As described in the preceding sections, none of the habitats present within the Site are Annex I Type habitats. The Active Raised Bog (Annex I habitat type code 7110) within Cloonbar Bog is located beyond the footprint of the Proposed Development, and beyond the red line boundary. Beyond the red line boundary, within Cloonbar Bog, the habitat becomes wetter as you move away from the influence of the Black (Shrule) river/arterial drainage channel. However, there is a land drain located 6.2m beyond the red line boundary which is influencing adjacent habitat quality by drawing down the water table locally and essentially forms a hydrological break between the main Cloonbar Bog habitat and the proposed development lands.

None of the habitats within or immediately adjacent to the Proposed Development are QI habitats within any SAC.

3.1.4.2 Terrestrial Species

Mammals

In Ireland, several mammal species are protected within Special Areas of Conservation (SACs) under the EU Habitats Directive. These are otter, bottlenose dolphin, harbour porpoise, and common seal. Given the Proposed Development is located inland, the focus of mammal survey to inform appropriate assessment was on otter. Survey was carried out on 26th September 2022 and 1st June 2024 and in accordance with:

- Chanin P (2003) 'Monitoring the Otter Lutra lutra'. Conserving Natura 2000 Rivers Monitoring Series No 10. English Nature, Peterborough
- National Otter Survey of Ireland 2010/12. Irish Wildlife Manuals No. 76 (Reid, et al., 2013)
- NRA (2008) (Guidelines For The Treatment of Otters Prior to The Construction of National Road Schemes

Focus was on crossing points of drains and watercourses by the Proposed Development Infrastructure and locations where infrastructure is proposed within 150m of any drain or watercourse, with survey extending 200m upstream and downstream of these locations. Additionally, observations of Otter activity were also recorded as part of the aquatic ecology surveys carried out in 2022 (detailed further in Section 3.1.4.1).

No otter resting or breeding sites were recorded within the Proposed Development Site during dedicated otter surveys carried out by Fehily Timoney, which extended 200m upstream and downstream of locations watercourse crossings and where infrastructure was within 150m of any drain or watercourse. Neither were any otter resting or breeding sites recorded during the aquatic surveys of the watercourses in the catchment as conducted by Flynn Furney. However, signs of otter (slides, spraints) were observed on the Togher River and the Black (Shrule) river, and there are prominent mammal paths parallelling the river near T7 which are likely attributable to otter.

Bats

Lesser horseshoe bats are the only bat species in Ireland protected under the Habitats regulations for which it is required that SACs are designated. Bat surveys for the Proposed Development included survey for lesser horseshoe bats and were conducted over the 2020, 2021 and 2023 bat activity seasons by Woodrow Environmental Consultants, with an additional daytime roost assessment conducted in 2024. The study area for bats included the lands within the proposed development boundary, the proposed wind turbines development infrastructure (including temporary construction compounds and the 110 kV infrastructure) plus a 300m buffer. All habitats within the footprint of the works were examined for potential to support bats and significant habitat features located within 100m plus one rotor radius of turbines were assessed.

The surveys encompassed preliminary roost assessments, summer and winter roost inspections, activity surveys (transects and emergence surveys) and static detector surveys.

The following guidelines in relation to bats were adhered to:

- Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). The Bat Conservation Trust, London.
- Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition)'. Collins, J. (ed) (2023). Bat Conservation trust (updated 27th March 2024)
- Guidance on Bat Surveys, Assessment & Mitigation for Onshore Wind Turbine Developments – Version 1.1 NIEA, Natural Environment Division, (2021, Updated April 2024)

- Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation (NatureScot 2021)
- Wind Turbine/Wind Farm Development Bat Survey Guidelines (Bat Conservation Ireland, 2012);
- Bat Survey Guidelines: Traditional Farm Buildings Scheme (Aughney et al., 2008)
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, 2006);

Further details on bat survey methodology are available in Appendix 9.2 – Bat Survey Report, Volume III of the EIAR.

Lesser horseshoe bat was recorded within the survey area, though only in the form of sporadic individual passes. Most calls across all years indicate low numbers commuting through the area, with no calls recorded at the same detector locations between seasons or years indicating that there is no habitat within the proposed development site that is of particular importance as part of a core foraging range or commuting corridor for lesser horseshoe bat. Only one detector showed a greater number of passes in summer 2020 at S.09, located on a hedgerow c. 180m south of T6. Calls suggest foraging or commuting.

Marsh Fritillary

Marsh fritillary (*Euphydryas aurinia*) is Ireland's only legally protected insect species. It is afforded protection under Annex II of the EU Habitats Directive. As part of ecological walkover assessments for the Proposed Development, the habitats within the Site were assessed for suitability to support Marsh Fritillary having regard to the National Biodiversity Data Centre Marsh Fritillary Habitat Condition Form: i.e. sites with the presence of the butterfly's foodplant, devil's-bit scabious Succisa pratensis (see Figure 9.6 of Volume IV of the EIAR for Marsh Fritillary survey areas). Habitats which were determined to be potentially suitable or habitats in good condition to support Marsh Fritillary (as per the habitat condition form) were subjected to dedicated Marsh Fritillary larval web searches on 31st August 2022. The surveys were undertaken within the optimal period for undertaking larval web surveys, i.e. August – September, on dry days, with no rain and little wind. The survey methodology followed that described in the NBDC Marsh Fritillary Larval Web Recording Form and surveys were carried out under dry weather conditions.

Marsh Fritillary larval web search survey confirmed the presence of the species at one location: Tonacooleen West wetland. However, it is located outside of the red line boundary but was included as part of the survey scope as it was considered as part of early design iterations for the development of the 110 kV substation. This wetland is located 695m west of the Proposed Development. Two locations within the Site were assessed through habitat walkover survey as having potential to support Marsh Fritillary: the wet grassland near T2 and the patches of Devils-bit scabious along the turbary road adjacent to cutover bog at Cloonbar Bog. However, as per the NBDC Habitat Condition Assessment for March Fritillary, the grassland were assessed as currently unsuitable for Marsh Fritillary given the low frequency of Succisa per m2 (~5%) and the level of grazing at this location (allowing invasion of gorse). The habitat along the turbary road was patchy and has a high frequency of gorse scrub invasion. As such these habitats, in terms of their ability to support Marsh Fritillary are assessed as locally important, lower value, and the Fritillary larval web searches did not result in any webs being identified.

Whorl Snail

As part of ecological walkover assessments for the Proposed Development, the habitats within the Site were assessed for suitability to support these whorl snail species. Targeted whorl snail surveys were carried out within damp pasture and flood plain areas within the Proposed Development lands. The number of monitoring stops within suitable habitat and survey method was in accordance with Long, M.P. & Brophy, J.T. (2013). Surveys were conducted on 08th October 2021, and 27th September 2022. Materials used included a light-coloured tray (onto which to beat vegetation, and onto which snails fall), hand lens (x10) and tablet (Field Maps software). Identification was aided through Mollusc Ireland: https://www.habitas.org.uk/molluscireland/index.html

3.1.4.3 Aquatic Species

Flynn Furney Environmental Consultants conducted aquatic ecology surveys at 12 locations within the Black (Shrule) river and its tributaries (located within the following waterbody catchments: WE_Corrib_Togher_BeaghMore, WE_Corrib_Black_CloghansBeg and WE_Corrib_Black_Cloghmoyne) between July 26th and July 28th 2022.

Survey methodology included a walkover of the watercourses to characterise the river habitats plus assessment by wading with a bathyscope where appropriate. The surveys conformed to the following standards:

- River habitat assessment and hydromorphology assessment (RHAT) in accordance with BS EN 14614:2004 & RHS Manual 2003 Version 1 (2018)
- Assessment of correlation to Annex I habitat 'Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation' mas made against The Interpretation Manual of European Union Habitats - EUR28 (European Commission, 2013) and https://eunis.eea.europa.eu/habitats/10077
- Visual assessment for the presence of aquatic invasive alien species listed on the Third Schedule of the European Communities (Birds & Natural Habitats) Regulations 2011 as amended (S.I. No. 477 of 2011)
- Fishery habitat appraisal, specifically focusing on Salmonids, Salmo spp., (Hendry& Cragg-Hine, 2003); Lamprey Lampetra spp., (Maitland, 2003); White-Clawed, Crayfish, Austropotamobius pallipes, (Holdich, 2003 & Peay, 2003) and Freshwater Pearl Mussel, Margaritifera margaritifera, (Skinner et al., 2003).
- Water quality biological analysis (Toner et al., 2005)

An additional confirmatory aquatic ecology walkover survey was conducted by Fehily Timoney Ecologists between 12th and 14th August 2024 to assess the validity of the aquatic ecology surveys given passage of time, based on and assessment of any change in the baseline aquatic environment. Confirmatory walkovers determined that there had been change from the initial baseline determined in 2022 and as such no additional surveys were recommended. The results of the Flynn Furney aquatic ecology surveys remain valid and are representative of the current baseline environment.

See Appendix 9.3 of Volume III of the EIAR for further details.

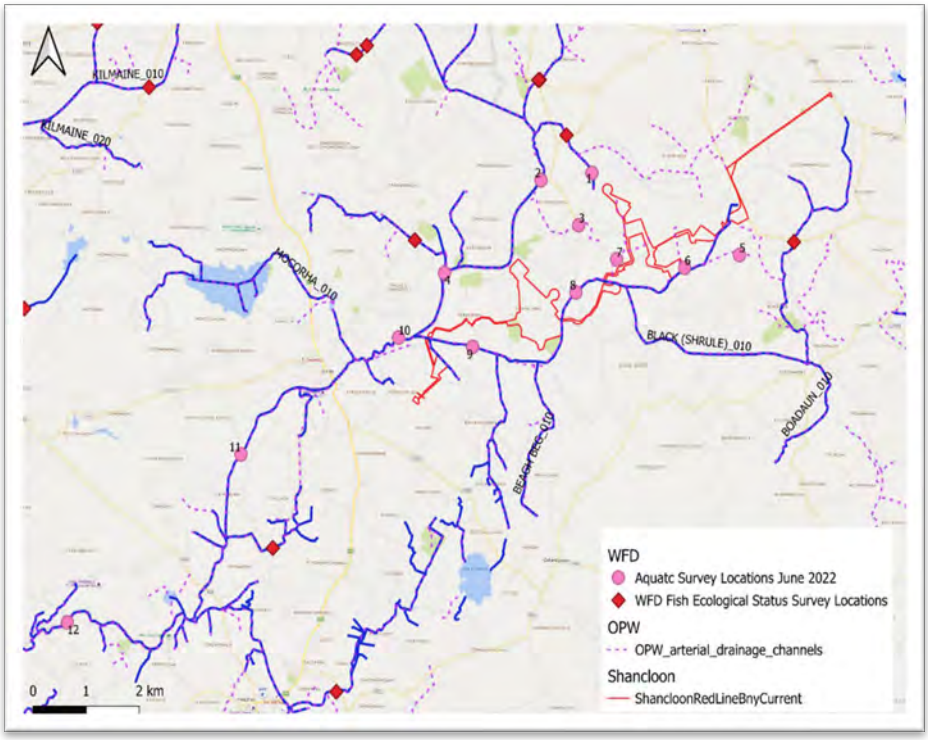

Image 3-1: Aquatic Survey Locations

Three species of fish were observed in the study area namely, three-spined stickleback (Gasterosteus aculeatus), brown trout (Salmo trutta sp.) and salmon (Salmo salar). The watercourses provide some suitable habitat for European eel (Anguilla anguilla) and lamprey spp. also.

No freshwater pearl mussels (Margaritifera margaritifera) were observed during the surveys. Watercourses surveyed were deemed unsuitable for this species due to historic dredging and straightening of river channels a lack stable riverbed substrates such as boulder, cobble and gravel. From this, combined with unsuitable geology and the lack of any historical records of its presence in the Black (Shrule) and Togher Rivers, it can be concluded that freshwater pearl mussel is absent from this river catchment.

No White-clawed crayfish were found at any of the invertebrate sampling sites. Much of the survey sites were deemed low-moderate potential for crayfish due to historic dredging and straightening and therefore, a lack of suitable habitat.

The majority of both the Togher River (and associated tributaries) and the Black (Shrule) River have been heavily impacted by historical dredging, deepening and widening. A kick sample for macroinvertebrates was not acquired at several sample sites during ecological field survey due to the unsuitability of substrates and deep water. Biological analysis indicated water quality status of poor-moderate status throughout the Togher and Black (Shrule) Rivers and associated tributaries. This means that the watercourses are slightly to moderately polluted and are of unsatisfactory status.

No aquatic flora communities with the Annex I habitat 'Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation' (3260) (i.e. 'floating river vegetation') were present at any of the survey sites.

The Third Schedule invasive species Water Fern and Canadian Pondweed occur in the Togher River. Additionally, Crayfish plague is confirmed in the Corrib catchment.

3.1.4.4 Bird Species

Ornithological surveys were conducted by Woodrow Sustainable Solutions within and surrounding the Proposed Development site from April 2019 to September 2024 (excluding 2022). Surveys were carried out adhering to Scottish Natural Heritage guidelines (SNH, 2017)[5]. The following surveys were carried out:

- Vantage point surveys;
- Breeding bird surveys;
- Kingfisher survey
- Hen harrier roost watches
- Winter bird surveys; and
- Hinterland bird surveys.

Full details of ornithology surveys are presented in Appendix 10.1 of Volume III.

3.1.4.5 Target Species Observation (Flight Activity Surveys)

In accordance with SNH guidance (2017), for the purposes of the flight activity surveys (vantage point surveys), the Site is defined not by the red line boundary for the Proposed Development but by a 500m radius circle (buffer) around the proposed wind turbine locations. The proposed turbine locations form the centre point of each of these 500m radius buffers. This study area is called the 'flight activity survey area' and is unique to this survey type. Any target species passing within this 500m buffer from proposed turbine locations (flight activity survey area) is considered within the Site under the SNH (2017) guidance.

During the 2019 - 2020 non-breeding season, 22 target species were recorded within the flight activity survey area. Of these six were red-listed (curlew, golden plover, kestrel, lapwing, snipe, woodcock), nine were amber-listed (black-headed gull, cormorant, hen harrier, lesser black-backed gull, mallard, merlin, mute swan, teal, whooper swan), and seven were green-listed (buzzard, great black-backed gull, grey heron, jack snipe, little egret, peregrine falcon, sparrowhawk). Six are also listed under Annex I of the EU Birds Directive (golden plover, hen harrier, merlin, whooper swan, little egret, peregrine falcon).

During the 2020 - 2021 non-breeding season, 19 target species were recorded within the flight activity survey area. Of these, four species were red-listed (golden plover, kestrel, lapwing, snipe), ten species were amber-listed (cormorant, greylag goose, gyrfalcon, hen harrier, herring gull, lesser black-backed gull, mallard, merlin, mute swan, whooper swan), and five were green-listed (buzzard, grey heron, little egret, peregrine sparrowhawk). Six are also listed under Annex I of the EU Birds Directive (golden plover, hen harrier, little egret, merlin, peregrine and whooper swan).

During the 2019 breeding season, 16 target species were recorded within the flight activity survey area. Of these three were red-listed (curlew, kestrel, snipe), seven were amber-listed (common gull, hen harrier, herring gull, lesser black-backed gull, mallard, merlin), and six were green-listed (buzzard, crane, greenshank, grey heron, sparrowhawk, whimbrel). Three are also listed under Annex I of the EU Birds Directive (hen harrier, merlin, common crane).

[5] Scottish Natural Heritage, now NatureScot - SNH (2017). Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms. SNH Guidance Note (Version 2: March 2017 update).

During the 2020 breeding season, 12 target species were recorded within the flight activity survey area. Of these two were red-listed (kestrel, snipe), five were amber-listed (common sandpiper, herring gull, lesser black-backed gull, mallard, mute swan), and five were green-listed (buzzard, grey heron, peregrine falcon, sparrowhawk, whimbrel). One was listed under Annex I of the EU Birds Directive (peregrine falcon).

During the 2023-24 non-breeding season, 19 target species were recorded within the flight activity survey area. Of these four were red-listed (golden eagle, kestrel, snipe, white-tailed eagle), nine were amber-listed (cormorant, golden plover, grey heron, hen harrier, herring gull, lapwing, lesser black-backed gull, mallard, merlin), and five were green-listed (buzzard, Canada goose, great black-backed gull, little egret, whooper swan). Six are also listed under Annex I of the EU Birds Directive (golden eagle, golden plover, hen harrier, little egret, white-tailed eagle and whooper swan).

During the 2024 breeding season, 18 target species were recorded within the flight activity study area. Of these three were red-listed (golden plover, kestrel, snipe), 11 amber-listed (black headed gull, brent goose, common gull, cormorant, great black-backed gull, herring gull, lesser black-backed gull, mallard, merlin, mute swan, whooper swan) and four were green-listed (buzzard, grey heron, sparrowhawk, whimbrel). Of the mentioned species, three are also listed under Annex I of the EU Birds Directive (golden plover, merlin, whooper swan).

3.1.4.6 Breeding Bird Surveys

Breeding bird surveys were conducted within the 500m buffers surrounding the proposed turbine locations for the presence of breeding waders. Additionally, surveys surrounding 800m from the proposed turbine locations were carried out to determine the presence of curlew. These surveys captured the baseline avian species using the proposed development, as well as their abundance and seasonal visitors of the summer months.

Over the 2019 breeding season, a total of 39 species were recorded. Of the 39 species, one is listed on Annex I of the EU Birds Directive (kingfisher), four are red-listed (curlew, kestrel, meadow pipit, snipe), nine are amber-listed (goldcrest, kingfisher, lesser black-backed gull, linnet, mallard, sand martin, skylark, swallow, willow warbler), and 26 are green-listed. Meadow pipit, snipe, goldcrest, sand martin, skylark and willow warbler were confirmed to be breeding within the study area. The breeding status was not confirmed for linnet and mallard, however surveyors indicated they were likely breeding within the 500m buffer surrounding the proposed turbine locations. Kingfisher were found holding breeding territory outside of this 500m buffer.

Over the 2020 breeding season, a total of 49 species were recorded. Of the 49 species, two are listed on Annex I of the EU Birds Directive (kingfisher, mute swan), three are red-listed (kestrel, meadow pipit, snipe), 13 are amber-listed (goldcrest, greenfinch, house sparrow, kingfisher, lesser black-backed gull, linnet, mallard, mute swan, sand martin, skylark, spotted flycatcher, swallow, willow warbler), and 36 are green-listed.

Over the 2024 breeding season, a total of 51 species were recorded. Of these, five were red-listed (grey wagtail, kestrel, meadow pipit, snipe, swift) and 10 were amber-listed (common gull, goldcrest, lesser black-backed gull, linnet, mallard, sand martin, skylark, starling, swallow, willow warbler and the remaining 36 species are green-listed.

The breeding status of meadow pipit, goldcrest, skylark, and willow warbler was confirmed within the 500m turbine buffer. Linnet, mallard, and skylark were identified as likely breeding within the 500m turbine buffer. Additionally, snipe, kingfisher, and sand martin were recorded breeding and holding breeding territories outside of the 500m turbine buffer

3.1.4.7 Breeding Raptor Surveys

The study area for the breeding raptor surveys comprised a 2km buffer surrounding the proposed turbine locations, as per SNH guidance (2017). VPs, as well as driven and walked transects were used to identify potential nesting habitat within the surrounding hinterland during the breeding seasons.

During the 2019 breeding season, two raptors were observed, namely kestrel and buzzard. Kestrel (red-listed) was identified to the south-west to the 2km buffer. Buzzard (green-listed) was observed to the north and north-east of the 2km buffer. No breeding activity was detected in either raptor species.

During the 2020 breeding season, three raptors were observed, namely kestrel, buzzard and sparrowhawk. Kestrel were observed flying or hunting, within the west of the 500m buffer. A juvenile kestrel was identified flying in this area in July. No nest sites were observed, however records indicate kestrel held a breeding territory within the western portion of the study area in 2020. Surveyors identified buzzard and detected breeding in the northern part of the 2km buffer in July when three fledgling buzzards were observed on an oak tree. Sparrowhawk (green-listed) were observed in the north and north-east of the 500m buffer. One breeding territory was confirmed, and another two potential breeding territories were detected.

During the 2024 breeding season, three raptor species were observed namely buzzard, kestrel and sparrowhawk along with short-eared owl. A male and juvenile kestrel were observed hunting over bog habitats in the west of the 500 m turbine buffer in July. While a nest site was not located, records indicate that kestrel held a breeding territory within the west of the breeding raptor survey area. Buzzards have been confirmed to be breeding in the eastern part of the 500 m turbine buffer in July when one fledging was observed on a spruce.

No hen harrier, peregrine falcon or merlin were recorded within the 2km buffer during these surveys.

3.1.4.8 Winter Walkover Surveys

500m buffers surrounding the proposed turbine locations were examined during the winter walkover surveys / non-breeding seasons. This comprised of surveyors walking the study area and noting all avifaunal species observed, to provide information on the distribution of winter bird species occurring within the Proposed Development and how they use the respective habitats.

During the 2019-2020 non-breeding season, a total of 15 species were recorded. Of the 15 species, four are listed on Annex I of the EU Birds Directive (golden plover, mute swan, little egret, peregrine falcon), five are red-listed (curlew, golden plover, lapwing, snipe, woodcock), five are amber-listed (cormorant, mallard, mute swan, teal, wigeon), and five are green-listed (little egret, grey heron, jack snipe, moorhen, peregrine falcon).

During the 2020-2021 non-breeding season, a total of 22 species were recorded. Of the 22 species, five are listed on Annex I of the EU Birds Directive (golden plover, hen harrier, kingfisher, whooper swan, little egret), six are red-listed (golden plover, kestrel, pochard, shoveler, snipe, woodcock), ten are amber-listed (cormorant, hen harrier, kingfisher, lesser lack-backed gull, mallard, merlin, mute swan, teal, whooper swan, wigeon), and six are green-listed (buzzard, grey heron, jack snipe, little egret, sparrowhawk, whimbrel).

During the 2023-24 non-breeding season, a total of 57 species were recorded. Of these seven were red-listed (golden plover, kestrel, lapwing, meadow pipit, redwing, snipe, woodcock) and 14 amber-listed (cormorant, goldcrest, hen harrier, kingfisher, lesser black-backed gull, linnet, mallard, sand martin, skylark, starling, teal, whooper swan, wigeon and willow warbler). The remaining 36 species are green-listed. Of all, the mentioned species four are also listed under Annex I of the Eu Birds Directive (golden plover, hen harrier, kingfisher and whooper swan).

3.1.4.9 Wintering Waterbird Surveys

SNH (2017) guidelines recommend study areas for wintering waterbirds to occur up to 500m from the Proposed Development to comprehensively examine foraging locations, and up to 1km for roost locations. As swan and goose distributions are not well documented outside of designated sites in Ireland, and as many wintering waterbirds occur outside of SPAs, the wintering waterbird surveys study area was extended to 6km from the proposed development. This allowed turloughs and loughs in the surrounding environment to be studied, and the approach is in line with that employed by Irish Wetland Bird Surveys (I-WeBS).

During the 2019-2020 non-breeding season, a total of 36 species were recorded. Of the 36 species, five are listed on Annex I of the EU Birds Directive (dunlin, golden plover, little egret, ruff, whooper swan), eleven are red-listed (black-tailed godwit, curlew, dunlin, golden plover, goldeneye, lapwing, pochard, redshank, shoveler, snipe, woodcock), 18 are amber-listed (black-headed gull, common gull, coot, cormorant, gadwall, great crested grebe, greylag goose, herring gull, lesser black-backed gull, mallard, mute swan, pintail, ruff, teal, tufted duck, whimbrel, whooper swan, wigeon), and seven are green-listed (great black-backed gull, green sandpiper, grey heron, little egret, little grebe, moorhen, pink-footed goose).

During the 2020-2021 non-breeding season, a total of 24 species were recorded. Of the 24 species, three are listed on Annex I of the EU Birds Directive (golden plover, little egret, whooper swan), five are red-listed (curlew, golden plover, lapwing, pochard, snipe), 13 are amber-listed (greater white-fronted goose, black-headed gull, common gull, cormorant, greylag goose, herring gull, lesser black-backed gull, mallard, mute swan, teal, tufted duck, whooper swan, wigeon), and six are green-listed (great black-backed gull, grey heron, little egret, little grebe, pink-footed goose, whimbrel).

During the 2023-2024 non-breeding season, a total of 33 species were observed. Of these, seven were red-listed (curlew, dunlin, golden plover, lapwing, pochard, shoveler and snipe) and 19 amber-listed ((Greater) white-fronted goose, black-headed gull, common gull, coot, cormorant, gadwall, great crested grebe, greylag goose, herring gull, lesser black-backed gull, mallard, mute swan, pintail, teal, tufted duck, whooper swan, wigeon, barnacle goose, red-breasted merganser, and seven green-listed (great black-backed gull, grey heron, little egret, little grebe, moorhen, pink-footed goose and ring-necked duck). Of the mentioned species, five are also listed under Annex I of the EU Birds Directive (golden plover, (Greater) white-fronted goose, whooper swan, barnacle goose and little egret).

3.1.4.10 Nocturnal Surveys for Snipe, Woodcock, Owls and other crepuscular and nocturnal species

Two dusk surveys were conducted during the 2019 breeding season, and two in the 2020 breeding season, to identify breeding waders, in particular roding woodcock and other crepuscular and nocturnal species such as owls. The study area for these surveys comprised the 500m buffer surrounding the proposed turbine locations.

The surveys conducted during the 2019 breeding season determined there was no potential for breeding woodcock to occur within the 500m buffer surrounding the proposed turbine locations. As such, targeted woodcock surveys were not necessary to repeat during the 2020 breeding season.

During the 2019 breeding season, a total of 12 species were recorded. Of the 12 species, none are listed on Annex I of the EU Birds Directive, three are red-listed (kestrel, meadow pipit, snipe), four are amber-listed (lesser black-backed gull, mallard, skylark, swallow), and five are green-listed (cuckoo, grey heron, reed bunting, song thrush, wren).

During the 2020 breeding season, a total of 17 species were recorded. Of the 17 species, none are listed on Annex I of the EU Birds Directive, two are red-listed (meadow pipit, snipe), six are amber-listed (linnet, mallard, mute swan, skylark, spotted flycatcher, willow warbler), and nine are green-listed (blackbird, buzzard, grey heron, lesser redpoll, mistle thrush, robin, sedge warbler, siskin, stonechat).

3.1.4.11 Kingfisher Surveys

Kingfisher habitat suitability surveys were carried out to determine if there were suitable habitats within the study area for kingfisher. Due to the elusive and territorial nature of kingfisher, any sighting of this species during the breeding season was considered to be holding breeding territory.

During the 2019 breeding bird surveys, kingfisher were detected outside of the 500m turbine buffer, and were considered to be holding territory along the Black (Shrule) River.

During the 2019 VP watches, kingfisher were also detected outside of the 500m turbine buffer, holding territory along the Black (Shrule) River.

During the 2019-2020 non-breeding season, one individual was recorded along the Togher River within the 500m turbine buffer.

Habitat suitability surveys as per Cummins et al. (2010) indicated there are suitable nesting habitats for this species along the Black (Shrule) River (outside of the 500m turbine buffer) and the Togher River (within the 500m turbine buffer). The bird surveys indicated breeding kingfisher territories exist at both of these locations.

3.1.4.12 Hen Harrier Roost Searches

Hen harrier roost searches were conducted in a study area that encompassed 2km from the proposed development, in accordance with SNH (2017) guidelines.

During the 2019-2020 non-breeding season, no hen harrier observations were made during the targeted hen harrier roost searches.

During the 2020-2021 non-breeding season, hen harriers were observed on five instances. A male hen harrier was observed in the south-western portion of the 500m buffer surrounding the proposed turbine locations before dusk. In the same area, two ringtail hen harriers were detected hunting along the Black (Shrule) River and briefly interacting in a display flight.

During the 2023-2024 non-breeding season, no hen harrier observations were made during the targeted hen harrier roost searches.

3.1.4.12.1 Collision Risk Model

A Collision Risk Modelling (CRM) was also carried out in accordance with Band, B (2024)[6] as detailed in Appendix 10.1 of Volume III, Appendix XIII thereof.

The bird occupancy method (Scottish Natural Heritage, 2000) was used to calculate the number of bird transits through the rotors, and the spreadsheet accompanying the Scottish Natural Heritage report was used to calculate collision probabilities for birds transiting through the rotors.

Three turbine models have been subjected to CRM assessment: the Vestas V150 5.6 MW (V150), Nordex 149 5.7 MW (N149), and Siemens Gamesa 155 (SG155). The results of the CRM are presented in Table 3-1.

[6] Band, B. 2024. Using a collision risk model to assess bird collision risks for onshore wind farms. NatureScot Research Report.

Table 3-1: Collision rate estimated by the non-breeding (NB) and the breeding seasons (B) and year-round, applying different avoidance rates.

Turbine	Target species	Collision rate after 0.95 avoidance			Collision rate after 0.98 avoidance			Collision rate after 0.99 avoidance			Collision rate after 0.995 avoidance			Per decade*	Per 30 years*
		NB	B	Year	NB	B	Year	NB	B	Year	NB	B	Year		
SG155	Buzzard	0.09	0.64	0.73	0.04	0.26	0.29	0.02	0.13	0.15	0.009	0.064	0.07	2.92	8.76
	Cormorant	0.19	0.10	0.30	0.08	0.04	0.12	0.04	0.02	0.06	0.019	0.010	0.03	1.19	3.56
	Curlew	0.60	0.01	0.61	0.24	0.005	0.24	0.12	0.002	0.12	0.060	0.001	0.06	2.45	7.34
	Golden plover	22.36	-	22.36	8.95	-	8.95	4.47	-	4.47	2.236	0.0001	2.24	89.45	268.36
	Great black-backed gull	0.04	0.82	0.87	0.02	0.33	0.35	0.01	0.16	0.17	0.004	0.082	0.09	0.87	2.60
	Herring gull	0.75	0.18	0.94	0.30	0.07	0.37	0.15	0.04	0.19	0.075	0.018	0.09	0.94	2.81
	Kestrel	0.28	1.02	1.30	0.11	0.41	0.52	0.06	0.20	0.26	0.028	0.102	0.13	13.03	39.10
	Lapwing	4.86	-	4.77	1.94	-	1.91	0.97	-	0.97	0.486	-	0.49	19.44	58.33
	Lesser black-backed gull	0.19	1.64	1.84	0.08	0.66	0.73	0.04	0.33	0.37	0.019	0.164	0.18	1.84	5.51
	Mallard	0.11	0.18	0.28	0.04	0.07	0.11	0.02	0.04	0.06	0.011	0.018	0.03	1.14	3.42
	Snipe	0.18	0.41	0.58	0.07	0.16	0.23	0.04	0.08	0.12	0.018	0.041	0.06	2.33	6.99
	Sparrowhawk	0.03	0.06	0.09	0.01	0.02	0.04	0.01	0.01	0.02	0.003	0.006	0.01	0.36	1.08
	Whimbrel	-	0.14	0.14	-	0.06	0.06	-	0.03	0.03	-	0.014	0.01	0.58	1.74
	Whooper swan	0.75	-	0.75	0.30	-	0.30	0.15	-	0.15	0.075	-	0.08	0.75	2.26

Turbine	Target species	Collision rate after 0.95 avoidance			Collision rate after 0.98 avoidance			Collision rate after 0.99 avoidance			Collision rate after 0.995 avoidance			Per decade*	Per 30 years*
		NB	B	Year	NB	B	Year	NB	B	Year	NB	B	Year		
N149	Buzzard	0.08	0.53	0.60	0.03	0.21	0.24	0.02	0.11	0.12	0.008	0.053	0.06	2.41	7.24
	Cormorant	0.16	0.09	0.25	0.07	0.04	0.10	0.03	0.02	0.05	0.02	0.009	0.03	1.01	3.03
	Curlew	0.56	0.01	0.58	0.23	0.00	0.23	0.11	0.00	0.12	0.06	0.001	0.06	2.30	6.90
	Golden plover	21.09	-	21.09	8.43	-	8.43	4.22	-	4.22	2.11	-	2.11	84.35	253.04
	Great black-backed gull	0.04	0.82	0.87	0.02	0.33	0.35	0.01	0.16	0.17	0.004	0.082	0.09	0.87	2.60
	Herring gull	0.75	0.18	0.94	0.30	0.07	0.37	0.15	0.04	0.19	0.08	0.018	0.09	0.94	2.81
	Kestrel	0.23	0.86	1.09	0.09	0.34	0.44	0.05	0.17	0.22	0.02	0.086	0.11	10.88	32.64
	Lapwing	4.70	-	4.77	1.88	-	1.91	0.94	-	0.94	0.47	-	0.47	18.81	56.44
	Lesser black-backed gull	0.17	1.42	1.58	0.07	0.57	0.63	0.03	0.28	0.32	0.02	0.142	0.16	1.58	4.75
	Mallard	0.09	0.15	0.25	0.04	0.06	0.10	0.02	0.03	0.05	0.01	0.015	0.02	0.98	2.95
	Snipe	0.13	0.29	0.42	0.05	0.12	0.17	0.03	0.06	0.08	0.01	0.029	0.04	1.68	5.03
	Sparrowhawk	0.03	0.06	0.09	0.01	0.02	0.03	0.01	0.01	0.02	0.003	0.006	0.01	0.35	1.04
	Whimbrel	-	0.14	0.14	-	0.06	0.06	-	0.03	0.03	-	0.014	0.01	0.56	1.69
	Whooper swan	0.68	-	0.68	0.27	-	0.27	0.14	-	0.14	0.07	-	0.07	0.68	2.05
V150	Buzzard	0.07	0.48	0.55	0.03	0.19	0.22	0.01	0.10	0.11	0.007	0.048	0.06	2.20	6.61

Turbine	Target species	Collision rate after 0.95 avoidance			Collision rate after 0.98 avoidance			Collision rate after 0.99 avoidance			Collision rate after 0.995 avoidance			Per decade*	Per 30 years*
		NB	B	Year	NB	B	Year	NB	B	Year	NB	B	Year		
	Cormorant	0.15	0.08	0.23	0.06	0.03	0.09	0.03	0.02	0.05	0.015	0.008	0.02	0.93	2.80
	Curlew	0.53	0.01	0.54	0.21	0.005	0.22	0.11	0.003	0.11	0.053	0.001	0.05	2.18	6.53
	Golden plover	20.70	-	20.70	8.28	-	8.28	4.14	-	4.14	2.070	-	2.07	82.80	248.41
	Great black-backed gull	0.04	0.76	0.81	0.02	0.31	0.32	0.01	0.15	0.16	0.004	0.076	0.08	0.81	2.42
	Herring gull	0.69	0.17	0.86	0.28	0.07	0.35	0.14	0.03	0.17	0.069	0.017	0.09	0.86	2.59
	Kestrel	0.21	0.78	0.99	0.08	0.31	0.39	0.04	0.16	0.20	0.021	0.078	0.10	9.87	29.61
	Lapwing	4.43	-	4.43	1.77	-	1.77	0.89	-	0.89	0.443	-	0.44	17.73	53.18
	Lesser black-backed gull	0.16	1.32	1.48	0.06	0.53	0.59	0.03	0.26	0.30	0.016	0.132	0.15	1.48	4.43
	Mallard	0.09	0.15	0.23	0.04	0.06	0.09	0.02	0.03	0.05	0.009	0.015	0.02	0.94	2.82
	Snipe	0.12	0.28	0.41	0.05	0.11	0.16	0.02	0.06	0.08	0.012	0.028	0.04	1.63	4.89
	Sparrowhawk	0.03	0.05	0.08	0.01	0.02	0.03	0.01	0.01	0.02	0.003	0.005	0.01	0.32	0.95
	Whimbrel	-	0.14	0.14	-	0.05	0.05	-	0.03	0.03	-	0.014	0.01	0.54	1.62
	Whooper swan	0.62	-	0.62	0.25	-	0.25	0.12	-	0.12	0.062	-	0.06	0.62	1.87

*Suggested avoidance rate suggested by SNH (2018) and Furness (2019) (Table A13.3) was used to estimate the number of collisions per decade and for the operational lifespan of the proposed wind farm development (30 years)

Cumulative Collision Risk

There are two proposed (in planning) wind farm developments within 25km of the Proposed Development, namely Clonberne Wind Farm and Laurclavagh Wind Farm along with a consented single turbine development at Cloonascragh. Additionally, there is one operational wind farm within 25km of the Proposed Development, namely Cloonlusk Wind Farm (comprising two turbines). The potential for the Proposed Development to result in cumulative effects with these wind farms was assessed and it was determined that given the size and scale of Cloonascragh and Cloonlusk Wind Farm potential for bird collision is negligible. The predicted number of collisions for SCI bird species recorded at Shancloon, Laurclavagh and Clonberne was determined (see Table 3-2).

Table 3-2: Collision risk on species occuring at all wind farm locations

	Predicted annual collision rates CRM*		
	Shancloon	**Laurclavagh**	**Clonberne**
Golden Plover	2.24	0.787	15.144
Lapwing	1.91	0.234	20.645
Lesser black-backed Gull	0.18	0.198	N/A
Greater black-backed Gull	0.35	1.103	N/A
Snipe	0.23	0.037	1.922
Whooper Swan	0.08	0.051	0.215

* Noting that the Shancloon CRM uses the latest NatureScot Wind Farm Collision Risk Model (updated March 2025), with other wind farms using the older model.

4. SCREENING FOR APPROPRIATE ASSESSMENT

4.1 Introduction

This section of the report presents an examination of whether the Proposed Development could have a significant effect on a European site (either alone or in-combination with other plans or projects).

4.1.1 Identification of relevant European Sites using Source-Pathway-Receptor Model

The process of determining the likelihood of significant effects from a Proposed Development on European sites is an iterative process centred around a Source-Pathway-Receptor model as per OPR, 2021[7]. In order for an effect to be established, all three elements of this mechanism must be in place. The absence of one of the elements of the mechanism is sufficient to conclude that a potential effect cannot occur.

- Source(s) – e.g. pollutant run-off, noise, removal of vegetation, etc.;
- Pathway(s) – functional link, or ecological pathway e.g. watercourse flowing into a downstream SAC; and
- Receptor(s) – the qualifying habitats and species of European sites and ecological resources supporting those habitats/species.

In the context of this report, a source is any identifiable element of the Proposed Development that is known to interact with the receiving environment. A receptor is the Qualifying Interests (QI)[8] for an SAC/cSAC or Special Conservation Interests (SCI)[9] for an SPA/cSPA or an ecological feature that is known to be utilised by the QI/SCI. In practice, the term Qualifying Interests also applies to SCIs (and is used in this document for simplicity). A pathway is any connection or link between the source and the receptor.

The European Commission Notice (2021) on the 'Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC', states that in identifying European sites (Natural 2000 sites), which may be affected by the project, the following should be identified:

- Any European sites geographically overlapping with any of the actions or aspects of the project in any of its phases, or adjacent to them;
- Any European sites within the likely zone of influence (ZoI) of the project. European sites located in the surroundings of the project (or at some distance) that could still be indirectly affected by aspects of the project, including as regards the use of natural resources (e.g., water) and various types of waste, discharge or emissions of substances or energy;

[7] Office of the Planning Regulator. (2021). OPR Practice Note PN01 Appropriate Assessment Screening for Development Management

[8] SACs are areas designated under the Habitats Directive to conserve habitats listed in Annex I of the Directive and plant and animal species listed in Annex II. Collectively these are referred to as the 'Qualifying Interests' or 'QIs' of the SAC / cSAC.

[9] SPAs are sites classified under the Birds Directive to protect rare or vulnerable bird species listed in Annex I to the Directive as well as regularly occurring migratory species and wetlands. Wetland habitats that support internationally important populations of migratory birds may be coastal or inland. Collectively, these species and habitats are referred to as the 'Special Conservation Interests' of the SPA / cSPA.

- European sites whose connectivity or ecological continuity can be affected by the plan or project.

There are no European sites geographically overlapping with any of the actions or aspects of the project. As such, further consideration is given to the 'likely zone of influence' and 'connectivity or ecological continuity'.

4.1.2 Zone of Influence

As per CIEEM guidelines (2018)[10], the ZoI for a Proposed Development is defined having regard to the spatial and temporal scale of potential biophysical changes in the environment which might occur as a result of the development and throughout its lifetime. In considering such potential biophysical changes, the following was considered:

- The potential for biophysical change by disturbance/damage/ degradation to terrestrial habitats is taken as the footprint of the works (including site clearance and accommodation works) plus 50m beyond (based on Ryan Hanley, 2014)[11]. There are no European sites located within 50m of the Proposed Development.
- For groundwater dependant terrestrial ecosystems (GWDTE), regard is had to SEPA guidelines[12] which prescribes a zone for potential hydrogeological effects as 250m from ground works. There are no European sites designated for the protection of GWDTEs located within 250m of the Proposed Development. Shrule Turlough SAC is the nearest at 2.58km from the Site and is outside of the ZOI (noting also hydrological and hydrological flow paths do not connect the development and the SAC as set out in Section 3.1.3).
- The NRA (2008) Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes notes a 150m potential disturbance zone for otter for breeding holts and 20m for non-breeding active holts. As such a potential ZoI is taken as the proposed development plus a 150m buffer. Otter is a mobile species with a potential territory of 20 km (Marnell et al, 2011)[13]. However, in areas with an abundance of food and other resources (as is the case in the Corrib catchment) territories are smaller (Kruuk & Moorhouse 1991)[14]. Of the European sites within a 20km radius of the Proposed Development, only Lough Corrib SAC is designated for the protection of Otter. It is noted that the waterbodies within the Proposed Development lands flow into the SAC 1.46 km downstream, but with the main otter habitat being associated with the larger watercourses and the lakes. While it is unlikely that the otter activity observed within the Proposed Development lands is from otter which form part of the population of the SAC, on a precautionary basis Lough Corrib SAC is considered to be within the ZoI for disturbance to otter.

[10] CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.3. Chartered Institute of Ecology and Environmental Management, Winchester
[11] Ryan Hanley (2014b) Stage 1: Appropriate Assessment Screening Methodology for the Maintenance of Arterial Drainage Schemes. Prepared by Ryan Hanley Consulting Engineers on behalf of the Office of Public Works
[12] Scottish Environment Protection Agency (2014) Land Use Planning System SEPA Guidance Note 31. Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and groundwater Dependent Terrestrial Ecosystems.
[13] Marnell, F., Ó Néill, L., Lynn, D. (2011) How to calculate range and population size for the otter? The Irish approach as a case study. IUCN Otter Spec. Group Bull. 28(8): 15-22.
[14] Kruuk, H., & Conroy, J. W. H. (1991). Mortality of Otters (Lutra lutra) in Shetland. Journal of Applied Ecology, 28(1), 83–94. https://doi.org/10.2307/2404115

- The BCT (2020)[15] identifies core sustenance zones (CSZ) for bats from their roost location. For lesser horseshoe bat (LHB) a 2km CSZ is prescribed. The only SACs located within 2km of the project is the Lough Corrib SAC, however the roosts associated with the SAC are located further away (beyond 2km) and are closer to the Lough Corrib lake itself (located c. 90km from the Proposed Development). Field surveys and desktop assessment identified that there are no summer or winter roosts for LHB within the core foraging range for LHB. The next nearest Special Area of Conservation for lesser horseshoe bats is Kildun Souterrain [002320] and lies approximately 13.5 km west of the Proposed Development. This lies beyond the foraging range of lesser horseshoe bats (2 km). There are no LHB roosts within the ZOI and core sustenance zones from roost locations are similarly not within the ZoI.
- The potential disturbance zone for birds was considered having regard to Cutts et al (2013)[16] and was defined as 500m. There are no Special Protection Areas located within 500m of the Proposed Development. Consideration of connectivity or ecological continuity for birds is set out in Section 4.1.3.

4.1.3 Connectivity or Ecological Continuity

Connectivity or ecological continuity refers to the degree to which different parts of a landscape, ecosystem, or habitat are physically or functionally linked, allowing the movement of organisms, nutrients, energy, or ecological processes across space. Consideration is therefore given to whether there could be landscape[17] or ecological connectivity[18] to any QI or SCI species. In considering connectivity or ecological continuity the following is noted:

- None of the terrestrial habitats that will be lost, damaged or degraded as a result of the Proposed Development are integral to the maintenance of the structure or function of any other habitats within any European sites and do not form continuity with any such habitats. The landbanks in which the development is proposed are isolated in terms of connectivity to European sites by the local drain and waterbody network and by agriculture and forestry land practices in the local environment.

[15] Bat Conservation Trust, BCT (2020) Core Sustenance Zones and habitats of importance for designing Biodiversity Net Gain for bats. Bat Conservation Trust, London.

[16] Cutts N, Hemingway K and Spencer J (2013). The Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects. Produced by the Institute of Estuarine and Coastal Studies (IECS). Version 3.2.

[17] Landscape connectivity is a combined product of structural and functional connectivity, i.e. the effect of physical landscape structure and the actual species use of the landscape.

[18] Connectivity is defined as a measure of the functional availability of the habitats needed for a particular species to move through a given area. Examples include the flight lines used by bats to travel between roosts and foraging areas or the corridors of appropriate habitat needed by some slow colonising species if they are to spread.

- The Institute of Air Quality Management (Holman et al, 2024)[19] states that for sensitive ecological receptors, sensitivity to dust is 'High' up to 20m from the source and reduces to 'Medium' 50m from the source. The guidelines also stipulate that dust deposition from construction and demolition typically occurs up to 500 m from large sites, 200 m from medium sites and 50 m from small sites. A 500m ZoI for dust is adopted given the scale of the proposed development. There are no European sites with 500m of the Proposed Development, however the Togher and Black(Shrule) rivers are located within 500m and connect 1.46 km downstream to the Lough Corrib SAC. As such the SAC is potentially within the indirect ZoI of the Proposed Development through potential effects on ecological continuity (functional link) of the Togher and Black(Shrule) rivers and the Lough Corrib SAC.
- IFI (2020) guidelines[20] indicates that where development is located within 35m to 60m of a watercourse then impacts on the aquatic environment can be expected. The layout of the Proposed Development has been specifically designed to ensure that the major wind farm infrastructure (i.e. turbines, hardstands, substation, met mast and construction compounds) avoid the main watercourses, achieving a minimum 50m setback from watercourses. However, the Proposed Development lands are heavily drained and there will be interaction with land drains as part of the Proposed Development. While these land drains are not themselves ecologically important habitat and do not support QIs, they do provide connectivity to the larger watercourses in the catchment. As such, there is potential for degradation or loss of aquatic habitat of ecological value during the works through indirect effects resulting from water pollution. Additionally, there is potential for disturbance to aquatic fauna during in stream works as associated with the sheet piling adjacent to Cloonbar Bog, and at culvert and bridge crossings associated with internal access roads within the Site. These works will also result in the loss of riparian habitat within the footprint of the bridge/culvert and piling works. The Togher and Black(Shrule) rivers within the project site support Atlantic salmon and have habitat suitability for lamprey species. It is highly likely that these species form part of the populations of the Lough Corrib SAC given the short downstream distance of the SAC and a such the aquatic habitats within the Proposed Development form functional ecological continuity with the SAC. As such the Lough Corrib SAC is considered to be within the ZoI for impacts to aquatic species of the SAC.
- Collins, 2023[21] states that summer and winter LHB roost sites are generally no more than 5-10km apart. Having regard to NPWS database on LHB roosts, the known roosts are located beyond the 5-10km range of the Proposed Development. This is evidenced by the low levels of LHB activity within the Proposed Development lands. As such no ecological continuity is determined.
- Marsh Fritillary - Studies[22] show that marsh fritillaries are capable of dispersal over 1-2 kilometres, however most individuals remain within or close to their natal site. There are no European sites designated for the protection of marsh fritillary located within 2 km of the Proposed Development, in fact there are no SACs designated for this species within 20km. While lands located c. 1km northwest of the substation location have been confirmed, through field survey, to host marsh fritillary, this population is not a population associated with any European site.

[19] Holman et al (2024). IAQM Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London.
[20] Inland Fisheries Ireland (2020) A Guide to the Protection of Watercourses through the use of Buffer Zones, Sustainable Drainage Systems, Instream Rehabilitation, Climate / Flood Risk and Recreational Planning.
[21] Collins J. (ed.) (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition). The Bat Conservation Trust, London

[22] Zimmermann, K., Schtickzelle, N. & Baguette, M. (2005). _Mark–recapture on large spatial scale reveals long-distance dispersal in the Marsh Fritillary, Euphydryas aurinia

- Regard was had to SNH, 2016 'Guidance on Assessing Connectivity with Special Protection Areas (SPAs)', and an initial study area of 20km was adopted (based on the largest documented core foraging range for SPA bird species) in order to determine whether the bird species recorded using the Proposed Development lands could be associated with any SPA. Within this 20 km study area are Lough Corrib SPA (004042), Lough Carra SPA (004051) and Lough Mask SPA (004062) protected for wetland and waterbirds and their associated habitats. Having examined the species for which the SPAs are designated, along with their core foraging ranges and their typical foraging, roosting, breeding and wintering habitat associations, the following was determined in terms of landscape/ecological connectivity to SPAs within 20km of the Proposed Development:
    - Lough Carra SPA is designated for the protection of Common Gull (Larus canus).
        - There were low levels of common gull activity recorded with a total of three records. This species is a coastal breeder a generalist feeder. Although, the habitats present within the redline boundary could support black-headed gull foraging, this species was seen commuting over the site within no evidence of landing or foraging in the site. On this basis, the SPA is not physically or functionally connected to the lands that would be affected by the Proposed Development, and is outside of the ZoI.
    - Lough Mask SPA is designated for Tufted Duck (*Aythya fuligula*) [A061], Black-headed Gull (*Chroicocephalus ridibundus*) [A179], Common Gull (*Larus canus*) [A182], Lesser Black-backed Gull (*Larus fuscus*) [A183], Common Tern (*Sterna hirundo*) [A193], Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395], Wetland and Waterbirds [A999].
        - Tufted Ducks were recorded during the winter waterbird surveys but was not found within the Proposed Development. The closest record was located ca. 2km to the south of the nearest turbine, and it is apparent that the lands that will be affected by the Proposed Development (i.e. within the 500m disturbance zone) do not support Tufted duck.
        - Common tern was not recorded during the ornithology surveys and the lands within the disturbance zone of the Proposed Development are not generally suitable for this species.
        - There were low levels of common gull activity recorded with a total of three records. This species is a coastal breeder a generalist feeder. Although, the habitats present within the redline boundary could support black-headed gull foraging, this species was seen commuting over the site within no evidence of landing or foraging in the site. It is apparent that the lands that will be affected by the Proposed Development (i.e. within the 500m disturbance zone) do not support this species.
        - Lesser Black-backed Gull has been observed flying, foraging and hunting within the habitats of the Proposed Development.
        - Greenland White-fronted Goose - Survey results indicate infrequent activity within the boundary of the Proposed Development. It is apparent that the lands that will be affected by the Proposed Development (i.e. within the 500m disturbance zone) do not support this species.
    - Lough Corrib SPA is designated for Gadwall (*Anas strepera*) [A051], Shoveler (*Anas clypeata*) [A056], Pochard (*Aythya ferina*) [A059], Tufted Duck (*Aythya fuligula*) [A061], Common Scoter (*Melanitta nigra*) [A065], Hen Harrier (*Circus cyaneus*) [A082], Coot (*Fulica atra*) [A125], Golden Plover (*Pluvialis apricaria*) [A140], Black-headed Gull (*Chroicocephalus ridibundus*) [A179], Common Gull (*Larus canus*) [A182], Common Tern (*Sterna hirundo*) [A193], Arctic Tern (*Sterna paradisaea*) [A194], Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395], Wetland and Waterbirds [A999].

- Gadwall and Common Scoter were not recorded within the Proposed Development lands or during bird survey.
- Shoveler was predominantly found roosting and foraging in the turloughs within the wider environment. There was no evidence of regular use of habitat within the footprint of the Proposed Development
- Pochard - there was no evidence of regular use of habitat within the footprint of the Proposed Development
- Tufted Ducks were recorded during the winter waterbird surveys but was not found within the Proposed Development. The closest record was located ca. 2km to the south of the nearest turbine.
- Hen harrier has been recorded hunting within the bog habitats within the proposed development lands.
- Coot was not recorded within the Proposed Development, or within the immediate surroundings of the Proposed Development
- Golden Plover was recorded within the development lands during winter season, with Cloonbar East Wetland noted as an area of higher frequency of usage.
- Black-headed Gull was not recorded using the habitats within or immediately adjacent to the Proposed Development.
- Common tern and Arctic Tern was not recorded during the ornithology surveys
- Greenland White-fronted Goose - Survey results indicate infrequent activity within the boundary of the Proposed Development

- On the basis of the above, it is assessed that Lough Mask SPA and Lough Corrib SPA are within the ZoI of the Proposed Development due to potential for functional connectivity between the development lands and SCI species.

4.2 Summary of S-P-R Assessment

In identifying European sites which may be affected by the project, the following is concluded:

- There are no European sites geographically overlapping with any of the actions or aspects of the project in any of its phases, or adjacent to them.
- Lough Corrib SAC is within the likely zone of influence (ZoI) of the project.
- European sites whose connectivity or ecological continuity can be affected by the project are determined as Lough Mask SPA, Lough Corrib SPA and Lough Corrib SAC.

4.3 Assessment of Likely Significant Effects

This section of the report explains the metrics used when assessing if the potential impacts of the Proposed Development are likely to results in significant effects on European sites.

The European sites with pathways for potential effects arising from the sources for impact from the proposed development are:

- Lough Mask SPA
- Lough Corrib SPA and
- Lough Corrib SAC

The EC Guidance (European Commission, 2021) notes that the significance of the effects will vary depending on factors such as the magnitude of impact, the type, extent, duration, intensity, timing, probability, in-combination effects and the vulnerability of the habitats and species concerned.

These European sites are now examined in Table 3-2 for the potential for likely significant effects in view of the sites' conservation objectives, noting that these European sites have valid and up to date conservation objectives in place as follows:

- Lough Mask SPA - NPWS (2025) Conservation Objectives: Lough Mask SPA 004062. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.
- Lough Corrib SPA - NPWS (2023) Conservation Objectives: Lough Corrib SPA 004042. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage
- Lough Corrib SAC - NPWS (2017) Conservation Objectives: Lough Corrib SAC 000297. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

Table 4-1: Assessment of Significant Effects

a) Identify all potential direct and indirect impacts that may have an effect on the conservation objectives of a European site, taking into account the size and scale of the project under the following headings:	
Impacts:	**Possible Significance of Impacts: (duration/magnitude etc.)**
Construction and Decommissioning Phase	There is potential for the temporary deterioration of aquatic habitats of watercourses which drain the Proposed Development lands due to run-off of pollutants during the construction /decommissioning of the Proposed Development. The Black (Shrule) river and the Togher River flow into the Lough Corrib SAC and Lough Corrib SPA and could result in degradation of supporting habitats for the species associated with these European sites. Third Schedule invasive species Water Fern and Canadian Pondweed occur in the Togher River. In-stream works for the Proposed Development has the potential to contribute to the spread of these invasives to downstream areas within the Lough Corrib SAC. Crossings of the Black(Shrule) and Togher river, and bankside works has potential to result in loss/degradation of aquatic habitat through accidental pollution and direct removal which support fish and lamprey populations likely associated with the Lough Corrib SAC. Additionally, pollution of the Black(Shrule) and Togher rivers has potential to be carried downstream into the Lough Corrib SAC and Lough Corrib SPA, which could result in reduction of aquatic habitat quality within the European Sites. There is potential temporary interruption to otter (associated with the Lough Corrib SAC) commuting / feeding along the riverbanks at the locations of the culvert and bridge crossings and sheet piling works. SCI species associated with Lough Mask SPA and Lough Corrib SPA have been recorded within the Proposed Development lands and surrounding habitats. Direct loss of habitat which supports SCI species due to the development will be relatively small, and the design of the wind farm is such that the road alignment and locations of turbine infrastructure has been selected to minimise the requirement for removal of higher value avian habitat such as scrub, raised bog and woodland. As such the more prominent impact will be the potential for disturbance and / or displacement of birds from these habitats during the construction and decommissioning phases of the development. The duration of disturbance will be short-term and the magnitude of the impact will be relative to the sensitivity of the individual bird species to noise and human presence.
Operational Phase	Significant effects on water quality are not anticipated at any geographic scale during the operation of the Proposed Development given there will be no requirement for in-stream works or earthworks, and the surface water drainage design for the Site maintains runoff to greenfield rates. Riparian corridors of the higher value watercourses within the Site are being retained as part of the Proposed Development design. As such no impacts on otter or aquatic fauna are likely.

a) Identify all potential direct and indirect impacts that may have an effect on the conservation objectives of a European site, taking into account the size and scale of the project under the following headings:	
	The primary cause of direct effects on birds during the operational phase is due to collision with turbine blades. Not all bird species are equally susceptible to collision, and some species suffer proportionately high levels of collision mortality. The Collision Risk Model Report (See EIAR Appendix 10.1, and Appendix XIII thereof) has determined that there will be potential for bird collision due to the wind farm. One of the potential operational effects of wind farms is that the turbines act as a barrier to bird migratory flyways or local flight paths. No evidence of a significant commuting or migratory path over the Proposed Development lands was determined during several years of bird survey at the site and surrounding hinterland (See EIAR Appendix 10.1). No impacts are likely.
In-Combination / Other	Article 6(3) of the Habitats Directive requires that: "*Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives*". It is therefore required that the likely significant effects of the proposed development are considered in-combination with any other plans or projects. The consideration of in-combination effects with other plans or projects focused on the sources of impacts identified for the proposed development and ecological pathways identified through S-P-R assessment. To identify other proposed or permitted development in the area, a planning search was carried out using the online planning enquiry system including from the Department of Housing, Local Government and Heritage planning database and the County Council Planning database. All project considered cumulatively are presented in Appendix 2.4, Volume III of the EIAR/NIS. The small-scale projects include single dwelling houses and extensions to agricultural buildings, none of which projects have any notable environmental effects and none of which are within an SPA or SAC nor do they have S-P-R connectivity to any European Site in terms of ZoI or ecological continuity impacts. There are no proposed or consented wind farm developments that share the sub-catchment or subbasin with the Proposed Development and as such the potential for cumulative degradation of aquatic habitat in Lough Corrib SAC and SPA cannot occur. The OPW will continue to maintain the Corrib Headford Arterial Drainage Scheme on a 4-6 year rolling basis. In-stream works associated with the Proposed Development has potential to act cumulatively with arterial drainage works through sedimentation and risk of accidental pollution.

a) Identify all potential direct and indirect impacts that may have an effect on the conservation objectives of a European site, taking into account the size and scale of the project under the following headings:	
	Turbary turf cutting and forestry activities occur in the vicinity of the Proposed Development and within a shared waterbody catchment. These activities can result in sedimentation of the local drains and watercourses and may be contributary to the existing Poor/Moderate surface water status in the Black(Shrule) river. While potential effects on water quality from peat slippage or sediment runoff form the Proposed Development are deemed unlikely, there is potential for accidental runoff from the Site to act cumulatively with forestry and turbary activities if not properly mitigated. The potential for cumulative effects due to bird collision at the Proposed Development combined with the proposed Laurclavagh and Clonberne wind farms was determined (see Table 3-2).
b) Describe any likely changes to the European sites:	
Lough Corrib SAC	The construction activities associated with the project have the potential to introduce pollutants into the Togher and Black(Shrule) Rivers, which ultimately flows into Lough Corrib SAC. During the construction phase, sedimentation and impacts from concrete wash out, including changes in pH and alkalinity, could alter the rivers natural conditions. These changes may reduce the carrying capacity of Lough Corrib by degrading water quality and surrounding aquatic habitats. The resulting ecological disruption, including the loss of submerged vegetation and alterations in water quality, can destabilise natural structure and function of the necessary to support the aquatic habitats and species of the SAC.
Lough Mask SPA	SCI species potentially associated with Lough Mask SPA have been recorded within the Proposed Development lands and surrounding habitats. Disturbance and / or displacement of birds during construction and decommissioning will be of a short term duration. The SCI bird species of Lough Mask SPA are Tufted Duck, Black-headed Gull, Common Gull, Lesser Black-backed Gull, Common Tern, Greenland White-fronted Goose. The bird mortality due to collision risk from the Shancloon Wind Farm was determined (See Appendix 10.1 of Volume III). Of these species only Lesser Black-backed Gull was determined to have an associated collision risk with the Proposed Development (on the basis of habitat usage and flight activity relative to the wind turbines) and cumulatively with other projects. As per Percival (2003) the magnitude of the effect on bird population can range from negligible (< 1% population lost) to very high (< 20% of population remains) depending on collision risk relative to bird population. There is no other S-P-R connectivity to Lough Mask and as such no other likely changes.

a) Identify all potential direct and indirect impacts that may have an effect on the conservation objectives of a European site, taking into account the size and scale of the project under the following headings:	
Lough Corrib SPA	SCI species potentially associated with Lough Corrib SPA have been recorded within the Proposed Development lands and surrounding habitats. Disturbance and / or displacement of birds during construction and decommissioning will be of a short term duration. The SCI bird species of Lough Corrib SPA are Gadwall, Shoveler, Pochard, Tufted Duck, Common Scoter, Hen Harrier, Coot, Golden Plover, Black-headed Gull, Common Gull, Common Tern, Arctic Tern, Greenland White-fronted Goose. The bird mortality due to collision risk from the Shancloon Wind Farm was determined (See Appendix 10.1 of Volume III). Of the SPA species only Lesser Black-backed Gull and Golden Plover were determined to have an associated collision risk with the Proposed Development (on the basis of habitat usage and flight activity relative to the wind turbines) and cumulatively with other projects. As per Percival (2003) the magnitude of the effect on bird population can range from negligible (< 1% population lost) to very high (< 20% of population remains) depending on collision risk relative to bird population. The construction activities associated with the project have the potential to introduce pollutants into the Togher and Black(Shrule) Rivers, which ultimately flows into Lough Corrib SPA. This can result in degradation of the wetland habitats for which the SPA is designated. There is no other S-P-R connectivity to Lough Corrib and as such no other likely changes.
c) Are 'mitigation' measures necessary to reach a conclusion that likely significant effects can be ruled out at screening?	
☐ **No** ☒ **Yes**	Mitigation measures are needed to avoid water pollution and to manage the potential for direct impacts on aquatic species associated with Lough Corrib SAC during the construction and decommissioning phases of the Proposed Development. Potential need to manage collision risk to SPA bird species may be necessary depending on the magnitude of effect on SPA population.

4.4 Screening Conclusion

In the absence of mitigation measures (which have not been considered at this screening stage), likely significant effects on the qualifying interests and special conservation interests of European sites cannot be excluded beyond reasonable scientific doubt and on the basis of objective scientific information and in light of the conservation objectives of the relevant European sites.

A Natura Impact Statement has been completed in respect of the Proposed Development which assesses the potential for adverse effects on the integrity of:

- Lough Corrib SAC (000297)
- Lough Corrib SPA (004042)
- Lough Mask SPA (004062)

5. NATURA IMPACT STATEMENT

5.1 Introduction

This Natura Impact Statement (NIS) has been prepared to support the competent authority (An Coimisiún Pleanála) in carrying out their appropriate assessment of the proposed Shancloon Wind Farm. The conclusions presented in this NIS are intended to enable the competent authority to ascertain whether the Proposed Development will adversely affect the integrity[23] of the European site(s), in view of the site(s) conservation objectives, with a potential for Source-Pathway-Receptor connectivity to the proposed wind farm.

An appropriate assessment involves the following steps:

- collecting information on the project and on the European site (upon which it has been determined that there is potential for likely significant effects);
- assessing the implications of the project in view the European site's conservation objectives, individually or in combination with other plans or projects;
- ascertaining whether the project is likely to have adverse effects on the ecological integrity of the European site;
- considering mitigation measures (including their monitoring) to avoid or reduce impacts to a level where they will no longer adversely affect the integrity of the European site.

This Natura Impact Statement (NIS) has been prepared in support of the Appropriate Assessment of the Proposed Development to be undertaken by the competent authority. The NIS considers whether the potential impacts of the Proposed Development will adversely affect the integrity of European Sites identified in the AA screening with respect to each site's conservation objectives. Measures are identified to mitigate adverse effects on the integrity of European Sites.

Information on the Proposed Development in presented in Section 2. of this report. A description of the baseline environment is presented in Section 3. and an overview of the European sites identified through the AA screening has have potential for significant effects is provided in 5.2.

5.2 Information on the European Sites

5.2.1 Lough Corrib SAC

Lough Corrib SAC (Site Code: 000297) is a large and ecologically significant freshwater lake in western Ireland, spanning parts of counties Galway and Mayo. It is designated as a Special Area of Conservation under the EU Habitats Directive due to its wide variety of habitats and species of European interest.

[23] The 'integrity of the site' can be defined as the coherent sum of the site's ecological structure, function and ecological processes, across its whole area, which enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is designated.

The site contains several priority habitats including hard water lakes, active raised bogs, degraded raised bogs (still capable of regeneration), alkaline fens, and limestone pavement. Lough Corrib supports important populations of protected species such as the white-clawed crayfish (Austropotamobius pallipes), Atlantic salmon (Salmo salar), otter (Lutra lutra), and lesser horseshoe bat (Rhinolophus hipposideros). The lake and its associated wetlands support a rich flora, including rare and endangered plant species like slender naiad (Najas flexilis). The site is vulnerable to threats such as water pollution, invasive species (notably zebra mussels), drainage, agricultural intensification, and peat extraction.

Table 5-1: Threats, Pressures and Activities with Impacts on the Lough Corrib SAC

Code	Threats & Pressures	Rank (H-high, M-medium, L-low)	Inside (I)/ outside (O)/ both(B)
A.02.01	Acid input/acidification	H	B
C.01.03.02	Agricultural intensification	H	I
G05	Mechanical removal of peat	H	I
H01.08	Other human intrusions and disturbances	H	O
I01	Diffuse pollution to surface waters due to household sewage and waste waters	H	I
C01.01	Invasive non-native species	L	O
E03.01	Sand and gravel extraction	L	I
A04.03	Disposal of household / recreational facility waste	M	I
A08	Abandonment of pastoral systems, lack of grazing	M	B
A10.01	Fertilisation	M	I
B01	Removal of hedges and copses or scrub	M	B
D01	Forest planting on open ground	M	I
D03.01.02	Roads, paths and railroads	M	I
E01.01	Piers / tourist harbours or recreational piers	M	O
E01.03	Continuous urbanisation	M	I
J02.01.03	Dispersed habitation	M	I

5.2.1.1 Qualifying Interests - Specific Information

NPWS (2017) Conservation Objectives: Lough Corrib SAC 000297 and are discussed hereunder.

5.2.1.1.1 [1092] White-clawed Crayfish *Austropotamobius pallipes*

As per the detailed Site-Specific Conservation Objectives (SSCO) document (NPWS, 2017), white-clawed crayfish is known to occur within the aquatic habitat of the SAC. A distribution map is available for this species within the SSCO (Map 10). The total distribution of white-clawed crayfish is unknown. Potential white-clawed crayfish habitat is present adjacent and downstream of the proposed development, however aquatic field survey carried out to inform the EIAR and NIS for the Proposed Development did not find any evidence of crayfish. According to the Article 17 Report (NPWS 2019), the overall Conservation Status for this species is 'Bad' and the overall Conservation Trend is 'Deteriorating'.

Targets and Attributes

The Conservation Objective for White-clawed Crayfish is '*To maintain the favourable conservation condition of White-clawed Crayfish in Lough Corrib SAC.*'

Table 5-2: Targets and Attributes for white-clawed crayfish

Attribute	Target
Distribution rivers	No reduction from baseline
Distribution: Lough Corrib	No reduction from baseline
Population structure: recruitment	Juveniles and/or females with eggs in all occupied tributaries and occupied parts of Lough Corrib
Negative indicator species	No alien crayfish species
Disease	No instances of disease
Water quality	At least Q3-4 at all sites sampled by EPA
Habitat quality: heterogeneity	No decline in heterogeneity or habitat quality

5.2.1.2 Brook Lamprey Lampetra planeri

As per the detailed SSCO document (NPWS, 2017), brook lamprey is known to occur within the aquatic habitat of the SAC. No specific distribution map is available for this species within the SSCO. According to the Natura 2000 Form, permanent brook lamprey populations are present within the SAC. Field survey identified suitable lamprey habitat within the watercourses within the development boundary. According to the Article 17 Report (NPWS 2019), the overall Conservation Status for Brook Lamprey is 'Favourable' and the overall Conservation Trend is 'Stable'.

Targets and Attributes

The Conservation Objective for Brook Lamprey is '*To maintain the favourable conservation condition of Brook Lamprey in the Lough Corrib SAC.*'

Attribute	Target
Distribution	Access to all watercourses down to first order streams
Population structure of juveniles	At least three age/size groups of brook/river lamprey present
Juvenile density in fine sediment	Mean catchment juvenile density of brook/river lamprey at least 5/m²
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds
Availability of juvenile habitat	More than 50% of sample sites positive

5.2.1.3 Sea Lamprey Petromyzon marinus

As per the detailed SSCO document (NPWS, 2017), sea lamprey is known to occur within the aquatic habitat of the SAC. According to the Article 17 Report (NPWS 2019), the overall Conservation Status for sea lamprey is 'Bad' and the overall Conservation Trend is 'Stable'. No specific map is available for this species within the SSCO. Sea lamprey traditionally congregate and build spawning nests in the River Corrib in Galway city, both up- and downstream of the Salmon Weir Bridge. Their further upstream passage is impeded by the regulating weir immediately upstream. It is therefore unlikely that this species is present in the rivers in the vicinity of the proposed development.

Targets and Attributes

The Conservation Objective for Sea Lamprey is '*To restore the favourable conservation condition of Sea Lamprey in the Lough Corrib SAC*.'

Attribute	Target
Distribution: extent of anadromy	Greater than 75% of main stem length of rivers accessible from estuary
Population structure of juveniles	At least three age/size groups present
Juvenile density in fine sediment	Mean catchment juvenile density at least 1/m²
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds
Availability of juvenile habitat	More than 50% of sample sites positive, with a minimum of four positive sites in a catchment, which are at least 5km apart

*5.2.1.4 Salmon (*Salmo salar*)*

As per the detailed SSCO document (NPWS, 2017), Atlantic salmon is known to occur within the aquatic habitat of the SAC. No specific distribution map is available for this species within the SSCO however, there are no barriers to its migration in Lough Corrib SAC. Salmon are known to spawn in the headwaters of Lough Corrib tributaries. According to the Natura 2000 Form, reproducing salmon populations are common within the SAC. Salmon were recorded in the catchment of the proposed development during aquatic field survey. According to the Article 17 Report (NPWS 2019), the overall Conservation Status for Atlantic Salmon is 'Inadequate' and the overall Conservation Trend is 'Stable'.

Targets and Attributes

The Conservation Objective for Salmon is '*To maintain the favourable conservation condition of Salmon in the Lough Corrib SAC.*'

Attribute	Target
Distribution: extent of anadromy	100% of river channels down to second order accessible from estuary
Adult spawning fish	Conservation Limit (CL) for each system consistently exceeded
Salmon fry abundance	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling
Out-migrating smolt abundance	No significant decline
Number and distribution of redds	No decline in number and distribution of spawning redds due to anthropogenic causes
Water quality	At least Q4 at all sites sampled by EPA

5.2.1.5 Otter (Lutra lutra)

As per the detailed SSCO document (NPWS, 2017), otter is known to occur within the aquatic habitat of the SAC. A distribution map is available for this species within the SSCO (Map 12). According to the Article 17 Report (NPWS 2019), the overall Conservation Status for Otter is 'Favourable' and the overall Conservation Trend is 'Improving'. No watercourses are present within the vicinity of the Proposed Wind Farm site. Evidence of otter was recorded along the Black (Shrule) River, however no otter holts or resting places were recorded during field survey.

Targets and Attributes

The Conservation Objective for Otter is '*To maintain the favourable conservation condition of Otter in the Lough Corrib SAC*.'

Attribute	Target
Distribution	No significant decline
Extent of terrestrial habitat	No significant decline. Area mapped and calculated as 1,054ha along river banks/ lake shoreline/around ponds
Extent of freshwater (river) habitat	No significant decline. Length mapped and calculated as 314.2km.
Extent of freshwater (lake) habitat	No significant decline. Area mapped and calculated as 4,178ha.
Couching sites and holts	No significant decline
Fish biomass available	No significant decline
Barries to connectivity	No significant increase.

5.2.1.6 Slender Naiad (Najas flexilis)

According to the SSCO document- *Najas flexilis* (NPWS, 2017a) it is acknowledged that it is likely to be difficult to map and measure the area of *Najas flexilis* habitat in a lake. *Najas flexilis* is typically associated with high water quality, i.e., the absence of eutrophication impacts. According to map 13 of the SSCO document, this species occurs within the northern half of Lough Corrib, and on a precautionary basis has been identified as occurring within the likely Zone of Impact as it is characteristically associated with lake habitat 3130, which has potential to occur throughout the lake. According to the 2019 Article 17 Report, 'The slender naiad (*Najas flexilis*) is a fragile, annual plant that grows in clear-water, lowland lakes. It has an unusual global distribution, being widespread in North America but more restricted in Europe and Asia and is rare and declining in many countries. The core of the species' European range is Ireland and Scotland. The species is considered to occur in 52 lakes in counties Clare, Donegal, Galway, Kerry and Mayo, with most sites found near the coast. It is a glacial relict species that is not colonising new sites, rather it has occupied the same lakes continuously for almost 10,000 years. It is considered to have gone extinct in six lakes. The overall Conservation Status for *Najas flexilis* is 'Inadequate' and the overall Conservation Trend is 'Deteriorating'

Targets and Attributes

The Conservation Objective for Slender Naiad is '*To restore the favourable conservation condition of Slender Naiad in the Lough Corrib SAC*.'

Attribute	Target
Population extent	Restore the spatial extent of *Najas flexilis* within the lake, subject to natural processes
Population depth	Restore the depth range of *Najas flexilis* within the lake, subject to natural processes
Population viability	Restore plant fitness, subject to natural processes.
Population abundance	Restore the cover abundance of *Najas flexilis*, subject to natural processes
Species distribution	Restore to at least the north-western bay, subject to natural processes
Habitat extent	Restore, subject to natural processes
Hydrological regime: water level fluctuations	Maintain appropriate natural hydrological regime necessary to support the habitat for the species
Lake substratum quality	Restore appropriate substratum type, extent and chemistry to support the population of the species
Water quality	Restore appropriate water quality to support the population of the species
Acidification status	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the population of *Najas flexilis*, subject to natural processes
Water colour	Restore/maintain appropriate water colour to support the population of *Najas flexilis*
Associated species	Restore appropriate associated species and vegetation communities to support the population of *Najas flexilis*
Fringing habitat: area and condition	Maintain the area and condition of fringing habitats necessary to support the population of *Najas flexilis*

5.2.1.7 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea

According to the SSCO (NPWS, 2017), the full distribution and characteristics of the Oligotrophic to mesotrophic standing waters lake habitat in Lough Corrib SAC have not been mapped. While the characteristic species slender naiad (*Najas flexilis*) was recorded in the western arm of Lough Corrib, that area appears to be dominated by Oligotrophic waters lake habitat, with the Oligotrophic to mesotrophic standing waters lake habitat found towards the northern basin proper. The division between lake habitats 3130 and 3140 may be difficult to determine and both habitats may occur throughout the lake. The 2019 Article 17 Report states that 'Habitat 3130, 'Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the IsoetoNanojuncetea' has been interpreted as a mixed *Najas flexilis* lake habitat in Ireland. The co-occurrence of *Potamogeton perfoliatus* and *Isoetes lacustris* is also characteristic. Owing to its rare species and relatively high species richness, habitat 3130 is of high conservation value. Ireland is a European stronghold for the habitat and for *Najas flexilis*.' The overall Conservation Status for 3130 lake habitat is 'Inadequate' and the overall Conservation Trend is 'Deteriorating'.

Targets and Attributes

The Conservation Objective for 3130 lake habitat is '*To restore the favourable conservation condition of Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoëto-Nanojuncetea in Lough Corrib SAC.*'

Attribute	Target
Habitat area	Area stable or increasing, subject to natural processes
Habitat distribution	No decline, subject to natural processes.
Typical species	Typical species present, in good condition, and demonstrating typical abundances and distribution.
Vegetation composition: characteristic zonation	All characteristic zones should be present, correctly distributed and in good condition
Vegetation distribution: maximum depth	Restore maximum depth of vegetation, subject to natural processes
Hydrological regime: water level fluctuations	Maintain appropriate natural hydrological regime necessary to support the habitat
Lake substratum quality	Restore appropriate substratum type, extent and chemistry to support the vegetation
Water quality: transparency	Restore appropriate Secchi transparency. There should be no decline in Secchi depth/transparency
Water quality: nutrients	Restore the concentration of nutrients in the water column to sufficiently low levels to support the habitat and its typical species
Water quality: phytoplankton biomass	Restore appropriate water quality to support the habitat, including high chlorophyll a status

Attribute	Target
Water quality: phytoplankton composition	Maintain appropriate water quality to support the habitat, including high phytoplankton composition status
Water quality: attached algal biomass	Restore/maintain trace/absent attached algal biomass
Water quality: macrophyte status	Maintain high macrophyte status
Acidification status	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes
Water colour	Restore/maintain appropriate water colour to support the habitat
Dissolved organic carbon (DOC)	Restore/maintain appropriate organic carbon levels to support the habitat
Turbidity	Restore/maintain appropriate turbidity to support the habitat
Fringing habitat: area and condition	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of habitat 3130

5.2.1.8 Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.

According to the SSCO (NPWS, 2017), the hard water lake habitat is found in Lough Corrib, notably the southern basin. Its exact distribution and area has not been mapped however, and it is likely to also extend along the eastern side of the northern basin, therefore this habitat has been identified as occurring within the likely Zone of Impact. According to the 2019 Article 17 Report, 'The hard-water lake habitat (Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.) is strongly associated with lowland lakes over limestone bedrock. It is also found on calcareous sand at the landward side of machair plains and in canals. The habitat is dominated by algae, particularly stoneworts (*Chara* spp.). Ireland has some of the best European examples of the hard-water lake habitat and, as a result, particular responsibility for maintaining/restoring this natural habitat at Favourable conservation status within the EU. The hard-water lake habitat is under significant pressure from eutrophication, the primary sources of nutrients and organic material being agriculture and municipal and industrial wastewaters. Movement of pollutants, especially phosphorus, through ground water is a significant concern.' The overall Conservation Status for 3140 lake habitat is 'Bad' and the overall Conservation Trend is 'Deteriorating'.

Targets and Attributes

The Conservation Objective for 3140 lake habitat is '*To restore the favourable conservation condition of Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. in Lough Corrib SAC.*'

Attribute	Target
Habitat area	Area stable or increasing, subject to natural processes
Habitat distribution	No decline, subject to natural processes.
Typical species	Typical species present, in good condition, and demonstrating typical abundances and distribution.
Vegetation composition: characteristic zonation	All characteristic zones should be present, correctly distributed and in good condition
Vegetation distribution: maximum depth	Restore maximum depth of vegetation, subject to natural processes
Hydrological regime: water level fluctuations	Maintain appropriate natural hydrological regime necessary to support the habitat
Lake substratum quality	Restore appropriate substratum type, extent and chemistry to support the vegetation
Water quality: transparency	Restore appropriate Secchi transparency. There should be no decline in Secchi depth/transparency
Water quality: nutrients	Restore the concentration of nutrients in the water column to sufficiently low levels to support the habitat and its typical species
Water quality: phytoplankton biomass	Restore appropriate water quality to support the habitat, including high chlorophyll a status
Water quality: phytoplankton composition	Maintain appropriate water quality to support the habitat, including high phytoplankton composition status
Water quality: attached algal biomass	Restore/maintain trace/absent attached algal biomass
Water quality: macrophyte status	Maintain high macrophyte status
Acidification status	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes
Water colour	Restore/maintain appropriate water colour to support the habitat
Dissolved organic carbon (DOC)	Restore/maintain appropriate organic carbon levels to support the habitat

Attribute	Target
Turbidity	Restore/maintain appropriate turbidity to support the habitat
Fringing habitat: area and condition	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of habitat 3130

5.2.1.9 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation

The selection of SACs for this habitat used a broad interpretation of the habitat description, as it is itself broad ranging. According to the SSCO, the habitat description for 3260 ranges from upland bryophyte/macroalgal dominated stretches, to lowland depositing rivers with pondweeds and starworts. There is little known about the characteristics or sub-types in Lough Corrib SAC. Site-specific objectives for the habitat concentrate upon high conservation value sub-types. Many of the rivers included in the Lough Corrib SAC are in arterial drainage scheme which have altered aquatic plant distribution and species composition. According to the NPWS Article 17 Report, the habitat has a broad definition, covering from upland, flashy, oligotrophic, bryophyte- and algal-dominated rivers, to tidal reaches dominated by higher plants. In Ireland, the highest conservation interest is associated with lowland depositing and tidal rivers and unmodified, fast-flowing, low-nutrient rivers. Crow-footed dominated reaches typically have low species diversity and generally indicates poor condition and damage. The main problems for river habitats in Ireland are damage through hydrological and morphological change, eutrophication and other water pollution. Agriculture and municipal and industrial discharges are the most significant sources of nutrient and organic pollution. The overall Conservation Status for this habitat is 'Inadequate' and the Conservation Trend is 'Deteriorating'.

The habitat was not recorded during aquatic surveys at the proposed development Site, Togher River and Black (Shrule) River, however it may occur downstream.

Targets and Attributes

The Conservation Objective for 3260 river habitat is '*To maintain the favourable conservation condition of water courses of plain to montane levels with the Ranunculion fluitantis and CallitrichoBatrachion vegetation in Lough Corrib SAC*.'

Attribute	Target
Habitat area	Area stable or increasing, subject to natural processes
Habitat distribution	No decline, subject to natural processes.
Hydrological regime: river flow	Maintain appropriate hydrological regimes
Hydrological regime: groundwater discharge	Maintain appropriate hydrological regimes
Substratum composition: particle size range	Maintain appropriate substratum particle size range, quantity and quality, subject to natural process

Attribute	Target
Water quality	Maintain appropriate water quality to support the natural structure and functioning of the habitat
Vegetation composition: typical species	Typical species of the relevant habitat sub-type should be present and in good condition
Floodplain connectivity: area	The area of active floodplain at and upstream of the habitat should be maintained
Riparian habitat: area	Maintain the area and condition of fringing habitats necessary to support the habitat and its sub-types

5.2.1.10 Calcareous fens with Cladium mariscus and species of the Caricion davallianae

According to the SSCO (NPWS, 2017), Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* have not been mapped in detail for Lough Corrib SAC and thus total area of the qualifying habitat is unknown. While the full extent of Annex I fen habitats (both this habitat and Alkaline fens) within the SAC is currently unknown, their area is extensive and they often occur in association with and transitional to other habitats including *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (6410), Active raised bogs (7110), Petrifying springs with tufa formation (*Cratoneurion*) (7220) and Limestone pavements (8240) (NPWS internal files). In addition, the document also states that maintenance of groundwater, surface water flows and water table levels within natural ranges is essential for this wetland habitat. According to the 2019 Article 17 Report, the overall Conservation Status for this habitat is 'Inadequate' and the Conservation Trend is 'Stable'.

Targets and Attributes

The Conservation Objective for calcareous fen habitat is '*To maintain the favourable conservation condition of Calcareous fens with Cladium mariscus and species of the Caricion davallianae in Lough Corrib SAC*.'

Attribute	Target
Habitat area	Area stable or increasing, subject to natural processes
Habitat distribution	No decline, subject to natural processes.
Ecosystem function: hydrology	Maintain appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat
Ecosystem function: peat formation	Maintain active peat formation, where appropriate
Ecosystem function: water quality	Maintain appropriate water quality, particularly nutrient levels, to support the natural structure and functioning of the habitat
Vegetation structure: typical species	Maintain vegetation cover of typical species including brown mosses and vascular plants

Attribute	Target
Vegetation composition: non-native species	Cover of non-native species less than 1%
Vegetation composition: trees and shrubs	Cover of scattered native trees and shrubs less than 10%
Physical structure: disturbed bare ground	Cover of disturbed bare ground not more than 10%. Where tufa is present, disturbed bare ground not more than 1%
Physical structure: drainage	Areas showing signs of drainage because of drainage ditches or heavy trampling not more than 10%
Indicators of local distinctiveness	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat

5.2.1.11 Petrifying springs with tufa formation (Cratoneurion)

According to the SSCO (NPWS, 2017), Petrifying springs with tufa formation (*Cratoneurion*) have not been mapped within Lough Corrib SAC and thus the total area of the qualifying habitat in the SAC is unknown. However, the necessary ecological conditions required for this habitat occur around Lough Corrib. The overall Conservation Status for this habitat is 'Inadequate' and the Conservation Trend is 'Deteriorating'.

Targets and Attributes

The Conservation Objective for petrifying spring habitat is '*To maintain the favourable conservation condition of Petrifying springs with tufa formation (Cratoneurion)* in Lough Corrib SAC*.'

Attribute	Target
Habitat area	Area stable or increasing, subject to natural processes
Habitat distribution	No decline, subject to natural processes.
Hydrological regime: height of water table; water flow	Maintain appropriate hydrological regimes
Water quality - nitrate level	No increase from baseline nitrate level and less than 10mg/l
Water quality - phosphate level	No increase from baseline phosphate level and less than 15µg/l
Vegetation composition: positive indicator species	At least three positive/high quality indicator species as listed in Lyons and Kelly (2016) and no loss from baseline number
Vegetation composition: negative indicator species	Potentially negative indicator species should not be Dominant or Abundant; invasive species should be absent

Attribute	Target
Vegetation structure: sward height	Field layer height between 10cm and 50cm (except for bryophyte-dominated ground <10cm)
Physical structure: trampling/dung	Cover should not be Dominant or Abundant

5.2.1.12 Alkaline fens

According to the SSCO (NPWS, 2017), Alkaline fens have not been mapped in detail for Lough Corrib SAC and thus total area of the qualifying habitat is unknown. While the full extent of Annex I fen habitats (both this habitat and Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* (7210)) within the SAC is currently unknown, their area is extensive and they often occur in association with and transitional to other habitats including *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (6410), Active raised bogs (7110), Petrifying springs with tufa formation (*Cratoneurion*) (7220) and Limestone pavements (8240) (NPWS internal files). The overall Conservation Status for this habitat is 'Bad' and the Conservation Trend is 'Deteriorating'.

Targets and Attributes

The Conservation Objective for alkaline fen habitat is '*To maintain the favourable conservation condition of Alkaline fens in Lough Corrib SAC*'.

Attribute	Target
Habitat area	Area stable or increasing, subject to natural processes
Habitat distribution	No decline, subject to natural processes.
Ecosystem function: soil nutrients	Maintain soil nutrient status within natural range
Ecosystem function: peat formation	Maintain active peat formation, where appropriate
Ecosystem function: hydrology	Maintain appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat
Ecosystem function: water quality	Maintain appropriate water quality, particularly nutrient levels, to support the natural structure and functioning of the habitat
Community diversity	Maintain variety of vegetation communities, subject to natural processes
Vegetation composition: number of positive indicator species (brown mosses)	Number of brown moss species present at each monitoring stop is at least one

Attribute	Target
Vegetation composition: number of positive indicator species (vascular plants)	Number of positive vascular plant indicator species present at each monitoring stop is at least two for small-sedge flushes and at least three for black bog-rush (*Schoenus nigricans*) flush and bottle sedge (*Carex rostrata*) fen
Vegetation composition: cover of positive indicator species	Total cover of brown moss species and positive vascular plant indicator species at least 20% for small-sedge flushes and at least 75% cover for black bog-rush (*Schoenus nigricans*) flush and bottle sedge (*Carex rostrata*) fen
Vegetation composition: negative indicator species	Total cover of negative indicator species less than 1%
Vegetation composition: non-native species	Cover of non-native species less than 1%
Vegetation composition: native trees and shrubs	Cover of scattered native trees and shrubs less than 10%
Vegetation composition: soft rush and common reed cover	Total cover of soft rush (*Juncus effusus*) and common reed (*Phragmites australis*) less than 10%
Vegetation structure: height	Proportion of live leaves and/or flowering shoots of vascular plants that are more than 5cm above the ground surface should be at least 50%
Physical structure: disturbed bare ground	Cover of disturbed bare ground less than 10%
Physical structure: drainage	Area showing signs of drainage because of drainage ditches or heavy trampling less than 10%
Physical structure: tufa formations	Disturbed proportion of vegetation cover where tufa is present is less than 1%
Indicators of local distinctiveness	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat

5.2.1.13 Lesser Horseshoe Bat Rhinolophus hipposideros

According to the SSCO (NPWS, 2017) the SAC has been selected for lesser horseshoe bats because of the presence of one important summer roost. The 2019 Article 17 Report, the overall Conservation Status for this species is 'Inadequate' and the Conservation Trend is 'Declining'.

Attribute	Target
Population per roost	Minimum number of 100 bats for summer roost (roost id. 217 in NPWS database).
Summer roosts	No decline.

Attribute	Target
Number of auxiliary roosts	No decline.
Extent of potential foraging habitat	No significant decline.
Linear features	No significant loss, within 2.5km of qualifying roosts.
Light pollution	No significant increase in artificial light intensity adjacent to named roost or along commuting routes within 2.5km of the roost.

5.2.2 Lough Corrib SPA

Lough Corrib SPA is one of Ireland's most important inland waterbird sites, located in County Galway (with some areas extending into County Mayo). It is designated under the EU Birds Directive due to its international significance for breeding and wintering birds. The lake's numerous islands provide ideal nesting and roosting conditions for the SPA species. The site supports a rich diversity of breeding and wintering waterbirds, including:

- Pochard (Aythya ferina) [A059]
- Tufted Duck (Aythya fuligula) [A061]
- Common Scoter (Melanitta nigra) [A065]
- Hen Harrier (Circus cyaneus) [A082]
- Coot (Fulica atra) [A125]
- Golden Plover (Pluvialis apricaria) [A140]
- Black-headed Gull (Chroicocephalus ridibundus) [A179]
- Common Gull (Larus canus) [A182]
- Common Tern (Sterna hirundo) [A193]
- Arctic Tern (Sterna paradisaea) [A194]
- Greenland White-fronted Goose (Anser albifrons flavirostris) [A395]
- Shoveler (Spatula clypeata) [A857]
- Gadwall (Mareca strepera) [A889]

The site holds numbers of certain species that meet or exceed internationally significant thresholds.

Water pollution, disturbance from tourism, boating, and changes to land use around the lake pose risks to bird populations.

Table 5-3: Site specific pressures and threats with potential to impact the European Site

Code	Threats and Pressures	Rank (H-High, M-Medium, L-Low)	Inside/Outside/Both (I/O/B)
F03.01	Hunting	H	I
F02.03	Leisure fishing	H	I
A04	Grazing	L	O
E01	Urbanised areas, human habitation	H	O
G01.01	Nautical sport	L	I
B	Sylviculture, forestry	M	O
A08	Fertilisation	L	O

5.2.2.1 Special Conservation Interests Specific Information

Site Specific conservation objectives for the SPA are set out in NPWS (2023) Conservation Objectives: Lough Corrib SPA 004042, and are discussed hereunder.

5.2.2.1.1 Gadwall (*Anas strepera*)

The National population of over-wintering gadwall in Ireland has increased by 24% from 1994/95 to 2019/20. According to the SSCO for Lough Corrib SPA, the gadwall population has reduced by 40% between surveys undertaken in the periods between 1995-2000 and 2012-2017. Most recent data showed a population of 29 gadwall using the SPA.

Targets and Attributes

The Conservation Objective for Gadwall is '*To restore the favourable conservation condition of gadwall in Lough Corrib SPA.*'

Attributes	Target
Winter population trend	Long term winter population trend is stable or increasing
Winter spatial distribution	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target
Disturbance at wintering site	Disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution

Attributes	Target
Barriers to connectivity and site use	Barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA
Forage spatial distribution, extent and abundance	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target
Roost spatial distribution and extent	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target

5.2.2.1.2 Shoveler (*Anas clypeata*)

The National population of over-wintering shoveler in Ireland has declined by 11% from 1994/95 to 2019/20. According to the SSCO for Lough Corrib SPA, the shoveler population has reduced by 84% between surveys undertaken in the periods between 1995-2000 and 2012-2017. Most recent data showed a population of 15 shoveler using the SPA.

Targets and Attributes

The Conservation Objective for Shoveler is '*To restore the favourable conservation condition of shoveler in Lough Corrib SPA*'

Attributes	Target
Winter population trend	Long term winter population trend is stable or increasing
Winter spatial distribution	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target
Disturbance at wintering site	Disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution
Barriers to connectivity and site use	Barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA
Forage spatial distribution, extent and abundance	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target
Roost spatial distribution and extent	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target

5.2.2.1.3 Pochard (*Aythya ferina*)

The National population of over-wintering pochard in Ireland has decreased by 79% from 1994/95 to 2019/20. According to the SSCO for Lough Corrib SPA, the pochard population has reduced by 94% between surveys undertaken in the periods between 1995-2000 and 2012-2017. Most recent data showed a population of 625 pochard using the SPA.

Targets and Attributes

The Conservation Objective for Pochard is '*To restore the favourable conservation condition of pochard in Lough Corrib SPA*'

Attributes	Target
Winter population trend	Long term winter population trend is stable or increasing
Winter spatial distribution	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target
Disturbance at wintering site	Disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution
Barriers to connectivity and site use	Barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA
Forage spatial distribution, extent and abundance	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target
Roost spatial distribution and extent	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target

5.2.2.1.4 Tufted Duck (*Aythya fuligula*)

The National population of over-wintering tufted duck in Ireland has declined by 18% from 1994/95 to 2019/20. According to the SSCO for Lough Corrib SPA, the tufted duck population has reduced by 56% between surveys undertaken in the periods between 1995-2000 and 2012-2017. Most recent data showed a population of 2,399 tufted duck using the SPA.

Targets and Attributes

The Conservation Objective for Tufted Duck is '*To restore the favourable conservation condition of tufted duck in Lough Corrib SPA*'.

Attributes	Target
Winter population trend	Long term winter population trend is stable or increasing
Winter spatial distribution	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target
Disturbance at wintering site	Disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution
Barriers to connectivity and site use	Barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA
Forage spatial distribution, extent and abundance	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target
Roost spatial distribution and extent	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target

5.2.2.1.5 Common Scoter (*Melanitta nigra*)

The National population of breeding common scoter in Ireland has declined by 21% from 1994/95 to 2019/20. According to the SSCO for Lough Corrib SPA, the common scoter population has experienced an increase of 27% between surveys undertaken in the periods between 1995 and 2020. Most recent data showed a population of 38 potential breeding pairs of common scoter using the SPA.

Targets and Attributes

The Conservation Objective for Common Scoter is '*To maintain the favourable conservation condition of common scoter in Lough Corrib SPA*'.

Attributes	Target
Breeding population trend	Long term trend is stable or increasing.
Productivity rate	Sufficient productivity to maintain the population trend as stable or increasing
Distribution of nesting habitat	No significant loss of distribution in the long term, other than that occurring due to natural patterns of variation

Attributes	Target
Extent and condition of nesting habitat	Sufficient area of high-quality habitat to support the population target
Disturbance at breeding site	Disturbance occurs at levels that do not significantly impact the achievement of targets for breeding population trend and spatial distribution of nesting habitat
Barriers to connectivity and site use	Barriers do not significantly impact the breeding population's access to the SPA or other ecologically important sites outside the SPA
Forage spatial distribution, extent and abundance	Sufficient number of locations, area of suitable habitat, and available forage biomass to support the population target

5.2.2.1.6 Hen Harrier (*Circus cyaneus*)

Lough Corrib SPA holds Ireland's largest freshwater lake, along with numerous islands. Its lake fringe (e.g. reedbeds, calcareous fens) and terrestrial habitats (e.g. raised bog, scrub, wet grassland, deciduous birch woodland) provide roosting and foraging options for hen harriers and other raptors during the non-breeding season. The four year mean peak recorded at this SPA (based on the period 2006/07 - 2009/10) was eight hen harriers, determined using standard survey methods (see O'Donoghue, 2011; 2019). Counts (NPWS unpublished data) indicate numbers regularly attending this communal roost site in the SPA have fallen over the past decade or so, likely linked to declines in the Slieve Aughty Mountains SPA breeding population ca. 30km away and nationally (NPWS, 2022).

Targets and Attributes

The Conservation Objective for Hen Harrier is '*To restore the favourable conservation condition of hen harrier in Lough Corrib*.'

Attributes	Target
Roost attendance: individual hen harriers	Long term winter population trend within the SPA is stable or increasing
Forage area spatial distribution, extent and abundance	Sufficient extent of suitable habitats and biomass of available prey items across the Site to help support the population
Roost spatial distribution and extent	Sufficient number of locations, area of suitable roosting habitat to support the population
Disturbance at the roost site	Human activities occur at levels that do not significantly impact upon wintering hen harrier

5.2.2.1.7 Coot *(Fulica atra*)

The National population of over-wintering coot in Ireland has declined by 23% from 1994/95 to 2019/20. According to the SSCO for Lough Corrib SPA, the coot population has reduced by 87% between surveys undertaken in the periods between 1995-2000 and 2012-2017. Most recent data showed a population of 1,912 coot using the SPA.

Targets and Attributes

The Conservation Objective for Coot is '*To restore the favourable conservation condition of coot in Lough Corrib SPA*.'

Attributes	Target
Winter population trend	Long term winter population trend is stable or increasing
Winter spatial distribution	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target
Disturbance at wintering site	Disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution
Barriers to connectivity and site use	Barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA
Forage spatial distribution, extent and abundance	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target
Roost spatial distribution and extent	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target

5.2.2.1.8 Golden Plover (*Pluvialis apricaria*)

The National population of over-wintering golden plover in Ireland has declined by 54% from 1994/95 to 2019/20. According to the SSCO for Lough Corrib SPA, the golden plover population has increased by 21% between surveys undertaken in the periods between 1995-2000 and 2012-2017. Most recent data showed a population of 2,088 golden plover using the SPA.

Targets and Attributes

The Conservation Objective for Golden Plover is '*To maintain the favourable conservation condition of golden plover in Lough Corrib SPA.*'

Attributes	Target
Winter population trend	Long term winter population trend is stable or increasing
Winter spatial distribution	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target
Disturbance at wintering site	Disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution
Barriers to connectivity and site use	Barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA
Forage spatial distribution, extent and abundance	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target
Roost spatial distribution and extent	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target
Supporting habitat: area and quality	Sufficient area of utilisable habitat available in ecologically important sites outside the SPA

5.2.2.1.9 Black-headed Gull (*Chroicocephalus ridibundus*)

According to the SSCO for Lough Corrib SPA, black-headed gull colonies have been recorded at multiple locations across Lough Corrib SPA. Most recent population estimates for breeding black-headed gull are estimated at 400 pairs. These numbers represent a short-term decline from the 2010 population estimate of 51%. These number also represent an acute long-term decline from an estimated 3,000 breeding pairs in 1983.

Targets and Attributes

The Conservation Objective for Black-headed Gull is '*To restore the favourable conservation condition of black-headed gull in Lough Corrib SPA*.'

Attributes	Target
Breeding population size	Long term population is stable or increasing.
Productivity rate	Sufficient to maintain the population
Distribution: extent of available nesting options within the SPA	Sufficient availability of suitable nesting sites throughout the SPA to maintain the population
Prey biomass available	Sufficient extent of biomass of available prey items across the Site to help support the population
Disturbance at the breeding site	Disturbance occurs at levels that do not significantly impact on black-headed gull at the breeding site
Disturbance at areas ecologically connected to the colony	Disturbance occurs at levels that do not significantly impact on black-headed gull at the breeding site.
Barriers to connectivity	No significant increase

5.2.2.1.10 Common Gull (*Larus canus*)

According to the SSCO for Lough Corrib SPA, breeding common gull have been recorded at multiple locations across Lough Corrib SPA. Most recent population estimates for breeding common gull are estimated at 137 pairs. These numbers represent a short-term decline from the 2010 population estimate of 50%. These number also represent a long-term decline of at least 74% in breeding pairs of common gull since surveys undertaken in 1983.

Targets and Attributes

The Conservation Objective for Common Gull is '*To restore the favourable conservation condition of common gull in Lough Corrib SPA*'

Attributes	Target
Breeding population size	Long term population is stable or increasing.
Productivity rate	Sufficient to maintain the population
Distribution: extent of available nesting options within the SPA	Sufficient availability of suitable nesting sites throughout the SPA to maintain the population
Prey biomass available	Sufficient extent of biomass of available prey items across the Site to help support the population
Disturbance at the breeding site	Disturbance occurs at levels that do not significantly impact on common gull at the breeding site
Disturbance at areas ecologically connected to the colony	Disturbance occurs at levels that do not significantly impact on common gull at the breeding site.
Barriers to connectivity	No significant increase

5.2.2.1.11 Common Tern (*Sterna hirundo*)

According to the SSCO for Lough Corrib SPA, breediung common tern have been recorded at multiple locations across Lough Corib SPA. Most recent population estimates for breeding common tern are estimated at 6 pairs. These numbers represent a short-term decline from a 2007 population estimate of 73%. In both the short- and long-term breeding pairs of common tern have declined with 27 breeding pairs estimated to be using Lough Corrib SPA in 1984 and 37 pairs in 1995.

Targets and Attributes

The Conservation Objective for Common Tern is '*To restore the favourable conservation condition of common tern in Lough Corrib SPA*.'

Attributes	Target
Breeding population size	Long term population is stable or increasing.
Productivity rate	Sufficient to maintain the population
Distribution: extent of available nesting options within the SPA	Sufficient availability of suitable nesting sites throughout the SPA to maintain the population
Prey biomass available	Sufficient extent of biomass of available prey items across the Site to help support the population
Disturbance at the breeding site	Disturbance occurs at levels that do not significantly impact on common tern at the breeding site
Disturbance at areas ecologically connected to the colony	Disturbance occurs at levels that do not significantly impact on breeding common tern
Barriers to connectivity	No significant increase

5.2.2.1.12 Arctic Tern (*Sterna paradisaea*)

According to the SSCO for Lough Corrib SPA, breeding arctic tern have been recorded at multiple locations across Lough Corib SPA. Most recent population estimates for breeding common tern are estimated at 10 pairs. These numbers represent a short-term decline from a 2007 population estimate of almost 80%. Overall, the breeding population of arctic tern within Lough Corrib SPA has fluctuated significantly with 10 breeding pairs estimated to be using Lough Corrib SPA in 1984 and 60 pairs in 1995.

Targets and Attributes

The Conservation Objective for Arctic Tern is '*To restore the favourable conservation condition of Arctic tern in Lough Corrib SPA*.'

Attributes	Target
Breeding population size	Long term population is stable or increasing.
Productivity rate	Sufficient to maintain the population
Distribution: extent of available nesting options within the SPA	Sufficient availability of suitable nesting sites throughout the SPA to maintain the population
Prey biomass available	Sufficient extent of biomass of available prey items across the Site to help support the population
Disturbance at the breeding site	Disturbance occurs at levels that do not significantly impact on Arctic tern at the breeding site
Disturbance at areas ecologically connected to the colony	Disturbance occurs at levels that do not significantly impact on Arctic tern at the breeding site
Barriers to connectivity	No significant increase

5.2.2.1.13 Greenland White-fronted Goose (*Anser albifrons flavirostris*)

The National population of Greenland white-fronted goose in Ireland has declined by 13% from 1985 to 2018. According to the SSCO for Lough Corrib SPA, the Greenland white-fronted goose population has reduced by 91% between surveys undertaken in the periods between 1994-1999 and 2016-2021. Most recent data showed a population of 15 Greenland white-fronted goose using the SPA.

Targets and Attributes

The Conservation Objective for Greenland white-fronted goose is '*To restore the favourable conservation condition of* Greenland white-fronted goose *in Lough Corrib SPA*.'

Attributes	Target
Winter population trend	Long term winter population trend is stable or increasing.
Winter spatial distribution	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target
Disturbance at wintering site	The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution
Barriers to connectivity and site use	No significant impact on the wintering population's access to the SPA or other ecologically important sites outside the SPA
Forage spatial distribution, extent and abundance	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target
Roost spatial distribution and extent	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target
Supporting habitat: area and quality	Sufficient area of utilisable habitat available in ecologically important sites outside the SPA

5.2.2.1.14 Wetlands

Lough Corrib is a site of international importance for wintering waterfowl. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest. Potential indirect effects on the supporting wetland habitat of waterbirds within the SPA in the form of degradation of surface water quality was identified.

Targets and Attributes

The Conservation Objective for the habitat is '*To maintain the favourable conservation condition of* wetlands *in Lough Corrib SPA*.'

Attributes	Target
Wetland habitat area	No significant loss to wetland habitat within the SPA, other than that occurring from natural patterns of variation.
Wetland habitat quality and functioning	No significant impact on the quality or functioning of the wetland habitat within the SPA, other than that occurring from natural patterns of variation.

5.2.3 Lough Mask SPA

Lough Mask SPA is designated under the EU Birds Directive for the protection of important bird species and their habitats. It covers a large freshwater lake in County Mayo, part of the western lake district of Ireland, with a mix of open water, islands, and surrounding wetlands.: The site is especially important for wintering waterbirds, notably:

- Tufted Duck (Aythya fuligula) [A061]
- Black-headed Gull (Chroicocephalus ridibundus) [A179]
- Common Gull (Larus canus) [A182]
- Lesser Black-backed Gull (Larus fuscus) [A183]
- Common Tern (Sterna hirundo) [A193]
- Greenland White-fronted Goose (Anser albifrons flavirostris) [A395]

Wetland habitat types within the SPA Include open water, reedbeds, wet grassland, and small islands providing roosting and feeding grounds.

The site supports a significant number of birds in terms of national population thresholds, especially for wintering ducks and geese.

Water pollution, habitat disturbance from recreation are primary pressures on the SPA.

Table 5-4: Threats, Pressures and Activities with Impacts on the Lough Mask SPA

Code	Threats & Pressures	Rank (H-high, M-medium, L-low)	Inside (I)/ outside (O)/ both(B)
B	Sylviculture, forestry	L	O
A10	Restructuring agricultural land holding	M	O
F02.03	Leisure fishing	H	I
A08	Fertilisation	M	O

5.2.3.1 Special Conservation Interests Specific Information

NPWS (2025) Conservation Objectives: Lough Mask SPA 004062, and are discussed here under.

5.2.3.1.1 Tufted Duck (Aythya fuligula)

The national population of wintering Tufted Duck in Ireland has declined by 18% from 1994/95 - 2019/20, as monitored via the Irish Wetland Bird Survey (I-WeBS) (Kennedy et al., 2022). During the baseline assessments to inform SPA designation, 453 Tufted Duck were estimated to be using this SPA (4 year mean of peak counts for the period 1995/96 - 1999/2000; no data for 1998/99. A population of 432 Tufted Duck were estimated to be using the Lough Mask SPA in recent years (4 year mean of peak counts for the period 2017/18 - 2022/23, excluding 2020/21, from IWeBS monitoring). This represents an estimated population decline of 5% since the baseline period, less than the national trend.

Targets and Attributes

The Conservation Objective is to restore the Favourable conservation condition of Tufted Duck at Lough Mask SPA

Attributes	Target
Winter population trend	Population remains viable and stable or increasing long-term (favourable status).
Winter spatial distribution	No reduction in natural range or use patterns within the SPA.
Disturbance at wintering site	Disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution
Barriers to connectivity and site use	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target
Roost spatial distribution and extent	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target

5.2.3.1.2 Black-headed Gull (Chroicocephalus ridibundus)

An estimated 425 pairs of Black-headed Gull were recorded at this site in 1977 (Whilde, 1978) and there have been multiple counts since. Subsequent surveys in 1988 and 1993 saw a population increase with 1,325 pairs in 1993 being the highest recorded for this site (Lloyd at al., 1991; Hunt and Heffernan, 2006). The population fluctuated in the following two surveys in 1999 and 2006 when breeding numbers dropped to 329 but rose back to 1,200 pairs (Mitchell et al., 2004; Hunt and Heffernan, 2006). However, since then the population has been more stable with similar records of 790, 641 and 797 recorded across surveys in 2018, 2021 and 2022 (NPWS internal files). The most recent population estimate of 354 pairs in 2023 is notably lower and represents a population decrease of 17% since 1977. However, overall the population does appear to be stable.

Targets and Attributes

The Conservation Objective is to restore the Favourable conservation condition of Black-headed Gull in Lough Mask SPA

Attributes	Target
Breeding population size	Long term SPA population trend is stable or increasing
Productivity rate	Sufficient to maintain a stable or increasing population
Distribution: extent of available nesting options within the SPA	Sufficient availability of suitable nesting sites throughout the SPA to maintain a stable or increasing population
Forage spatial distribution, extent, abundance and availability	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target
Disturbance at the breeding site	Disturbance occurs at levels that do not significantly impact on birds at the breeding site
Disturbance at areas ecologically connected to the colony	Disturbance occurs at levels that do not significantly impact on breeding population
Barriers to connectivity	Barriers do not significantly impact the population's access to the SPA or other ecologically important sites outside the SPA

5.2.3.1.3 Common Gull (Larus canus)

Records of gulls breeding at Lough Mask exist from as early as 1900 (Ussher and Warren, 1900). An estimated 465 pairs of Common Gull were recorded at this site in 1977 (Whilde, 1978) and there have been multiple counts since. Subsequent surveys in 1988 and 1993 yielded 292 and 371 pairs respectively (Lloyd at al., 1991), the start of a declining trend. The population dropped further between 1999 and 2016 - 2018 when the population ranged between 124 and 210 pairs (Mitchell et al., 2004; Hunt and Heffernan, 2006; Burnell et al., 2023). The population has continued to decline with approximately 57 recorded in 2021, the lowest on record for the site, and 76 pairs in 2022 (NPWS internal files). The most recent population estimate of 59 pairs in 2023 represents a population decrease of 87% since 1977.

Targets and Attributes

The Conservation Objective is to restore the Favourable conservation condition of Common Gull in Lough Mask SPA.

Attributes	Target
Breeding population size	Long term SPA population trend is stable or increasing
Productivity rate	Sufficient to maintain a stable or increasing population
Distribution: extent of available nesting options within the SPA	Sufficient availability of suitable nesting sites throughout the SPA to maintain a stable or increasing population
Forage spatial distribution, extent, abundance and availability	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target
Disturbance at the breeding site	Disturbance occurs at levels that do not significantly impact on birds at the breeding site
Disturbance at areas ecologically connected to the colony	Disturbance occurs at levels that do not significantly impact on breeding population

5.2.3.1.4 Lesser Black-backed Gull (Larus fuscus)

Records of gulls breeding at Lough Mask exist from as early as 1900 (Ussher and Warren, 1900). An estimated 366 pairs of Lesser Black-backed Gull were recorded at this site in 1977 (Whilde, 1978) and there have been multiple counts since. The following surveys in 1988 and 1993 yielded 447 and 361 pairs respectively (Lloyd at al., 1991), indicating a stable population. The population appeared to decline in 1999 and 2006 when breeding numbers dropped to 286 and 282 pairs (Mitchell et al., 2004; Hunt and Heffernan, 2006). However, since then the population has increased with approximately 557 recorded between 2016 and 2018 (Burnell et al., 2023) and 608 and 563 pairs recorded in 2021 and 2022 (NPWS internal files). The most recent population estimate of 668 pairs in 2023 is the highest for the site and represents a population increase of 83% since 1977

Targets and Attributes

The Conservation Objective is to maintain the Favourable conservation condition of Lesser Black-backed Gull in Lough Mask SPA.

Attributes	Target
Breeding population size	Long term SPA population trend is stable or increasing
Productivity rate	Sufficient to maintain a stable or increasing population

Attributes	Target
Distribution: extent of available nesting options within the SPA	Sufficient availability of suitable nesting sites throughout the SPA to maintain a stable or increasing population
Forage spatial distribution, extent, abundance and availability	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target
Disturbance at the breeding site	Disturbance occurs at levels that do not significantly impact on birds at the breeding site
Disturbance at areas ecologically connected to the colony	Disturbance occurs at levels that do not significantly impact on breeding population
Barriers to connectivity	Barriers do not significantly impact the population's access to the SPA or other ecologically important sites outside the SPA

5.2.3.1.5 Common Tern (Sterna hirundo)

The Common Tern population in this SPA was surveyed in 1995 as part of the all-Ireland tern survey which recorded 44 pairs (Hannon et al., 1997). The population has been surveyed multiple times since and count totals have been consistent with little fluctuation. Total breeding pairs of Common Tern between 1999 and 2021 have amounted to 39, 36, 42, 35, 55, 48, 41 and 46, indicating a stable population (Hannon et al., 1997; Mitchell et al., 2004; Hunt and Heffernan, 2006; Burnell et al., 2023; NPWS internal files). The most recent population estimate of 46 pairs is similar to the 1995 count, an increase of 5%. The national population has increased by 91% between 1998 - 2002 and 2015 - 2021.

Targets and Attributes

The Conservation Objective is to maintain the Favourable conservation condition of Common Tern in Lough Mask SPA.

Attributes	Target
Breeding population size	Long term SPA population trend is stable or increasing
Productivity rate	Sufficient to maintain a stable or increasing population
Distribution: extent of available nesting options within the SPA	Sufficient availability of suitable nesting sites throughout the SPA to maintain a stable or increasing population

Attributes	Target
Forage spatial distribution, extent, abundance and availability	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target
Disturbance at the breeding site	Disturbance occurs at levels that do not significantly impact on birds at the breeding site
Disturbance at areas ecologically connected to the colony	Disturbance occurs at levels that do not significantly impact on breeding population
Barriers to connectivity	Barriers do not significantly impact the population's access to the SPA or other ecologically important sites outside the SPA

5.2.3.1.6 Greenland White-fronted Goose (Anser albifrons flavirostris)

The national population of Greenland White-fronted Goose has declined by 13% between 1985 and 2018 (EEA, 2019). The flock (sub-population) of Greenland White-fronted Goose known as the Erriff and Derrycraff river valleys flock is understood to use the Lough Mask SPA (see Burke et al., 2014). During the period of baseline assessments to inform SPA designation, the Erriff and Derrycraff river valleys flock was estimated to comprise 141 geese (4 year mean of peak counts for baseline period 1995/96 - 1998/99; see Burke et al., 2014). In recent years the Erriff and Derrycraff river valleys flock was estimated at 87 geese (5 year mean of peak counts for the period 2018/19 - 2022/23; see Fox et al., 2019, 2020, 2021, 2022 and 2023). This represents an estimated population decline of 38% since the baseline period, greater than the national trend.

Targets and Attributes

The Conservation Objective is to restore the Favourable conservation condition of Greenland White-fronted Goose at Lough Mask SPA.

Attributes	Target
Winter population trend	Long term winter population trend is stable or increasing
Winter spatial distribution	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target
Disturbance at wintering site	Disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution
Barriers to connectivity and site use	Barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA
Forage spatial distribution, extent and abundance	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target

Attributes	Target
Roost spatial distribution and extent	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target
Supporting habitat: area and quality	Sufficient area of utilisable habitat available in ecologically important sites outside the SPA

5.2.3.1.7 Wetlands

Targets and Attributes

The Conservation Objective is to maintain the Favourable conservation condition of Wetland habitats in Lough Mask SPA as a resource for the regularly-occurring migratory waterbirds that utilise these areas.

Attributes	Target
Wetland habitat area	No significant loss to wetland habitat within the SPA, other than that occurring from natural patterns of variation
Wetland habitat quality and functioning	No significant impact on the quality or functioning of the wetland habitat within the SPA, other than that occurring from natural patterns of variation

5.3 Impact Prediction

Section 4.2 and Table 4-1 of this report identify the potential impacts from the Proposed Development as follows:

- Bird Collision risk during turbine operation
- Disturbance and / or displacement of birds and otter from habitats during construction and decommissioning
- Degradation of river water quality due to runoff from site and during in-stream works during construction and decommissioning
- Loss/damage to aquatic habitat as cause by in-stream and riparian works, and/or due to runoff from site causing degradation in water quality
- Direct mortality of aquatic species during in-stream works

These potential impacts from the Proposed Development are discussed further hereunder.

5.3.1 Bird Collision Risk

The Collision Risk Model Report (See Appendix 10.1, and Appendix XIII thereof) presents the results of collision risk modelling for the proposed Shancloon Wind Farm. The following bird species were recorded within during vantage point surveys (to monitor flight activity within the Wind Farm Site and to a 500m radius of the proposed turbines to inform the collision risk model): black-headed gull, buzzard, common gull, common sandpiper, cormorant, crane, curlew, golden plover, great black-backed gull, greenshank, grey heron, greylag goose, gyr falcon, hen harrier, herring gull, jack snipe, kestrel, lapwing, lesser black-backed gull, little egret, mallard, merlin, mute swan, peregrine, snipe, sparrowhawk, teal, whimbrel, whooper swan, and woodcock.

Of the above species, the following are SCI species of Lough Mask SPA: Black-headed Gull, Common Gull and, Lesser Black-backed Gull, and the following are SCIs of Lough Corrib SPA: Hen harrier, Golden plover, black-headed gull, and common gull.

Of the above SCI species, only the following were observed to be flying within the survey area at a height within the rotor risk area: Golden plover and Lesser black-backed gull.

The predicted number of collisions and predicted percentage increase in annual mortality rates in relation to the SCI populations for the SCI receptor species recorded at Shancloon within the collision risk area (i.e. Golden plover and Lesser black-backed gull) are resented in Table 5-5. The assessment of effects combining magnitude and sensitivity to assess significance (Percival, 2003) has determined that the proposed Shancloon Wind Farm will not have a significant impact on the SCI population of these species with a negligible (i.e. <1%) impact determined in terms of the loss to bird populations.

Table 5-5: Collision risk effects on species populations

Parameter	Description	Source / Calculation	Golden Plover	Lesser Black-backed gull
			Lough Corib SPA Population	Lough Mask SPA population
pop	Population size	Conservation Objectives Reports	2088	1336
surv	Annual survival rate	Adult survival rates from www.bto.org/understanding-birds/birdfacts accessed 04/07/2025	0.73	0.913
mort(back)	Annual background mortality	pop*(1-surv)	563.76	116.232
mort(coll)	Predicted annual collision mortality	Predicted collision rates from CRM	2.24	0.18
%mort(increase)	Percentage increase in annual mortality rate due to collisions		0.397	0.155

Parameter	Description	Source / Calculation	Golden Plover	Lesser Black-backed gull
			Lough Corib SPA Population	Lough Mask SPA population
	% of population potentially affected by collision mortality	Quote this in report-reference to Percival	**0.107**	**0.013**
Magnitude (Percival, 2003)			<1% (Negligible)	<1% (Negligible)

5.3.2 Disturbance and / or displacement of birds and otter from habitats during construction and decommissioning

For birds, permanent habitat loss associated with the Proposed Development will be minor and predominantly to low value improved agricultural grassland and the potential for a displacement effects on birds is low, as shown in Table 5-6, with only the potential for wintering golden plover to be displaced identified as likely.

Table 5-6: Potential Displacement / Barrier Effect to SCI Species

Key Receptor (Sensitivity)	Disturbance	Barrier Effect/Displacement
Black-headed Gull (Low)	There were low levels of black-headed gull activity recorded with a total of six records; one in summer 2019, two in winter 2019/20 and three in summer 2024, with numbers ranging from two to six individuals. Black-headed gull was not a frequent visitor within the study area. There was no evidence of regular use of the site for landing or foraging by this species. Therefore, construction related disturbance is not anticipated to have an effect.	Displacement Effect: Black-headed gull were recorded within or partially within the Proposed Development on a total of six records; one in summer 2019, two in winter 2019/20 and three in summer 2024, with numbers ranging from two to six individuals. This species was not recorded using the habitats within or immediately adjacent to the Proposed Development. Additionally, the surrounding environment comprises suitable roosting and foraging habitats. As such, in the event of displacement, there are extensive areas of suitable habitat for this species. No displacement is envisaged. Barrier Effect: There is no evidence of a commuting or migratory path over the lands within the site boundary, with only a total of six observations across the entire survey period. Therefore, barrier effect is not anticipated.

Key Receptor (Sensitivity)	Disturbance	Barrier Effect/Displacement
Common gull (Low)	There were low levels of common gull activity recorded with a total of five records during VP watches. There was no evidence of regular use of the site for landing or foraging by this species. Therefore, construction related disturbance is not anticipated to have an effect.	Displacement Effect: This species was not recorded using the habitats within or immediately adjacent to the Proposed Development. Additionally, the surrounding environment comprises suitable roosting and foraging habitats. As such, in the event of displacement, there are extensive areas of suitable habitat for this species. No displacement is envisaged. Barrier Effect: There is no evidence of a commuting or migratory path over the lands within the site boundary, with only a total of five observations across the entire survey period. Therefore, barrier effect is not anticipated.
Golden Plover (Medium)	A total of 48 golden plover observations were recorded during VP watches. Flock size ranged from one to 180 birds with an average flock size of 27 birds. Flight activity was recorded during the non-breeding seasons with higher activity noted over winter 2023-24 compared to winter 2020-21 and winter 2020-19. The Cloonbar East Wetland was noted as an area of higher frequency of usage within the study area for wintering golden plover and more recent data from 2023-2024 indicates an increase in habitat usage within Beagh More West Cutover and the improved grassland north of this where T5,6,8 and 9 are located. In Cloonbar East Wetland, golden plover flocks with up to 120 individuals were primarily observed circling the wetland. During winter 2023-24, flocks of up to 180 were observed with activity more widespread. Beagh More West cutover bog and the improved grassland north of this are evident as being areas of increased use. According to Pearse-Higgins et al. (2012), golden plover is susceptible to disturbance during the construction of windfarms. Cloonbar East Wetland is an important wintering ground for golden plover with a habitat association noted with Cloonbar East Wetland within the wintering season. The short swathes of grass, provide optimal habitat for winter roosting. Golden plover would therefore be vulnerable to disturbance during the construction works in proximity to the wetland. Having regards to Cutts, et al (2013) a potential disturbance zone of 500m is assumed, which encompasses the entire Cloonbar East Wetland.	Displacement Effect: The frequency of golden plover records in the non -breeding season and large flock sizes (up to 180 birds) present, indicate that they over-winter within the lands of the site boundary. The habitats within the site, such as bog, wet grassland provide suitable wintering habitat for this species. Hoetker et al. (2006) reported that wind farms can result in negative effects on golden plovers. Therefore, there is potential for wintering golden plover to be displaced from the lands within the site boundary during the operational phase of the wind farm. Barrier Effect: Due to the presence of wintering golden plover within the lands of the site boundary, there is potential for birds to alter their migration routes to and from the area. Previous studies have found evidence to suggest that golden plover is susceptible to the barrier effect caused by wind farms (Hoetkar et al., 2006). Therefore, the potential for an impact cannot be omitted.

Key Receptor (Sensitivity)	Disturbance	Barrier Effect/Displacement
(Greenland) white-fronted goose (Medium)	This species was only recorded during wider area winter surveys. As such, the results indicate no activity within the site boundary of the Proposed Development. Therefore, this species is unlikely to be impacted by disturbance during the construction phase. No significant effects are anticipated.	Displacement Effect: There is no evidence to suggest that this species is regularly using the lands within the footprint of the Proposed Development as it was only recorded during wider area winter surveys. Therefore, no significant effect is anticipated. Barrier Effect: The low level of activity indicates that this is not an important migratory route for this species. Additionally, with reference to the Eurasian African Bird Migration Atlas (Spina et al., 2022), the locations of the Proposed Development, is not situated along any know significant migratory routes of this species. Therefore, a significant barrier effect is not anticipated.
Hen harrier (Medium)	During the non-breeding seasons, hen harrier was observed hunting, with activity scattered across the site primarily over bog habitat (Cloonteen Cloonbar Toberrroe, Beagh More West and Cloonsheen Shancloon bog). There were a low number of infrequent records with no evidence of roosting. Additionally, hen harrier are not breeding or using the lands within the site/study area regularly during breeding season, with just one observation recorded. The results indicate infrequent hen harrier activity within the study area with limited suitable habitat available. A total of 22 observations of this species were recorded at this site and were not thought to be associated with breeding or winter roosting sites. Therefore, this species is unlikely to be impacted by disturbance during the construction phase.	Displacement Effect: The lands withing the site boundary do not provide optimal breeding or roosting habitat (heather moorland) for hen harrier. The results show an infrequent use of the site by this species, on occasion for hunting along conifer plantations. No displacement effect is anticipated due to the low level of activity and unsuitability of habitat present. Barrier Effect: There were a total of 22 observations across the three year survey period. This low level of activity indicates that this is not an important commuting route for this species. Therefore, no barrier effect is anticipated.
Lesser Black-backed gull (Low)	There is a high level of activity over Improved agricultural grassland (GA1) in mosaic with wet grassland (GS4) in the west of the site, where turbines T2, T3 and T4, Construction Compound # 2, and the meteorological mast are located. Therefore, there is potential for construction related disturbance to species us.	Displacement Effect: This species was regularly observed within the site boundary and surrounding area. For this coastal breeder, the habitat present here is unsuitable for breeding. Therefore, the large volume of activity evident here can be attributed to foraging. The species has low sensitivity to disturbance / displacement, and as such will likely acclimatise to the development, with displacement likely to be on a short-term basis only. Barrier Effect: High levels of lesser black-backed gulls were recorded during the survey period with a total of 162 VP observations across three years.

Key Receptor (Sensitivity)	Disturbance	Barrier Effect/Displacement
		However, this species has been found to not be susceptible to the barrier effect and there is evidence to show lesser black-backed continue to utilize lands within operational wind farms. To this end, there is no significant effect anticipated.
Shoveler (High)	This species was predominantly found roosting and foraging in the turloughs within the wider environment. Only one record occurred within the Proposed Development. There is no evidence of regular use of habitat within the footprint of the Proposed Development. Therefore, no significant effect is anticipated.	Displacement effect: There is no evidence of regular use of habitat within the footprint of the Proposed Development. Therefore, no displacement effect is anticipated. Barrier effect: Given the lack of regular use within the footprint of the Proposed Development, no barrier effect is anticipated.

No otter resting or breeding sites were recorded within the Proposed Development Site during dedicated otter surveys carried out by Fehily Timoney, which extended 200m upstream and downstream of locations watercourse crossings and where infrastructure was within 150m of any drain or watercourse. Neither were any otter resting or breeding sites recorded during the aquatic surveys of the watercourses in the catchment as conducted by Flynn Furney. However, signs of otter (slides, spraints) were observed on the Togher River and the Black (Shrule) river, and there are prominent mammal paths parallelling the river near T7 which are likely attributable to otter. There is potential for temporary interruption to otter commuting along the riverbanks at the locations of the culvert and bridge crossings and sheet piling works (due to proximity to the watercourses at these locations), resulting in a short-term disturbance of otter from these sections of the watercourses.

The new bridge crossing will require removal of riparian vegetation to allow construction. The bridge footings will be 2.5m setback landward from the riverbank and as such will retain a riparian area that will revegetate over time and will ensure suitable habitat for otter passage.

5.3.3 Degradation of river water quality due to runoff from site and during in-stream works during construction and decommissioning

The layout of the Proposed Development has been specifically designed to ensure that the major wind farm infrastructure (i.e. turbines, hardstands, substation, met mast and construction compounds) avoid the main watercourses within the study area, with the locations of such infrastructure achieving a minimum 50m setback from watercourses. However, the Proposed Development lands are heavily drained and there will be interaction with land drains as part of the Proposed Development. While these land drains are not themselves ecologically important habitat and do not support aquatic QIs, they do provide connectivity to the larger watercourses in the study area. As such, there is potential for degradation or loss of aquatic habitat of ecological value during the works through indirect effects resulting from water pollution.

There is potential for construction activities associated with the Proposed Development, including construction of turbine hardstands and access tracks, to result in the run-off of and infiltration of pollutants, including silts, hydrocarbons and cementitious material to drains and other watercourses within the Proposed Development Site. This could also result from the removal of vegetation, movement of peat or the use of concrete and other construction materials. The watercourses within the catchment flow into the Lough Corrib SAC and Lough Corrib SPA. There is as such potential for degradation in water quality and aquatic habitat quality which might support the SCA/SPA conservation interests.

Extensive ground investigation for the Proposed Development has been carried out and a peat slippage risk assessment prepared for the Site (see Appendix 11.1). The findings, which involved a stability analysis of over 80 locations, show that the Site has an acceptable margin of safety and is suitable for the proposed wind farm project. Slope inclinations at the infrastructure locations range from 1 to 2 degrees with the average being 2 degrees. The relatively flat topography/nature of the terrain on site reflects the low risk of peat failure. The purpose of the stability analysis was to determine the stability i.e. Factor of Safety (FoS), of the peat slopes. The FoS provides a direct measure of the degree of stability of a peat slope. A FoS of less than 1.0 indicates that a slope is unstable; a FoS of greater than 1.0 indicates a stable slope. An acceptable FoS for slopes is generally taken as a minimum of 1.3. The stability analysis for this project, which analysed the turbine locations, access roads and substation, resulted in FoS above the minimum acceptable value of 1.3 and hence the site has a satisfactory margin of safety. As such, peat slippage at the Site is unlikely.

HDD will be employed at one location to cross the Togher River. If not properly managed, there is potential for frac-out to occur during the HDD drilling process. A frac out occurs when the pressure of the drilling fluid in a borehole exceeds the strength of the surrounding soil, causing the soil to fracture and the fluid to escape to the surface. The HDD location will be within alluvium soils underlain by firm tills and Dinantian Pure Bedded Limestones.

A flood risk assessment was prepared as supported by a detailed hydraulic model of the catchment informed by detailed Digital Terrain Model (DTM) and surveyed watercourse cross sectional data from the catchment. The model has determined that the Proposed Development will not increase flood risk elsewhere within the catchment.

5.3.4 Loss/damage to aquatic habitat as cause by in-stream and riparian works, and/or due to runoff from site causing degradation in water quality

The watercourses within the catchment flow into the Lough Corrib SAC and Lough Corrib SPA. There is as such potential for degradation in water quality and aquatic habitat quality which might support the SCA/SPA conservation interests.

There is potential for disturbance to aquatic fauna during in stream works as associated with the sheet piling adjacent to Cloonbar Bog, and at culvert and bridge crossings associated with internal access roads within the Site. These works will also result in the loss of riparian habitat within the footprint of the bridge/culvert and piling works.

Culvert crossing near the source of the Black (Shrule) river (EIAR culvert reference: Culvert No CV14) and the sheet piled solution for the floated road through Cloonbar bog will include works on the river. At these locations the river is a narrow arterial drainage channel (OPW channel reference CH4/13/7) of low fishery potential with sluggish flows and soft, muddy substrate. River width is 2m – 3m and riparian vegetation is low growing scrub. The watercourse is subject to OPW arterial drainage and is subject to a 4-6 year cycle of drainage maintenance, with the most recent cycle having been carried out between 2020 and 2024[24]. It will be necessary to temporarily overpump the flow in the watercourse to allow the installation of the culvert. This will be carried out in accordance with Inland Fisheries Ireland (2016) guidelines. Driving a pile into the sediment with an impact hammer introduces high intensity impulsive sound waves into the water column that result in a rapid rise in pressure which can potentially cause injury in fish. However, it is noted that the construction methodology proposed for the piles is press in piles, which has a low associated noise effect. Notwithstanding, given that the aquatic habitat on this section of the Black (Shrule) River is subject to intermittent disturbance from arterial drainage maintenance and is of low fishery value, any loss of or disturbance to in-stream or riparian habitat would be in keeping with the current trend in baseline environment and similarly potential for disturbance to fisheries is low given the habitat quality at this location.

A new bridge crossing is proposed on the Togher River (ITM 533089.53, 754307.53) The Togher River has good fishery value, albeit the in-stream habitat is suitable for adult salmonids only: comprising pools with softer substrate with only low amounts of hard substrates present. The Togher River is part of the Corrib Headford arterial drainage scheme (channel CH4/13 Sect. 2) and is subject to regular (every 4 to 6 years) disturbance due to maintenance works, most recently in-stream silt and vegetation management and embankment maintenance. The river channel width at the proposed bridge crossing is 5-6m. It will be necessary to temporarily flume the watercourse to allow the construction of the bridge. This will be carried out in accordance with best practice guidelines: SEPA (2009) guidelines and IFI (2016) guidelines. Flume pipes are constructed by installing one or more sections of pipe in the watercourse to allow uninterrupted flow of water within the watercourse and to allow the bridge crossing construction essentially under dry conditions i.e. the flume forms a physical barrier between the construction area and the watercourse. The flume pipes will be sized in accordance with expected flows and will be oversized to compensate for any modelled 1 in 100 plus climate change flood flows. The timeframe for fluming the watercourse will be 3-5 days. The flume will be left in situ for the duration of the bridge construction works (which will carried out over a 3-6 month period).

There is potential for the flume pipe, if not properly designed and installed, to result in scouring of riverbed and bank, impediment of fish passage, and damage to fishery habitat through compaction and isolation from river flow and sedimentation of the downstream watercourses through bed disturbance during installation and removal. Given the ecological value of the watercourse such impacts could have a negative effect on the value of fishery habitat and access to upstream supporting habitat (noting that generally the upstream sections of the Black (Shrule) river provide low potential spawning habitat for lamprey and salmonids as shown in IFI monitoring station 30_2343_78A_a and Site 6 in the Aquatic Report, Appendix 9.3, however the arterial drainage channel upstream of the bridge crossing, as represented by Site 7 in Appendix 9.3 does have Brook Lamprey spawning potential).

The existing OPW bridge crossing structure ref. 9664 B2 is also located on arterial drainage channel CH4/13 Sect. 2 on the Togher River. This will be used to access lands in which turbines T1 to T4 will be constructed. The existing bridge width is sufficient for turbine delivery, as such it will not be necessary to extend the bridge. The existing bank will remain undisturbed and there will be no requirement for instream works. Effects on the aquatic environment will be neutral.

[24] See NIS for the drainage scheme: https://assets.gov.ie/73176/4139f67ed05d48a8a6e6203410f3611d.pdf

With the exception of arterial drainage channel CH4/13/5, all other arterial drainage channels or land drains within and downstream of the Site, are not ecologically sensitive and provide poor fisheries and aquatic faunal habitat. There is no potential for significant effects as a result of direct habitat loss for fisheries and aquatic fauna on these channels. For arterial drainage channel CH4/13/5, there will be a need to extend an existing farm access crossing (OPW ref 9675) on the channel. Characterisation of this arterial drainage channel is represented by Site 7 in the Baseline Aquatic Ecology Assessment included in Appendix 9.3. The channel width is c. 2m at the farm crossing and the existing crossing is 3m wide comprising a concrete blockwork structure. There is some scouring upstream of the crossing. The channel substrate upstream and downstream has suitable lamprey and brown trout spawning gravels. The existing structure will be removed and replaced with a piped culvert (culvert reference CV3) 5m in length. The culvert will be installed in accordance with IFI 2016 guidelines. The culvert will need to be installed under dry works conditions and as such will require overpumping of the arterial drainage channel. Such activities, if not properly mitigated have potential to cause degradation of spawning habitat, sedimentation of downstream fishery habitat, and impediment to fishery movement.

The HDD crossing for the 33 kV cable (ITM 529758.48,753338.06) on the Togher River will require excavation of agricultural lands. No riparian habitat will be affected, and no in-stream works are required. The lands will be reinstated post cable installation. Effects will be temporary and not significant in terms of potential for loss or damage to the aquatic and riparian environment.

5.3.5 Direct mortality of aquatic species during in-stream works

While the sections of watercourses to be flumed / overpumped will be sweep netted and electro-fished as part of the process for isolating the works area, there is potential for smaller lamprey ammocoetes and juvenile crayfish to remain present in depositing areas containing mud and silt and in stony habitat and as such there is potential for direct mortality of small lamprey larvae and / or crayfish during fluming / overpumping. These are QI species of the Lough Corrib SAC.

5.4 Potential for Adverse Effects

European and national legislation places a collective obligation on Ireland to maintain or restore habitats and species in the Natura 2000 Network to favourable conservation condition.

Conservation objectives for European sites relate to the site and the QI/SCI for which they are designated. NPWS define the favourable conservation status of an Annex I habitat or Annex II species as achieved when:

- its natural range, and area it covers within that range, are stable or increasing;
- 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 habitats and species is achieved through the maintenance or restoration of conservation status according to the Conservation Objectives of the site, as set out relative to the attributes and targets prescribed in Section 5.2.

The conservation objectives of the Qualifying Interests of the Lough Corrib SAC are presented in Table 5-6, and an assessment is made of whether the identified impacts of the proposed development could be considered to have an adverse effect on the integrity of the site having regard to the attributes and targets set out in the conservation objectives report.

Table 5-7: Assessment of Potential for Adverse Effects on the Integrity of the Lough Corrib SAC

Qualifying Interest	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets	Potential for Adverse Effects
[3110] Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	The QI habitat is associated with the lake habitat in Lough Corrib and does not occur within the watercourses at and adjacent to the proposed development. There is no potential for the Proposed Development to have any direct effect on the habitat extent within the lake which supports this species. Flood risk assessment for the Proposed Development has determined that there will be no impact on the natural flood processes of the catchment due to the development, as such the required hydrological regime for this species will not be affected. A deterioration in water quality in the event of pollution runoff during works in and adjacent to the Black (Shrule) and Togher Rivers during construction has potential to flow downstream and enter Lough Corrib. Such an event would be unlikely to alter the Lake substratum quality, Water quality, Acidification status or Water colour, DOO or turbidity of the lake given the small scale of in-stream works, distance from the lake and relative available dilution in the lake. Of note also is the low peat slippage risk at the Shancloon site. Conservation Objective to *restore the favourable conservation condition of* Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) *would not be impacted such that adverse effects would be experienced.*	No
[3130] Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*	The QI habitat is associated with the lake habitat in Lough Corrib and does not occur within the watercourses at and adjacent to the proposed development. There is no potential for the Proposed Development to have any direct effect on the habitat extent within the lake which supports this species. Flood risk assessment for the Proposed Development has determined that there will be no impact on the natural flood processes of the catchment due to the development, as such the required hydrological regime for this species will not be affected.	No

Qualifying Interest	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets	Potential for Adverse Effects
	A deterioration in water quality in the event of pollution runoff during works in and adjacent to the Black (Shrule) and Togher Rivers during construction has potential to flow downstream and enter Lough Corrib. Such an event would be unlikely to alter the Lake substratum quality, Water quality, Acidification status or Water colour, DOO or turbidity of the lake given the small scale of in-stream works, distance from the lake and relative available dilution in the lake. Of note also is the low peat slippage risk at the Shancloon site. Conservation Objective to restore the favourable conservation condition of Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoëto-Nanojuncetea in Lough Corrib SAC *would not be impacted such that adverse effects would be experienced.*	
[3140] Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	The QI habitat is associated with the lake habitat in Lough Corrib and does not occur within the watercourses at and adjacent to the proposed development. There is no potential for the Proposed Development to have any direct effect on the habitat extent within the lake which supports this species. Flood risk assessment for the Proposed Development has determined that there will be no impact on the natural flood processes of the catchment due to the development, as such the required hydrological regime for this species will not be affected. A deterioration in water quality in the event of pollution runoff during works in and adjacent to the Black (Shrule) and Togher Rivers during construction has potential to flow downstream and enter Lough Corrib. Such an event would be unlikely to alter the Lake substratum quality, Water quality, Acidification status or Water colour, DOO or turbidity of the lake given the small scale of in-stream works, distance from the lake and relative available dilution in the lake. Of note also is the low peat slippage risk at the Shancloon site. Conservation Objective to *restore the favourable conservation condition of Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. in Lough Corrib SAC would not be impacted such that adverse effects would be experienced.*	No

Qualifying Interest	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets	Potential for Adverse Effects
[3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	The habitat was not recorded during aquatic surveys at the proposed development Site, Togher River and Black (Shrule) River, however it may occur downstream. There is no potential for the Proposed Development to have any direct effect on the habitat extent. The flood risk model for the proposed development has determined that there will be no changed to hydrological regime in the catchment as a result of the development. As such the conservation targets for hydrological regime and floodplain connectivity will not be affected. Small section of riparian habitat will be removed as part of the proposed development, however these are not at location in co-incidence of floating river vegetation habitat. The target to 'maintain the area and condition of fringing habitats necessary to support the habitat and its sub-types' will not be affected. A deterioration in water quality in the event of pollution runoff during works in and adjacent to the Black (Shrule) and Togher Rivers during construction has potential to flow downstream. This could have an effect on the attributes of 'Substratum composition: particle size range' and 'water quality'. As such the Conservation Objective to *maintain the favourable conservation condition of water courses of plain to montane levels with the Ranunculion fluitantis and CallitrichoBatrachion vegetation in Lough Corrib SAC might be adversely affected.*	Yes
[1029] Freshwater Pearl Mussel *Margaritifera margaritifera*	The Freshwater Pearl Mussel population for which this SAC is designated is located in the Owenriff catchment, to the west of Lough Corrib. The Proposed Development is located to the east of Lough Corrib. Therefore, there is no potential for likely significant effect on the population of freshwater pearl mussel for which this SAC has been designated. As such the Conservation Objective to restore the favourable conservation condition of Freshwater Pearl Mussel in Lough Corrib SAC will not be *adversely affected.*	No

Qualifying Interest	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets	Potential for Adverse Effects
[1092] White-clawed Crayfish *Austropotamobius pallipes*	Suitable habitat for the QI species is present along the Black (Shrule) and Togher Rivers, including at the locations of some of the watercourse crossings proposed as part of the Proposed Development, however crayfish were not recorded within these rivers during aquatic survey for the Proposed Development. Given the suitability of habitat in the rivers and downstream in the Corrib river, it is assumed that crayfish are present in these watercourses. It is noted however that within the Lough Corrib catchment, there have been confirmed detections of crayfish plague (Aphanomyces astaci) associated with the River Clare. A deterioration in water quality in the event of pollution runoff during works in and adjacent to the Black (Shrule) and Togher Rivers during construction has potential to result in adverse effects on the conservation objection to maintain the favourable conservation condition of White-clawed Crayfish in Lough Corrib SAC as: in-stream works can result in the spread and increase / spread of crayfish plague, which is contrary to the target for 'no instances of disease' a reduction in water quality is likely to be only a short-term effect and would be unlikely to reduce quality to below Q3-4 at sites sampled by the EPA, however it may impact the distribution of crayfish in the catchment	Yes
[1095] Sea Lamprey *Petromyzon marinus*	According to the site-specific conservation objectives, Sea lamprey (Petromyzon marinus) traditionally congregate and build spawning nests in the River Corrib in Galway city, both up- and downstream of the Salmon Weir Bridge. Their further upstream passage is impeded by the regulating weir immediately upstream. Therefore, they are highly unlikely to be found in the upper reaches of the River Corrib, Lough Corrib or its tributaries. Given the absence for a pathway for effect there is no potential for the Proposed Development to have an adverse effect on the Conservation Objective to restore the favourable conservation condition of Sea Lamprey in the Lough Corrib SAC.	No

Qualifying Interest	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets	Potential for Adverse Effects
[1096] Brook Lamprey *Lampetra planeri*	Suitable juvenile habitat for the QI species is present along the Black (Shrule) and Togher Rivers. No spawning habitat is present. However, spawning habitat is known to be present downstream. A deterioration in water quality in the event of pollution runoff during works in and adjacent to the Black (Shrule) and Togher Rivers during construction has potential to result in adverse effects on the conservation target for "no decline in extent and distribution of spawning beds" During in-stream works during the construction stage, a dry works area will be created thereby acting as a temporary impediment to lamprey movement up or downstream of the works area. One of the conservation objective targets for brook lamprey is "Access to all watercourses down to first order streams". However, as the impact will be only very temporary, it will not significantly impede movement such that an adverse effect is experienced. The works areas will be electrofished in advance thereby ensuring no effect on adult lamprey population. However, electrofishing can be ineffective for recovery of juvenile lamprey from riverbed sediments, as such there is potential for reduction in juvenile population locally from within the works areas. This could impact the target for "at least three age/size groups of brook/river lamprey present", albeit only locally to the works. Culverts will be installed in accordance with IFI requirements and buried 500mm below the bed of the watercourse. This will ensure no loss of juvenile lamprey habitat, and will allow sufficient sediment depth above the anoxic zone (typically 1 to 5 cm below the sediment-water interface in fine sediment). As such there will e no adverse effect on the target for "more than 50% of sample sites positive". There is potential for adverse effect on the Conservation Objective to maintain the favourable conservation condition of Brook Lamprey in the Lough Corrib SAC.	Yes

Qualifying Interest	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets	Potential for Adverse Effects
[1106] Salmon *Salmo salar*	While aquatic survey determined that much of the Black (Shrule) and Togher Rivers was unsuitable for salmonids, salmon was recorded during field survey. The surveys determined that generally there is good salmonid nursery habitat is present within the rivers, with adult habitat is deemed to be of moderate value whilst spawning habitat is generally poor or absent. Further downstream, moving away from the Proposed Development, the watercourses improve and juvenile Atlantic salmon noted to be present in high numbers. 'Good' nursery and adult salmonid holding habitat is present whilst spawning potential is poor. The habitat on arterial drainage channel CH4/13/5 where the existing crossing is proposed to be replaced by a larger culvert hosts suitable salmonid spawning gravels. During in-stream works during the construction stage, a dry works area will be created thereby acting as a temporary impediment to salmonid movement up or downstream of the works area. One of the conservation objective targets for salmon is "100% of river channels down to second order accessible from estuary". However, as the impact will be only very temporary, it will not significantly impede movement such that an adverse effect is experienced. The works areas will be electrofished in advance thereby ensuring no effect on salmonid population. The watercourses within and in the locality of the Proposed Development do not have suitable salmon spawning habitat. However, spawning habitat is known to be present downstream. A deterioration in water quality in the event of pollution runoff during works in and adjacent to the Black (Shrule) and Togher Rivers during construction has potential to result in adverse effects on the conservation target for "No decline in number and distribution of spawning redds due to anthropogenic causes". There is potential for adverse effects on the Conservation Objective to maintain the favourable conservation condition of Salmon in the Lough Corrib SAC.	Yes

Qualifying Interest	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets	Potential for Adverse Effects
[1833] Slender Naiad *Najas flexilis*	This species occurs within the lake habitat of Lough Corrib (generally the north-western bay). There is no potential for the Proposed Development to have any direct effect on the habitat extent of the lake which supports this species. Flood risk assessment for the Proposed Development has determined that there will be no impact on the natural flood processes of the catchment due to the development, as such the required hydrological regime for this species will not be affected. A deterioration in water quality in the event of pollution runoff during works in and adjacent to the Black (Shrule) and Togher Rivers during construction has potential to flow downstream and enter Lough Corrib. Such an event would be unlikely to alter the Lake substratum quality, Water quality, Acidification status or Water colour of the lake given the small scale of in-stream works, distance from the lake and relative available dilution in the lake. Of note also is the low peat slippage risk at the Shancloon site. Conservation Objective to *restore the favourable conservation condition of Slender Naiad in the Lough Corrib SAC would not be impacted such that adverse effects would be experienced.*	No
Lesser Horseshoe Bat *Rhinolophus hipposideros*	Suitable habitat for lesser horseshoe bat is present at the Proposed Development however field survey observed numbers to be very low and sporadic, indicating that the Site is not part of LHB core sustenance zone.	No
[1355] Otter *Lutra lutra*	Otter are present on the Black (Shrule) and Togher Rivers. However, no resting or breeding sites were noted during field survey. Notwithstanding, during construction and decommissioning works, the Proposed Development has potential to act as a barrier to connectivity for otter Conservation Objective to maintain the favourable conservation condition of Otter in the Lough Corrib SAC may be adversely effected	Yes
[7210] Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7220] Petrifying springs with tufa formation (*Cratoneurion*)	No potential S-P-R connectivity has been determined for these habitats relative to the hydrogeological regime, geology and location of the Proposed Development lands relative to these habitats.	No

Qualifying Interest	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets	Potential for Adverse Effects
[7230] Alkaline fens	There is no potential for adverse effects on the conservation objective of these habitats.	
[1393] Slender Green Feather-moss *Drepanocladus vernicosus*	No potential S-P-R connectivity has been determined for these habitats / species relative to the hydrological and hydrogeological regime, geology and location of the Proposed There is no potential for adverse effects on the conservation objective of these habitats and species.	No
[6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)		
[6410] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)		
[7110] Active raised bogs		
[7120] Degraded raised bogs still capable of natural regeneration		
[7150] Depressions on peat substrates of the Rhynchosporion		
[8240] Limestone pavements		
[91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles		
[91D0] Bog woodland		

Table 5-8: Assessment of Potential for Adverse Effects on the Integrity of the Lough Corrib SPA

Qualifying Interest	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets	Potential for Adverse Effects
Gadwall (*Anas strepera*) [A051]	This species was not recorded during the three year survey period within the proposed development. There is no potential for adverse effects on the conservation objective of this species.	No

Qualifying Interest	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets	Potential for Adverse Effects
Shoveler (*Anas clypeata*) [A056]	This species was predominantly found roosting and foraging in the turloughs within the wider environment. Only one record occurred within the Proposed Development. Given the low level of activity within the footprint of the works, there is no potential for adverse effects on the conservation objective of this species.	No
Tufted Duck (*Aythya fuligula*) [A061]	This species was not recorded during the three year survey period within the proposed development. There is no potential for adverse effects on the conservation objective of this species.	No
Common Scoter (*Melanitta nigra*) [A065]	This species was not recorded during the three year survey period within the proposed development. There is no potential for adverse effects on the conservation objective of this species.	No
Hen Harrier (*Circus cyaneus*) [A082]	Although, hunting was recorded within this site, the habitat is suboptimal and only very low levels of hen harrier activity was observed. There is no potential for adverse effects on the conservation objective of this species.	No
Coot (*Fulica atra*) [A125]	This species was not recorded during the three year survey period within the proposed development. There is no potential for adverse effects on the conservation objective of this species.	No
Golden Plover (*Pluvialis apricaria*) [A140]	A total of 48 golden plover observations were recorded during VP watches. Flock size ranged from one to 180 birds with an average flock size of 27 birds. Flight activity was recorded during the non-breeding seasons with higher activity noted over winter 2023-24 compared to winter 2020-21 and winter 2020-19. The Cloonbar East Wetland was noted as an area of higher frequency of usage within the study area for wintering golden plover and more recent data from 2023-2024 indicates an increase in habitat usage within Beagh More West Cutover and the improved grassland north of this where T5, 6, 8 and 9 are located. In Cloonbar East Wetland, golden plover flocks with up to 120 individuals were primarily observed circling the wetland. During winter 2023-24, flocks of up to 180 were observed with activity more widespread. Beagh More West cutover bog and the improved grassland north of this are evident as being areas of increased use.	Yes

Qualifying Interest	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets	Potential for Adverse Effects
	The Proposed Development includes the construction of road and turning head within the Cloonbar East Wetland and T5, 6, 8 and 9 overlap with areas of high golden plover wintering activity. This will result in minor loss of habitat and disturbance during the construction phase. With that, there is potential risk of collision during the operational phase. Taking a 98% avoidance rate, the magnitude of the collision risk effect is assessed as Negligible - based on maximum no. predicted 8.95 collisions per year which is equal to 0.429% of the local Lough Corrib SPA population, as detailed in Appendix 10.1 of Volume III, Appendix XIII thereof. Taking a 99.8% avoidance rate, the magnitude of the effect is assessed as Negligible - based on maximum no. predicted 2.24 collisions per year which is equal to 0.107% of the local Lough Corrib SPA population. There is potential for wintering golden plover to be displaced from the lands within the site boundary during the operational phase of the wind farm. As such, there is potential for adverse effects on the conservation objective of this species through displacement.	
Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	Black-headed gull was not a frequent visitor within the study area. There was no evidence of regular use of the site for landing or foraging by this species. There is no potential for adverse effects on the conservation objective of this species.	No
Common Gull (*Larus canus*) [A182]	Common gull was not a frequent visitor to the lands within the site boundary. There was no evidence of regular use of the site for landing or foraging by this species. There is no potential for adverse effects on the conservation objective of this species.	No
Common Tern (*Sterna hirundo*) [A193]	This species was not recorded during the three year survey period within the proposed development. There is no potential for adverse effects on the conservation objective of this species.	No
Arctic Tern (*Sterna paradisaea*) [A194]	This species was not recorded during the three year survey period within the proposed development. There is no potential for adverse effects on the conservation objective of this species.	No

Qualifying Interest	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets	Potential for Adverse Effects
Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]	There is a lack of evidence to suggest Greenland white-fronted goose are regularly wintering within the lands of the site. There is no potential for adverse effects on the conservation objective of this species.	No
Wetlands and waterbirds [A999]	Waterbird flight activity (e.g. mallard, cormorant, lesser black-backed gull and heron) was predominantly observed in association with the Black (Shrule) and Togher rivers, with flight direction often in a parallel direction to the watercourse. These waterbird species were found roosting and foraging in the surrounding hinterland sites including at Shrule Turlough (~4.7km N) and Hackett Lough (~3km S). Waders such as Snipe and Curlew were mainly observed in association with raised bog habitat within Cloonclasha-Beagh More cutover complex, Cloonteen-Cloonbar-Toberroe cutover complex, Cloonsheen-Shancloon bog and cutover and north of Beagh More Shancloon wetland and cutover. Although these species were observed less frequently during the breeding season, there was evidence of breeding with drumming activity recorded withing the bogs. As such, there is potential for adverse effects on the conservation objective of this species through displacement.	Yes

Table 5-9: Assessment of Potential for Adverse Effects on the Integrity of the Lough Mask SPA

Qualifying Interest	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets	Potential for Adverse Effects
Tufted Duck *Aythya fuligula*	This species was not recorded during the three year survey period within the proposed development. There is no potential for adverse effects on the conservation objective of this species.	No
Black-headed Gull *Chroicocephalus ridibundus*	Black-headed gull was not a frequent visitor within the study area. There was no evidence of regular use of the site for landing or foraging by this species. There is no potential for adverse effects on the conservation objective of this species.	No
Common Gull *Larus canus*	Common gull was not a frequent visitor to the lands within the site boundary. There was no evidence of regular use of the site for landing or foraging by this species. There is no potential for adverse effects on the conservation objective of this species.	No

Qualifying Interest	Does the proposed development provide for any potential delay or interruption in the achievement of this Conservation Objective, as defined by its Attributes and Targets	Potential for Adverse Effects
Lesser Black-backed Gull *Larus fuscus*	Lesser black-backed gulls were frequently seen flying/commuting over the site. Activity was concentrated over Improved agricultural grassland (GA1) in mosaic with wet grassland (GS4), in between Cloonsheen Shancloon bog and cutover, Beagh More Shancloon wetland and cutover and Beagh More west cutover where they were predominantly recorded foraging and commuting. Therefore, there is potential for construction related disturbance to this species. There is potential risk of collision during the operational phase. Considering an avoidance rate of 99%, magnitude of the effect on the local population is assessed as negligible - based on maximum predicted 0.18 collisions per year, annual predicted loss is 0.013% of the local Lough Mask SPA population. There is no potential for adverse effects on the conservation objective of this species.	No
Common Tern *Sterna hirundo*	This species was not recorded during the three year survey period within the proposed development. There is no potential for adverse effects on the conservation objective of this species.	No
Greenland White-fronted Goose Anser albifrons flavirostris	There is a lack of evidence to suggest Greenland white-fronted goose are regularly wintering within the lands of the site. There is no potential for adverse effects on the conservation objective of this species.	No
Wetlands and waterbirds [A999]	Waterbird flight activity (e.g. mallard, cormorant, lesser black-backed gull and heron) was predominantly observed in association with the Black (Shrule) and Togher rivers, with flight direction often in a parallel direction to the watercourse. These waterbird species were found roosting and foraging in the surrounding hinterland sites including at Shrule Turlough (~4.7km N) and Hackett Lough (~3km S). Waders such as Snipe and Curlew were mainly observed in association with raised bog habitat within Cloonclasha-Beagh More cutover complex, Cloonteen-Cloonbar-Toberroe cutover complex, Cloonsheen-Shancloon bog and cutover and north of Beagh More Shancloon wetland and cutover. Although these species were observed less frequently during the breeding season, there was evidence of breeding with drumming activity recorded withing the bogs. As such, there is potential for adverse effects on the conservation objective of this species through displacement.	Yes

5.5 In-Combination Assessment

A review of permitted and proposed developments within the wider landscape was undertaken in order to assess the potential for cumulative impacts on European Sites. The developments assessed are listed in Appendix 2.4, Volume III.

Impacts identified for the Proposed Development with potential to negatively affect the integrity European sites (in the absence of mitigation) are summarised as follows:

- Degradation of river water quality due to runoff from site and during in-stream works during construction and decommissioning
- Loss/damage to aquatic habitat as cause by in-stream and riparian works, and/or due to runoff from site causing degradation in water quality
- Direct mortality of aquatic species during in-stream works
- Disturbance and / or displacement of birds from habitats during construction and decommissioning
- Disturbance and / or displacement of otter from habitats during construction and decommissioning

The potential for permitted and proposed developments to act in combination with the Proposed Development so as to act cumulatively with the project-related impacts is discussed hereunder.

5.5.1 Potential for Cumulative Effects on Water Quality / Aquatic Environment

It is accepted best practice that developments within the same catchment and at the construction stage need to be taken into consideration when assessing the potential for cumulative effects. According to Entec's 2008 report *"it is conceivable that two or more wind farms (or indeed other developments) in the catchment of a water receptor could result in combined runoff impacts to water quality, which then exceed Environmental Quality Standard thresholds. It is generally the case that in such circumstances any such effect is only likely to have the potential to be significant during the construction period. Once operational, any effects are likely to be restricted to high rainfall events when the level of dilution of impact is proportionately increased by higher flow levels that can be anticipated under these circumstances. Despite this theoretical potential impact, it is possible to control construction effects by good management techniques and therefore in practice significant effects, either individually or cumulatively, will rarely occur. Where such impacts occur other regulation provides additional controls. Due to the existing regulation over water environment there are absolute controls on the manner in which developments are constructed and operated in respect of the water environment which result in any potential effect being designed out. In this way it is unlikely that any cumulative effect would be significant."* [25]

Therefore, only other developments that lie in the same catchment(s) as the Proposed Development that have the potential to have their construction stage overlap with the Proposed Development's construction stage are considered.

[25] Entec UK Limited (2008) Review of Guidance on the Assessment of Cumulative Impacts of Onshore Windfarms: Phase 1 Report

- Wind Farms - There are no proposed or consented wind farm developments that share the sub-catchment or subbasin with the Proposed Development (as per Galway County Council and An Coimisiún Pleanála planning data, accessed March 2025).
- Other Developments - Appendix 2.4, Volume III of the EIAR/NIS lists the projects considered in the cumulative assessment. All potential cumulative projects within the shared Proposed Development waterbody catchments relate to small scale residential and rural developments of single dwellings, house extensions, or farm buildings. None of these consented projects are located within 50m of any watercourse and as such, and given their small-scale nature, there is no potential for them to act cumulatively with the Proposed Development to cause a significant effect on water quality or hydrology.
- Land Use - The OPW will continue to maintain the Corrib Headford Arterial Drainage Scheme on a 4-6 year rolling basis. The OPW arterial drainage works practices are subject to the requirements of OPW best practice environmental guidance 'Environmental Guidance: Drainage Maintenance and Construction'[26] and Standard Operating Procedures, which sets out how staff should carry out their activities in an environmentally sensitive and sustainable manner to limit potential impacts on habitats and species. These best practice measures are a standard suite of measures used to support environmental and ecological assessments which are carried out on the drainage schemes, including Appropriate Assessments, EcIAs and CEMPs. The guidelines include specific measures for the protection of *inter alia* otter, lamprey, salmonids, bank nesting birds (e.g. kingfisher), and floating river vegetation, as well as measures to ensure no spread of invasive species. Cumulative effects are not anticipated whereby the arterial drainage works are carried out in accordance with the best practice measures and relevant environmental and ecological assessments.
- Land Use - Turbary turf cutting and forestry activities occur in the vicinity of the Proposed Development and within a shared waterbody catchment. These activities can result in sedimentation of the local drains and watercourses and may be contributary to the existing Poor/Moderate surface water status in the Black(Shrule) river. While potential effects on water quality from peat slippage or sediment runoff form the Proposed Development are deemed unlikely, there is potential for accidental runoff from the Site to act cumulatively with forestry and turbary activities if not properly mitigated.

5.5.2 Potential for Cumulative Effects on Disturbance / Displacement of Species

5.5.2.1 Otter

No otter holts or couches are present within the zone of impact of the Proposed Development; however, otter paths were observed along the watercourses, indicating that the rivers are part of otter territory.

Appendix 2.4, Volume III of the EIAR/NIS lists the projects considered in the cumulative assessment. All potential cumulative projects relate to small scale residential and rural developments of single dwellings, house extensions, or farm buildings. None of these are located within 50m of any watercourse and as such would not disturb otter from commuting or foraging within the watercourses.

[26] Brew, T., Gilligan, N., 2019, Environmental Guidance: Drainage Maintenance and Construction. Series of Ecological Assessments on Arterial Drainage Maintenance No 13. Environment Section, Office of Public Works, Trim, Co. Meath, Ireland.

The OPW will continue to maintain the Corrib Headford Arterial Drainage Scheme on a 4-6 year rolling basis. The works will be carried out in accordance with OPW 'Environmental Guidance: Drainage Maintenance and Construction' and 'Standard Operating Procedures (SOP)'. Specific to otter, the OPW's SOP requires that riparian vegetation is retained where possible, areas of dense scrub are avoided by large plant, and that works do not take place in stretches of channel in proximity of suspected or confirmed otter resting place. Cumulative effects are not anticipated whereby the arterial drainage works are carried out in accordance with the best practice measures and relevant environmental and ecological assessments.

5.5.2.2 Birds

The following wind energy developments were assessed for potential for cumulative effects on birds:

Table 5-10: Wind Energy Applications within 25km of the Proposed Development

Wind Farm	Number of Turbines	Distance and Direction from Proposed Development	Status
Clonberne	11	18km E	Proposed in planning
Laurclavagh	8	10.5km SE	Proposed in planning
Cloonascragh	1	12.2km SE	Granted
Cloonlusk	2	15.16km SE	Existing

Considering the turbines for all the wind farms assessed cumulatively will be constructed in a phased approach, because the ports can only accommodate a certain number of turbine imports at any given time, and the far distance of nearest windfarms, significant cumulative effects during construction are not anticipated. As such, the potental impacts considered further are from operational phase of the wind farms i.e.

Cloonascragh wind energy development is a single turbine with hub height of 97m, and blade rotor diameter of 136m. The NIS provided in support of the planning application for this project noted that the project site does not provide suitable habitat for any of the special conservation interest wetland bird species or for hen harrier. Given the scale of this development, location and lack of ecological functional connectivity with any European sites, there is no potential for cumulative impacts on SCI birds with the Proposed Development.

Potential for cumulative effects with the other wind energy developments is considered hereunder.

The birds that have a common presence across all of the wind energy developments (as noted through field survey carried out by the individual developers as part of the planning application / consent process) that are considered cumulatively are presented in Table 5-11. The birds which are SCI species of Lough Corrib SPA and/or Lough Mask SPA are shown in **Bold**.

Table 5-11: Species at Shancloon, Laurclavagh, Cloonlusk and Clonberne

Species	Shancloon	Laurclavagh	Clonberne	Cloonlusk
Black-headed gull	✓*	✓*		
Buzzard	✓*	✓*	✓*	✓
Common gull	✓*	✓*		
Cormorant	✓*			

Species	Shancloon	Laurclavagh	Clonberne	Cloonlusk
Curlew	✓*	✓	✓	
Goldcrest	✓*			✓
Golden Plover	✓*	✓*	✓	
Great black-backed gull	✓*			
Hen harrier	✓*	✓*	✓	✓
Herring gull	✓*			
Kestrel	✓*	✓*	✓*	✓
Kingfisher	✓*		✓	
Lapwing	✓*	✓*	✓*	
Lesser black-backed gull	✓*	✓*		
Little egret	✓*	✓	✓	
Mallard	✓*			
Meadow pipit	✓*	✓		✓
Merlin	✓*	✓	✓*	
Mute Swan	✓*			
Peregrine	✓*	✓*	✓*	✓
Skylark	✓*			✓
Snipe	✓*	✓*	✓*	✓
Sparrowhawk	✓*	✓*	✓*	✓
Swallow	✓*			
Whimbrel	✓*			
Whooper swan	✓*	✓*	✓*	
Willow warbler	✓*			
Woodcock	✓*	✓	✓	
Greylag Goose	✓*			
Greater white fronted goose	✓*			
Shoveler	✓*			
Wigeon	✓*			
Teal	✓*			

*Symbolises species classified as a key receptor within that particular site.

Cumulative Collision Risk

As per Section 5.3.1, the magnitude of the effect due to potential for bird collision from the Proposed Development has been assessed as Negligible as per NatureScot's Wind Farm Collision Risk Model (updated March 2025) and assessment against Percival, 2003. Notwithstanding, consideration is given here for the potential for cumulative collision effects on SCI birds with other wind farms i.e. through combined mortality, which might together cause adverse effects on European sites.

While Hen Harrier, Black-headed Gull, Common Gull and Shoveler were observed within the bird survey areas during field studies, they were assessed as having no potential for collision with the Proposed Shancloon Wind Farm (the Proposed Development) due to absence of records within potential collision height (PCH). As such there can be no cumulative collision risk for these species between the Proposed Development and other wind farms. As such, only Golden Plover and Lesser Black-backed Gull are assessed further in terms of potential for cumulative collision. Thus, the following is noted:

- At Cloonlusk, the only SCI species in common between this wind farm and Shancloon wind farm is Hen Harrier. For both the proposed Development and for Cloonlush wind farm, hen harrier was observed not to occur within potential collision height for the individual wind farms. As such there can be no cumulative collision risk to Hen harrier.
- At Laurclavagh - a potential for collision for Golden Plover and Lesser Black-backed Gull was identified in the project NIS, however it was assessed as having no potential for adverse effect via collision risk to the SCI populations.
- At Clonberne - while a collision potential for Golden Plover was identified, it was noted in the project NIS that given there no SPAs within 20km of the Proposed Project, there is no potential for collision risk for the SCI species population.

Notwithstanding the conclusion of no potential for impacts on SCI populations for the individual wind energy projects, an assessment is made as to whether they could have a cumulative effect when considering the combined collision potential for all the developments together.

The predicted number of collisions and cumulative predicted percentage increase in annual mortality rates in relation to the SPA populations calculated for SCI species recorded at Shancloon, Laurclavagh and Clonberne, are shown in Table 5-12. Golden Plover is a SCI of Lough Corrib and most recent population figures for this SPA species is 2088 birds[27]. Lesser Black-backed Gull is a SCI for Lough Mask, and most recent population figures for this SPA species is 1336 birds[28].

[27] Source: NPWS (2023) Conservation Objectives: Lough Corrib SPA 004042. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.
[28] Source: iWeBS Site Summary Table for 0D005 Lough Mask 2015-2020

Table 5-12: Cumulative Effects of collision risk on SCI species populations

	Predicted annual collision mortality rate (CRM)			SPA POP: Percentage of the Lough Mask or Lough Corrib SPA population affected by colision mortality			
	Shancloon	Laurclavagh	Clonberne	Shancloon	Laurclavagh	Clonberne	Cumulative Effect
Golden Plover	2.24	0.787	15.144	0.107	0.038	0.725	0.87
Lesser Black-backed Gull	0.18	0.198	N/A	0.013	0.015	0	0.028

* Noting that the Shancloon CRM uses the latest NatureScot Wind Farm Collision Risk Model (updated March 2025), with other wind farms using the older model.

For Golden Plover the collision risk at each project site has been calculated as:

- 2.24 collisions per year at Shancloon
- 0.787 collisions per year at Laurclavagh
- 15.144 collisions per year at Clonberne

Annual mortality of adult Golden Plover is 27% per annum (Sandercock, 2003), which would equate to 563 birds from the 2,088 SPA population. Cumulatively, an additional 0.38 Golden Plover (equating to 0.87% of the SPA population) are predicted to be lost from the combined collision mortality due to operation of Shancloon, Laurclavagh and Clonberne wind farms (nothing that on a precautionary basis it is assumed, for the purpose of this assessment, that all such birds are part of the SPA population). As per Percival, 2003, this equates to an impact magnitude of ' Negligible ', i.e. <1% of population affected due to bird collision resulting in "*very slight change from baseline condition. Change barely distinguishable, approximating to the 'no change' situation*".

For Lesser Black-backed Gull the collision risk at each project site has been calculated as:

- 0.18 collisions per year at Shancloon
- 0.198 collisions per year at Laurclavagh
- 0 collisions per year at Clonberne

Annual mortality of adult Lesser Black-backed Gull is 8.7% per annum (Sandercock, 2003), which would equate to 116 birds from the 1,336 SPA population. Cumulatively, an additional 0.38 Golden Plover (equating to 0.028% of the SPA population) are predicted to be lost from the combined collision mortality due to operation of Shancloon, Laurclavagh and Clonberne wind farms (nothing that on a precautionary basis it is assumed, for the purpose of this assessment, that all such birds are part of the SPA population). As per Percival, 2003, this equates to an impact magnitude of ' Negligible ', i.e. <1% of population affected due to bird collision resulting in "*very slight change from baseline condition. Change barely distinguishable, approximating to the 'no change' situation*".

5.6 Mitigating Adverse Effects

5.6.1 Introduction

Mitigation is prescribed in accordance with mitigation by avoidance as a first approach. Where this is not feasible, measures to prevent impacts from giving rise to adverse effects should be adopted (e.g. management of surface water runoff). Where impacts cannot be avoided mitigation by reduction of impact is required to limit the exposure of the receptor to an acceptable level (often achieved by interrupting the pathway between the source and receptor).

Potential project-related impacts likely to negatively affect the site integrity European sites (in the absence of mitigation) are summarised below as follows:

- Disturbance and / or displacement of birds from habitats during construction and decommissioning
- Disturbance and / or displacement of otter from habitats during construction and decommissioning
- Degradation of river water quality due to runoff from site and during in-stream works during construction and decommissioning
- Loss/damage to aquatic habitat as cause by in-stream and riparian works, and/or due to runoff from site causing degradation in water quality
- Direct mortality of aquatic species during in-stream works

Note, while bird collision during turbine operation has been determined for Golden Plover and Lesser Black-backed Gull, the magnitude of the effect on the SPA populations is assessed as not significant based on maximum predicted collisions per year as an annual predicted loss percentage loss of the Lough Mask SPA and Lough Corrib SPA populations.

Mitigation is prescribed hereunder to address the impacts such that adverse effects on site integrity of the European sites does not occur. These measures are in addition to the Surface Water and Hydrology Measures and measures to protect biodiversity generally as prescribed in the EIAR.

Mitigation measures are set out in accordance with the guidance (European Commission, 2021). Mitigation is described with respect to:

- How the measures will avoid / prevent / reduce the adverse impacts on the site to an acceptable level.
- The expected results from implementing and degree of confidence in their likely success.
- The timescale, relative to the project, when they will be implemented and by whom.
- How and when the measures will be monitored.

5.6.2 Mitigation By Avoidance in Design

A process of 'mitigation by avoidance', as informed by constraints assessment and consultation, was undertaken during the design of the wind farm with the objective of avoiding / minimising the potential for adverse effects on European sites. The Site layout and drainage infrastructure has been designed such that it is sympathetic to the existing topography and aims to maintain the existing hydrological regime of the Site such that it does not create a changed hydrological response to precipitation. The design has been informed by a detailed flood risk assessment for the Site.

The infrastructure has been located such that it is set back as far as reasonably practicable from hydrological features, with an ethos of ensuring a minimum setback of 50 m between mapped surface waters and wind farm infrastructure, and a minimum setback of 10 m from non-mapped streams and drainage features with the exception of HDD locations and watercourse crossings.

The Proposed Development has been specifically designed to avoid, where feasible, the breeding and resting places of these protected wild animals and to minimise habitat loss/fragmentation and disturbance/displacement. Riparian corridors of the higher value watercourses within the Site are being retained as part of the Proposed Development design, either by citing the infrastructure a 50m setback from the watercourses or ensuring the new bridge crossing retains a 2.5m riparian corridor. As such ecological connectivity at a landscape level will not be impacted.

Swales and drainage channels will discharge runoff from access roads and areas of hardstanding to settlement ponds. These will be suitably sized to accommodate flows from storm events up to and including the 1 in 100-year storm event. Settlement ponds will not discharge directly to any drain or watercourse. Rather, flows from the ponds will be dispersed diffusely over land to allow natural overland flow and percolation within the catchment.

Watercourse crossings will be designed and suitably sized to accommodate peak, or storm discharge rates so as not to cause risk of impeding flows during extreme storm events and causing flooding

The design and turbine layout were informed by multiple collision risk models. The findings of these CRMs were utilised to advise the layout and design alternatives. As such, areas of high avian activity were considered and avoided to minimise collision risk.

The layout of roads and other associated infrastructure was purposely designed to avoid habitats of high ecological value. Instead infrastructure was purposely designed to be situated in low value agricultural grassland utilising natural gaps in existing hedgerow to minimise vegetation and breeding habitat loss.

The construction of the floated road in Cloonbar bog will use push in sheet piling in order to limit noise levels which might cause disturbance to birds.

Table 5-13: Details of Mitigation Measures to be Implemented for the proposed scheme

Adverse Effect	Description of the measures, details on implementation, effectiveness, monitoring				
	How the measure will contribute to avoiding/reducing the effects on the integrity of the site	How it will be implemented and by whom	Demonstrate its effectiveness (e.g. based on scientific evidence / expert rationale)	Timescale of implementation, relative to the plan or project	Proposed monitoring scheme and reporting requirements.
Protection Qualifying Interests of Lough Corrib SAC for which adverse effects have been identified					
Effect # 1: Degradation in water quality and loss/damage to aquatic habitat	Measure #1.1 Best practice construction methods will be used to avoid potential for effects on water quality following the documents and guidelines listed below: • Water Run-Off from Construction Sites - SEPA - (WAT-SG-75) • The SUDS Manual - CIRIA C753. • Site Handbook for the Construction of SUDS - CIRIA C698 ISBN 0 86017 698 3. • Works and maintenance in or near water - PPG5 - (October 2007) • Environmental good practice on site guide (fourth edition) (C741) • Guidance for Pollution Prevention, dealing with spills: GPP 22-(October 2018) • Temporary Construction Methods - SEPA -(WAT-SG-29) • Guidelines on protection of Fisheries During Construction Works in and Adjacent to Waters - Inland Fisheries Ireland - (IFI 2016) • Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes - TII Publications (2008) All construction works will be carried out in accordance with the following appendices in Volume III: • Appendix 2.1 Construction Environmental Management Plan • Appendix 11.4 Peat and spoil Management Plan • Appendix 12.2 Surface water Management Plan				
	These measures will prevent sediment and pollution runoff to the aquatic environment thereby blocking a pathway for effects on the downstream European sites	Measures will be implemented by the Contractor	These are standard and proven environmental protection techniques and set out in industry guidelines	For the duration of construction and decommissioning	The Environmental Manager and ECoW will monitor the implementation of the mitigation measures with regular reporting to client.

Adverse Effect	Description of the measures, details on implementation, effectiveness, monitoring				
	How the measure will contribute to avoiding/reducing the effects on the integrity of the site	**How it will be implemented and by whom**	**Demonstrate its effectiveness (e.g. based on scientific evidence / expert rationale)**	**Timescale of implementation, relative to the plan or project**	**Proposed monitoring scheme and reporting requirements.**
Effect # 2: Loss/damage to aquatic habitat through invasive species	(measures in additional to water pollution control measures) Measure #2.1: Control of aquatic invasive species All works within and adjacent to watercourses will be carried out in accordance with Inland Fisheries Ireland Biosecurity Protocols: https://www.fisheriesireland.ie/Biosecurity/biosecurity.html. All plant, equipment and footwear/clothing that comes into contact with the aquatic environment will be checked, cleaned and thoroughly dried equipment and clothing before using again. If everything cannot be dry for at least 48 hours before re-entering the water, then disinfectant will be required. • CHECK plant, equipment, clothing and footwear for living plants and animals. Pay particular attention to areas that are damp or hard to inspect. • CLEAN and wash all equipment, footwear and clothes thoroughly (in situ before leaving the area). If you do come across any plants and animals, leave them at the water body where you found them. • DRY all equipment and clothing for at least 48 hours – some species can live for many days or weeks in moist conditions. Make sure you don't transfer water elsewhere. • DISINFECT everything if complete drying is not possible. Use disinfectant such as Milton (follow product label), Virkon Aquatic (3mg/L), Proxitane (30mg/L) or an iodine based product for 30 minutes. Items difficult to soak can be sprayed or wiped down with disinfectant.				
	These measures will prevent spread of invasive aquatic species to downstream European sites	Measures will be implemented by the Contractor	These are standard and proven environmental protection techniques and set out in industry guidelines	For the duration of construction and decommissioning	The Environmental Manager and ECoW will monitor the implementation of the mitigation measures with regular reporting to client.

Adverse Effect	Description of the measures, details on implementation, effectiveness, monitoring				
	How the measure will contribute to avoiding/reducing the effects on the integrity of the site	**How it will be implemented and by whom**	**Demonstrate its effectiveness (e.g. based on scientific evidence / expert rationale)**	**Timescale of implementation, relative to the plan or project**	**Proposed monitoring scheme and reporting requirements.**
Effect # 3 Direct mortality of aquatic species	Measure #3.1: Avoidance of Spawning Season The installation of the flume on the Togher River and the construction of the culvert on arterial drainage channel CH4/13/5 will be carried out outside of the salmonid and lamprey spawning seasons. Once the flume is in place on the Togher river, bridge construction works will be carried out and without curtailment of timing of the works. Similarly, the HDD crossing works for the Togher River will be carried out outside of the salmonid and lamprey spawning seasons.				
	This will be done so as to ensure access to spawning habitat and no impacts on species populations.	Measures will be implemented by the Contractor	This is a standard method prescribed by IFI to avoid impacts on fisheries.	Salmon spawning is from November to March, while lamprey spawning occurs in early Summer (April to June). It will not be necessary to curtail the works on the Black (Shrule) River to outside of the spawning season given the unsuitability of the habitat at the works and upstream for spawning.	The Environmental Manager / ECoW will monitor the implementation of the mitigation measures with regular reporting to client.
	Measure #3.2: Protection of Lamprey / Translocation out of Dry Works Areas The fluming of the Togher River to accommodate the new bridge crossing will require mitigation for lamprey. Piling works on the Black (Shrule) River will require mitigation for lamprey. The new culvert on arterial drainage channel CH4/13/5 will require mitigation for lamprey.				

Adverse Effect	Description of the measures, details on implementation, effectiveness, monitoring				
	How the measure will contribute to avoiding/reducing the effects on the integrity of the site	**How it will be implemented and by whom**	**Demonstrate its effectiveness (e.g. based on scientific evidence / expert rationale)**	**Timescale of implementation, relative to the plan or project**	**Proposed monitoring scheme and reporting requirements.**
	Electrofishing for lamprey ammocoetes will follow the Lamprey ammocoete survey methodology given in Harvey J & Cowx I (2003). This method will not be feasible in deeper water (i.e. at the new bridge crossing) due to deep waters and poor visibility. In such a case dredging only will be used as the lamprey recovery method. For areas to be electrofished, the selected areas of suitable in-stream habitat within the works areas will be electricofished using a pulsed DC electrical fishing. The affected area will be fished in a zigzag pulse and draw manner with a minimum effort of 1 minute fishing per m2. A fishing operation will be started with the gear constantly 'on' followed by a regular on/off sequence. While the gear is 'on' the anode will be slowly pulled backwards in the water to cause lampreys to emerge from burrows as a result of electro-taxis. This procedure will be repeated throughout the operation, working though consecutive adjoining 1m2 areas. By keeping the anode 1-15cm above the sediment and pulling the anode backwards, the number of lampreys stunned within the substrate will be reduced. Captured lampreys (and other fish) will be removed quickly using the anode net or dip net and placed into a bucket of river water. Lampreys captured will be translocated to suitable nursery habitats located upstream of the proposed works. Following electrofishing procedure, the river-bed sediment will be dredged from the watercourse (using a long reach machine and bucket) and will be checked for the presence / absence of lamprey and these will be collected from the spoil. Juvenile lampreys will be in the top c. 20cm of substrate in the river (oxygenated area), so the dredging will first remove the top 200cm of silt using the machine bucket and spread this out on a flat wooden sheeting/pallet for examination. Lampreys captured will be translocated to suitable nursery habitats located upstream of the proposed works and spread out at a density of <10 m2.				
	Mitigation is proposed hereunder to ensure the juvenile lamprey are effectively removed from works areas in advance of the construction activities so as to ensure the protection of the populations in the catchment.	The above method will be carried out by the EcOW	This is a standard methodology as per O'Connor W. (2006) A survey of juvenile lamprey populations in the Boyne Catchment. Irish Wildlife Manuals, No. 24 National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.	These works will be carried out outside of the salmonid and lamprey spawning seasons	The Environmental Manager / ECoW will monitor the implementation of the mitigation measures with regular reporting to client.

Adverse Effect	Description of the measures, details on implementation, effectiveness, monitoring				
	How the measure will contribute to avoiding/reducing the effects on the integrity of the site	**How it will be implemented and by whom**	**Demonstrate its effectiveness (e.g. based on scientific evidence / expert rationale)**	**Timescale of implementation, relative to the plan or project**	**Proposed monitoring scheme and reporting requirements.**
	Measure #3.3: Protection of Salmonid Spawning Habitat The habitat on arterial drainage channel CH4/13/5 where the existing crossing is proposed to be replaced by a larger culvert hosts suitable salmonid spawning gravels. Following dewatering, the spawning gravels will be removed from within the works area for later reinstatement, all of which will be done under the instruction of the ECoW. These will be stored locally and following culvert installation (which will be in accordance with IFI guidelines, and will be embedded 500mm below existing bed level), the gravels will be reinstated.				
	This measures will ensure that salmonid spawning gravels are retained within the catchment	The above method will be carried out by the EcOW	This is a standard methodology as per OPW Environmental Drainage Maintenance Guidance Notes 10 Steps to Environmentally Friendly Maintenance And Mih, W. C. 1979. Hydraulic restoration of stream gravel for spawning and rearing of salmon species. Report No. 33. State of Washington Water Research Center, Washington State University, Pullman	These works will be carried out outside of the salmonid and lamprey spawning seasons	The Environmental Manager / ECoW will monitor the implementation of the mitigation measures with regular reporting to client.

Adverse Effect	Description of the measures, details on implementation, effectiveness, monitoring				
	How the measure will contribute to avoiding/reducing the effects on the integrity of the site	**How it will be implemented and by whom**	**Demonstrate its effectiveness (e.g. based on scientific evidence / expert rationale)**	**Timescale of implementation, relative to the plan or project**	**Proposed monitoring scheme and reporting requirements.**
Effect # 4: Disturbance to wetland bird species	Measure # 4.1: Timing of Works Involving Impulsive Noise (Mitigation by Avoidance) during Construction A 70 dB(A) impulsive noise is likely to trigger an adverse behavioural response in birds. The wetland habitats in the locality which support wetland birds are: Cloonbar Bog, Commonage Area / Cloonbar East Wetland, Beagh More North Cutover, Cloonsheen-Shancloon bog and cutover complex and Cloonmweelaun-Cloonaglasha. Works which could cause an impulsive noise >70 dB(A) at the boundary of these habitats (as shown on Figure 9.5, Volume IV) will be avoided where feasible during the wintering season (October 1st and March 31st).				
	Constraining the timing of works which result in impulsive noise e.g. piling to outside of the wintering season will avoid noise disturbance to wintering wetland bird species.	The ECoW and Construction Contractor will ensure no noisy (impulsive) works during the winter season.	The constraining of the timing of works is a standard environmental protection technique and is set out in industry guidelines.	No noisy (impulsive) works between October 1st and March 31st.	EcOW with ornithological experience is required on site to monitor bird activity and response to noise stimuli and will have the power to stop the works where birds are showing adverse behaviour to noise generated by the works e.g. reduced feeding activity, birds showing an alert response or birds moving away.
	Measure # 2.2: Noise Barriers and ECoW In the event that the timing of works cannot be curtailed to outside of the winter period, due to programme or other uncontrollable factors, a noise barrier will be implemented to ensure that				

Adverse Effect	Description of the measures, details on implementation, effectiveness, monitoring				
	How the measure will contribute to avoiding/reducing the effects on the integrity of the site	**How it will be implemented and by whom**	**Demonstrate its effectiveness (e.g. based on scientific evidence / expert rationale)**	**Timescale of implementation, relative to the plan or project**	**Proposed monitoring scheme and reporting requirements.**
	noise >70 dB(A) at the boundary of Cloonbar Bog, Commonage Area / Cloonbar East Wetland, Beagh More North Cutover, Cloonsheen-Shancloon bog and cutover complex and Cloonmweelaun-Cloonaglasha (as shown on Figure 9.5, Volume IV) will not occur. An ECoW with ornithological experience will be required to observe bird response to noise stimuli and will have power to stop works in the event birds display adverse behaviour to noise stimuli.				
	The measure will limit noise stimuli for birds and as such mitigate disturbance effects.	EcOW will monitor bird behaviour and response to noise stimuli, whilst the mobile noise barrier will be installed by the construction contractor in advance of noisy construction works.	Published records (see Cutts et al, 2013) has established a general 70 dB threshold for bird disturbance.	Noise mitigation measures will be in place for the noisy or impulsive works in the construction phase during winter bird season.	EcOW with ornithological experience will be required on site to monitor bird activity and response to noise stimuli and will have the power to stop the works where birds are showing adverse behaviour to noise generated by the works e.g. reduced feeding activity, birds showing an alert response or birds moving away.
Effect # 5: Disturbance to otter	Measure #5.1: Survey for Otter A pre-construction mammal survey will be undertaken within the mammal survey study area to reconfirm the existing environment as described in the EIAR/NIS.				

Adverse Effect	Description of the measures, details on implementation, effectiveness, monitoring				
	How the measure will contribute to avoiding/reducing the effects on the integrity of the site	How it will be implemented and by whom	Demonstrate its effectiveness (e.g. based on scientific evidence / expert rationale)	Timescale of implementation, relative to the plan or project	Proposed monitoring scheme and reporting requirements.
	The measure will limit potential for disturbance effects to otter.	EcOW will carry out survey. Works in and adjacent to watercourses will be phased so as not to create a significant barrier to movement for otter.	If an Otter holt should be encountered at any point, then NPWS will be informed and NRA Guidelines for the Treatment of Otters Prior To the Construction of National Road Schemes will be followed.	No later than 12 months prior to construction	Reporting will be to NPWS where otter resting / breeding place is recorded.

5.6.3 Monitoring

5.6.3.1 Environmental / Ecological Clerk of Works

An Environmental / Ecological Clerk of Works (EnCoW / ECoW) will be appointed by the Developer with responsibility for monitoring at the Site during the construction phase of the Development. The Clerk of Works will have the authority to temporarily stop works to prevent negative effects on SCI/QI species of European sites or to ensure corrective action (as set out above) is taken to mitigate adverse effects.

5.6.3.2 Water Quality

A Surface Water Quality Monitoring Programme will be established which will commence 12 months prior to construction in order to confirm the baseline physio-chemical conditions and hydromorphological conditions of the watercourses within the Site and will continue throughout construction and for three months post-commissioning phase of the Proposed Development.

Monthly water quality grab samples will be taken from the Togher River (Black[Shrule]_010) at locations approximately 10m downstream of the proposed watercourse crossings. Water quality sampling will be undertaken in accordance with BS EN ISO 5667 - Water Quality Sampling. The samples will be checked in situ for:

- pH;
- Temperature;

- Turbidity;
- Conductivity; and
- Dissolved Oxygen.

using a fully calibrated portable pH/temperature/conductivity meter (with pH resolution of 0.01 pH), turbidity probe and a flow impellor.

The samples will then be submitted to an appropriately certified laboratory (ILAB or similar) in accordance with the laboratory custody protocol for assessment of the following parameters:

- Biological Oxygen Demand;
- Chemical Oxygen Demand;
- Total Hardness;
- Total Suspended Solids;
- Total Dissolved Solids;
- Nitrate;
- Nitrite;
- Ammoniacal Nitrogen;
- Molybdate Reactive Phosphorus;
- Total Coliforms; and
- Faecal Coliforms (E.coli).

A record of monthly meteorological conditions (as a minimum precipitation and temperature) will be maintained.

Biological water quality assessment using the EPA Q-value methodology will be carried out once prior to the commencement of construction and on a six month basis during the monitoring period.

The hydromorphological baseline at the proposed watercourse crossings within the Site will be reconfirmed pre-construction using the River Hydromorphology Assessment Technique (RHAT). Annual RHAT assessments will be carried out which will be compared against the baseline. The Design and Construction of the bridge crossing and culverts will minimise upstream afflux, avoid turbulence and minimise loss of the natural channel bed due to the culvert or structure in order to ensure that hydromorphology is not affected. The Design will ensure that the baseline river Hydromorphological Condition Score derived from the initial RHAT assessment is not altered such that it would impact the derived WFD hydromorphology classification.

The Contractor will ensure that the daily visual monitoring of the surface water network for visible signs of construction impact is carried out on a daily basis for example, riparian vegetation loss, evidence of oil/fuel slick, sediment plumes, fish kill.

5.6.3.3 Birds

A post construction monitoring programme will be implemented at Shancloon in order to confirm monitor bird collision and displacement; the results of this will be submitted annually to the competent authority and NPWS. Published guidance on assessing the impacts of wind farms on birds from English Nature and the Royal Society for the protection of birds recommends the implementation of an agreed post development monitoring programme as a best practice mitigation measure (Drewitt and Langston, 2006).

In addition, published recommendations on swans and wind farms (Rees, 2012) suggests that systematic post construction monitoring; adapted to quantify collision, barrier, and displacement, be conducted over a period of sufficient duration to allow for annual variation or in combination effects. The following individual components will be carried out:

1. Fatality Monitoring (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction)- A comprehensive fatality monitoring programme will be undertaken following published best practice (Shawn et al., 2010; Fijn et al., 2012 and Grunkorn, 2011); the primary components are as follows:
    a) Initial carcass removal trials to establish levels of predator removal of possible fatalities. This will be done following best recommended practice and with due cognisance to published effects such as predator swamping, whereby excessive placement of carcasses increases predator presence and consequently skews results (Shawn et al., 2010). No turbines which are used for carcass removal trials will be used for subsequent fatality monitoring. Carcass removal trials will be continued for the duration of fatality searches.
    b) Turbine searches for fatalities will be undertaken following best practice (Fijn et al., 2012 and Grunkorn, 2011) in terms of search area (minimum radius hub height of 81m) and at intervals selected to effectively sample fatality rates based on carcass removal rates (1 per month). To be conducted during years 1, 2, 3, 5, 10 and 15 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring to be agreed with NPWS.
    c) A standardised approach with a possible control group and/or variation in search techniques such as straight line transects/ randomly selected spiral transects/ dog searches will be undertaken. This will provide a means of robustly estimating the post construction collision fatality impact (if any).
    d) Recorded fatalities will be calibrated against known predator removal rates to provide an estimate of overall fatality rates.

Reports will be submitted to the competent authority and NPWS following each round of surveys.

2. Flight Activity Survey (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction) - A flight activity survey will be undertaken during the summer and winter months to include both vantage point and hinterland surveys as Per SNH (2017) guidance:
    e) Record any barrier effect i.e. the degree of avoidance exhibited by species approaching or within the Site (Drewitt and Langston, 2006). Target species to be all raptors and owls, all wild goose and duck species, all swan species, and all wader species.
    f) Record changes in flight heights of key receptors post construction.

Reports will be submitted to the competent authority and NPWS following each round of surveys. This survey is to be conducted during years 1, 2, 3, 5, 10 and 15 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring requirements will be agreed with NPWS.

3. Monthly Wildfowl Census (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction). A monthly wildfowl census, following the methods utilised for the baseline survey, is to be repeated on a monthly basis during the winter period. This aims to:
   g) Assess displacement levels (if any) of wildfowl post construction
   h) Assess overall habitat usage changes within the vicinity of the Proposed Development post construction.

This survey will be conducted during years 1, 2, 3, 5, 10 and 15 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring requirements will be agreed with NPWS. Reports will be submitted to the competent authority and NPWS following each round of surveys.

4. Breeding Bird Survey (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction). A breeding bird survey (moorland breeding bird and Common Bird Census), following methods used in the baseline survey to be repeated yearly between early April to early July. This aims to:
   i) Assess any displacement effects such as those recorded on breeding birds. Overall density of breeding birds to be annually recorded.
5. Breeding Wader Survey (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction). A breeding bird survey, following methods used in the baseline survey to be repeated yearly April-May-June.

Both of the above surveys are to be conducted during years 1, 2, 3, 5, 10 and 15 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring requirements will be agreed with NPWS.

5.7 Conclusions on Post-Mitigation Impacts

The potential for adverse effects on each of the individual Qualifying Interests (QIs) and Special Conservation Interests (SCIs) that were identified as being at risk of potential effects are assessed in view of the Conservation Objectives of those habitats and species. Mitigation measures have been incorporated into the Proposed Development for the avoidance of impacts as fully described in Section 5.5 of this NIS. The potential for residual adverse effects discussed:

- All potential pathways for direct and indirect deterioration in habitat quality which supports SCI species and QI species have been prevented.
- A range of bespoke mitigation measures have been prescribed in terms on water quality and in-stream works to ensure that no impacts will occur in relation to alteration in community, extent, structure or distribution of aquatic QI species of Lough Corrib SAC as a result of the proposals and no deterioration in the condition of aquatic habitat due to the proposed works.
- Mitigation measures are prescribed to ensure no effects on SCI bird populations of Lough Mask SPA and Lough Corrib SPA through displacement during the construction works.

Based on the above, following the implementation of mitigation measures, it can be concluded, in view of the best scientific knowledge and based on objective information, that the Proposed Development will not adversely affect the integrity of any European site.

6. CONCLUSION

For the reasons set out in detail in this NIS, in the light of the best scientific knowledge in the field, all aspects of the proposed development which, by itself, or in combination with other plans or projects, may affect the relevant European Sites have been assessed and it has been concluded that the Proposed Development will not adversely affect the integrity of any relevant European site in view of that site's conservation objectives.

The NIS contains information which the competent authority may consider in making its own complete, precise and definitive findings and conclusions and upon which it is capable of determining that all reasonable scientific doubt has been removed as to the effects of the Proposed Development on the integrity of the relevant European sites.

Taking cognisance of measures incorporated into the project design and mitigation measures to avoid effects that are considered in the preceding section, the proposed development will not adversely affect the integrity of the Lough Corrib SAC (000297), Lough Corrib SPA (004042) or Lough Mask SPA (004062).

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