Planning and Environmental Consultants

Appropriate Assessment Screening Report and Natura Impact Statement

Laurclavagh Renewable Energy Development, Co. Galway

DOCUMENT DETAILS

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Table of Contents

TABLE OF FIGURES

TABLE OF TABLES

APPENDICES

1. INTRODUCTION

1.1 Background

MKO has been appointed to provide the information necessary to allow the competent authority to conduct an Article 6(3) Appropriate Assessment Screening and Appropriate Assessment of the Proposed Project.

Screening for Appropriate Assessment is required under Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive). Where it cannot be excluded that a project or plan, either alone or in combination with other projects or plans, would have a significant effect on a European Site then same shall be subject to an appropriate assessment of its implications for the Site in view of the Site's conservation objectives. The current project is not directly connected with, or necessary for, the management of any European Site. Consequently, the project has been subject to the Appropriate Assessment Screening process.

This Natura Impact Statement (NIS) has been prepared in accordance with the European Commission's Assessment of Plans and Projects Significantly affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC (EC, 2021) and Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (EC, 2018) as well as the Department of the Environment's Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (DoEHLG, 2010) and the Appropriate Assessment Screening for Development Management. Office of the Planning Regulator, Dublin 7, Ireland OPR (2021).

1.2 References to Proposed Project

The Proposed Project, which will be known as the 'Laurclavagh Renewable Energy Development', is referenced within this NIS as follows:

- The 'Proposed Wind Farm' refers to the 8 no. turbines and supporting infrastructure which is the subject of this Section 37E application.
- The 'Proposed Grid Connection' refers to the 110kV substation and supporting infrastructure which will be the subject of a separate Section 182A application.
- The 'Proposed Project' comprises the Proposed Wind Farm and the Proposed Grid Connection, all of which are located within the NIS Study Boundary (the 'Site') and assessed together within this NIS.

1.3 Statement of Authority

This NIS has been prepared by Rachel Walsh (B.Sc.). Rachel has 4 years' experience in ecological consultancy and has worked on Appropriate Assessments and Ecological Impact Assessments for a range of project types, including renewable energy infrastructure, water services infrastructure and transport infrastructure. This report has been reviewed by John Hynes (B.Sc., M.Sc., MCIEEM). John has 10 years' experience in ecological management and assessment.

The baseline ecological walkover surveys were undertaken by Rachel Walsh (BSc.), Cillian Burke (BSc.) and Brónagh Boylan (BSc.) of MKO. With regard to ornithological surveys, the scope of works and survey methodology was devised by Padraig Cregg, Principal Ornithology of MKO, and is fully compliant with recent NatureScot (formerly Scottish Natural Heritage) guidance (SNH, 2017). Field surveys were undertaken by Eilis Hogan, John Curtin, Jen Fisher, Jonah Gaine, Jack Kennedy, Louis de Vries, Marcus Hogan, Margeaux Pierrel, Nessa Lee, Peter Capsey, Patrick Manley, Paul Troake, Sarah Jorgensen, Tom Rea, Zuzana Erosova and Zak O'Connor. All of the aforementioned surveyors are suitably qualified and competent in the field of ornithological and/or ecological surveying as relevant.

1.4 Methodology

Stage 1 Screening - The purpose of the screening stage is to determine, on the basis of a preliminary assessment and objective criteria, whether a plan or project, alone and in-combination with other plans or projects, could have significant effects on a European site in view of the site's conservation objectives.

There is no necessity to establish such an effect; it is merely necessary for the Competent Authority to determine that there may be such an effect. The need to apply the precautionary principle in making any key decisions in relation to the tests of Appropriate Assessment (AA) has been confirmed by the case law of the Court of Justice of the European Union (CJEU). Plans or projects that have no appreciable effect on a European site may be excluded. The threshold at this first stage is a very low one and operates as a trigger in order to determine whether a Stage Two AA must be undertaken by the Competent Authority on the implications of the proposed project for the conservation objectives of a European Site. Therefore, where significant effects are likely, uncertain or unknown at screening stage, a Stage Two AA will be required.

Stage 2 - A Stage Two AA is a focused and detailed examination, analysis and evaluation carried out by the Competent Authority of the implications of the plan or project, alone and in-combination with other plans and projects, on the integrity of a European site in view of that site's conservation objectives. Case law has established that such an Appropriate Assessment, to be lawfully conducted, in summary:

> (i) must identify, in the light of the best scientific knowledge in the field, all aspects of the proposed project which can, by itself or in-combination with other plans or projects, affect the conservation objectives of the European site;
>
> (ii) must contain complete, precise and definitive findings and conclusions and may not have lacunae or gaps; and
>
> (iii) may only include a determination that the proposed project will not adversely affect the integrity of any relevant European site where the competent authority decides (on the basis of complete, precise and definitive findings and conclusions) that no reasonable scientific doubt remains as to the absence of the identified potential effects. If adverse impacts can be satisfactorily avoided or successfully mitigated at this stage, so that no reasonable doubt remains as to the absence of the identified potential effects, then the process is complete. If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must proceed to stage three and, if necessary, stage four.

1.5 Structure and Format of this Document

- Section 1 provides an introduction, background information and statement of authority for the AASR and NIS.
- Section 2, provides a full description of all elements of the Proposed Project.
- In Section 3, the characteristics of the receiving environment are fully described.
- In Section 4, a Stage 1 Screening is undertaken to identify any European Sites upon which there is a potential for a likely significant effect to occur either individually or in combination with other plans and projects as a result of the Proposed Project.
- Section 5, the Natura Impact Statement provides a detailed consideration of the Screened In European Sites and identifies the relevant qualifying features and how they may be affected in light of their conservation objectives.
- Section 6 provides an assessment of the potential for adverse effects on the identified European Sites as a result of the Proposed Project and in the absence of mitigation. This section also prescribes mitigation to robustly block any identified pathways for impact for effect.
- Section 7 provides an assessment of residual effects taking into consideration the proposed mitigation.
- In Section 8, the potential in combination effects of the Proposed Project on European Sites, when considered in combination with other plans and projects were assessed.
- A concluding statement is provided in Section 9.

2. DESCRIPTION OF PROPOSED PROJECT

2.1 Site Location

The Proposed Project is located within a rural setting in northwest Galway, approximately 8km southwest of Tuam and 10km north of Claregalway. The N83 National Road runs in a north-south direction directly to the east of the Proposed Wind Farm site. Land use currently comprises pastural agricultural land. The surrounding land use is primarily pastural agricultural lands, as well as one-off rural housing. Existing access is via the N83 onto the L61461 Local Road in a westerly direction, a temporary access road between the N83 and the L61461 will facilitate construction stage access to the Proposed Wind Farm site. The Site encompasses the Proposed Wind Farm and the Proposed Grid Connection which includes an underground cabling connection from the proposed on-site 110kV substation to the existing Cloon 110kV electrical substation in the townland of Cloonascragh, Co. Galway. The Site location context is shown on Figure 2-1. The grid reference for the approximate centre of the Site is M 37273 43814.

2.2 Characteristics of the Proposed Project

Consultation with An Bord Pleanála confirmed that the Proposed Project will be subject to a dual consenting process, with development relating to the Proposed Grid Connection being subject to a separate planning application under Section 182A of the Planning and Development Act, 2000, as amended. The Proposed Project (Wind Farm and Grid Connection) and its component parts are the subject of separate planning applications under Section 37E (Proposed Wind Farm) and Section 182A (Proposed Grid Connection) of the Planning and Development Act 2000, as amended. The development description for the current planning application as appears in the public notices is as follows:

The Proposed Wind Farm will consist of the provision of the following:

i. *8 no. wind turbines with an overall turbine tip height of 185 metres; a rotor blade diameter of 163 metres; and hub height of 103.5 metres, and associated foundations, hard-standing and assembly areas;*
ii. *A thirty-year operational life of the wind farm from the date of full commissioning of the wind farm and subsequent decommissioning;*
iii. *Underground electrical cabling (33kV) and communications cabling;*
iv. *A temporary construction compound;*
v. *A temporary security cabin;*
vi. *A meteorological mast with a height of 30 metres and associated foundation and hard-standing area;*
vii. *A new gated site entrance on the L61461;*
viii. *Junction accommodation works and a new temporary access road off the N83 to the L61461, to facilitate turbine delivery and construction access to the site;*
ix. *Upgrade of existing site tracks/ roads and provision of new site access roads, junctions and hardstand areas.*
x. *Upgrade of the existing L61461;*
xi. *Spoil Management;*
xii. *Site Drainage;*
xiii. *Tree and hedgerow removal;*
xiv. *Biodiversity Enhancement measures (including the planting of natural woodland, hedgerows and species rich grassland for new habitat);*
xv. *Operational stage site signage; and*
xvi. *All ancillary works and apparatus.*

The Proposed Grid Connection, which will be subject to a separate planning application under Section 182A of the Planning and Development Act 2000 (as amended), will consist of the provision of the following:

1. *A permanent 110kV onsite substation compound (2 no. control buildings with welfare facilities, all associated electrical plant and apparatus, security fencing, underground cabling, underground wastewater holding tank, site drainage and all ancillary works);*
2. *A temporary construction compound*
3. *Approximately 14.3km of 110kV underground cabling (including joint bays and watercourse crossings) which will run along the Proposed Wind Farm access roads onto the L61461, the N83 and the L6141 connecting to Cloon 110kV Substation.*

The 'Proposed Project', which encompasses the Proposed Wind Farm (Section 37E) and Proposed Grid Connection (Section 182A) has been assessed within this NIS. The Proposed Project is located within the NIS Site Boundary or the 'Site' and measures approximately 944 hectares (ha).

This application seeks a ten-year planning permission and a 30-year operational life from the date of commissioning of the entire wind farm.

A map of the Proposed Project layout overlaying the habitats within the Site is shown in Figure 3-2.

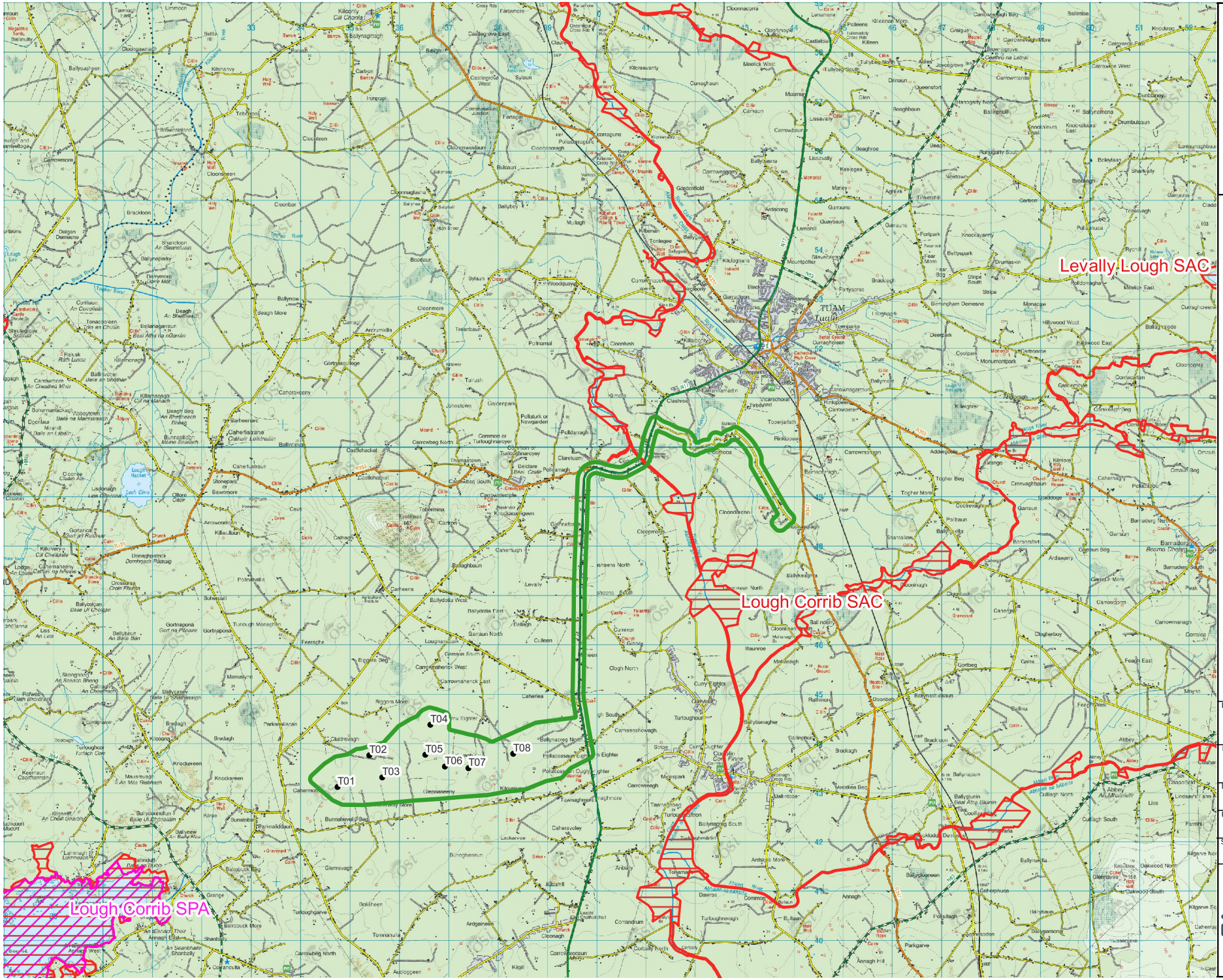
2.3 Results of Consultation

MKO undertook a scoping exercise during preparation of this NIS. Table 2-1 below provides a list of the organisations consulted with regard to biodiversity during the scoping process, and notes where scoping responses were received.

Table 2-1 Organisations consulted with regard to biodiversity

Consultee	Response	
Department of Agriculture, Food and the Marine (DAFM)	29.06.2023	Response from the felling division: "If the Proposed Project will involve the felling or removal of any trees, the developer must obtain a felling licence from this department before trees are felled or removed. A Felling licence application form can be obtained from Felling Section, Department of Agriculture, Food and the Marine, Johnstown Castle Estate, Co. Wexford. A felling licence granted by the Minister provides authority under the Forestry Act 2014 to fell or otherwise remove a tree or trees and/or to thin a forest for silvicultural reasons."
An Taisce	25/05/2023	Acknowledgement of request
Bat Conservation Ireland	-	No response received to date
Birdwatch Ireland	-	No response received to date
Department of Communications, Climate Action and the Environment	25.05.2023	Acknowledgement of receipt

Department of Culture, Heritage and the Gaeltacht	30.06.2023	Acknowledgement of receipt
Development Applications Unit **Department of Housing, Local Government and Heritage**	30.06.2023	The Department is not in a position to make specific comments on this particular referral at this time. No inference should be drawn from this that the Department is satisfied or otherwise with the proposed activity. The Department may submit observations/recommendations at a later stage in the process.
Forest Service	-	No response received to date
Galway County Council	26.05.2023	Acknowledgement of receipt
Inland Fisheries Ireland	-	No response received to date
Irish Peatland Conservation Council	-	No response received to date
Irish Red Grouse Association	-	No response received to date
Irish Raptor Study Group	-	No response received to date
Irish Wildlife Trust	25.05.2023	Thank you for contacting us. We do not have the staff capacity to respond to this consultation at the moment but we will endeavour to respond if possible.



Map Legend

- Turbine Location
- EIAR Site Boundary
- SPA
- SAC

N

Drawing Title

Site Location

Project Title
Laurclavagh Renewable Energy Development

Drawn By	Checked By
RW	JH
Project No.	**Drawing No.**
210627	Figure 2-1
Scale	**Date**
1:100,000	2024-03-12

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3. CHARACTERISTICS OF THE RECEIVING ENVIRONMENT

3.1 Ecological Survey Methodologies

3.1.1 Ecological Multidisciplinary Walkover Surveys

Multidisciplinary walkover surveys were undertaken on the following dates:

- 17th of August 2023
- 20th of September 2022
- 11th of July 2022
- 4th of July 2022
- 30th of July 2021

All of the survey timings fall within the recognised optimum period for vegetation surveys/habitat mapping, i.e. April to September (Smith *et al.*, 2011). A comprehensive walkover of the entire site was completed with incidental records also incorporated from other dedicated species/habitat specific surveys including bats, marsh fritillary and quadrat surveys.

The walkover surveys were also designed to detect the presence, or likely presence, of a range of protected species. The survey included a search for badger setts and areas of suitable habitat, potential features likely to be of significance to bats and additional habitat features for the full range of other protected species that are likely to occur in the vicinity of the Proposed Project (e.g. otter etc.). In addition, an inventory of other species of local biodiversity interest was compiled including invertebrates (butterflies, dragonflies, damselflies, beetles), plants, fungi etc.

The multi-disciplinary walkover surveys comprehensively covered the entire study area and based on the survey findings, further detailed targeted surveys were carried out for features and locations of ecological significance. These surveys were carried out in accordance with NRA *Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna* on National Road Schemes (NRA, 2009).

During the multidisciplinary surveys, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was conducted.

There are no surface water courses in the vicinity of the Proposed Wind Farm site. However, watercourses are present along the Proposed Grid Connection underground cabling route. Otter surveys were conducted as per NRA (2009) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes). This involved a search for all otter signs e.g. spraints, scat, prints, slides, trails, couches and holts. In addition to the width of the rivers/watercourses, a 10m riparian buffer (both banks) was considered to comprise part of the otter habitat (NPWS 2009). The dedicated otter surveys also followed the guidance as set out in NRA (2008) '*Guidelines for the Treatment of Otters Prior to the Construction of National Roads Schemes'* and following CIEEM best practice competencies for species surveys.

3.1.2 Aquatic surveys

Dedicated aquatic baseline surveys were undertaken in the vicinity of the Proposed Project between 12th of July 2022 and 14th of July 2022. Whilst no surface water pathways drain the Site, a small number of watercourses are crossed by the Proposed Grid Connection underground cabling route. A total of 15 no. sites (14. no riverine & 1 no. pond) were selected for detailed aquatic assessment. Aquatic survey

sites were present on the Glennafosha River (EPA code: 30G69) and unnamed inline pond, Clare River (3C01) and unnamed tributary, Killeenlaun River (20K46), Cregg River (30C03), Ballinduff River (30B05) and an unnamed tributary and the Kilroe Stream (30K23). Survey effort focused on both instream and riparian habitats at each aquatic sampling location. Surveys at each of these sites included a fisheries assessment (electro-fishing and/or fisheries habitat appraisal), white-clawed crayfish survey (*Austropotamobius pallipes*), otter survey (within 150m of the survey site), macrophyte and aquatic bryophyte survey and (where suitable) biological water quality sampling (Q-sampling). Suitability for freshwater pearl mussel (*Margaritifera margaritifera)* was assessed at each survey site with environmental DNA (eDNA) sampling undertaken for the species at 3 no. strategically chosen riverine locations within the vicinity of the project. These water samples were also analysed for white-clawed crayfish and crayfish plague (*Aphanomyces astaci*). This holistic approach informed the overall aquatic ecological evaluation of each site in context of the Proposed Project and ensured that any habitats and species of high conservation value would be detected.

Full details of the methodology followed for the aquatic surveys as well as details of the locations of survey sites is provided in the Aquatic Baseline Report, Appendix 3.

3.1.3 Bird Surveys

In order to inform the scope of the bird surveys required for the NIS, a review was undertaken of the location of nearby Special Protection Areas and associated SCI species so that the survey design would include a focus on target SCI species in addition to all species captured for the purpose of the EIAR chapter, Chapter 7 - Ornithology. Results of the target SCI species surveys are presented in Section 3.3.3.

Full details of bird survey effort and results are provided in Appendix 4.

Field surveys were undertaken during the survey period April 2020 to March 2022 and from April 2023 to September 2023, consisting of three breeding seasons (April – September) and two non-breeding seasons (October – March). Based on the results of the desk study, consultation and reconnaissance site visits, the assemblage of bird species in the Proposed Wind Farm site and the likely importance of the Proposed Wind Farm site for these species was ascertained. Then, adopting a precautionary approach, a site-specific scope for ornithological surveys was devised. The data provided in the field surveys is robust and allows clear, precise and definitive conclusions to be made on the avian receptors identified within the Proposed Wind Farm site.

The survey work that was undertaken from April 2020 to March 2022 and from April 2023 to September 2023 forms the core dataset for the assessment of impacts on ornithology. In the absence of specific national bird survey guidelines, the ornithological surveys were designed and undertaken in full accordance with the guidance document '*Recommended bird survey methods to inform impact assessment of onshore wind farms'* (SNH, 2017). The various ornithological surveys undertaken at the Proposed Wind Farm site and hinterland are described in detail below. The Proposed Grid Connection underground cabling route was surveyed as part of a multidisciplinary walkover (Section 3.3.1.1.5).

3.1.3.1 Vantage Point Surveys

Vantage point (VP) surveys were undertaken in accordance with SNH (2017) to monitor flight activity within the Proposed Wind Farm site and to a 500m radius of the proposed turbine locations. Surveys were conducted from two fixed point vantage points to allow as comprehensive as possible coverage of the 500m survey radius surrounding the proposed turbines locations. The vantage point locations were selected by undertaking a viewshed analysis (described below) and confirmed by a reconnaissance visit and initial field surveys to ensure that the proposed turbine layout was entirely covered.

3.1.3.1.1 *Viewshed Analysis*

Viewsheds were calculated using Resoft Wind Farm ZTV (Zone of Theoretical Visibility) software in combination with QGIS (Version 3.22) using a notional layer suspended at 20m, which is representative of the minimum height considered for the Potential Collision Risk Area based on the turbine model. Note that while the relevance of being able to view as much of the Site to ground level is acknowledged, the NatureScot guidance emphasises the importance of visibility of the 'collision risk volume' when the data is to be used to estimate the risk of collision with turbines by birds. Therefore, the viewshed analysis aims to identify the most suitable locations to site vantage points such that the airspace of the turbine rotor swept area is in view using the fewest possible number of vantage points.

The viewshed analysis involved tested each VP location for its visibility coverage by creating a viewshed point 1.75m in height (to represent the height of observer) on a map using 10m contours terrain data. The relative height of any surrounding trees and its effects on visibility is also accounted for in the analysis. Using the ZTV software, a viewshed of 360° was produced calculating an area 22m from ground level up to a 2km radius. The resulting viewshed image was then cropped to 180° to give the viewshed.

3.1.3.1.2 *Data Recording and Digitisation*

Survey methodology followed SNH (2017). The surveyor collected data on bird observations and flight activity from the scanning arc of 180° to a 2km radius at the fixed vantage point locations for two 3-hour watches separated by a minimum 30 minute break (i.e., 6 hours total) per month. Surveys were conducted from April to September (breeding season) and October to March (winter season) inclusive, and were scheduled to provide a minimum of 36 hours per winter or breeding season and spread over the full daylight period, including dawn and dusk watches, to coincide with the highest periods of bird activity.

Table 3-1 Vantage point survey watch duration

Survey Season and Number of Vantage Points (VPs)	Effort per Vantage Point (VP)
Breeding Season 2020 (2 VPs)	36 hours per VP
Winter Season 2020/2021 (2 VPs)	36 hours per VP
Breeding Season 2021 (2 VPs)	36 hours per VP
Winter Season 2021/2022 (2 VPs)	36 hours per VP
Breeding Season 2023 (2 VPs)	36 hours per VP

Flight activity of target species was mapped and recorded as per defined flight bands which were chosen in relation to the dimensions of potential turbine models for the Site. Bands were split into 0-15m, 15-25m, 25-200m and >200m. All flight activity within height bands 15-25m and 25-200m is considered to be within the Potential Collision Height (PCH) with regard to the turbine swept area. In addition, the presence of any non-target species was recorded to inform the evaluation of supporting habitat. The survey effort is presented in Appendix 4, including full details of dates, times and weather conditions. **Error! Reference source not found.**

3.1.3.2 Winter Walkover Surveys

Winter walkover surveys were undertaken to record the presence of bird species within the Proposed Wind Farm site and to a 500m radius, including areas between vantage point locations. The methodology was broadly based on methods described in Bibby *et al.* (2000) and adapted Brown and Shepherd surveys' (SNH, 2017). Transect routes were walked across different habitat complexes within the survey area where access allowed. All target species were recorded and mapped. In addition, the presence of any non-target species was recorded to inform the evaluation of supporting habitat.

Winter walkover surveys were conducted in daylight hours over four visits between October and March (i.e., four visits in winter 2020/2021 and four visits in winter 2021/2022). Survey effort is presented in Appendix 4, including full details of dates, times and weather conditions for each survey.

3.1.3.3 Breeding Walkover Surveys

Breeding walkover surveys were undertaken to determine possible, probable or confirmed breeding bird activity within the Proposed Wind Farm site and to a 500m radius. The methodology was based on Brown and Shepherd (1993) and Calladine *et al.* (2009), combined with Common Bird Census methods (British Trust for Ornithology, 2021) for dense habitat. Transect routes were walked across different habitat complexes within the survey area where access allowed. Using binoculars, the surveyor regularly scanned the surroundings of each transect for target species. All target species were mapped and breeding status was assigned following British Trust for Ornithology (BTO) breeding status codes[1]. In addition, the presence of any non-target species was recorded to inform the evaluation of supporting habitat.

Breeding walkover surveys were conducted during daylight hours over four visits during the core breeding season months April to July (2020, 2021 and 2023). Survey effort is presented in Appendix 4, including full details of dates, times and weather conditions for each survey.

3.1.3.4 Waterbird Distribution and Abundance Surveys

Waterbirds include: swans, geese and ducks; cormorant, shag, divers and grebes; auks and seabirds; gulls, terns and skuas; herons, egrets and crane; rails and crakes; waders; and kingfisher. Significant wetlands and waterbodies within 8km of the Proposed Wind Farm site were surveyed for waterbirds during the 2020/2021 and 2021/2022 winter and passage seasons (August to May inclusive) to provide information on their distribution in relation to the Proposed Wind Farm. The area surveyed exceeds the 500m for foraging waterbirds and 1km for roosting waterbirds requirements of SNH (2017) and follows the recommendations of SNH (2016).

Survey methodology follows Gilbert *et al.* (1998) and the Irish Wetland Bird Survey (BirdWatch Ireland, 2021). Surveys were undertaken during daylight hours from suitable vantage points at wetlands and waterbodies. All target waterbird species were recorded and mapped. Survey effort, including details of survey duration and weather conditions, is presented in Appendix 4.

3.1.3.5 Hen Harrier Roost Surveys

Hen harrier roost surveys were undertaken within areas of suitable roosting habitat at the Proposed Wind Farm site and to a 2km radius. These surveys aimed to identify active winter hen harrier roosts near or within the Proposed Wind Farm site. Survey methodology followed Gilbert *et al.* (1998) and O'Donoghue (2019). Roost watches of 2-3 hours were conducted at four hen harrier vantage point locations from dusk until last visible light during which all hen harrier observations were recorded and mapped.

Each hen harrier vantage point was surveyed once per month during the winter season between October and March inclusive (in winter 2020/2021 and 2021/2022). Survey effort is presented in Appendix 4, including full details of dates, times and weather conditions.

3.1.3.6 Breeding Raptor Surveys

Raptors include all harrier, falcon, buzzard, eagle, hawk, owl, kite and osprey species. Breeding raptor surveys were undertaken within the Proposed Wind Farm site and to a 2km radius to identify occupied

[1] https://www.bto.org/our-science/projects/birdatlas/methods/breeding-evidence

territories and monitor their breeding success near or within the Proposed Wind Farm site. Survey methodology followed Hardey *et al.* (2013). Breeding raptor watches of 3 hours (supplemented by transects if necessary) were conducted during daylight at four breeding raptor locations. All raptor species observed were recorded and mapped and breeding status was assigned following BTO breeding status codes. Surveyors did not approach nest sites to avoid disturbance.

Each breeding raptor location was surveyed once per month during the core breeding season between April and July. Survey effort is presented in Appendix 4, including full details of dates, times and weather conditions.

3.2 Regional and Local Hydrology and Hydrogeology

3.2.1 Proposed Wind Farm

The following summary of the local hydrology and hydrogeology in the vicinity of the Proposed Project is provided below, as extracted from Chapter 9 of the EIAR (Appendix 2).

Regional hydrology:

With respect to regional hydrology, the Proposed Wind Farm site is located primarily within the Corrib catchment, within Hydrometric Area 30 (Corrib) of the Irish River Basin District. On a more local scale, the Proposed Wind Farm site is contained within the Clare(Galway)_SC_060 subcatchment. The River Clare is situated ~4.0km east of the Proposed Wind Farm site and flows south, while Lough Corrib is located ~4.3km to the west/southwest.

The closest watercourse to the Proposed Wind Farm site is the Ballinduff stream (also referred to as Bunnatubber spring by the EPA) situated 2.6km west of the Proposed Wind Farm site. The upper reaches of the stream are situated near 2 no. mapped turloughs and a spring mapped in the townland of Kilcoona, as well as a further spring in the townland of Bunatober).

The Glennafosha stream is mapped ~3.7km northwest of the Proposed Wind Farm site, which flows west before discharging to the River Clare. The Cregg stream is mapped ~4.7km south of the Wind Farm site and flows west to Lough Corrib. The source of the Cregg stream is also located near a mapped spring, which has been traced back to Ballyglunin cave, located 10.7km northeast of the spring...

The regional area spanning east-west between Cahermorris and Ballycreg North and north-south between the townlands of Castlehacket and Lackanroe is distinctively void of mapped river/stream channels. The surface hydrological network does increase towards the margins of this regional area, with channels emerging 1-2km west of the River Clare and east of Lough Corrib.

Local hydrology:

There is a distinct lack of local drainage (field drains, ditches, first-order streams etc) within the Proposed Wind Farm site and surrounding area. The topography broadly slopes southwest across the site, although local variations do exist. Any surface water runoff from the Proposed Wind Farm site is expected to flow in this direction, however it will infiltrate to ground within a short distance, as evidenced by the lack of drainage channels. No field drains or surface watercourses were observed following numerous site walkover surveys. The agricultural fields are primarily improved grassland, which are well drained.

3.2.2 Proposed Grid Connection

The Proposed Grid Connection underground cabling route is located within the Clare(Galway)_050 and Clare(Galway)_060 river waterbodies, within the Clare[Galway]_SC_060, Clare[Galway]_SC_040 and Clare[Galway]_SC_020 subcatchments... The Proposed Grid Connection underground cabling route runs north along the N83 and crosses a tributary of the River Clare (Glennafosha stream) at Claretuam bridge, and crosses the River Clare approximately 0.9km east of this point at Cloonmore bridge. There are 4 no. watercourse crossings along the Proposed Grid Connection underground cabling route.

Drainage along the Proposed Grid Connection underground cabling route is broadly localised to drainage ditches along the road carriageway of the N83 road. The River Clare (Galway)_050 channel

(tributary of main River Clare) meets the N83 National Road approximately 3.1km southwest of Tuam, and subsequently runs approximately parallel to the N83 road, varying between 0.25 – 1.25km east of the road carriageway. Drainage from the road carriageway will primarily drain in the direction of the tributary of the River Clare, however under typical moderate rainfall conditions, the surface water will likely infiltrate through the soil/subsoil before reaching the river as shallow baseflow.

3.2.3 Hydrogeology

The Proposed Project is situated within the Clare-Corrib GWB (Groundwater Body), which extends over an area of ~1,422 km^2, stretching from Moylough and Menlough in the east, to the southern shore of Lough Corrib in the west and extending as far north as Ballyhaunis. The Clare-Corrib groundwater Body is classified as a Regionally Important Aquifer (karstified conduit)...

A description of the Clare-Corrib GWB is provided in the Initial Characterisation Summary sheet for the groundwater body. The details within this text have been summarised below, with the addition of context with respect to the Proposed Project.

The topography of the Clare-Corrib Groundwater Body is characterised by small hills and low ridges, with elevation ranging from 10-160mOD. The topography slopes gently westward towards Lough Corrib (at ~8-10mOD).

The bedrock geology comprises Dinantian Pure Bedded Limestone, with areas of Pure Unbedded Limestones near Headford. Karstification is widespread in the GWB with recorded Karst features such as enclosed depressions and swallow holes mapped by the GSI. The frequency of mapped karst features is greater in the eastern section of the GWB, east of the River Clare.

Well yields are variable across the GWB ranging from excellent (>400 m^3/day) to moderate (40-100 m^3/day). The groundwater table has a high annual variation, indicating that the storage is low, with storativity ranging between 0.01-0.02 (Daly, 1985). Overall, groundwater flow directions are to the southwest, with all groundwater discharging to Lough Corrib...

The GWB report[2] states the following:

"...The area is drained by the River Clare and its tributaries, however the present day drainage network has been changed significantly by arterial drainage that took place early in the nineteenth century. According to Coxon and Drew (1983), much of the current stream network is a storm runoff system that is inactive during summer months. Thus, prior to drainage, streams sank underground via the turloughs present in the GWB."

3.2.4 Tracer Studies

Tracer studies have been completed at several springs in the area in order to better understand groundwater flow directions in the underlying bedrock. The tracer studies were undertaken by introducing a dye to the water in the turlough and observing any dye discharge from known local springs. Tracer studies have identified/established groundwater connections between the following:

- *Kilcoona Spring and Lough Hackett (~4.6km north to south flow);*
- *Bunatober spring and borehole to northeast (~4.25km northeast to southwest flow);*
- *Mills pond spring and borehole to northeast (~4.4km northeast to southwest flow);*
- *Mills pond spring and River Clare (~10.7km northeast to southwest flow); and,*
- *Aucloggeen Spring and Ballyglunnin Cave (~10.7km northeast to southwest flow).*

[2] *Clare-Corrib Groundwater Body Initial Characterisation Report, GSI., 2004*

The karst features and tracer study lines are depicted in Plate 3-1 below. The data proves that groundwater flows within the Proposed Project site are in a south/southwest direction.

3.2.5 Turloughs

There are a number of turloughs mapped outside the NIS Site Boundary. The closest mapped turlough is located 2 km north of the Proposed Wind Farm site and 2.2km from the nearest proposed turbine. A list of turloughs mapped by the GSI within 5km of the Proposed Wind Farm site is given below.

- Turlough in townland of Fearagha – 2km north of Proposed Wind Farm site;
- Turlough Monaghan – 3.5km north of Proposed Wind Farm site; and,
- 6 no. small turloughs situated in the townland of Balrobuckbeg, near the Balrobuckbeg GWS – 2km west of Proposed Wind Farm Site.

The turloughs are generally small scale and distal to the Proposed Project. None of the above-listed turloughs are designated as SAC's or SPA's, while Turlough Monaghan is designated as a proposed NHA. The water level data collected, (outlined in Section 9.3.7.3.2 of Chapter 9 of the EIAR, Appendix 2), *indicates groundwater flows from east to west. As Turlough Monaghan is situated 3.5km north of the Site, groundwater from the proposed site will not travel in the direction of this turlough. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Proposed Wind Farm site, which proves that groundwater flow direction is in a southwest direction.*

The location of the turloughs mapped by the GSI are denoted with the "T" symbol in Plate 3-1 provided below.

3.2.6 Springs

Karst features are mapped by the GSI and available through the GSI online viewer. There are several karst features mapped near the Proposed Wind Farm site. The closest mapped karst feature is a spring, situated between T7 and T8. There are also 3 no. depressions and a cave mapped ~0.8km south of the southwestern corner of the Proposed Wind Farm site.

The spring between proposed turbines 7 and 8 was investigated during the walkover surveys of the Proposed Wind Farm site by Hydro Environmental Services Ltd (as documented in Chapter 9 of the EIAR, Appendix 2). Given the difference in groundwater levels between this perched aquifer (at ~40mOD) and the bedrock aquifer (14-29mOD), the available data suggests that there is no hydraulic connection between the spring and the underlying bedrock aquifer. The mapped spring is not a karst spring with water from the underlying limestone aquifer emerging at this point, but rather a shallow well intercepting water in the perched gravel aquifer.

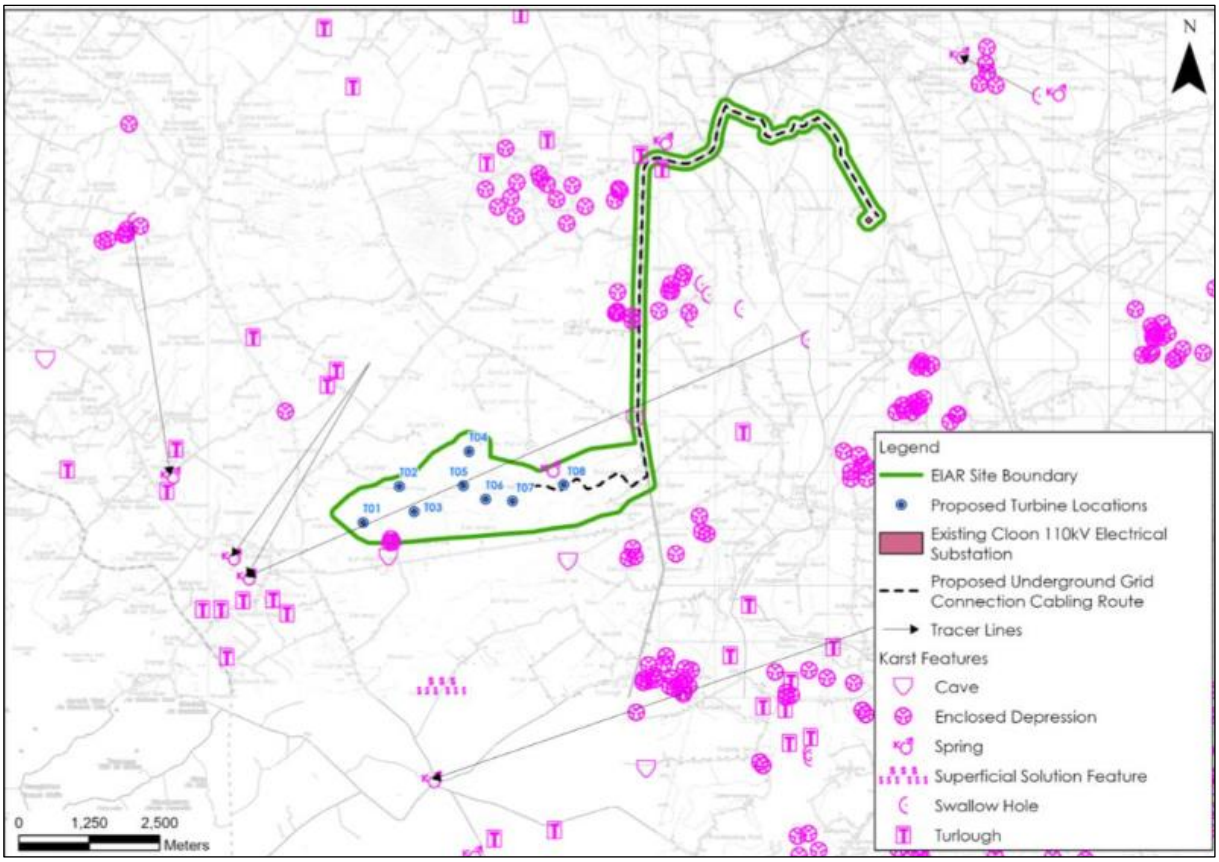


Plate 3-1 GSI-mapped karst features in the vicinity of the Proposed Project site. Source: Hydro-Environmental Services

3.2.7 Baseline Water Quality

The below desk study data on the baseline water quality of surface water bodies and groundwater in the vicinity of the Proposed Project.

The Proposed Project is located in the Clare Corrib Groundwater body. The Clare Corrib GWB (GWB: IE_WE_G_0020) is assigned 'Good Status' under the 2016-2021 WFD cycle, which is defined based on the quantitative status and chemical status of the GWB. This GWB is considered "Not at Risk" under the 3rd cycle risk rating.

The Proposed Project Site is located in the WFD river sub basins of the Ballinduff Stream_010, which has a 2016-2021 WFD Status of "Good" and is deemed to be "Not at risk" of missing out on the 2027 WFD objectives, and the Clare (Galway_060), which has a 2016-2021 Status of "Poor" and is deemed to be "At risk" of not meeting the WFDs 2027 objectives.

The Clare (Galway)_070 has a WFD 2016-2021 Status of "Good" and is deemed to be "Not at risk" of missing out on the WFDs 2027 objectives. The Clare (Galway)_080 has a WFD 2016-2021 Status of "Moderate" and is deemed to be "At risk" of missing out on the WFDs 2027 objectives. The Clare (Galway)_090 has a WFD 2016-2021 Status of "Moderate" and is deemed to be "At risk" of missing out on the WFDs 2027 objectives. The Clare (Galway)_100 has a WFD 2016-2021 Status of "Moderate" and is deemed to be "Under Review". The Corrib Lower lake body has a WFD 2016-2021 Status of "Good" and is deemed to be "Not at risk" of missing the WFDs 2027 objectives.

Table 3-2 Summary of surface water body status. Extracted from Chapter 9 of this EIAR.

SWB	Overall Status (2013-2018)	Overall Status (2016-2021)	Risk 3rd Cycle	Pressures
Ballinduff Stream_010	Good	Good	Not at risk	-
Clare (Galway)_060	Moderate	Poor	At risk	Hydromorphology
Clare (Galway)_070	Good	Good	Not at risk	-
Clare (Galway)_080	Moderate	Moderate	At risk	Hydromorphology
Clare (Galway)_090	Moderate	Moderate	At risk	Hydromorphology
Clare (Galway)_100	Moderate	Moderate	Under review	-
Corrib Lower	Good	Good	Not at risk	-

3.3 Results of Baseline Ecological Surveys

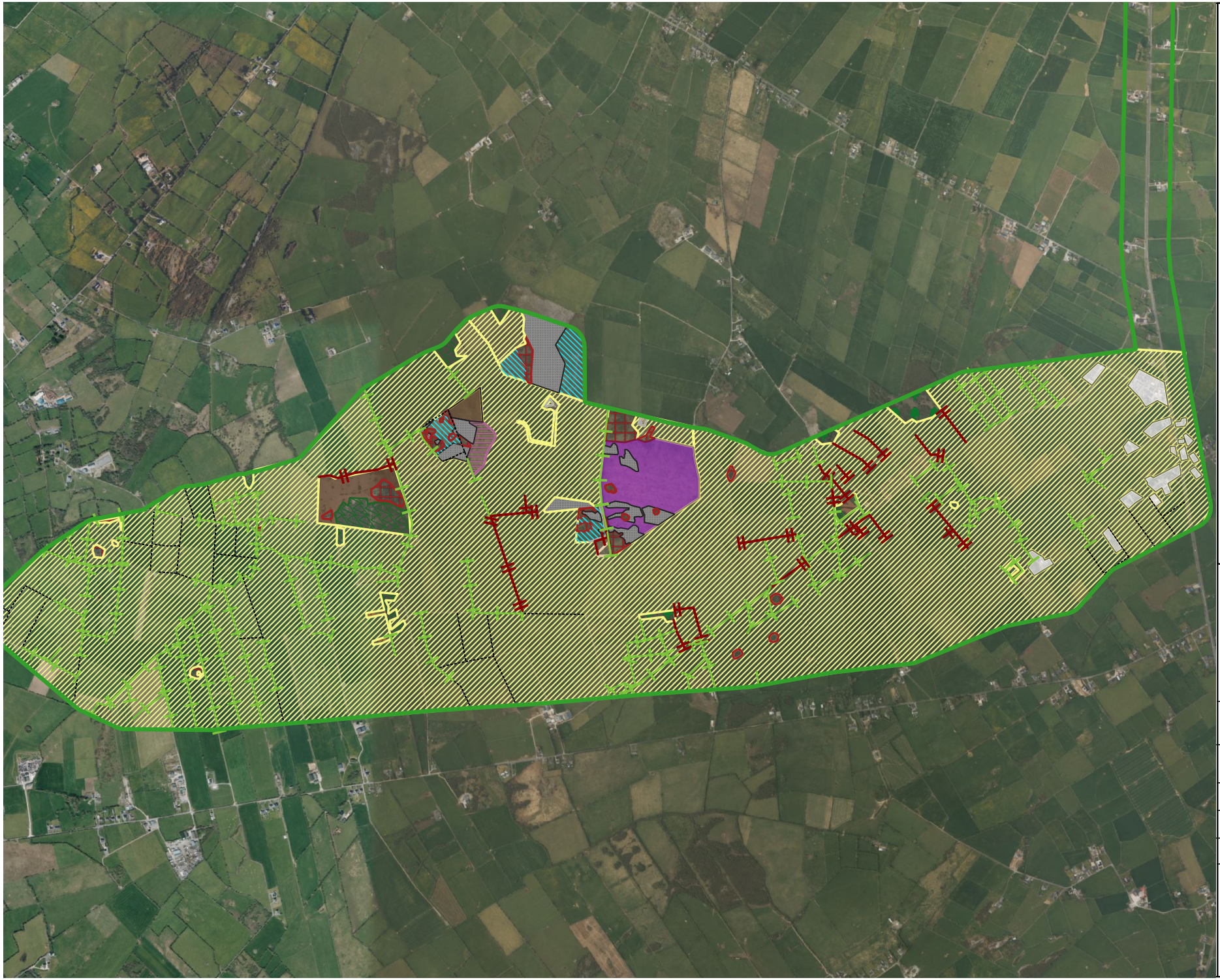
3.3.1 Ecological Walkover Surveys

3.3.1.1 Description of Habitats and Flora within the Ecological Survey Area

A total of fifteen habitats were recorded within the Proposed Project site, including;

- Improved agricultural grassland (GA1)
- Dry calcareous and neutral grassland (GS1)
- Dry meadows and grassy verges (GS2)
- Exposed calcareous rock (Limestone pavement) (ER2)
- Dry calcareous heath (HH2)
- Immature woodland (WS2)
- Oak-ash-hazel woodland (WN2)
- Hedgerows (WL1)
- Treelines (WL2)
- Scrub (WS1)
- Dense bracken (HD1)
- Horticultural land
- Stone walls (BL1)
- Spoil and bare ground (ED2)
- Buildings and Artificial Surfaces (BL3)

A habitat map of the Site is provided in Figure 3-1. A map showing the development footprint overlaying the Habitat Map is shown in Figure 3-2.



Drawing Title
Habitat Map of Proposed Wind Farm

Project Title
Laurclavagh Renewable Energy Development

Drawn By	Checked By
RW	JH
Project No.	Drawing No.
210627	Figure 3-1
Scale	Date
1:23,000	2024-03-12

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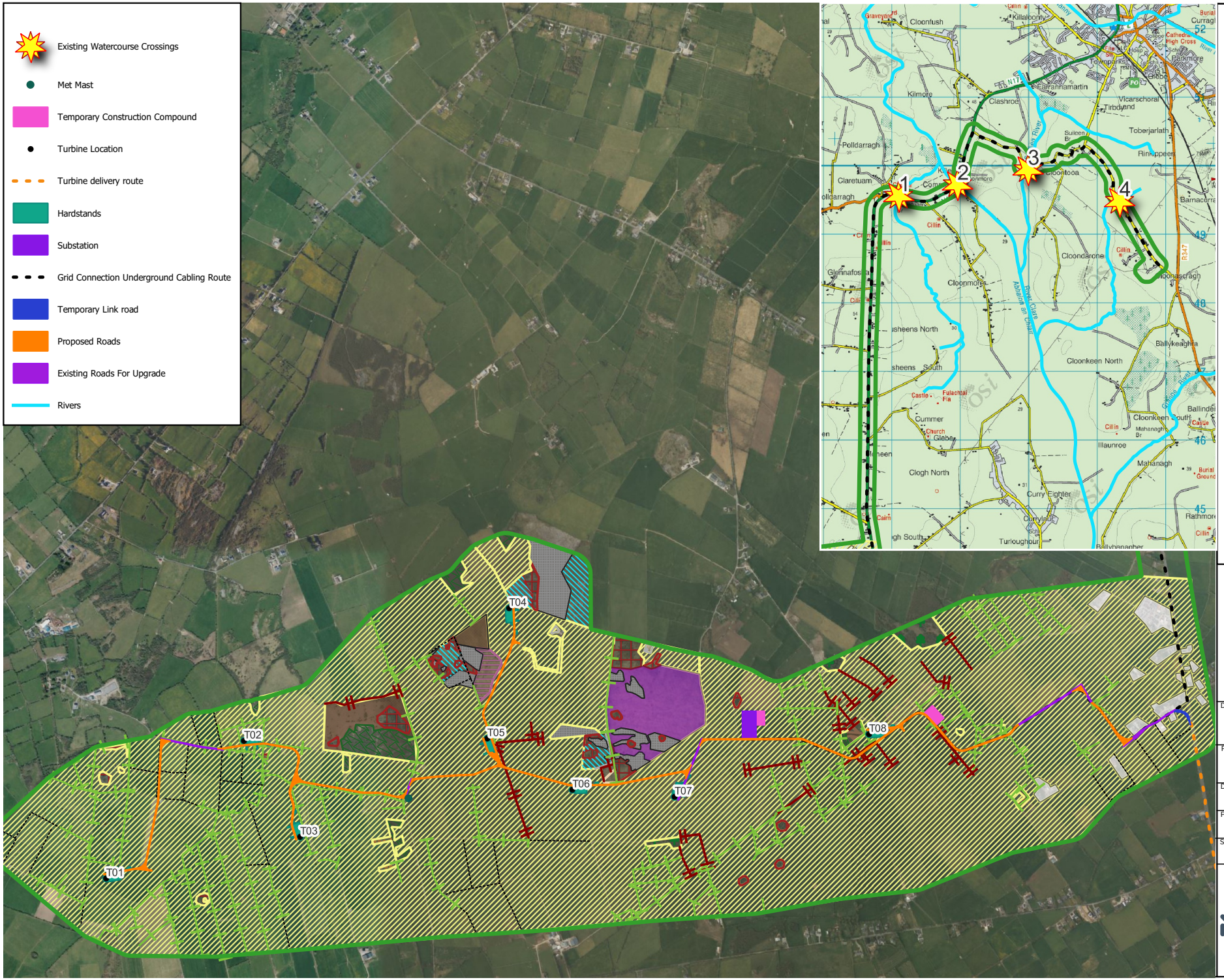

Map Legend

- EIAR Site Boundary
- Hedgerows (WL1)
- Treelines (WL2)
- Stonework (BL1)
- Earth banks (BL2)
- Artificial surfaces (BL3)
- Exposed calcareous rock (ER2)
- Improved agricultural grassland (GA1)
- Dry calcareous and neutral grassland (GS1)
- Dry meadows and grassy verges (GS2)
- Dense bracken (HD1)
- Dry calcareous heath (HH2)
- Oak-ash-hazel woodland (WN2)
- Scrub (WS1)
- Immature woodland (WS2)
- Mosaic of limestone pavement, heath and grassland

Drawing Title
Habitat Map of Proposed Wind Farm and Overlay

Project Title
Laurclavagh Renewable Energy Development

Drawn By	Checked By
RW	JH
Project No.	Drawing No.
210627	Figure 3-2
Scale	Date
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3.3.1.1.1 Grassland habitats

Grasslands make up a significant proportion of the habitats within the Site. The Site comprises large areas of improved agricultural grassland (GA1) with small areas of dry calcareous and neutral grassland (GS1) in associated with areas of limestone pavement, and small less intensively managed fields of dry meadows and grassy verges (GS2). Detailed botanical quadrat data was recorded on site in the form of relevés taken at specific locations within the Site, see Appendix 6-1 of the accompanying EIAR. The botanical data from all relevés was uploaded to the National Biodiversity Data Centre (NBDC) online habitat classification system ERICA[3].

Improved agricultural grassland (GA1)

The areas of improved agricultural grassland (GA1) have primarily been intensively managed for sheep and cattle grazing, and many of the fields surveyed have been reseeded with perennial ryegrass (*Lolium perenne*). Turbines T1- T8, the temporary construction compound, substation, met mast and all internal site access tracks are located within this habitat. The NBDC online habitat classification system ERICA classified the areas of improved agricultural grassland as conforming to the Perennial rye grass-white clover community (GL3B), and Yorkshire-fog – Perennial Rye-grass community (GL2C). These are fairly species-poor grassland communities with relatively little recognised conservation value.

Plate 3-2 Improved agricultural grassland (GA1) within the Site, occurring within the footprint of Turbine 5

[3] *Engine for Relevés to Irish Communities Assignment*

Dry calcareous and neutral grassland (GS1)

Areas of Dry calcareous and neutral grassland (GS1) comprise of a mix of both semi-natural and semi-improved grasslands.

Some areas mapped as Dry calcareous and neutral grassland (GS1) have been subject to intensive cattle grazing and improvement, see Plate 3-3. These areas comprise a moderate proportion of perennial rye grass (*Lolium perenne)* and other agricultural species including creeping buttercup (*Ranunculus repens),* white clover (*Trifolium repens),* creeping thistle (*Cirsium arvense)*, ragwort (*Senecio jacobaea)* and dandelion (*Taraxacum officinale agg.).* Species typical of calcareous grasslands found in these areas include lady's bedstraw (*Galium verum),* cats ear (*Hypochaeris radicata),* harebell (*Campanula rotundifolia),* tormentil (*Potentilla erecta),* mouse ear hawkweed (*Pilosella officinarum),* Burnet saxifrage (*Pimpinella saxifraga*), birds foot trefoil (*Lotus corniculatus*), ox eye daisy (*Leucanthemum vulgare),* knapweed (*Centaurea nigra)* and *Scleropodium purum.* The NBDC online habitat classification system ERICA classified these areas as crested dogs tail – red clover community (GL3D), and red fescue – ribwort plantain community (GL3C), with some relevés being transitional in composition. Community GL3C has a 19.2% affinity with Annex I 6210 Orchid-rich calcareous grassland* (Perrin, 2016a). Community GL3D has a 20.7% affinity with Annex I 6210 Orchid-rich calcareous grassland* (Perrin, 2016a). These areas hold some conservation value given their relative species richness. No proposed site infrastructure is located within dry calcareous or neutral grassland habitat.

Other areas of calcareous grassland (GS1) occur in close association with limestone pavement and are described in Section 3.3.1.1.2 below.

Plate 3-3 Semi improved calcareous/neutral grassland to the west of the Site

Dry meadows and grassy verges (GS2)

Some less intensively managed fields with a higher sward are categorised as dry meadows and grassy verges (GS2), see Plate 3-4. An area of GS2 habitat with a high sward (30 to 50cm) occurs adjacent to

hazel scrub/limestone pavement habitat within the west of the Site. This grassland was classified as GS2 at the time of survey given the high sward and lack of management at time of survey, however, given the species rich composition, this area has potential to conform to the Annex I 6210 calcareous grassland habitat. This grassland area is relatively species rich with species including ox eye daisy (*Leucanthemum vulgare),* knapweed (*Centaurea nigra),* red clover (*Trifolium pratense),* silverweed (*Potentilla anserina),* quaking grass (*Briza media),* harebells (*Campanula rotundifolia),* eyebright (*Euphrasia officinale agg.),* lady's bedstraw (*Galium verum),* tormentil (*Potentilla erecta),* smooth hawks beard *(Crepis capillaris*), sweet vernal grass (*Anthoxanthum odoratum),* cocks foot (*Dactylis glomerata),* bents (*Agrostis spp.),* with some scrubbier areas of hawthorn (*Crataegus monogyna)* and blackthorn (*Prunus spinosa).* No infrastructure is proposed in these areas.

Plate 3-4 Dry meadows and grassy verges (GS2)

3.3.1.1.2 *Exposed Calcareous Rock (Limestone Pavement) (ER2) and Associated Habitats*

Areas of bare limestone pavement are present within central and northern areas of the Site. These occur primarily as bare areas of shattered limestone rock (ER2) and correspond to the Annex I habitat 'Limestone pavement [8240]'. These areas have been mapped under Article 17 mapping. Some of these areas have been mapped on the Habitat Map as occurring as a mosaic with calcareous grassland (GS1) and calcareous heath communities (HH2), as described below. These areas in places are encroached with bracken (*Pteridium aquilinum),* bramble (*Rubus fruticosus agg.)* and common gorse (*Ulex europaeus).* No infrastructure is proposed in any limestone pavement areas or associated habitats.

Plate 3-5 Exposed calcareous rock (ER2) within the Site

Oak-ash-hazel woodland (WN2)

Some areas of limestone pavement within the Site occur with oak-ash-hazel woodland (WN2) and have been mapped as such where they occur. This habitat corresponds to the *Corylus avellana – Ctenidium molluscum* Vegetation Type 2A Low Woodland as per Irish Wildlife Manual 73. These areas comprise a low woodland canopy dominated by hazel (*Corylus avellana)* with some blackthorn (*Prunus spinosa),* bramble and hawthorn (*Crataegus monogyna)* at times. An area mapped under Article 17 mapping in the northwest of the Site is included here, as well as a larger area within the mid-west of the Site adjacent to GS2 habitat. These areas are completely avoided by the footprint of the Proposed Project.

Plate 3-6 Article 17-mapped oak-ash-hazel woodland on limestone pavement within the northwest of the Site

Plate 3-7 Oak-ash hazel woodland on limestone in the centre to west of the Site

Dry calcareous heath (HH2)

Areas of Article 17 mapped limestone pavement occur in close association with Calcareous heath habitat (HH2). Heath areas conform to vegetation type 7A *Calluna vulgaris – Potentilla erecta* heath and include the species ling (*Calluna vulgaris),* blue moor grass (*Sesleria caerulea),* bell heather (*Erica cinerea),* mountain avens (*Dryas octopetala),* spring gentian (*Gentiana verna),* tormentil (*Potentilla erecta),* birds foot trefoil (*Lotus corniculatus),* harebells (*Campanula rotundifolia),* pignut (*Conopodium majus),* carline thistle (*Carlina vulgare),* eyebright (*Euphrasia officinale agg.),* lady's bedstraw (*Galium verum),* heath bedstraw (*Galium saxatile),* devils bit scabious (*Succisa pratensis),* kidney vetch (*Anthyllis vulneraria*), red clover (*Trifolium pratense),* yellow wort (*Blackstonia perfoliata),* quaking grass (*Briza media),* wall rue (*Asplenium ruta-muraria),* wild thyme (*Thymus polytrichous),* creeping willow (*Salix repens),* fairy flax (*Linum catharticum),* mouse ear hawkweed (*Pilosella officinarum),* burnet rose (*Rosa spinosissima),* glaucous sedge (*Carex flacca),* the bryophytes *Scleropodium purum, Tortella tortuosa, Ctenidium molluscum,* and the orchids heath spotted orchid (*Dactylorhiza maculata)* and fragrant orchid (*Gymnadenia conoposea).* These areas are completely avoided by the footprint of the Proposed Project.

Plate 3-8 Dry calcareous heath (HH2) within the Site

Calcareous grassland (GS1)

Limestone pavement also occurs in association with calcareous grassland (GS1) areas comprising quaking grass (*Briza media),* sweet vernal grass (*Anthoxanthum odoratum),* ox eye daisy, yarrow (*Achillea millefolium),* wild thyme (*Thymus polytrichous),* eyebright (*Euphrasia officinale agg.),* wild carrot (*Daucus carota),* yellow rattle (*Rhinanthus minor),* harebells (*Campanula rotundifolia),* devils bit scabious (*Succisa pratensis),* kidney vetch (*Anthyllis vulneraria*), common milkwort (*Polygala vulgaris),* carline thistle (*Carlina vulgaris),* knapweed (*Centaurea nigra),* cats ear (*Pilosella officinarum), Neckera crispa* and common spotted orchid (*Dactylorhiza fuchsii).* These areas were categorised by ERICA as the community GL3A – *Briza media – Thymus polytrichus* which has a 92% affinity with the Annex I

habitat '6210 Orchid-rich calcareous grassland*'. These areas are completely avoided by the footprint of the Proposed Project.

Plate 3-9 Calcareous grassland (GS1) occurring in association with limestone pavement within the Site, with some bracken encroachment present.

3.3.1.1.3 Hedgerows (WL1), Treelines (WL2) and Stone walls (BL1)

Agricultural fields within the Site are typically bordered by stone walls (BL1) which are often bare or else associated with hedgerow (WL1) and treeline (WL2) habitat, which is dominated by hawthorn (*Crataegus monogyna* – both hedgerow height and taller mature specimens), blackthorn (*Prunus spinosa),* hazel (*Corylus avellana),* bramble (*Rubus fruticosus agg.)* and ash (*Fraxinus excelsior).* These habitats are present within the footprint of some Proposed Wind Farm roads and within the vicinity of proposed turbines T1, T2, T3, T5 and T8.

Plate 3-10 Hawthorn treeline (WL2) along stone wall (BL1) within the Site

3.3.1.1.4 *Other Habitats*

Immature woodland (WS2) and Scrub (WS1)

A small area of hawthorn-dominated immature woodland occurs within the Site, close to proposed turbine 8. Other small areas of hazel-dominated immature woodland (WS2) and bramble scrub (WS1) are also present within the Site. These areas are completely avoided by the footprint of the Proposed Project.

Plate 3-11 Hawthorn dominated immature woodland within the Site

Plate 3-12 Hazel dominated immature woodland within the Site

Dense Bracken (HD1)

Some small areas of the Site are heavily encroached with bracken (*Pteridium aquilinum).* Some areas of Annex I limestone pavement and associated habitats are being encroached by bracken also. These areas are completely avoided by the footprint of the Proposed Project.

Plate 3-13 Dense bracken within the Site

Plate 3-14 Limestone pavement/calcareous grassland areas encroached with bracken

Horticultural land

During the habitat surveys undertaken between 2021 and 2023, it was noted that on occasion some fields within the east of the Site were used for growing vegetables including brassicas, but which were reseeded with perennial grass in subsequent years.

Plate 3-15 Horticultural field within the Site (2022)

Spoil and bare ground (ED2), Recolonising bare ground (ED3), Buildings and artificial surfaces (BL1)

Unbound farm tracks within the Site are categorised as spoil and bare ground (ED2), with areas becoming recolonised by ruderal plants categorised as recolonising bare ground (ED3). These areas are small and are not mapped in detail. Private dwellings and agricultural buildings are also present within the Site and are categorised as buildings and artificial surfaces (BL3).

3.3.1.1.5 *Habitats along the Underground Cabling Route*

It is proposed to construct an onsite 110 kV substation within the Proposed Wind Farm site and to connect from here via a 110 kV underground electrical cable connection to the existing 110 kV Cloon substation near Tuam, Co Galway. The underground electrical cabling route originates at the proposed onsite 110kV substation and before reaching the 110kV Cloon substation property. The underground electrical cabling route is approximately 14.3km in length and is located primarily within the public road corridor, with a short section of underground cabling (approximately 2.1km) within the internal road network within the Proposed Wind Farm site.

The underground cable route will be located entirely within the existing road, starting starting within the L61461 as it leaves the Proposed Wind Farm site (Plate 3-16) and continuing east along a smaller local road (Plate 3-17). Habitats found along the road include stone walls (BL1), dry meadows and grassy verges (GS2), agricultural grasslands (GA1), wet grasslands (GS4) and peatlands further east along the route. Hedgerows (WL1) and treelines (WL2) also border the road. There are four water crossings along the route which are described further below. The locations of water-crossings are shown on Figure 3-2.

Water crossing 1 (Plate 3-18) consists of a culverted high stone bridge (BL1) with 2 low concrete pipes over the Glennafosha River, a depositing/lowland river (FW2). The river is highly modified and straightened, had an imperceptible flow and was highly vegetated with grasses, evidently an ephemeral river. The surrounding areas consist of agricultural fields.

Water crossing 2 (Plate 3-19) consists of a stone arch bridge over the Clare River, a depositing/lowland river (FW2) with a moderate flow at this location. As summarised in the Aquatic Baseline Report, Appendix 3, this river has been extensively straightened and deepened historically and has deep V-shaped banks. The river is 8-10m wide and 0.4m to 1.8m deep. The below description of the river habitat in the vicinity of this water crossing is extracted from the Aquatic Baseline Report:

> *The substrata were dominated by large boulder, cobble and localised patches of coarse gravel. The Site supported frequent water crowfoot (Ranunculus sp.), curled pondweed (Potamogeton crispus) and perfoliate pondweed (Potamogeton perfoliatus) in riffle areas upstream of the bridge. Boulders supported abundant Rhynchostegium riparoides with occasional Fontinalis antipyretica and Brachythecium rivulare. Despite hydromorphological impacts, given the presence of several key indicator species (EC, 2013), the aquatic vegetation community was representative of the Annex I habitat 'Water courses of plain to montane levels, with submerged or floating vegetation of the Ranunculion fluitantis and Callitricho-Batrachion (low water level during summer) or aquatic mosses [3260]'. The steep banks supported scattered bramble (Rubus fruticosus agg.) scrub with frequent hawthorn and dry meadow habitat (GS2). The Site was bordered by semi-improved pasture (GA1).*

Water crossing 3 (Plate 3-20) over the Killeelaun River consists of a single stone arch structure over a small lowland/depositing river (FW2). The following description of this river in the vicinity of the water crossing is extracted from the Aquatic Baseline Report:

> *The small lowland depositing river (FW2) had been extensively straightened and deepened historically with resulting poor hydromorphology and a steep trapezoidal channel (banks to 5m in height). The river averaged a homogenous 3m wide and 0.4m deep and suffered from low summer flows at the time of survey. The profile comprised slow-flowing glide with no riffle or pool areas. The substrata were dominated by cobble and gravel but these were exposed to very heavy siltation. The Site was heavily vegetated with frequent fool's watercress (Apium nodiflorum), common duckweed (Lemna minor), ivy-leaved duckweed (Lemna trisulca), lesser water parsnip (Berula erecta) and branched bur-reed (Sparganium erectum). Blue water speedwell (Veronica anagallis-aquatica), water forget-me-not and water plantain (Alisma plantago-aquatica) were occasional. Small pondweed (Potamogeton berchtoldii) and broad-leaved pondweed (Potamogeton natans) were also occasional in addition to spiked water-*

milfoil (Myriophyllum spicatum) and water starwort (Callitriche sp.). Given the presence of several key indicator species (EC, 2013), the aquatic vegetation community was representative of the Annex I habitat 'Water courses of plain to montane levels, with submerged or floating vegetation of the Ranunculion fluitantis and Callitricho-Batrachion (low water level during summer) or aquatic mosses [3260]'. Filamentous algae covered 30% surface area of the channel bed, indicating significant enrichment. The steep banks supported intermittent hedgerows of hawthorn and bramble and dry meadow habitat (GS2). The Site was bordered by semi-improved pasture (GA1).

Water crossing 4 (Plate 3-21) consists of a pipe culvert along a tributary of the Clare River. This river is categorised as a lowland/depositing stream (FW2). The following is extracted from the Aquatic Baseline Report:

The diminutive lowland depositing stream (FW2) had been extensively straightened and deepened historically with resulting poor hydromorphology and U-shaped channel with 2m-high banks. The stream flowed under the local road via a pipe culvert and averaged 0.5m wide and 0.05m deep. The stream suffered from low summer flows at the time of survey. The profile comprised shallow riffle and glide. The substrata were dominated by small boulder, cobble and coarse gravel. Despite low flows, siltation was low overall. The Site was heavily vegetated with abundant fool's watercress with occasional watercress (Nasturtium officinale), ivy-leaved duckweed, brooklime and water starwort (Callitriche sp.). The moss Rhynchostegium riparoides was common on boulders with the liverwort Pellia endiviifolia present locally. Filamentous algae was present (5%), indicating enrichment. The riparian areas were dominated by mature grey willow (Salix cinerea) and ash with dense bramble in the understories. The Site was bordered by semi-improved pasture (GA1) and wet grassland (GS4).

Plate 3-16 The Proposed Grid Connection underground cabling route as it leaves the Proposed Wind Farm site along the N83.

Plate 3-17 Smaller road along the Proposed Grid Connection underground cabling route as it travels eastwards towards the Cloon substation

Plate 3-18 Water crossing 1 along the Glennafosha River

Plate 3-19 Water crossing 2 over the Clare River

Plate 3-20 Water crossing 3 over the Killeelaun River

Plate 3-21 Water crossing 4 over Clare River tributary

3.3.1.1.6 Protected Habitats

In summary, as described in the preceding sections, the following Annex I habitats are present within the Site but are located completely outside of the footprint of the Proposed Project:

- Limestone pavements [8240]
- Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) [6210]
- European dry heaths [4030]

None of the above-listed habitats are QI habitats within an SAC or SPA.

The following aquatic Annex I habitat was recorded within the Clare River and Killeelaun River in the vicinity of existing water crossings along the Proposed Underground Grid Connection. This habitat is a QI habitat of Lough Corrib SAC within which the Clare River is located:

- Water courses of plain to montane levels, with submerged or floating vegetation of the Ranunculion fluitantis and Callitricho-Batrachion (low water level during summer) or aquatic mosses [3260]

3.3.1.1.7 Invasive species

During field surveys, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was conducted. No invasive species listed under the Third Schedule of the European Communities Regulations 2011 were recorded within the Site.

The invasive macrophyte Nuttall's waterweed (*Elodea nuttallii*) was recorded at site B3 on the lower reaches of the Cregg River (Addergoole Bridge). The invasive pathogen crayfish plague (*Aphanomyces astaci*) was detected via eDNA analysis in the Clare River at Lackagh Bridge (site A7) and the

Ballinduff Stream at site C5 (see Aquatic Baseline Report, Appendix 3). There are no instream works proposed as part of the development, therefore, there is no risk of spread of invasive plant material or crayfish plague.

3.3.2 Aquatic Surveys

Full details of results of aquatic surveys undertaken in July 2022 are provided in the Aquatic Baseline Report (Appendix 3) and are summarised in this section.

The following aquatic ecology summary is extracted from the Aquatic Baseline Report:

> *The watercourses in the vicinity of the proposed Laurclavagh wind farm were typically lowland channels which had been extensively straightened and or deepened historically as part of arterial drainage and land reclamation works, resulting in poor hydromorphology and reduced habitat heterogeneity. Whilst some good instream recovery had occurred locally (e.g. Clare River), siltation and hydromorphological pressures were evident throughout the survey area. The highest value watercourses within vicinity of the project in terms of aquatic ecology were those with higher flow volumes and better instream recovery from arterial drainage, namely the Clare River and, to a lesser degree, the Cregg River and Ballinduff Stream.*

The following paragraphs summarise the fish species that were found during the electrofishing surveys:

> *Atlantic salmon were present at 3 no. sites in total, namely, all survey sites on the Clare River... Brown trout were also recorded at these sites, in addition to site C5 on the Ballinduff Stream. Salmonids were present in low numbers, with site A3 on the Clare River supporting the best quality salmonid habitat (very good quality) and the highest relative density of both Atlantic salmon and brown trout...Elsewhere, the quality of salmonid was typically poor due to significant hydromorphological pressures resulting from arterial drainage (i.e. extensive straightening & deepening).*
>
> *No lamprey ammocoetes (Lampetra sp.) were recorded during targeted electro-fishing. This was considered to reflect the paucity of suitable nursery (soft sediment) habitat within the vicinity of the proposed project, in addition to the presence of sub-optimal or absence of spawning habitat, primarily due to arterial drainage pressures...*
>
> *European eel were only recorded in low densities at a total of 4 no. sites on the Clare River (A3), Cregg River (B1 & B2) and Ballinduff Stream (C5)...The paucity of eel recorded during the electro-fishing surveys was considered to reflect a combination sub-optimal habitat resulting from historical modifications in addition to low summer flows at numerous survey sites...*

The following paragraphs summarise the results of kick-sampling and Q-Value evaluation carried out:

> *The mayfly Kageronia (Heptagenia) fuscogrisea was recorded from site was recorded from site B3 on the lower reaches of the Cregg River...The species is primarily found in well-vegetated reaches of alkaline rivers and is listed as near threatened in Ireland due to population declines (Kelly-Quinn & Regan, 2012).*
>
> *No other rare or protected macro-invertebrate species (according to national red lists) were recorded in the biological water quality samples taken from 10 no. wetted riverine sites or 1 no. sweep sample from pond site A1 in July 2022...*
>
> *Site A7 on the Clare River (Lackagh Bridge) achieved **Q4 (good status)** water quality and thus met the target good status (≥Q4) requirements of the European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 and the Water Framework Directive (2000/60/EC)...The remaining 9 no. wetted riverine sites achieved **Q3-4 (moderate status)** (sites A6 & B3) or **Q2-3 or Q3 (poor status)** (sites A3, A4, A5, B1, B2, C4 & C5).*

With the exception of site A7 on the Clare River, the biological water quality in the vicinity of the proposed project was unsatisfactory and was not meeting good status targets. Hydromorphology (channelisation, resulting from arterial drainage) is the primary threat to water quality within the survey area (EPA, 2019) and this was observed during the Site surveys. Furthermore, low summer flows typical of the wider karstic survey area also influenced biological water quality in July 2022.

No live white-clawed crayfish (Austropotamobius pallipes) were recorded via hand-searching and sweep netting of instream refugia during the surveys undertaken in July 2022. However, crayfish remains were identified in otter spraint recorded at a site on the Clare River. Furthermore, white-clawed crayfish eDNA was detected at site A7 on the Clare River and C5 on the Ballinduff Stream. Crayfish plague (Aphanomyces astaci) was detected at site A7 on the Clare River and site B3 on the Cregg River.

Composite water samples collected from the from the Clare River (site A7), Cregg River (B3) and Ballinduff Stream (C5) returned a negative result for freshwater pearl mussel (*Margaritifera margaritifera)* eDNA, i.e. freshwater pearl mussel eDNA not present or was present below the limit of detection in a series of 12 qPCR replicates (0 positive replicates out of 12, respectively). These results were considered as evidence of the species' absence at and or upstream of the sampling locations and support the absence of records for the species within the wider survey area.

3.3.3 Bird Surveys

In order to inform the scope of the bird surveys required for the NIS, a review was undertaken of the location of nearby Special Protection Areas (included in Table 4-1) and associated SCI species so that the survey design would include a focus on target SCI species in addition to all species captured for the purpose of the EIAR chapter. Results of the target SCI species surveys are presented below.

The target species (SCI species of nearby SPAs) recorded within the potential Zone of Impact of the Proposed Wind Farm during field surveys are listed in

Table 3-3, along with a summary of breeding and roosting status. The following sections describe the records of each target species under the individual survey headings. Of these, significant populations (national importance or county importance) of black-headed gull and golden plover were observed.

The EIAR bird survey results are provided in Appendix 4 of this NIS and sets out full results of bird surveys undertaken for the Proposed Project.

Table 3-3 Target species recorded in the Potential ZOI of the Proposed Project

Species	Overall breeding status	Overall wintering status
Golden Plover	**Non-breeding**.	**No regularly used roosts identified.** Birds were observed landing/roosting in arable fields within 500m of the proposed turbine layout, however no single location was regularly used.
Hen Harrier	**Non-breeding**.	**No regularly used roosts identified.**
Black-Headed Gull	**Non-breeding**.	**No regularly used roosts identified.**
Common Gull	**Non-breeding**.	**No regularly used roosts identified.**
Coot	**Non-breeding**.	**No regularly used roosts identified.**

Species	Overall breeding status	Overall wintering status
Lesser Black-backed Gull	**Non-breeding**.	**No regularly used roosts identified.**
Curlew	**Non-breeding**.	**No regularly used roosts identified.**
Lapwing	**Non-breeding**.	**No regularly used roosts identified.**

The target SCI species listed below were recorded during wildfowl distribution and abundance surveys, up to 8km from the Proposed Wind Farm site. These species were not observed on or near the Proposed Wind Farm site and therefore, there is no potential for impact from the Proposed Project.

- Common Scoter
- Common Tern
- Dunlin
- Gadwall
- Greenland White-fronted Goose
- Pochard
- Shoveler
- Tufted Duck

3.3.3.1 Golden Plover

Golden plover was recorded during the winter and passage season. Raw survey data and maps are provided in Section 1 in Appendix 4.

3.3.3.1.1 *Vantage Point Surveys*

Golden plover were observed on 23 occasions during the vantage point surveys (see Appendix 4, Figure 7.1.1). Observations ranged from an individual to 110 birds and were of birds commuting, circling or landing/roosting over grassland fields. Birds were observed landing or roosting in field within 500m of the proposed turbine layout on five occasions. There were 17 observations within 500m of the proposed turbine layout and 19 observations within the potential collision height. All observations were in the non-breeding/migratory season (October to April).

3.3.3.1.2 *Waterbird Distribution and Abundance Surveys*

Golden plover were observed on seven occasions during waterbird distribution and abundance surveys. Observations ranged from 10 to 65 birds, and were of birds circling, feeding, roosting or travelling. Observations were between 3.4km and 9.5km from the nearest proposed turbine.

3.3.3.1.3 *Incidental Observations*

There were five incidental observations of golden plover during hen harrier roost surveys (see Appendix 4, Figure 7.4.3). The observation ranged from an individual calling to 14 birds travelling or circling over grassland. Four of these observations were within 500m of the proposed turbine layout. One of these observations was of three birds landing in grassland fields within 500m of the proposed turbine layout.

3.3.3.2 Hen Harrier

Hen harrier was recorded during the winter season. Raw survey data and maps are provided in Section 2 in Appendix 4.

3.3.3.2.1 *Vantage Point Surveys*

Hen harrier was observed on five occasions during the vantage point surveys (see Appendix 4, Figure 7.4.4). All observations were of an individual bird and comprised the bird hunting or travelling over grassland fields. There were four observations within 500m of the proposed turbine layout and one observation was within the potential collision height. All observations were during the non-breeding season.

There were no further observations of this species during any of the other comprehensive surveys and no roosts were identified.

3.3.3.3 Black-headed Gull

Black-headed gull were observed in the breeding and winter season. Raw survey data and maps are provided in Section 7 in Appendix 4.

3.3.3.3.1 *Vantage Point Surveys*

Black-headed gull were observed on 42 occasions during the vantage point (see Appendix 4, Figure 7.4.15). Observations ranged from an individual to 75 birds and were of birds commuting or foraging/landing in grassland fields. There were 36 observations within 500m of the proposed turbine layout and 33 observations within the potential collision height. There were 17 observations in the core breeding season (April – August) and the remaining observations were in the non-breeding season (September to March).

3.3.3.3.2 *Breeding Walkover Surveys*

Black-headed gull were observed on two occasions during breeding walkover surveys. Observations ranged from an individual to six birds travelling over grasslands. Both observations were within 500m of the proposed turbine layout.

3.3.3.3.3 *Waterbird Distribution and Abundance Surveys*

Black-headed gull were observed on 72 occasions during waterbird distribution and abundance surveys. Observations ranged from an individual to 300 birds, and were of birds feeding, roosting, circling or travelling. Observations were between 3.3km and 8.5km from the nearest proposed turbine.

3.3.3.3.4 *Incidental Observations*

There were 11 incidental observations of black-headed during surveys (see Appendix 4, Figure 7.4.18). Observations ranged from an individual to 14 birds, and were of birds travelling and circling. Four of these observations were within 500m of the proposed turbine layout.

3.3.3.4 Common Gull

Common gull was recorded during the winter season. Raw survey data and maps are provided in Section 8 in Appendix 4.

3.3.3.4.1 *Vantage Point Surveys*

Common gull were observed on four occasions during vantage point surveys (see Appendix 4, Figure 7.4.19). Observations ranged from 40 to 250 birds and were of birds commuting over grassland fields. There were three observations within 500m of the proposed turbine layout and three observations within the potential collision height. All observations were on the same day, in March 2022.

3.3.3.4.2 Winter Walkover Surveys

Common gull were observed on one occasion during winter walkover surveys. This observation comprised of 50 birds travelling over grasslands and was greater than 500m from the proposed turbine layout.

3.3.3.4.3 Waterbird Distribution and Abundance Surveys

Common gull were observed on 12 occasions during waterbird distribution and abundance surveys. Observations ranged from an individual to 60 birds, and were of birds feeding, roosting, circling or travelling. Observations were between 5.7km and 8.3km from the nearest proposed turbine.

3.3.3.5 Coot

Coot was recorded during the breeding and winter season. Raw survey data and maps are provided in Section 9 in Appendix 4.

3.3.3.5.1 Waterbird Distribution and Abundance Surveys

Coot were observed on 16 occasions during waterbird distribution and abundance surveys. Observations ranged from an individual to 13 birds, and were of birds feeding, swimming or roosting. Observations were between 3.6km and 7.6km from the nearest proposed turbine.

3.3.3.5.2 Incidental Observations

There was one incidental observation of coot during hen harrier roost surveys in February 2022 (see Appendix 4, Figure 7.4.23). The observation was of an individual bird travelling over grassland, greater than 500m from the proposed turbine layout.

3.3.3.6 Lesser Black-backed Gull

Lesser black-backed gull was recorded during the breeding and winter season. Raw survey data and maps are provided in Section 10 in Appendix 4.

3.3.3.6.1 Vantage Point Surveys

Lesser black-backed gull were observed on 221 occasions during vantage point surveys (see Appendix 4, Figure 7-4-24.1 and 7-4-24.2). Observations ranged from an individual bird to 50 birds and were of birds travelling, circling or landing over grassland and arable fields. There were 166 observations within 500m of the proposed turbine layout and 187 observations were within the potential collision height. There were ten observations up to 19 birds landing in fields, three of which were within 500m of the proposed turbine layout.

3.3.3.6.2 Breeding Walkover Surveys

Lesser black-backed gull were observed on 13 occasions during breeding walkover surveys. Observations ranged from an individual to four birds travelling over grasslands. Ten observations were within 500m of the proposed turbine layout.

3.3.3.6.3 Winter Walkover Surveys

Lesser black-backed gull were observed on one occasion during winter walkover surveys. This observation comprised of 43 birds circling over grasslands, within 500m of the proposed turbine layout.

3.3.3.6.4 Waterbird Distribution and Abundance Surveys

Lesser black-backed gull were observed on 47 occasions during waterbird distribution and abundance surveys. Observations ranged from an individual to 41 birds, and were of birds roosting or travelling. Observations were between 4.9km and 8.7km from the nearest proposed turbine.

3.3.3.6.5 Incidental Observations

There were 62 incidental observations of lesser black-backed gull during hen harrier roost surveys, breeding raptor surveys and breeding red grouse surveys (see Appendix 4, Figure 7-4-28). The observations ranged from an individual to 30 birds travelling, circling or foraging. Nineteen of these observations were within 500m of the proposed turbine layout.

3.3.3.7 Curlew

Curlew was recorded during the breeding and winter season. Raw survey data and maps are provided in Section 11 in Appendix 4.

3.3.3.7.1 Vantage Point Surveys

Curlew was observed on only one occasion during vantage point surveys (see Appendix 4, Figure 7.4.29). This observation was of an individual bird travelling during the winter season. The observation was partially within 500m of the proposed turbine layout and within the potential collision height.

3.3.3.7.2 Waterbird Distribution and Abundance Surveys

Curlew were observed on 41 occasions during waterbird distribution and abundance surveys. Observations ranged from an individual to 124 birds and were of birds foraging, travelling, calling or roosting. Observations were between 3.4km and 7.7km from the nearest proposed turbine. There were four observations during the passage season (August/September) and all other observations were within the winter season.

3.3.3.7.3 Incidental Observations

There were three incidental observations of curlew during hen harrier roost surveys and breeding raptor surveys (see Appendix 4, Figure 7-4-31). The observations ranged from an individual to three birds and observations were of birds travelling or calling. One of these observations was within 500m of the proposed turbine layout.

3.3.3.8 Lapwing

Lapwing was recorded during the breeding and winter season. Raw survey data and maps are provided in Section 13 in Appendix 4.

3.3.3.8.1 Vantage Point Surveys

Lapwing were observed on four occasions during vantage point surveys (see Appendix 4, Figure 7.4.37). All observations occurred during the 2021/2022 winter season. The observations ranged from five to 43 birds commuting. Two observations were within, or partially within, 500m of the proposed turbine layout and all observations were within the potential collision height.

3.3.3.8.2 *Waterbird Distribution and Abundance Surveys*

Lapwing were observed on 35 occasions during waterbird distribution and abundance surveys. Observations ranged from an individual to 200 birds and were of birds foraging, commuting, calling or roosting. Observations were between 3.7km and 8.4km from the nearest proposed turbine. There were five observations during the autumn passage season (August/September), one during the breeding season (April) and all other observations were within the winter season. There were two observations relating to breeding behaviour (display flights in April, juvenile calls in August), at Lough Hackett (approximately 7.2km from the nearest proposed turbine).

3.3.3.8.3 *Incidental Observations*

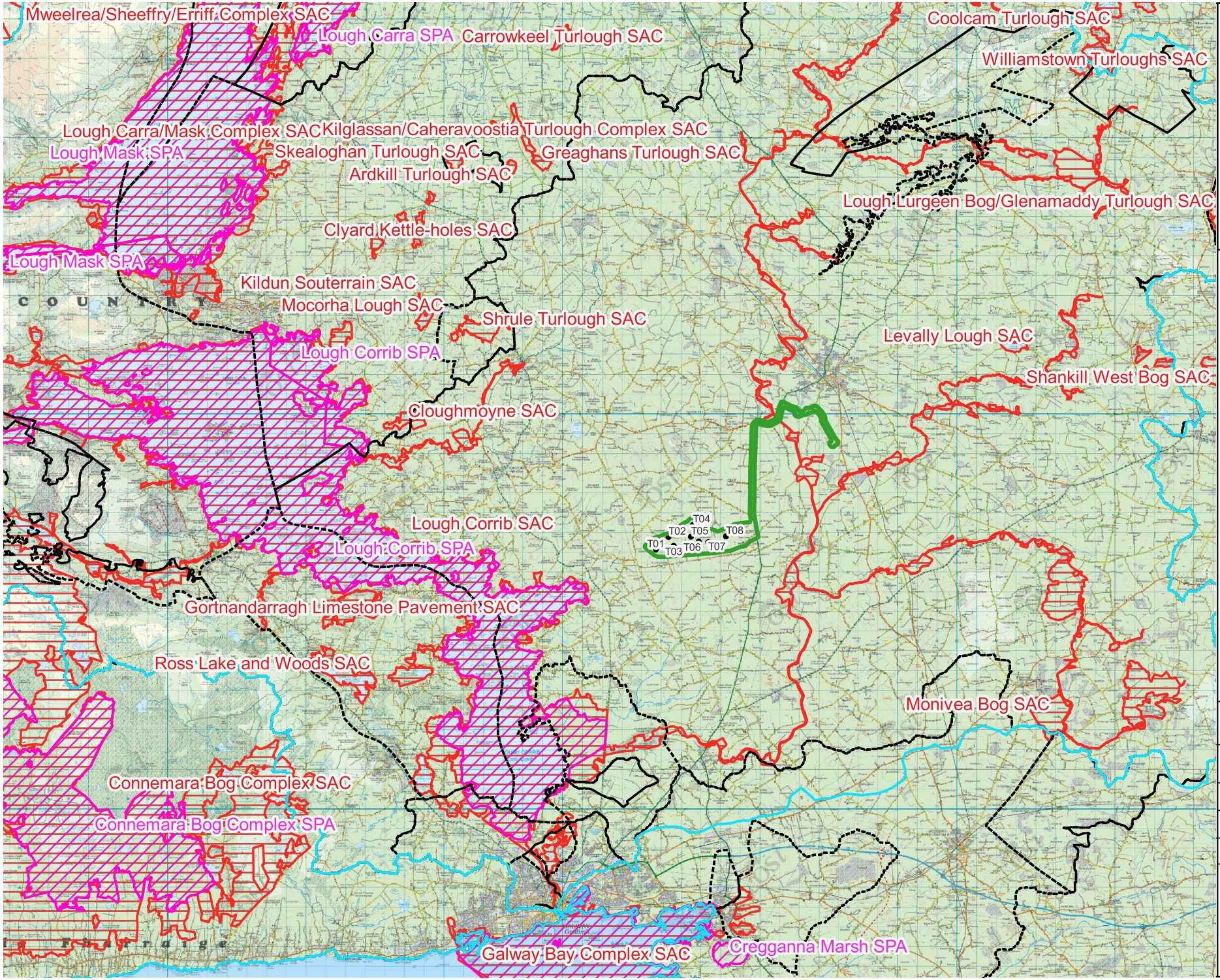
There were two incidental observations of lapwing during hen harrier roost surveys and vantage point surveys (see Appendix 4, Figure 7-4-39). The observations ranged from seven to 28 birds and were of birds commuting. Both observations were greater than 500m from the proposed turbine layout.

4. STAGE 1 – APPROPRIATE ASSESSMENT SCREENING

4.1 Identification of Relevant European Sites

The following methodology was used to establish any European Sites upon which there is a potential for a likely significant effect to occur either individually or in combination with other plans and projects as a result of the Proposed Project:

- Initially the most up to date GIS spatial datasets for European designated sites and water catchments were downloaded from the NPWS website (www.npws.ie) and the EPA website (www.epa.ie) on the 12/03/2024.
- All European Sites that could potentially be affected were identified using a source-pathway - receptor model. To provide context for the assessment, European Sites surrounding the development site are shown on Figure 4-1. Information on these sites according to the site-specific conservation objectives is provided in Table 4-1.
- The catchment mapping was used to establish or discount potential hydrological connectivity between the Site of the Proposed Project and any European Sites. The hydrological catchments and groundwater bodies are also shown in Figure 4-1.
- In relation to Special Protection Areas, in the absence of any specific European or Irish guidance in relation to such sites, the Scottish Natural Heritage (SNH) Guidance, '*Assessing Connectivity with Special Protection Areas* (SPA)' (2016) was consulted. This document provides guidance in relation to the identification of connectivity between Proposed Project and Special Protection Areas. The guidance takes into consideration the distances species may travel beyond the boundary of their SPAs and provides information on dispersal and foraging ranges of bird species which are frequently encountered when considering plans and projects.
- Table 4-1 provides details of all relevant European Sites as identified in the preceding steps and assesses the potential for likely significant effects on each.
- The assessment considers any likely direct or indirect impacts of the Proposed Project, both alone and in combination with other plans and projects, on European Sites by virtue of criteria including the following: size and scale, land-take, distance from the European Site or key features of the Site, resource requirements, emissions, excavation requirements, transportation requirements and duration of construction, operation and decommissioning were considered in this assessment.
- The Site synopses and conservation objectives of these sites, as per the NPWS website (www.npws.ie), were consulted and reviewed at the time of preparing this report 12/03/2024.
- Where potential pathways for Likely Significant Effect are identified, the Site is included within the Likely Zone of Impact and further assessment is required within the NIS.
- The potential for the Proposed Project to result in cumulative impacts on any European Sites in combination with other plans and projects was considered in the assessment that is presented in Table 4-1. Plans and projects considered include those that are listed in Appendix 6.



Map Legend

- EIAR Site Boundary
- SAC
- SPA
- WFD Catchments
- WFD Groundwater Bodies

Drawing Title

European Sites

Project Title: Laurclavagh Renewable Energy Development	
Drawn By: RW	Checked By: JH
Project No.: 210627	Drawing No.: Figure 4-1
Scale: 1:250,000	Date: 2024-03-12

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Table 4-1 Identification of European Sites within the Likely Zone of Impact

European Sites and distance from Proposed Project	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 12/03/2024	Conservation Objectives	Identification of Source-Pathway-Receptor chain
Special Areas of Conservation (SAC)			
Lough Corrib SAC [000297] Distance: The Proposed Grid Connection underground cabling route crosses over the Clare River which is located within this SAC. The Proposed Wind Farm site is located approx. 2.1km west of the SAC boundary.	› 1029 Freshwater Pearl Mussel *Margaritifera margaritifera* › 1092 White-clawed Crayfish *Austropotamobius pallipes* › 1095 Sea Lamprey *Petromyzon marinus* › 1096 Brook Lamprey *Lampetra planeri* › 1106 Salmon *Salmo salar* › 1303 Lesser Horseshoe Bat *Rhinolophus hipposideros* › 1355 Otter *Lutra lutra* › 1393 Slender Green Feather-moss *Drepanocladus vernicosus* › 1833 Slender Naiad *Najas flexilis* › 3110 Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) › 3130 Oligotrophic to mesotrophic standing waters with vegetation of the	Detailed conservation objectives for this site, (Version 1, April 2017[4]), were reviewed as part of the assessment and are available at www.npws.ie	There will be no direct effects as the Proposed Wind Farm infrastructure is located completely outside of the designated site. There are no instream works required as part of the Proposed Grid Connection underground cabling works, therefore there is no potential for direct effects associated with the existing crossing over the Clare River. A potential for indirect effect to the SAC was identified as a result of the Proposed Wind Farm via groundwater pathways given that the Proposed Wind Farm is located within a karst area. Additionally, a potential for indirect effect via surface water pathways as a result of the Proposed Grid Connection underground cabling route was identified. Taking a precautionary approach, a potential for indirect effect as a result of disturbance of QI fauna was also identified. **The SAC is considered to be within the Likely Zone of Impact and further assessment is required.**

[4] *https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000297.pdf*

European Sites and distance from Proposed Project	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 12/03/2024	Conservation Objectives	Identification of Source-Pathway-Receptor chain
	Littorelletea uniflorae and/or Isoeto-Nanojuncetea › 3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara spp.* › 3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation › 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 › 7210 Calcareous fens with *Cladium marsicus* and species of the Caricion davallianae › 7220 Petrifying springs with tufa formation (Cratoneurion) › 7230 Alkaline fens		

European Sites and distance from Proposed Project	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 12/03/2024	Conservation Objectives	Identification of Source-Pathway-Receptor chain
	› 8240 Limestone pavements › 91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles › 91D0 Bog woodland		
Levally Lough SAC [000295] Distance: 9.6km northeast	› 3180 Turloughs*	Detailed conservation objectives for this site, (Version 1, December 2020[5]), were reviewed as part of the assessment and are available at www.npws.ie	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. There is no downstream surface water connectivity from the Proposed Project site to this SAC. The water level data collected during the hydrological surveys undertaken, (outlined in Section 3.2), indicates that groundwater within the Proposed Project site flows from east to west. As this SAC is situated 9.6km northeast of the Proposed Project site, groundwater from the proposed site will not travel in the direction of this SAC. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Proposed Project, which proves that groundwater flow direction is in a southwest direction, as discussed in Section 6.5.1.3.2. **No pathway for significant effects on the designated site has been identified.**

[5] *https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000295.pdf*

European Sites and distance from Proposed Project	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 12/03/2024	Conservation Objectives	Identification of Source-Pathway-Receptor chain
Cloughmoyne SAC [000479] Distance: 12.7km northwest	› 8240 Limestone pavements	Detailed conservation objectives for this site, (Version 1, April 2019[6]), were reviewed as part of the assessment and are available at www.npws.ie	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. There is no pathway for effect on the terrestrial habitat for which this SAC is designated. **No pathway for significant effects on the designated site has been identified**
Shrule Turlough SAC [000525] Distance: 12.9km	› 3180 Turloughs*	Detailed conservation objectives for this site, (Version 1, January 2021[7]), were reviewed as part of the assessment and are available at www.npws.ie	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. This SAC is located within a separate groundwater body to the Proposed Project site, therefore, there is no potential for indirect effect. **No pathway for significant effects on the designated site has been identified**
Gortnandarragh Limestone Pavement SAC [001271]	› 8240 Limestone pavements	Detailed conservation objectives for this site, (Version 1, April 2019[8]), were reviewed as part of the assessment and are available at www.npws.ie	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site.

[6] *https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000479.pdf*
[7] *https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000525.pdf*
[8] *https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001271.pdf*

European Sites and distance from Proposed Project	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 12/03/2024	Conservation Objectives	Identification of Source-Pathway-Receptor chain
Distance: 13.5km			There is no pathway for effect on the terrestrial habitat for which this SAC is designated. **No pathway for significant effects on the designated site has been identified**
Galway Bay Complex SAC [000268] Distance: approx. 17km over land to the south	› 1140 Mudflats and sandflats not covered by seawater at low tide › 1150 Coastal lagoons* › 1160 Large shallow inlets and bays › 1170 Reefs › 1220 Perennial vegetation of stony banks › 1310 *Salicornia* and other annuals colonising mud and sand › 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) › 1355 Otter *Lutra lutra* › 1365 Harbour seal *Phoca vitulina* › 1410 Mediterranean salt meadows (Juncetalia maritimi)	Detailed conservation objectives for this site, (Version 1, April 2013[9]), were reviewed as part of the assessment and are available at www.npws.ie	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. The only hydrological pathway to this SAC would be via groundwater percolation to Lough Corrib SAC, and subsequent downstream surface water flows of approx. 15km to the marine waters of the SAC. Given the number of groundwater bodies and surface waters required to pass through before reaching the SAC, the minimum intervening hydrological distance, and the relative insensitivity of the marine based QI habitats to localised sedimentation events, there is no potential for likely significant effect on the SAC. The groundwater dependent QI habitats associated with this SAC are located within a separate groundwater body to the Proposed Project. **No pathway for significant effects on the designated site has been identified**

[9] *https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000268.pdf*

European Sites and distance from Proposed Project	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 12/03/2024	Conservation Objectives	Identification of Source-Pathway-Receptor chain
	› 3180 Turloughs* › 5130 -*Juniperus communis* formations on heaths or calcareous grasslands › 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites) › 7210 Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae* › 7230 Alkaline fens		
Special Protection Area (SPA)			
Lough Corrib SPA [004042] Distance: The Proposed Wind Farm is 3.6km east of the SPA boundary.	› A051 Gadwall *Anas strepera* › A056 Shoveler *Anas clypeata* › A059 Pochard Aythya ferina › A061 Tufted Duck *Aythya fuligula* › A065 Common Scoter *Melanitta nigra* › A082 Hen Harrier *Circus cyaneus* › A125 Coot *Fulica atra*	Detailed conservation objectives for this site, (Version 1, January 2023[10]), were reviewed as part of the assessment and are available at www.npws.ie	A potential for likely significant direct effect was identified as result of collision risk to SCI bird species associated with the Proposed Wind Farm. A further potential for likely significant indirect effect via water quality deterioration, resulting in a significant effect on SCI supporting habitat, was also identified, given that the Proposed Wind Farm is located within the same groundwater body as the SPA, and the

[10] *https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004042.pdf*

European Sites and distance from Proposed Project	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 12/03/2024	Conservation Objectives	Identification of Source-Pathway-Receptor chain
The SPA is located approx. 32km downstream of the Proposed Grid Connection underground cabling route via the Clare River.	› A140 Golden Plover *Pluvialis apricaria* › A179 Black-headed Gull *Chroicocephalus ridibundus* › A182 Common Gull *Larus canus* › A193 Common Tern *Sterna hirundo* › A194 Arctic Tern *Sterna paradisaea* › A395 Greenland White-fronted Goose *Anser albifrons flavirostris* › A999 Wetlands		Proposed Grid Connection underground cabling route has surface water connectivity with the SPA. **The SPA is considered to be within the Likely Zone of Impact and further assessment is required.**
Inner Galway Bay SPA [004031] Distance: over 17km over land to the south	› A003 Great Northern Diver *Gavia immer* › A017 Cormorant *Phalacrocorax carbo* › A028 Grey Heron *Ardea cinerea* › A046 Brent Goose *Branta bernicla hrota* › A050 Wigeon *Anas penelope* › A052 Teal *Anas crecca* › A056 Shoveler *Anas clypeata*	Detailed conservation objectives for this site, (Version 1, May 2013[11]), were reviewed as part of the assessment and are available at www.npws.ie	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. The only hydrological pathway to this SPA would be via groundwater percolation to Lough Corrib, and subsequent downstream surface water flows of approx. 15km to the marine waters of the SPA. Given the number of groundwater bodies and surface waters required to pass through before reaching the SPA, the minimum intervening hydrological distance, and the relative insensitivity of the marine based habitats to localised point-source sedimentation events, there is no

[11] *https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004031.pdf*

European Sites and distance from Proposed Project	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 12/03/2024	Conservation Objectives	Identification of Source-Pathway-Receptor chain
	› A069 Red-breasted Merganser *Mergus serrator* › A137 Ringed Plover *Charadrius hiaticula* › A140 Golden Plover *Pluvialis apricaria* › A142 Lapwing *Vanellus vanellus* › A149 Dunlin *Calidris alpina alpina* › A157 Bar-tailed Godwit *Limosa lapponica* › A160 Curlew *Numenius arquata* › A162 Redshank *Tringa totanus* › A169 Turnstone *Arenaria interpres* › A179 Black-headed Gull *Chroicocephalus ridibundus* › A182 Common Gull *Larus canus* › A191 Sandwich Tern *Sterna sandvicensis* › A193 Common Tern *Sterna hirundo* › A999 Wetlands		potential for likely significant effect on the SCI supporting marine habitats of the SPA. Given the distance between the Proposed Project and Inner Galway Bay SPA (17km) it has been determined that Common Gull observed on site during the survey period (see Section 3.3.3.4) are associated with Lough Corrib. Due to the large separation distance between the Proposed Project and the SPA, no potential for indirect effect on any other species has been identified. **No pathway for significant effects on the designated site has been identified**
Lough Mask SPA [004062]	› A061 Tufted Duck *Aythya fuligula* › A179 Black-headed Gull *Chroicocephalus ridibundus*	First Order Generic conservation objectives for this site, (October	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site.

European Sites and distance from Proposed Project	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 12/03/2024	Conservation Objectives	Identification of Source-Pathway-Receptor chain
Distance: 26km over land	› A182 Common Gull *Larus canus* › A183 Lesser Black-backed Gull *Larus fuscus* › A193 Common Tern *Sterna hirundo* › A395 Greenland White-fronted Goose *Anser albifrons flavirostris* › A999 Wetlands and Waterbirds	2022[12]), were reviewed as part of the assessment and are available at www.npws.ie. The Site has the following conservation objectives: *To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.* *To maintain or restore the favourable conservation condition of the wetland habitat at Lough Mask SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.*	There is no downstream hydrological connectivity from the Proposed Project site to the SPA. Therefore, there is no potential for hydrological impacts on SCI supporting wetland habitats. Lesser black-backed gull are an SCI species for Lough Mask SPA, however, given the large separation distance between the Proposed Project and Lough Mask and that there are breeding birds at Lough Corrib[13], it is more likely that the birds observed at the Proposed Project site (see Section 3.3.3.6) are associated with Lough Corrib. Due to the large separation distance between the Proposed Project and the SPA, no potential for indirect effect on any other species has been identified. **No pathway for significant effects on the designated site has been identified**

[12] *NPWS (2022) Conservation objectives for Lough Mask SPA [004062]. First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.*
[13] *https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004042.pdf*

4.2 Stage 1 Appropriate Assessment Screening Conclusion

It cannot be excluded beyond reasonable scientific doubt, in view of best scientific knowledge, on the basis of objective information and in light of the conservation objectives of the relevant European sites, that the Proposed Project, individually or in combination with other plans and projects, would be likely to have a significant effect on the following European Sites:

- Lough Corrib SAC
- Lough Corrib SPA

As a result, an Appropriate Assessment is required and a Natura Impact Statement shall be prepared in respect of the Proposed Project.

5. STAGE 2- NATURA IMPACT STATEMENT (NIS)

The potential for likely significant effects on the following European Sites in the absence of any mitigation, individually or cumulatively with other plans or projects, was identified in the preceding section:

- Lough Corrib SAC
- Lough Corrib SPA

The following sections consider each European Site individually to:

1. Determine which individual qualifying features have the potential to be adversely affected by the Proposed Project.
2. Provide information with regard to the Conservation Objectives and site-specific pressures and threats for those qualifying features that have the potential to be adversely affected.

5.1 Identification of relevant Qualifying Features and Desk Study

5.1.1 Lough Corrib SAC

The potential for impacts on this SAC were identified in Section 4.1 above. The identified pathways for effect include the following:

A potential for indirect effect to the SAC was identified as a result of the Proposed Wind Farm via groundwater pathways given that the Proposed Wind Farm is located within a karst area. Additionally, a potential for indirect effect via surface water pathways as a result of the Proposed Grid Connection underground cabling route was identified. Taking a precautionary approach, a potential for indirect effect as a result of disturbance of QI fauna was also identified.

Table 5-1 below lists the qualifying features of this European Site and determines, in the light of their Conservation Objectives, whether there is any complete source-pathway-receptor chain, by which adverse effects may occur.

5.1.1.1 Identification of Individual Qualifying Features with the Potential to be Affected

Table 5-1 Assessment of Qualifying features potentially affected

Qualifying feature	Conservation Objective (NPWS, Version 1, April 2017[14]),	Rationale	Potential for Adverse Effects Y/N
[1029] Freshwater Pearl Mussel *Margaritifera margaritifera*	*To restore the favourable conservation condition of Freshwater Pearl Mussel in Lough Corrib SAC.*	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 Project 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.	No

[14] *NPWS (2017) Conservation Objectives: Lough Corrib SAC 000297. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.*

[1092] White-clawed Crayfish *Austropotamobius pallipes*	*To maintain the favourable conservation condition of White-clawed Crayfish in Lough Corrib SAC.*	This species is known to occur in the Clare River catchment. There is no potential for direct effect as no instream works are required. A potential for likely indirect adverse effect as a result of deterioration in water quality exists as a result of construction of the Proposed Grid Connection underground cabling route which crosses this river via an existing crossing.	Yes
[1095] Sea Lamprey *Petromyzon marinus*	*To restore the favourable conservation condition of Sea Lamprey in Lough Corrib SAC.*	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. However, taking a highly precautionary approach, a potential for likely adverse effect on the species as a result of deterioration in water quality has been identified.	Yes
[1096] Brook Lamprey *Lampetra planeri*	*To maintain the favourable conservation condition of Brook Lamprey in Lough Corrib SAC.*	There is no potential for direct effect as no instream works are required. However, a potential for likely indirect adverse effect on the species where it occurs downstream of the Proposed Grid Connection underground cabling route as a result of deterioration in water quality has been identified.	Yes
[1106] Salmon *Salmo salar*	*To maintain the favourable conservation condition of Atlantic Salmon in Lough Corrib SAC.*		Yes
[1355] Otter *Lutra lutra*	*To maintain the favourable conservation condition of Otter in Lough Corrib SAC.*	There are no watercourses or suitable otter habitat available in the vicinity of the Proposed Wind Farm site. No otter holts or resting places were identified on surface watercourses in the vicinity of the Proposed Grid Connection underground cabling route during dedicated surveys undertaken. However, a potential for likely indirect adverse effect on the species where it occurs	Yes

		downstream of the Proposed Grid Connection underground cabling route as a result of deterioration in water quality and disturbance/displacement has been identified.	
[1833] Slender Naiad *Najas flexilis*	*To restore the favourable conservation condition of Slender Naiad in Lough Corrib SAC.*	There is potential for this species to occur within Lough Corrib downstream of the Proposed Project. A potential for likely indirect adverse effect as a result in deterioration in water quality was identified.	Yes
[3110] Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	*To restore the favourable conservation condition of Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) in Lough Corrib SAC.*	According to Map 3 of the site-specific conservation objectives, this lake habitat occurs within the northwestern portion of Lough Corrib. It is likely to *occur elsewhere along the northern or western shoreline of Lough Corrib, in Ballydoo Lough (N. of Corrib) and in small lakes in the Owenriff catchment.* However, the Proposed Project, located within the Clare River catchment, is upstream of the southeastern portion of the lake only. Therefore, there is no potential for likely adverse effect on this lake habitat which is located upgradient of the catchment within which the Proposed Project is located.	No
[3130] Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*	*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.*	According to the site-specific conservation objectives, there is potential for this lake habitat to occur throughout the lake. Therefore, a potential for likely indirect adverse effect on this lake habitat exists as a result of deterioration in water quality.	Yes
[3140] Hard oligo-mesotrophic waters with benthic vegetation of *Chara spp.*	*To restore the favourable conservation condition of Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. in Lough Corrib SAC.*	This habitat is found within the southern basin of Lough Corrib. Therefore, a potential for likely indirect adverse effect on this lake habitat exists as a result of deterioration in water quality.	Yes
[3260] Water courses of plain to montane levels with the *Ranunculion*	*To maintain the favourable conservation condition of Water courses of plain to*	This habitat is present within the Clare River in the vicinity of the Proposed Grid Connection underground	Yes

fluitantis and *Callitricho-Batrachion* vegetation	*montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation in Lough Corrib SAC.*	cabling route. There is no potential for direct effect as no instream works are required. However, a potential for indirect likely adverse effect exists as a result of deterioration in water quality.	
[7210] Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*	*To maintain the favourable conservation condition of Calcareous fens with Cladium mariscus and species of the Caricion davallianae in Lough Corrib SAC.*	A potential for indirect adverse effect on these groundwater-dependent habitats has been identified as a result of deterioration in water quality associated with the Proposed Project.	Yes
[7220] Petrifying springs with tufa formation (*Cratoneurion*)	*To maintain the favourable conservation condition of Petrifying springs with tufa formation (Cratoneurion)* in Lough Corrib SAC.*		Yes
[7230] Alkaline fens	*To maintain the favourable conservation condition of Alkaline fens in Lough Corrib SAC.*		Yes
[1393] Slender Green Feather-moss *Drepanocladus vernicosus*	*To maintain the favourable conservation condition of Slender Green Feather-moss (Shining Sickle-moss) in Lough Corrib SAC.*	Due to the terrestrial nature of this species, there is no source-pathway-receptor chain for adverse effect on this species where it occurs within the SAC.	No
[6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)	*To maintain the favourable conservation condition of Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) in Lough Corrib SAC.*	Due to the terrestrial nature of this habitat, there is no source-pathway-receptor chain for adverse effect on this habitat where it occurs within the SAC.	No
[6410] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	*To maintain the favourable conservation condition of Molinia meadows on calcareous, peaty or clayey-silt-laden soils*	Due to the terrestrial nature of this habitat, there is no source-pathway-receptor chain for adverse effect on this habitat where it occurs within the SAC.	No

	(Molinion caeruleae) in Lough Corrib SAC.		
[7110] Active raised bogs	*To restore the favourable conservation condition of Active raised bogs* in Lough Corrib SAC.*	Due to the terrestrial nature of this habitat, there is no source-pathway-receptor chain for adverse effect on this habitat where it occurs within the SAC.	No
[7120] Degraded raised bogs still capable of natural regeneration	*The long-term aim for Degraded raised bogs still capable of natural regeneration is that its peat-forming capability is re-established; therefore, the conservation objective for this habitat is inherently linked to that of Active raised bogs (7110) and a separate conservation objective has not been set in Lough Corrib SAC.*	Due to the terrestrial nature of this habitat, there is no source-pathway-receptor chain for adverse effect on this habitat where it occurs within the SAC.	No
[7150] Depressions on peat substrates of the *Rhynchosporion*	*Depressions on peat substrates of the Rhynchosporion is an integral part of good quality Active raised bogs (7110) and thus a separate conservation objective has not been set for the habitat in Lough Corrib SAC.*	Due to the terrestrial nature of this habitat, there is no source-pathway-receptor chain for adverse effect on this habitat where it occurs within the SAC.	No
[8240] Limestone pavements	*To maintain the favourable conservation condition of Limestone pavements* in Lough Corrib SAC.*	Due to the terrestrial nature of this habitat, there is no source-pathway-receptor chain for adverse effect on this habitat where it occurs within the SAC.	No
[91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	*To maintain the favourable conservation condition of Old sessile oak woods with Ilex and Blechnum in the British Isles in Lough Corrib SAC.*	Due to the terrestrial nature of this habitat, there is no source-pathway-receptor chain for adverse effect on this habitat where it occurs within the SAC.	No
[91D0] Bog woodland	*To maintain the favourable conservation condition of Bog woodland* in Lough Corrib SAC.*	Due to the terrestrial nature of this habitat, there is no source-pathway-receptor chain for adverse effect on this habitat where it occurs within the SAC.	No

5.1.1.2 Site Specific Pressures and Threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to impact on the European Site were reviewed and considered in relation to the Proposed Project. These are provided in the table below.

Table 5-2 Site-specific threats, pressures and activities

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
High	A02.01	Acid input/acidification	Both
High	C01.03.02	Agricultural intensification	Inside
High	G05	Mechanical removal of peat	Inside
High	H01.08	Other human intrusions and disturbances	Outside
High	I01	Diffuse pollution to surface waters due to household sewage and waste waters	Inside
Low	C01.01	Invasive non-native species	Outside
Low	E03.01	Sand and gravel extraction	Inside
Medium	A04.03	Disposal of household / recreational facility waste	Inside
Medium	A08	Abandonment of pastoral systems, lack of grazing	Both
Medium	A10.01	Fertilisation	Inside
Medium	B01	Removal of hedges and copses or scrub	Both
Medium	D01	Forest planting on open ground	Inside
Medium	D03.01.02	Roads, paths and railroads	Inside
Medium	E01.01	Piers / tourist harbours or recreational piers	Outside
Medium	E01.03	Continuous urbanisation	Inside
Medium	J02.01.03	Dispersed habitation	Inside

'Removal of hedges and copses or scrub', and 'Other human intrusions and disturbances' have been identified as potential pathways for effect associated with the Proposed Project with regard to site-specific threats, pressures and activities.

5.1.1.3 Qualifying Interests - Specific Information

5.1.1.3.1 *[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). White-clawed crayfish (*Austropotamobius pallipes*) is

recorded from the entire lengths of the four main tributaries of the River Clare, however, its total distribution is unknown. 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 5-3 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

5.1.1.3.2 *[1095] 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 (*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. It is therefore unlikely that this species is present in the rivers in the vicinity of the Proposed Project but they are included on a precautionary basis.

Targets and Attributes

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

Table 5-4 Targets and Attributes for Sea Lamprey

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

5.1.1.3.3 *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. 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.'*

Table 5-5 Targets and Attributes for Brook Lamprey

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

5.1.1.3.4 *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.

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.'*

Table 5-6 Targets and Attributes for Salmon

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

5.1.1.3.5 *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 activity was found in the vicinity of the existing water crossings along the Proposed Grid Connection underground cabling route. No otter holts or resting places were recorded.

Targets and Attributes

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

Table 5-7 Targets and Attributes for Otter

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.

5.1.1.3.6 *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 habitat 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.'*

Table 5-8 Targets and Attributes for Slender Naiad

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*

5.1.1.3.7 *Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130]*

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.'*

Table 5-9 Targets and Attributes for lake habitat 3130

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
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

5.1.1.3.8 *Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. [3140]*

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.'*

Table 5-10 Targets and Attributes for lake habitat 3140

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
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 3140

5.1.1.3.9 *Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]*

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 were for Atlantic salmon *(Salmo salar)* and most of these rivers are in arterial drainage schemes 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'.

This habitat was found within the stretches of the Clare River and Killeelaun River in the vicinity of two existing water crossings along the Proposed Grid Connection underground cabling route.

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 Callitricho-Batrachion vegetation in Lough Corrib SAC.'*

Table 5-11 Targets and Attributes for water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation

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
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

5.1.1.3.10 *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.'

Table 5-12 Targets and Attributes for Calcareous fens with Cladium mariscus

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

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 as a result 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

5.1.1.3.11 *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.*'

Table 5-13 Targets and Attributes for Petrifying Springs

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

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

5.1.1.3.12 *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'*

Table 5-14 Targets and Attributes for Alkaline Fens

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
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 as a result 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

5.1.2 Lough Corrib SPA

The potential for impacts on this SPA were identified in Section 4.1 above. The identified pathways for effect include the following:

A potential for likely significant direct effect was identified as result of collision risk to SCI bird species associated with the Proposed Wind Farm.

A further potential for likely significant indirect effect via water quality deterioration, resulting in a significant effect on SCI supporting habitat, was also identified, given that the Proposed Wind Farm is located within the same groundwater body as the SPA, and the Proposed Grid Connection underground cabling route has potential surface water connectivity with the SPA.

The table below lists the qualifying features of this European Site and determines, in the light of their Conservation Objectives, whether there is any complete source-pathway-receptor chain, by which adverse effects may occur.

5.1.2.1 Identification of Individual Qualifying Features with the Potential to be Affected

Table 5-15 Assessment of Qualifying features potentially affected

Qualifying feature	Conservation Objective (NPWS, Version 1, January 2023[15])	Rationale	Potential for Adverse Effects Y/N
› Gadwall (*Anas strepera*) [A051]	*To restore the favourable conservation condition of gadwall in Lough Corrib SPA,*	The Proposed Wind Farm is located outside the 2 to 3km foraging range of this species (Johnson et al., 2014). Furthermore, this species was not observed on or near the Proposed Wind Farm site during the ornithological surveys undertaken between 2020 and 2023. No potential for indirect effects through collision risk, disturbance or displacement of this species exists.	Yes

[15] *NPWS (2023) Conservation Objectives: Lough Corrib SPA 004042. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage*

Qualifying feature	Conservation Objective (NPWS, Version 1, January 2023[15])	Rationale	Potential for Adverse Effects Y/N
		However, the SPA is located hydrologically downstream of the Proposed Grid Connection underground cabling route and is within the same groundwater body as the Proposed Wind Farm. Therefore, a potential for indirect adverse effect via deterioration in water quality as a result of construction activities thus affecting SCI supporting habitats was identified.	
› Shoveler (*Anas clypeata*) [A056]	*To restore the favourable conservation condition of shoveler in Lough Corrib SPA*	The Proposed Wind Farm is located outside the 2 to 3km foraging range of this species (Johnson et al., 2014). Furthermore, this species was not observed on or near the Proposed Wind Farm site during the ornithological surveys undertaken between 2020 and 2023. No potential for indirect effects through collision risk, disturbance or displacement of these species exists. However, the SPA is located hydrologically downstream of the Proposed Grid Connection underground cabling route and is within the same groundwater body as the Proposed Wind Farm. Therefore, a potential for indirect adverse effect via deterioration in water quality as a result of construction activities thus affecting SCI supporting habitats was identified.	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, January 2023[15])	Rationale	Potential for Adverse Effects Y/N
› Pochard (*Aythya farina*) [A059]	*To restore the favourable conservation condition of pochard in Lough Corrib SPA*	This species was not observed on or near the Proposed Wind Farm site during the ornithological surveys undertaken between 2020 and 2023. No potential for indirect effects through collision risk, disturbance or displacement of these species exists. However, the SPA is located hydrologically downstream of the Proposed Grid Connection underground cabling route and is within the same groundwater body as the Proposed Wind Farm. Therefore, a potential for indirect adverse effect via deterioration in water quality as a result of construction activities thus affecting SCI supporting habitats was identified.	Yes
› Tufted Duck (*Aythya fuligula*) [A061]	*To restore the favourable conservation condition of tufted duck in Lough Corrib SPA*	This species was not observed on or near the Proposed Wind Farm site during the ornithological surveys undertaken between 2020 and 2023. No potential for indirect effects through collision risk, disturbance or displacement of these species exists. However, the SPA is located hydrologically downstream of the Proposed Grid Connection underground cabling route and is within the same groundwater body as the Proposed Wind Farm. Therefore, a	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, January 2023[15])	Rationale	Potential for Adverse Effects Y/N
		potential for indirect adverse effect via deterioration in water quality as a result of construction activities thus affecting SCI supporting habitats was identified.	
› Common Scoter (*Melanitta nigra*) [A065]	*To maintain the favourable conservation condition of common scoter in Lough Corrib SPA*	This species was not observed on or near the Proposed Wind Farm site during the ornithological surveys undertaken between 2020 and 2023. No potential for indirect effects through collision risk, disturbance or displacement of these species exists. However, the SPA is located hydrologically downstream of the Proposed Grid Connection underground cabling route and is within the same groundwater body as the Proposed Wind Farm. Therefore, a potential for indirect adverse effect via deterioration in water quality as a result of construction activities thus affecting SCI supporting habitats was identified.	Yes
› Hen Harrier (*Circus cyaneus*) [A082]	*To restore the favourable conservation condition of hen harrier in Lough Corrib SPA,*	The Proposed Wind Farm site is located outside the core foraging range of breeding Hen Harrier (2km SNH 2016) but within max foraging range of breeding Hen Harrier (10km, SNH 2016). Hen harrier was observed on five occasions during the vantage point surveys. All observations were of an individual bird and comprised the bird hunting or travelling over	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, January 2023[15])	Rationale	Potential for Adverse Effects Y/N
		grassland fields. There were four observations within 500m of the proposed turbine layout and one observation was within the potential collision height. All observations were during the non-breeding season. Therefore, it is considered there is a potential for adverse effect via collision risk, disturbance and displacement associated with the species and further assessment is required.	
› Coot (*Fulica atra*) [A125]	*To restore the favourable conservation condition of coot in Lough Corrib SPA*	Coot were observed on 16 occasions during waterbird distribution and abundance surveys. Observations ranged from an individual to 13 birds, and were of birds feeding, swimming or roosting. Observations were between 3.6km and 7.6km from the nearest proposed turbine. This species was not observed on or near the Proposed Wind Farm site during the ornithological surveys undertaken between 2020 and 2023. No potential for indirect effects through collision risk, disturbance or displacement of these species exists. However, the SPA is located hydrologically downstream of the Proposed Grid Connection underground cabling route and is within the same groundwater body as the Proposed Wind Farm. Therefore, a	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, January 2023[15])	Rationale	Potential for Adverse Effects Y/N
		potential for indirect adverse effect via deterioration in water quality as a result of construction activities thus affecting SCI supporting habitats was identified.	
› Golden Plover (*Pluvialis apricaria*) [A140]	*To maintain the favourable conservation condition of golden plover in Lough Corrib SPA*	The core foraging range of this species is 3km, and max foraging range is 11km (SNH, 2016). Golden plover were observed on 23 occasions during the vantage point surveys. Observations ranged from an individual to 110 birds and were of birds commuting, circling or landing/roosting over grassland fields. Birds were observed landing or roosting in field within 500m of the proposed turbine layout on five occasions. There were 17 observations within 500m of the proposed turbine layout and 19 observations within the potential collision height. All observations were in the non-breeding/migratory season (October to April). Therefore, it is considered there is a potential for adverse effect via collision risk and habitat loss associated with the species and further assessment is required. Furthermore, the SPA is located hydrologically downstream of the Proposed Grid Connection underground cabling route and is within the same groundwater body as the Proposed Wind Farm. Therefore, a potential for indirect adverse	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, January 2023[15])	Rationale	Potential for Adverse Effects Y/N
		effect via deterioration in water quality as a result of construction activities thus affecting SCI supporting habitats was identified.	
› Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	*To restore the favourable conservation condition of black-headed gull in Lough Corrib SPA*	The Proposed Wind Farm site is the within core foraging range of the species, 11.4km (Thaxter et al., 2012). Black-headed gull were observed within, or partially within, the Proposed Wind Farm site on 29 occasions during breeding seasons and numbers ranged from an individual to 16 birds. Black-headed gull were observed within, or partially within, the Proposed Wind Farm site on 13 occasions during winter seasons and numbers ranged from an individual to 75 birds. Black-headed gull are an SCI species for the Lough Corrib SPA, however, this SPA cite breeding populations of black-headed gull only[16]. The wintering population of black-headed gull is not cited as an interest of the SPA. As a precautionary measure, it has been determined that the wintering population of Black-headed gull, while not cited as an interest of the SPA, still contribute to the 'wetlands and waterbirds' SCI of Lough Corrib SPA. Therefore, the potential for adverse effect via collision risk,	Yes

[16] *https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004042.pdf*

Qualifying feature	Conservation Objective (NPWS, Version 1, January 2023[15])	Rationale	Potential for Adverse Effects Y/N
		disturbance and displacement to the wintering species is considered further on a precautionary basis. Furthermore, the SPA is located hydrologically downstream of the Proposed Grid Connection underground cabling route and is within the same groundwater body as the Proposed Wind Farm. Therefore, a potential for indirect adverse effect via deterioration in water quality as a result of construction activities thus affecting SCI supporting habitats was identified.	
› Common Gull (*Larus canus*) [A182]	*To restore the favourable conservation condition of common gull in Lough Corrib SPA*	The Proposed Wind Farm site is within the core foraging range of 25km (Thaxter et al., 2012). Common Gull were not observed on or near the Site during the breeding season. Common gull were observed within, or partially within, the Proposed Wind Farm site on three occasions during the winter season and numbers ranged from 40 to 250 birds. Common gull are an SCI species for Lough Corrib SPA, however, this SPA cite breeding populations of common gull only[17]. As common gull were only observed during the	Yes

[17] *https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004042.pdf*

Qualifying feature	Conservation Objective (NPWS, Version 1, January 2023[15])	Rationale	Potential for Adverse Effects Y/N
		winter season, this population is not cited as an interest of the SPA. As a precautionary measure, it has been determined that the wintering population of Common gull, while not cited as an interest of the SPA, still contribute to the 'wetlands and waterbirds' SCI of Lough Corrib SPA. Therefore, the potential for adverse effect via collision risk, disturbance and displacement to the wintering species is considered further on a precautionary basis. Furthermore, the SPA is located hydrologically downstream of the Proposed Grid Connection underground cabling route and is within the same groundwater body as the Proposed Wind Farm. Therefore, a potential for indirect adverse effect via deterioration in water quality as a result of construction activities thus affecting SCI supporting habitats was identified.	
› Common Tern (*Sterna hirundo*) [A193]	*To restore the favourable conservation condition of common tern in Lough Corrib SPA*	The Proposed Wind Farm is within the core foraging range of the species (4.5km, Thaxter et al., 2012). However, this species was not observed on or near the Proposed Wind Farm site during the ornithological surveys undertaken between 2020 and 2023. No potential for indirect effects through collision risk,	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, January 2023[15])	Rationale	Potential for Adverse Effects Y/N
		disturbance or displacement of these species exists. However, the SPA is located hydrologically downstream of the Proposed Grid Connection underground cabling route and is within the same groundwater body as the Proposed Wind Farm. Therefore, a potential for indirect adverse effect via deterioration in water quality as a result of construction activities thus affecting SCI supporting habitats was identified.	
› Arctic Tern (*Sterna paradisaea*) [A194]	*To restore the favourable conservation condition of Arctic tern in Lough Corrib SPA*	The Proposed Wind Farm is within the core foraging range of the species, 7.1km (Thaxter et al., 2012). However, this species was not observed on or near the Proposed Wind Farm site during the ornithological surveys undertaken between 2020 and 2023. No potential for indirect effects through collision risk, disturbance or displacement of these species exists. However, the SPA is located hydrologically downstream of the Proposed Grid Connection underground cabling route and is within the same groundwater body as the Proposed Wind Farm. Therefore, a potential for indirect adverse effect via deterioration in water quality as a result of construction activities thus affecting SCI supporting habitats was identified.	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, January 2023[15])	Rationale	Potential for Adverse Effects Y/N
› Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]	*To restore the favourable conservation condition of Greenland white-fronted goose in Lough Corrib SPA*	The Proposed Wind Farm is within the core foraging range of 5 to 8km (SNH, 2016). However, this species was not observed on or near the Proposed Wind Farm site during the ornithological surveys undertaken between 2020 and 2023. No potential for indirect effects through collision risk, disturbance or displacement of these species exists. However, the SPA is located hydrologically downstream of the Proposed Grid Connection underground cabling route and is within the same groundwater body as the Proposed Wind Farm. Therefore, a potential for indirect adverse effect via deterioration in water quality as a result of construction activities thus affecting SCI supporting habitats was identified.	Yes
› Wetlands and waterbirds [A999]	*To maintain the favourable conservation condition of wetlands in Lough Corrib SPA*	The SPA is located approx. 28km downstream of the Proposed Grid Connection underground cabling route via the Clare River. The Proposed Wind Farm is located within the same groundwater body as the SPA. Due to this, a potential for indirect adverse effect via deterioration in surface and groundwater quality of the SPA exists and further assessment is required.	Yes

5.1.2.2 Site Specific Pressures and Threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to impact on the European Site were reviewed and considered in relation to the Proposed Project. These are provided in the table below. No pathways for impact in relation to the Proposed Project were identified.

Table 5-16 Site specific pressures and threats with potential to impact the European Site

Negative Impacts			
Rank	**Threats and Pressures**		**Inside/Outside/ Both (i / o / b)**
H	F03.01	Hunting	Inside
H	F02.03	Leisure fishing	Inside
L	A04	Grazing	Outside
H	E01	Urbanised areas, human habitation	Outside
L	G01.01	Nautical sport	Inside
M	B	Mountaineering, rock climbing, speleology	Outside
L	A08	Fertilisation	Outside

5.1.2.3 Special Conservation Interests' Specific Information

5.1.2.3.1 *Gadwall (Anas strepera) [A051]*

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.'*

Table 5-17 Targets and Attributes for Gadwall

Attribute	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

5.1.2.3.2 Shoveler (Anas clypeata) [A056]

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.'*

Table 5-18 Targets and Attributes for Shoveler

Attribute	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

5.1.2.3.3 Pochard (Aythya ferina) [A059]

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'*

Table 5-19 Targets and Attributes for Pochard

Attribute	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

5.1.2.3.4 *Tufted Duck (Aythya fuligula) [A061]*

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'.*

Table 5-20 Targets and Attributes for Tufted Duck

Attribute	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

5.1.2.3.5 *Common Scoter (Melanitta nigra) [A065]*

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'.*

Table 5-21 Targets and Attributes for Common Scoter

Attribute	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
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

5.1.2.3.6 *Hen Harrier*

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.'*

Table 5-22 Targets and Attributes for Hen Harrier

Attribute	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

5.1.2.3.7 *Coot (Fulica atra) [A125]*

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.'*

Table 5-23 Targets and Attributes for Coot

Attribute	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

5.1.2.3.8 Golden Plover (Pluvialis apricaria) [A140]

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.'*

Table 5-24 Targets and Attributes for Golden Plover

Attribute	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

5.1.2.3.9 Black-headed Gull (Chroicocephalus ridibundus) [A179]

According to the SSCO for Lough Corrib SPA, black-headed gull colonies have been recoded at multiple locations across Lough Corib 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.'*

Table 5-25 Targets and Attributes for Black Headed Gull

Attribute	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

5.1.2.3.10 *Common Gull (Larus canus) [A182]*

According to the SSCO for Lough Corrib SPA, breeding common gull have been recoded at multiple locations across Lough Corib 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'.*

Table 5-26 Targets and Attributes for Common Gull

Attribute	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

5.1.2.3.11 *Common Tern (Sterna hirundo) [A193]*

According to the SSCO for Lough Corrib SPA, breediung common tern have been recoded 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.'*

Table 5-27 Targets and Attributes for Common Tern

Attribute	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

5.1.2.3.12 *Arctic Tern (Sterna paradisaea) [A194]*

According to the SSCO for Lough Corrib SPA, breediung arctic tern have been recoded 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.'*

Table 5-28 Targets and Attributes for Arctic Tern

Attribute	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

5.1.2.3.13 Greenland White-fronted Goose (Anser albifrons flavirostris) [A395]

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.'*

Table 5-29 Targets and Attributes for Greenland White-fronted Goose

Attribute	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

5.1.2.3.14 *Wetlands [A999]*

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.

The following relevant information has been extracted from the NPWS site synopsis and Natura 2000 Data Form for the SPA:

> *'The Site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Greenland White-fronted Goose, Gadwall, Shoveler, Pochard, Tufted Duck, Common Scoter, Hen Harrier, Coot, Golden Plover, Black-Headed Gull, Common Gull, Common Tern and Arctic Tern. The Site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. 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 for Wetlands & Waterbirds.*
>
> *Lough Corrib SPA is an internationally important site which supports in excess of 20,000 wintering waterbirds, including a population of Pochard that is, itself, of international importance. A further six species of wintering waterfowl have populations of national importance. The Site also contains a nationally important communal roost site for Hen Harrier. Lough Corrib is the most important site in the country for breeding Common Scoter. Its populations of breeding gulls and terns are also notable, with nationally important numbers of Black-headed Gull, Common Gull, Common Tern and Arctic Tern occurring. It is of note that several species which regularly occur are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Greenland White-fronted Goose, Hen Harrier, Golden Plover, Common Tern and Arctic Tern. Lough Corrib is a Ramsar Convention site.'*

Targets and Attributes

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

Table 5-30 Targets and Attributes for wetlands of Lough Corrib SPA

Attribute	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

6. ASSESSMENT OF POTENTIAL EFFECTS & ASSOCIATED MITIGATION

This section of the NIS assesses the potential effects of the Proposed Project on the identified relevant Qualifying Interests/Special Conservation Interests. This assessment is undertaken in the absence of any mitigation and in respect of the conservation objectives of the European Site/s. The Conservation Objectives each of the European Sites assessed were reviewed on the 18.01.2024. The Conservation Objectives for these sites are available at the following locations:

Lough Corrib SAC:

- https://www.npws.ie/sites/default/files/protectedsites/conservation_objectives/CO000297.pdf

Lough Corrib SPA:

- https://www.npws.ie/sites/default/files/protectedsites/conservation_objectives/CO004042.pdf

Following the initial impact assessment, mitigation is prescribed where necessary to avoid adverse effects on the Conservation Objectives of the relevant QIs/SCIs.

6.1 Potential for Direct Effects on the European Sites

6.1.1 Collision Risk and Displacement/Barrier Effect

6.1.1.1 Operation

There is potential for ex-situ direct effects on the following SCI bird species of Lough Corrib SPA as a result of the operational phase of the Proposed Wind Farm:

- Golden plover (wintering)
- Hen Harrier (wintering)
- Black-headed Gull (breeding)
- Black-headed Gull (wintering – not an SCI population)
- Common Gull (wintering – not an SCI population)

6.1.1.1.1 *Golden Plover (Wintering)*

Lough Corrib SPA is designated for wintering Golden Plover.

Displacement and Barrier Effect

Hötker *et al.* (2006) state that Golden Plover will approach wind turbines to an average distance of 175m in non-breeding season. 7 no. of the 23 no. observations of golden plover were within 175m of the proposed turbine layout during surveys during the 2020/21 and 2021/22 winter seasons. In the event of displacement, there are extensive areas of similar habitat in the wider area. This would likely render such an effect inconsequential.

There is no evidence to suggest that the Proposed Wind Farm site lies on a migratory/ regular commuting route for this species, therefore barrier effect is not anticipated.

No potential for adverse effect via displacement of the SCI population of wintering golden plover is anticipated.

Collision Risk

The species was recorded flying within potential collision height during vantage point surveys. A "Random" collision risk analysis has been undertaken. To account for the potential for the nocturnal flight activity of water birds, it has been assumed in the collision risk analysis that this species was active for a quarter of night (full details provided in Appendix 5).

A key factor in calculating the predicted rate of collisions for a given species is the application of an avoidance rate. The avoidance rate accounts for the ability of a bird to take evasive action to avoid a collision with a turbine. Where species-specific avoidance rates are available these rates are usually very high, e.g. all swan species have been shown to avoid colliding with operating turbines 99.8% of the time. Until recently a species-specific avoidance rate has not been available for golden plover. A review of golden plover collision avoidance from four UK wind farms has been undertaken and is outlined in Appendix 5. The output of this new research was a golden plover avoidance rate of 99.6%. This avoidance rate was used in the collision risk analysis.

The collision risk has been calculated at a rate of 0.8 collisions per year, or one bird every year. Annual mortality of adult golden plover has been calculated at 27% per annum (Sandercock, 2003). If 0.8 collisions were to occur per year, it would mean that the losses at the Proposed Wind Farm site would increase the annual mortality of the county population (c. 4,423) by 0.07%. The predicted collision risk is negligible.

No potential for adverse effect via collision risk to the SCI population of golden plover are anticipated.

6.1.1.1.2 *Hen Harrier (Winter)*

Lough Corrib SPA is designated for Hen Harrier and includes the non-breeding season.

Displacement and Barrier Effect

No evidence of roosting was recorded within the Proposed Wind Farm site or within 2km of the Site. Hen harrier have been recorded to be subject to displacement impacts within a 500m radius of turbines (Pearce-Higgins et al., 2009). However, foraging/commuting hen harrier were infrequently recorded within the Proposed Wind Farm site and were only recorded within 500m of the proposed turbine layout on four occasions.

There will therefore be no adverse effects via displacement or barrier effect given the low numbers recorded and infrequency of these observations.

Collision Risk

The species was recorded flying within potential collision height during vantage point surveys. A "Random" collision risk analysis has been undertaken (full details provided in Appendix 5). The collision risk has been calculated at a ratio of 0.001 collisions per year, or one bird every 1,653 years.

The predicted collision risk is insignificant over the 30- year life-time of the Proposed Wind Farm and no potential for adverse effects are anticipated.

6.1.1.1.3 Black-headed Gull (Breeding)

Lough Corrib SPA is designated for breeding Black-headed Gull. Black-headed gull is a colonial ground nesting bird. Whilde (1983) identified four major colonies (one sited in each of the two basins with two colonies located in the interconnecting narrow section of the lough) and summarised that this gull nested on small, rushy islands with one colony situated on a bracken dominated island. In 2010 McGreal (2011) noted that the SPA's breeding black-headed gull colonies were confined to just two islands (one in each basin). The 2017 survey identified just one colony located in the upper basin.

Displacement and Barrier Effect

Black-headed gull were observed within, or partially within, the Proposed Wind Farm site on 29 occasions during breeding seasons and numbers ranged from an individual to 16 birds.

This species was not regularly recorded utilising habitats within the Site for roosting or foraging. Furthermore, significant areas of suitable roosting and foraging habitat for the species occur in the wider landscape and will be retained. In the event of displacement, there are extensive areas of similar habitat in the wider area. This would likely render such an effect inconsequential.

There is no evidence to suggest that the Proposed Wind Farm site lies on a migratory/ regular commuting route for this species, therefore barrier effect is not anticipated.

There will therefore be no adverse effects via displacement or barrier effect.

Collision Risk

The species was recorded flying within PCH during vantage point surveys. A "Random" collision risk analysis has been undertaken (full details provided in Appendix 5). The collision risk has been calculated at a rate of 0.5 collisions per year, or one bird every two years. To account for the potential for the nocturnal flight activity of water birds, it has been assumed in the collision risk analysis that this species was active for a quarter of night (full details provided in Appendix 5).

Annual mortality of adult black-headed gull has been calculated at 10% per annum (Prévot-Julliard *et al.*, 1998). If 0.5 collisions were to occur per year, it would mean that the losses at the Proposed Wind Farm would increase the annual mortality of the county population (c.1,960) by 0.26%. The predicted collision risk is negligible. No adverse effects are anticipated.

6.1.1.1.4 Black-headed Gull (Wintering – not an SCI population)

Lough Corrib SPA is designated for the breeding population of Black-headed Gull. As a precautionary measure, it has been determined that the wintering population of Black-headed gull, while not cited as an interest of the SPA, still contribute to the 'wetlands and waterbirds' SCI of Lough Corrib SPA. Therefore, the potential for adverse effects to the wintering population is considered further below on a precautionary basis. It should be noted, however, that due to the increased population sizes of the species during winter, the collision risk analysis will be inflated relative to potential impacts on the breeding population which is a designated SCI of the SPA.

Displacement and Barrier Effect

Black-headed gull were observed within, or partially within, the Proposed Wind Farm site on 13 occasions during winter seasons and numbers ranged from an individual to 75 birds.

This species was not regularly recorded utilising habitats within the Site for roosting or foraging. Significant areas of suitable roosting and foraging habitat for the species occur in the wider landscape

and will be retained. In the event of displacement, there are extensive areas of similar habitat in the wider area. This would likely render such an effect inconsequential.

There is no evidence to suggest that the Proposed Wind Farm site lies on a migratory/ regular commuting route for this species, therefore barrier effect is not anticipated.

There will therefore be no adverse effects via displacement or barrier effects to the SCI population.

Collision Risk

The species was recorded flying within potential collision height during vantage point surveys. A "Random" collision risk analysis has been undertaken (full details provided in Appendix 5). The collision risk has been calculated at a rate of 1.1 collisions per year, or one bird every year. To account for the potential for the nocturnal flight activity of water birds, it has been assumed in the collision risk analysis that this species was active for a quarter of night (full details provided in Appendix 5).

Annual mortality of adult black-headed gull has been calculated at 10% per annum (Prévot-Julliard et al., 1998). If 1.1 collisions were to occur per year, it would mean that the losses at the Proposed Wind Farm would increase the annual mortality of the county population (c. 3,611) by 0.3%. The predicted collision risk is negligible. No adverse effects are anticipated.

6.1.1.1.5 *Common Gull (Wintering – not an SCI population)*

Common gull is a ground nesting bird and breeds colonially but also in isolated pairs. Whilde (1983) described the nesting habitat as small, rocky islands with willow and on isolated rocks mainly in the upper lough and in the narrow section of the lough connecting the upper and lower basins. In 2010 McGreal (2011) identified 30 breeding sites across the lough and noted that the narrows held the greatest concentration of breeding pairs. Common gull can also site their nests on the lough's navigation markers.

Lough Corrib SPA is designated for the breeding population of Common Gull. As a precautionary measure, it has been determined that the wintering population of Common Gull, while not cited as an interest of the SPA, still contribute to the 'wetlands and waterbirds' SCI of Lough Corrib SPA. Therefore, the potential for adverse effects to the wintering population is considered further below on a precautionary basis. It should be noted, however, that due to the increased population sizes of the species during winter, the collision risk analysis will be inflated relative to potential impacts on the breeding population which is a designated SCI of the SPA.

Displacement and Barrier Effect

Common Gull were observed within, or partially within, the Proposed Wind Farm site on three occasions during winter and numbers ranged from 40 to 250 birds.

This species was not recorded utilising habitats within the Site for roosting or foraging. Significant areas of suitable roosting and foraging habitat for the species occur in the wider landscape and will be retained. In the event of disturbance, there are extensive areas of similar habitat in the wider area. This would likely render such an effect inconsequential.

There is no evidence to suggest that the Proposed Wind Farm site lies on a migratory/ regular commuting route for this species, therefore barrier effect is not anticipated.

There will therefore be no adverse effects via displacement or barrier effect.

Collision Risk

The species was recorded flying within PCH during vantage point surveys. A "Random" collision risk analysis has been undertaken (full details provided in Appendix 5). The collision risk has been calculated at a ratio of 5.8 collisions per year. To account for the potential for the nocturnal flight activity of water birds, it has been assumed in the collision risk analysis that this species was active for a quarter of night (full details provided in Appendix 5).

Annual mortality of adult common gull has been calculated at 14% per annum (Bukaciński and Bukacińska, 2003). If 5.8 collisions were to occur per year, it would mean that the losses at the Proposed Wind Farm would increase the annual mortality of the county population (c. 1,826) by 2.3%. The collision risk is predicted to be of low magnitude. No adverse effects are anticipated.

6.2 Potential for Indirect Effects on the European Sites

6.2.1 Ex-situ Disturbance/Habitat Loss

Lough Corrib SPA

A potential for indirect effect on the following SCI species of Lough Corrib SPA as a result of direct habitat loss or disturbance resulting from construction of the Proposed Project was identified:

- Golden plover (wintering)
- Hen Harrier (wintering)
- Black-headed Gull (breeding)
- Black-headed Gull (wintering)
- Common Gull (wintering)

Lough Corrib SAC

No otter holts were found within the Site or within 150m of the Proposed Project infrastructure footprint within or downstream of the Proposed Project site during the dedicated surveys undertaken. There are no surface water courses in the vicinity of the Proposed Wind Farm site. However, the Proposed Grid Connection underground cabling route crosses the Clare River, part of Lough Corrib SAC. Taking a precautionary approach, a potential for disturbance effects associated with construction activities to the otter population associated with the SAC which may commute along rivers along the Proposed Grid Connection underground cabling route was identified.

- 1355 Otter *Lutra lutra*

6.2.1.2 Construction

6.2.1.2.1 *Golden plover (winter)*

Direct Habitat Loss

Golden plover were observed within, or partially within, 500m of the proposed turbine layout on 21 occasions. Birds of county importance were observed on six occasions. Birds were observed landing and/or roosting in field within 500m of the proposed turbine layout on five occasions.

The land lost to the development footprint is small (i.e. 8.9ha/0.9% of Proposed Wind Farm site[18]) relative to the total area within the Site.

The species was observed infrequently foraging on the Proposed Wind Farm site during the wintering period. Birds were not dependent on the Proposed Wind Farm site for foraging or roosting. Given the abundance of similar suitable habitats in the wider area as those found within the Proposed Wind Farm site and that extensive areas of suitable foraging and roosting habitat will remain post construction, no significant impacts are predicted.

There will therefore be no adverse effects via habitat loss.

[18] *The NIS Site Boundary encompasses an area of approximately 945ha and the permanent footprint of the Proposed Project measures approximately 8.9ha, which represents approximately 0.9% of the Site.*

Disturbance

Research indicates that this species is susceptible to disturbance impacts during the construction works (Pearce-Higgins *et al.*, 2012). This species was not regularly recorded utilising habitats within the Site for roosting or foraging. Significant areas of suitable roosting and foraging habitat for the species occur in the wider landscape and will be retained. In the event of displacement, there are extensive areas of similar habitat in the wider area. This would likely render such an effect inconsequential.

Adverse disturbance effects are therefore not anticipated.

6.2.1.2.2 *Hen Harrier (Winter)*

Direct Habitat Loss

The Proposed Wind Farm site is dominated by improved agricultural grassland, this habitat is sub-optimal for wintering hen harrier.

Hen harrier was observed on five occasions during winter season surveys. No winter roosts were identified within the Proposed Wind Farm site or within 2km of the same, during the 2020/21 and 2021/22 winter seasons. There were no observations of hen harrier during breeding seasons.

Hen harrier were observed hunting within the Proposed Wind Farm site, however, the land lost to the development footprint is small (i.e. 8.9ha/0.9% of Proposed Wind Farm site[18]) relative to the total area within the Site.

Given that hen harrier were observed infrequently at the Proposed Wind Farm site, this limits the potential for the proposed infrastructure to result in ecologically significant habitat loss for hen harrier. Furthermore, there is an abundance of suitable habitat in the wider surroundings of the Proposed Wind Farm site.

No adverse effects via habitat loss are anticipated.

Disturbance

No confirmed hen harrier roosting sites were recorded within a 2km radius of the Proposed Wind Farm site. Foraging or commuting hen harrier were infrequently recorded within the Proposed Wind Farm site (only on five occasions over 30 months).

Therefore, based on the survey data, there is little potential for adverse disturbance effects given that hen harrier were not dependent on the habitats located in close proximity to development infrastructure for foraging or roosting.

6.2.1.2.3 *Black-headed Gull (Breeding)*

Lough Corrib SPA is designated for breeding Black-headed Gull. Black-headed gull is a colonial ground nesting bird. Whilde (1983) identified four major colonies (one sited in each of the two basins with two colonies located in the interconnecting narrow section of the lough) and summarised that this gull nested on small, rushy islands with one colony situated on a bracken dominated island. In 2010 McGreal (2011) noted that the SPA's breeding black-headed gull colonies were confined to just two islands (one in each basin). The 2017 survey identified just one colony located in the upper basin.

Direct Habitat Loss

Black-headed gull were observed within, or partially within, the Proposed Wind Farm site on 29 occasions during breeding seasons. and numbers ranged from an individual to 16 birds.

Black-headed gull were observed landing or foraging in fields within 500m of the proposed turbine layout on two occasions and were of two and three birds. Based on the survey data, black-headed gull infrequently utilise habitats within the Proposed Wind Farm site.

The land lost to the development footprint is small (i.e. 8.9ha/0.9% of Proposed Wind Farm site[18]) relative to the total area within the Site. Significant areas of suitable roosting and foraging habitat for the species occur in the wider landscape and will be retained.

No adverse effects via habitat loss are anticipated.

Disturbance

Black-headed gull were observed within, or partially within, the Proposed Wind Farm site on 29 occasions during breeding seasons and numbers ranged from an individual to 16 birds.

This species was not regularly recorded utilising habitats within the Site for roosting or foraging. Furthermore, significant areas of suitable roosting and foraging habitat for the species occur in the wider landscape and will not be subject to construction disturbance. In the event of disturbance, there are extensive areas of similar habitat in the wider area. This would likely render such an effect inconsequential. No adverse effects are anticipated.

6.2.1.2.4 *Black-headed Gull (wintering)*

Lough Corrib SPA is designated for the breeding population of Black-headed Gull. As a precautionary measure, it has been determined that the wintering population of Black-headed gull, while not cited as an interest of the SPA, still contribute to the 'wetlands and waterbirds' SCI of Lough Corrib SPA. Therefore, the potential for adverse effects to the wintering population is considered further below on a precautionary basis.

Direct Habitat Loss

Black-headed gull were observed within, or partially within, 500m of the proposed turbine layout on 13 occasions during winter seasons and ranged from an individual to 75 birds.

Black-headed gull were observed landing or foraging in fields within 500m of the proposed turbine layout on only two occasions and were of two and 50 birds. Based on the survey data, black-headed gull infrequently utilise habitats within the Proposed Wind Farm site.

The land lost to the development footprint is small (i.e. 8.9ha/0.9% of Proposed Wind Farm site[18]) relative to the total area within the Site. Significant areas of suitable roosting and foraging habitat for the species occur in the wider landscape and will be retained. Adverse effects are not anticipated.

Disturbance

Black-headed gull were observed within, or partially within, the Proposed Wind Farm site on 13 occasions during winter seasons and numbers ranged from an individual to 75 birds.

This species was not regularly recorded utilising habitats within the Site for roosting or foraging. Significant areas of suitable roosting and foraging habitat for the species occur in the wider landscape and will not be subject to construction disturbance. In the event of disturbance, there are extensive areas of similar habitat in the wider area. This would likely render such an effect inconsequential. No adverse effects are anticipated.

6.2.1.2.5 *Common Gull (Wintering)*

Lough Corrib SPA is designated for the breeding population of Common Gull. This species was not recorded in the vicinity of the Site during the breeding season. As a precautionary measure, it has been determined that the wintering population of Common Gull, while not cited as an interest of the SPA, still contribute to the 'wetlands and waterbirds' SCI of Lough Corrib SPA. Therefore, the potential for adverse effects to the wintering population is considered further below on a precautionary basis.

Direct Habitat Loss

Common Gull were observed within, or partially within, the Proposed Wind Farm site on three occasions during winter seasons and numbers ranged from 40 to 250 birds.

Common Gull were only observed commuting over the Proposed Wind Farm site. There were no observations of this species utilising habitats within the Proposed Wind Farm site for roosting or foraging.

The land lost to the development footprint is small (i.e. 8.9ha/0.9% of Proposed Wind Farm site[18]) relative to the total area within the Site. Significant areas of suitable roosting and foraging habitat for the species occur in the wider landscape and will be retained.

No adverse effects via habitat loss are anticipated.

Disturbance

Common Gull were observed within, or partially within, the Proposed Wind Farm site on three occasions during winter seasons and numbers ranged from 40 to 250 birds.

This species was not recorded utilising habitats within the Site for roosting or foraging. Significant areas of suitable roosting and foraging habitat for the species occur in the wider landscape and will not be subject to construction disturbance. In the event of disturbance, there are extensive areas of similar habitat in the wider area. This would likely render such an effect inconsequential.

No adverse effects are anticipated.

6.2.1.2.6 *Otter*

Direct Habitat Loss

No otter holts were found within the Site or within 150m of the Proposed Project infrastructure footprint during the surveys undertaken, including along the Proposed Grid Connection underground cabling route. No instream works are necessary for any element of the Proposed Wind Farm site or for the Proposed Grid Connection. There therefore no potential for adverse effect via habitat loss or barrier effects to otter.

Disturbance

A number of otter spraints were recorded during the dedicated aquatic surveys along watercourses associated with the Proposed Grid Connection underground cabling route, including in the vicinity of the existing water crossing over the Clare River. Given the layout of the Proposed Project, no habitat destruction, no loss of breeding or resting places and no direct mortality related impacts on this species are anticipated. Only minor underground cabling installation works are proposed within the public road. Therefore, there is no potential for the Proposed Project to result in any barrier to the movement of otter.

In relation to disturbance, otter are predominantly crepuscular in nature and it is anticipated that construction activity associated with the Proposed Grid Connection underground cabling route will be confined to daytime hours, thus minimizing potential disturbance related impacts to the species. Channin P (2003) provides a literary review with regard to anthropogenic disturbance and refers to several reports which have found that disturbance is not detrimental to otters (Jefferies (1987), (Durbin 1993), (Green & Green 1997). Irish Wildlife Manual No 76 (National Otter Survey of Ireland 2010/2012) notes that the occurrence of otter was unaffected by perceived levels of disturbance at the survey sites. It also notes that there is little published evidence demonstrating any consistent relationship between otter occurrence and human disturbance (Mason & Macdonald 1986, Delibes et al. 1991; Bailey &Rochford, 2006).

Given that all Proposed Grid Connection underground cabling route works will be located within the existing main road infrastructure, no potential for adverse effects to otter as a result of disturbance are anticipated.

Taking a precautionary approach, it is assumed that otter may occur along the lower reaches of the main watercourses downstream of the Proposed Grid Connection underground cabling route. There is potential for the construction activity to result in the run-off of silt and other pollutants such as hydrocarbons and cementitious material into land drains and minor watercourses. This represents a potential indirect effect on otter in the form of habitat degradation through water pollution which is considered under Section 6.2.2 below.

6.2.1.3 Operation

No additional pathways for effect via habitat loss or disturbance during operation of the development was identified.

6.2.2 Hydrological Impacts

6.2.2.1 Construction

6.2.2.1.1 *Earthworks (Removal of Vegetation Cover, Excavations and Stock Piling) Resulting in Suspended Solids Entrainment in Drainage Recharge*

Construction phase activities that will require earthworks resulting in the removal of vegetation cover and excavation of mineral subsoil (where present), and bedrock in certain areas, may result in the following potential sources of sediment laden water:

- Drainage and seepage water resulting from infrastructure excavations;
- Stockpiled excavated material providing a point source of exposed sediment;
- Construction of the Proposed Grid Connection underground cabling trench including small amounts of peat soils, resulting in entrainment of sediment from the excavations during construction; and,
- Erosion of sediment from emplaced site drainage channels (although these are limited in scale and channel length).

Proposed Wind Farm:

These activities can result in the generation of suspended solids in drainage water, and as there are no drainage outlets (other than recharge to ground) across the Site, there is a risk that sediment laden recharge water can enter the underlying aquifer. To reiterate, there are no recorded surface water features within the Proposed Wind Farm site.

Surface water runoff that will occur at site infrastructure will be recharged locally into subsoils. This recharge water will occur close to source and can migrate vertically to groundwater below the Site. The potential impacts on groundwater quality are assessed separately below in Section 6.2.2.1.6.

Proposed Grid Connection:

Along the Proposed Grid Connection underground cabling route, there are 4 no. surface water crossing points. The 2 no. primary crossings exist along existing bridges over the River Clare and a smaller tributary of the River Clare, while there are a further 2 no. crossings further east at small streams along a local road. The proposed Grid Connection underground cabling will be emplaced along the road carriageway, therefore no instream works will occur. However, taking a precautionary approach the works have the potential to adversely affect the River Clare within Lough Corrib SAC along the Proposed Grid Connection underground cabling route.

Proposed Mitigation Measures

Wind Farm Site

The key mitigation measures typically employed during the construction phase of Wind Farms is the avoidance of sensitive aquatic areas where possible, by application of suitable buffer zones (i.e. 50m to main watercourses, and 10m to main drains). At the Proposed Wind Farm site, the nearest surface watercourse is situated 2.6km away. Therefore, self-imposed buffer zones are not required at the site.

Spoil management areas for removed soil/subsoil will be localised to 4 no. spoil management areas and will be designed and constructed with the minimal amount of surface area exposed. In these spoil management areas, the vegetative top-soil layer will be removed and re-instated or reseeded directly after construction, allowing for re-vegetation which will mitigate against erosion.

Grid Connection underground cabling route

More than 95% of the underground electrical cabling connection route is >50m from any nearby watercourse, sections within 50m of the route are confined to existing watercourse crossings at bridges. It is proposed to limit any works in any areas located within 50m of any watercourse/waterbody including the stockpiling of excavated soils and subsoils.

No in-stream works are required at any of these crossings, however due to the proximity of the streams to the construction work at the crossing locations, there is a potential for surface water quality impacts during trench excavation work. Mitigation measures are outlined below.

A constraint/buffer zone will be maintained for all crossing locations where possible. In addition, measures which are outlined below will be implemented to ensure that silt laden or contaminated surface water runoff from the excavation work does not discharge directly to the watercourse.

The large setback distance from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures (discussed below) to be properly installed and operate effectively. The proposed buffer zone will:

- Avoid physical damage to watercourses, and associated release of sediment;
- Avoid excavations within close proximity to surface watercourses; and,
- Avoid the entry of suspended sediment from earthworks into watercourses.

Mitigation by Avoidance:

A key mitigation measure adopted during the design phase is the avoidance of infrastructure close to surface water features across the Proposed Wind Farm site. The Proposed Wind Farm site is significantly

distal from any surface water course, the nearest being the Ballinduff stream located 2.6km west of the site.

The Proposed Grid Connection underground cabling route crosses over 4 no. watercourses. Additional control measures, which are outlined further on in this section, will be undertaken at these locations.

The large setback distance from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures (discussed below) to be properly installed and operate effectively. The proposed buffer zone will:

- Avoid physical damage to watercourses, and associated release of sediment;
- Avoid excavations within close proximity to surface watercourses (again, absent from the Wind Farm site);
- Avoid the entry of suspended sediment from earthworks into watercourses; and,
- Avoid the entry of suspended sediment from the construction phase drainage system into watercourses, by allowing all surface water/recent rainfall to infiltrate to ground at the Proposed Wind Farm site.

Mitigation by Design:

- Source controls:
  - Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sand bags, oyster bags filled with gravel, filter fabrics, and other similar/equivalent or appropriate systems.
  - Small working areas, covering stockpiles, weathering off stockpiles, cessation of works in certain areas or other similar/equivalent or appropriate measures.
- In-Line controls:
  - Interceptor drains, erosion and velocity control measures such as check dams, sand bags, oyster bags, straw bales, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps/attenuation lagoons, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriate systems.
- Treatment systems:
  - Silt-buster system or equivalent.

Silt Fences

Silt fencing will be emplaced downgradient of turbines, to prevent any runoff of sediment laden water. Silt fences are effective at removing heavy settleable solids. Inspection and maintenance of these structures will be carried out during construction phase. They will remain in place throughout the entire construction phase.

Silt fences will also be emplaced along the Proposed Grid Connection underground cabling route during the construction phase. A double layer of silt fencing will be emplaced where the Proposed Grid Connection is near sensitive areas (*i.e.* watercourse crossing over River Clare).

Silt Bags

Silt bags will be used where small to medium volumes of water need to be pumped from excavations. As water is pumped through the bag, most of the sediment is retained by the geotextile fabric allowing filtered water to pass through. The discharge from the silt bags will be directed to the settlement ponds, where the water will be allowed to naturally infiltrate to ground.

Pre-emptive Site Drainage Management

The works programme for the initial construction stage of the Proposed Wind Farm site will also take account of weather forecasts and predicted rainfall in particular. Large excavations and movements of subsoil or vegetation stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

The following forecasting 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;
- 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;
- 3-hour 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; and,
- 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.

Using the safe threshold rainfall values will allow work to be safely controlled (from a water quality perspective) in the event of forecasting of an impending high rainfall intensity event.

Works should be suspended if forecasting suggests either of the following is likely to occur:

- >10 mm/hr (i.e. high intensity local rainfall events);
- >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
- >half monthly average rainfall in any 7 days.

Prior to works being suspended the following control measures should be completed:

- Secure all open excavations;
- Provide temporary or emergency drainage to prevent back-up of surface runoff; and,
- Avoid working during heavy rainfall and for up to 24 hours after heavy events to ensure drainage systems are not overloaded.

Management of Runoff from Spoil Storage Areas

It is proposed that excavated subsoil will be used for landscaping throughout the Site and any excess will be accommodated at 4 no. spoil management areas across the Proposed Wind Farm site.

Proposed surface water quality protection measures regarding the spoil storage areas are as follows:

- During the initial emplacement of spoil at the storage area, silt fences, straw bales and biodegradable matting will be used to control surface water runoff from the enclosure.
- Drainage from the storage areas will be directed to settlement ponds as required or will overflow through controlled overflow pipes.
- Discharge from the storage areas will be intermittent and will depend on preceding rainfall amounts.

- Once the storage areas have been seeded and vegetation is established the risk to downstream surface water is significantly reduced.

Therefore, at each stage of the spoil storage area development the above mitigation measures will be deployed to ensure protection of downstream water quality.

Timing of Site Construction Works

Construction of the Wind Farm site drainage system will only be carried out during periods of low rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff. Construction of the drainage system during this period will also ensure that attenuation features associated with the drainage system will be in place and operational for all subsequent construction works.

Monitoring

An inspection and maintenance plan for the on-site drainage system will be prepared in advance of the commencement of any works. Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended.

Any excess build-up of silt levels at infiltration outfall points or within the short drainage channels, that may decrease the effectiveness of the drainage feature, will be removed.

During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs should be undertaken at drainage outfall locations, and specifically following heavy rainfall events. The inspections will include ensuring that all surface water is infiltrating to ground as per the Drainage Design, with no surface water runoff from the Wind Farm site.

Residual adverse effects: Once the above listed mitigation measures are implemented, there will be no potential for residual adverse effects on water quality of European Sites as a result of earthworks and entrainment of suspended solids.

6.2.2.1.2 *Potential Release of Hydrocarbons during Construction and Storage*

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a significant pollution risk to groundwater, surface water and associated ecosystems, and to terrestrial ecology. The accumulation of small spills of fuels and lubricants during routine plant use can also be a pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. It is also a nutrient supply for adapted micro-organisms, which can rapidly deplete dissolved oxygen in waters, resulting in the death of aquatic organisms.

The pathways for the rapid transport of any potential spilt chemicals are limited at this site, due to the absence of any surface water drainage routes (rivers, streams *etc*). The primary pathway is through infiltration through the subsoil and bedrock and eventually reaching the underlying groundwater aquifer.

The potential release of hydrocarbons can occur during the works within the Proposed Wind Farm site and during works along the Proposed Grid Connection underground cabling route. As stated previously, the Proposed Wind Farm site does not directly interact with any surface watercourses. There are 4 no. surface watercourse crossings along the Proposed Grid Connection underground cabling route.

Proposed Mitigation Measures:

Mitigation measures proposed to avoid release of hydrocarbons at the Proposed Wind Farm site and along the Proposed Grid Connection underground cabling route are as follows:

- Minimal refuelling or maintenance of construction vehicles or plant will take place on site. Off-site refuelling will occur at a controlled fuelling station;
- On site re-fuelling of machinery will be carried out using a double skinned refuelling truck.
    - A refuelling truck will be used to refuel construction equipment used on site.
    - The refuelling truck will also carry fuel absorbent material and pads in the event of any accidental spillages.
    - The fuel truck will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site.
    - Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- Onsite refuelling will be carried out by trained personnel only;
- Fuels stored on site will be minimised. Fuel storage areas if required will be bunded appropriately for the fuel storage volume for the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor;
- Surface water runoff from temporary construction compounds will be collected and drained via silt traps and hydrocarbon interceptors prior to recharge to ground;
- The plant used during construction will be regularly inspected for leaks and fitness for purpose;

Residual adverse effects: Once the above listed mitigation measures are implemented, there will be no potential for residual adverse effects on water quality of European Sites as a result of hydrocarbon pollution.

6.2.2.1.3 *Release of Cement-Based Products*

Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. A pH range of $\geq 6 \leq 9$ is set in S.I. No. 293 of 1988 Quality of Salmonid Water Regulations, with artificial variations not in excess of ±0.5 of a pH unit. Entry of cement-based products into surface watercourses represent a risk to freshwater ecology along the Proposed Grid Connection underground cabling route.

At the Proposed Wind Farm site, this pathway (to surface waters) is not present, however, the release of cement-based products to the Site drainage system will percolate to ground. Batching of wet concrete on site and washing out of transport and placement machinery are the activities most likely to generate a risk of cement-based pollution to the underlying groundwater system. Mitigation measures will be put in place to protect groundwater.

Mitigation

The following mitigation measures are proposed for the Proposed Wind Farm site and the Proposed Grid Connection underground cabling route:

- No batching of wet-cement products will occur on site. Ready-mixed supply of wet concrete products and emplacement of pre-cast elements, will take place;
- Where concrete is delivered on site, only the chute will be cleaned, using the smallest volume of water practicable. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water will be undertaken at lined cement washout ponds;
- Weather forecasting will be used to plan dry days for pouring concrete;

- The pour site will be kept free of standing water and plastic covers will be ready in case of sudden rainfall event; and,
- Sand blinding, DPM and concrete blinding are to be provided at turbine formation level to create a vertical cut-off barrier and to mitigate the risk of concrete leakage into the ground below the turbine foundations.

Proposed Mitigation by Design:

The following mitigation measures are proposed:

- No in-stream excavation works are proposed and therefore there will be no impact on the stream at the proposed crossing locations;
- Where the proposed underground cabling route crosses a natural surface watercourse, the cable will pass over or below the existing culvert within the access road;
- Any guidance/mitigation measures proposed by the OPW or the Inland Fisheries Ireland will be incorporated into the design of the proposed crossings;
- As a further precaution, near stream construction work, will only be carried out during the period permitted by Inland Fisheries Ireland for in-stream works according to the Eastern Regional Fisheries Board (2004) guidance document "Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites", i.e., May to September inclusive. This time period coincides with the period of lowest expected rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses (any deviation from this will be done in discussion with the IFI); and
- During the near stream construction work double row silt fences will be emplaced immediately down-gradient of the construction area for the duration of the construction phase.

Residual adverse effects: Once the above listed mitigation measures are implemented, there will be no potential for residual adverse effects on water quality of European Sites as a result of pollution associated with cement based products.

6.2.2.1.4 *Potential Effects on Surface Water and topographically downgradient Surface Water bodies*

Surface water draining from an active construction site can contain elevated levels of suspended sediment, which can impact on downstream surface water bodies. The surface water can also contain cementitious runoff and/or hydrocarbons depending on the nature of the construction activity. Any alteration in the drainage regime within a site can impact on the volume of runoff which leaves the Site. These impacts can affect the quantity and quality of downstream surface waterbodies (where a flow path exists between the Site and the waterbody).

As noted above, no direct surface water pathways exist between the Proposed Wind Farm site and downgradient watercourses, and all pathways are via groundwater recharge and groundwater flow.

There are 4 no. watercourse crossings along the Proposed Grid Connection underground cabling route. Potential sources of suspended sediment include runoff from spoil excavated from the cabling trench. The mitigation measures outlined will ensure that there are no effects on downgradient surface waterbodies.

Mitigation by Avoidance:

The primary mitigating factor in relation to downgradient surface water bodies is the distinct lack of surface water courses across the Proposed Wind Farm site and the surrounding area. The rainfall falling

on the Proposed Wind Farm site recharges to the underlying groundwater aquifer. The closest mapped watercourse, the Ballinduff stream is situated 2.1 km west of the Proposed Wind Farm site.

Along the Proposed Grid Connection underground cabling route, the cabling will be emplaced within existing road carriageways and existing bridges. The utilisation of the existing roadways and bridges avoids any in-stream works.

Mitigation by Design:

Wind Farm - Due to the lack of surface water drainage from the Site, as well as the proposed drainage management plan which ensures the continuation of the existing hydrological/hydrogeological regime (groundwater recharge, with no runoff), along with the in-line treatment such as check dams, settlement ponds and Terrastop silt fencing, there will be no adverse effect on downstream waterbodies.

Grid Connection – The mitigation measures outlined in the sections above will ensure that control measures at watercourse crossings will protect downgradient surface water bodies.

Residual adverse effects: Once the above listed mitigation measures are implemented, there will be no potential for residual adverse effects on water quality of European Sites.

6.2.2.1.5 *Groundwater and Surface Water Contamination from Wastewater Disposal*

Release of effluent from wastewater treatment systems has the potential to impact on groundwater and surface waters if site conditions are not suitable for an on-site percolation unit. There are 2 no. construction compounds proposed for the Proposed Project (one temporary construction compound for the Proposed Wind Farm and one for the Proposed Grid Connection).

The construction compounds will be used as a base during the construction phase of the Proposed Wind Farm and the Proposed Grid Connection works.

Proposed Mitigation by Avoidance:

- A self-contained port-a-loo system with an integrated wastewater holding tank will be used at the Site compound, maintained by the providing contractor, and removed from site on completion of the construction works;
- Water supply for the Site office and other sanitation will be brought to site and removed after use from the Site to be discharged at a suitable off-site treatment location; and,
- No water will be sourced on the Site or discharged to the Site.

Residual adverse effects: Once the above listed mitigation measures are implemented, there will be no potential for residual adverse effects on water quality of European Sites as a result of wastewater disposal associated with the Proposed Project.

6.2.2.1.6 *Hydrogeological Impacts*

Potential Effects on Groundwater Flows and Levels due to alteration of recharge (including activation of potential karst)

Proposed Wind Farm

Groundwater flow within a recognised karst environment is difficult to fully quantity without significant datasets, as spatial variations in the degree of karstification can alter the permeability and transmissivity (essentially the volume of groundwater flowing through a particular unit of rock) by orders of magnitude.

For the Proposed Wind Farm site, a comprehensive site investigation dataset has been accrued between 2021-2023. The collated site investigation dataset for the Site has not identified any significant karst features within the underlying bedrock, following 230m of drilling within the bedrock, along with an extensive data from trial pitting in these areas.

Groundwater bearing bedrock formations (aquifers) were encountered between 19.5 – 41mbgl at the Proposed Wind Farm site, within the 3 no. deep groundwater monitoring wells. No water bearing formations were recorded during the drilling of the 10-10.5m deep rotary core boreholes The data from the rotary core drilling shows that the bedrock is generally medium hard to hard Limestone. The inflow of groundwater into the monitoring wells was encountered at depths >20m, and data from the GWS wells indicates groundwater strikes were similarly deep within the Limestone aquifer. There were no groundwater strikes recorded during the drilling of the 10 no. rotary core boreholes drilled across the Proposed Wind Farm site. The ~20m of competent Limestone bedrock below the Proposed Wind Farm site does not contain any evidence of karst flow systems.

Groundwater levels have been monitored extensively. Groundwater levels within the Proposed Wind Farm site are below the formation levels for the proposed turbine foundations. Groundwater levels in the deep water bearing aquifers (>20m depth) occasionally rise to near ground levels, however unless an excavation penetrates these deep aquifers this will not be observed in the overlying hard, competent limestone. As the proposed excavations are shallow in nature (typically 3-4m), groundwater strikes will not occur (as evidenced from the drilling of RC01-RC09 and RC-11) and as such the excavations will remain relatively dry (apart from managing rainfall). Groundwater levels may be affected by any change in recharge within a groundwater catchment. A reduction in recharge, which would be accompanied by an increase in surface water drainage, would clearly reduce the volume of water infiltrating to the bedrock aquifers and therefore lead to a reduction in groundwater levels. The drainage management design of the Proposed Wind Farm site has been optimised to ensure the volume of rainfall infiltrating through the subsoils to the groundwater aquifer will not change.

Proposed Grid Connection

Changes in the permeability of the ground along the Proposed Grid Connection underground cabling route can impact on groundwater recharge to the underlying aquifer. As the cable trench will be shallow (~1.3m) and within an existing road carriageway, the trench will be excavated within the soil/subsoil layer. Following the excavation of the trench, the cable will be laid and the soil/subsoil removed will be backfilled within the excavation (in the same order as it was removed). As such, the overall permeability of the ground along the Proposed Grid Connection route will not be altered to a significant degree. Where tarmacadam or other hardstanding is removed, this will be reinstated and as such the permeability will not change as a result of the Proposed Grid Connection underground cabling route.

Mitigation by Avoidance - Groundwater Flows:

Proposed Wind Farm

The construction of the turbines, met mast, access roads and other ancillary features of the Proposed Project could impact groundwater flows within the Proposed Wind Farm site, if a particular pathway e.g. karst conduit, existed near the development, however based on all the available site investigation data no reasonable pathways have been identified. The identification and avoidance of any potential karst features has been a key aim of the intrusive and extrusive site investigations, through iterative geophysical surveys, drilling and trial pit excavations and is considered to be the most rational method of mitigating against effecting flow paths, by avoiding any potential karst areas.

The Site data outlined within Section 9.3.7.2 and 9.3.7.3 (Appendix 2) provides sufficient scientific data to say, with a high degree of certainty, that the construction of the turbine foundations, met mast, site access roads, substation and other relatively near surface constructs, will not interact with or alter the existing groundwater recharge, and underlying groundwater flow, regimes.

Proposed Grid Connection

The Proposed Grid Connection underground cabling route will be routed along an existing road carriageway. The trench will for the cabling will be excavated to a depth of 1.3m and the soil/subsoil removed will be backfilled in place. As such there will be no significant change in the permeability of the lands occupied by the grid connection.

Mitigation by Design - Groundwater Levels:

As mentioned above, the critical driver of groundwater levels and the potential to affect them is through groundwater recharge. The drainage design of the Proposed Wind Farm site has been designed to mimic the existing hydrological regime within the Site, whereby surface water runoff pathways are generally short and rainfall readily percolates to ground. The drainage design incorporates check dams to reduce velocities, and level spreaders to allow water to infiltrate to ground.

The net effect of the drainage design will be that all rainfall falling within the Proposed Wind Farm site will remain on the Site and infiltrate to ground and will not exit the Site as runoff to surface watercourses.

Potential Effects on Groundwater Levels During Excavation works

Temporary dewatering of turbine foundations during construction has the potential to impact on local groundwater levels. The local groundwater levels which have been monitored over a 24-month period and a full understanding of local prevailing hydrogeological conditions has been gained. Groundwater level effects are not anticipated to be significant due the known local hydrogeological regime, and due to the proposed excavation method as outlined below. Groundwater levels across the Proposed Wind Farm site are well defined through monitoring of numerous groundwater wells and site investigation boreholes.

The known groundwater levels within the Proposed Wind Farm site are summarised in Section 9.3.7.6. Briefly, they range between 8.2 – 30.8 mOD across the Proposed Wind Farm site. Ground elevations and typical Winter groundwater levels are included in the Conceptual Site Model (Appendix 2). Known winter groundwater levels are below the proposed formation levels of all turbines, the drilling of the rotary core boreholes has confirmed that no groundwater strikes were met in the underlying 10-10.5m of bedrock and as such we can confirm there will be no groundwater dewatering requirements during turbine base construction.

No groundwater level effects are anticipated from the construction of the Proposed Grid Connection underground cabling trench due to the shallow nature of the excavation (i.e. ~1.3m), the excavation of the trench within the road carriageway and the unsaturated nature of the subsoil/bedrock to be excavated.

Impact Assessment – Proposed Wind Farm

Based on the engineering design, bedrock may be exposed where cut and fill excavations are proposed. Elsewhere, the proposed turbine base excavations will be within the subsoil strata and do not involve excavation into bedrock. The bedrock has been classified as a Regionally Important aquifer by the GSI, however the Site data from HES boreholes and site investigation boreholes indicates that groundwater is not met within the 0-10mgbl and was met first in borehole MW21-02 at 19.5mbgl *i.e.* very low permeability in the bedrock underlying the turbine locations. As outlined above, no groundwater dewatering will be required during the construction phase in any element of the Proposed Wind Farm.

The topographical and hydrogeological setting of turbine locations means no groundwater dewatering will be required. Moreover, direct rainfall and surface water runoff will be the main inflows that will require water volume and water quality management. For the avoidance of doubt, dewatering is defined

as a requirement to permanently drawdown the local groundwater table by means of over pumping, e.g. as would be required for the operation of a bedrock quarry in a valley floor. We consider that this example (the quarry example) is very different in scale and operation from the proposed operation of a temporary shallow excavations (3-4m), where the groundwater aquifer units (water strikes) are known to exist at depth (>19.5m). In order to explain this thoroughly we will outline our reasoning in a series of bullet points as follows:

- Firstly, the turbine locations are located on lands where the ground elevations are between ~35 and 60m OD;
- The elevations of the turbine foundations are above the elevations of groundwater levels recorded in monitoring wells and local domestic/farm wells, and therefore of the known groundwater levels within the Proposed Wind Farm site. Groundwater strikes were not met in any of the rotary core boreholes drilled to 10-10.5m at the turbine locations. Groundwater was only met in the deeper monitoring boreholes at depths greater than 19.5m. The turbine foundations will be excavated to 3-4mbgl and as such will not intercept any aquifer units, but will be excavated within the overlying subsoil and near-surface Limestone bedrock;
- The local bedrock comprises medium hard to hard Limestone and has been shown to be generally unfractured and unproductive (not water bearing) during site investigations. This means that groundwater flows at depth, beneath the turbine foundations, will be relatively minor;
- No regional groundwater flow regime, i.e. large volumes of groundwater flow, will be encountered at these elevations (as proven by the Site investigation drilling);
- Therefore, shallow inflows will be fed by recent rainfall, and possibly by limited seepage from localised permeable subsoils;
- As such any shallow groundwater seepage (within the subsoils) will be small in comparison to the expected surface water flows following any heavy rainfall events; and,
- Hence, it is considered that the management of surface water will form the largest proportion of water to be managed and treated, although where permeable subsoils are encountered, rainfall may infiltrate to ground rather than ponding at any excavation.

Any potential dewatering of excavations will take place above the local groundwater level, within excavations with ponded surface water. The water will be pumped a short distance to settlement ponds where it will recharge to ground. There will be no net change in runoff/recharge, other than the displacement of the recharge by a short distance (10's of metres).

Impact Assessment – Proposed Grid Connection underground cabling route

The Grid Connection underground cabling trench depth will only be approximately 1.3 m in depth, the excavation will be temporary and transient, and the cable trench will be backfilled with excavated material and/or hardcore material, depending on site conditions. Therefore, there will be no net loss of permeability across the 1.3m depth. As a result, and given the shallow depth, there will be very limited potential for groundwater level effects to occur.

Residual adverse effects: As shown above, there will be no potential for residual adverse effects on local groundwater levels which could impact downgradient European Sites.

6.2.2.2 Operation

6.2.2.2.1 *Progressive Replacement of Natural Surface with Lower Permeability Surfaces*

Proposed Wind Farm

Progressive replacement of the vegetated surface with impermeable surfaces could potentially result in an increase in the proportion of surface water runoff reaching the surface water drainage network, if the drainage design included surface water runoff leaving the Site. However, at this site, the drainage design has been optimised to allow for all rainfall which may fall on impermeable surfaces (such as at turbine hardstands) to recharge to ground as would normally occur at the Site. The Proposed Wind Farm site footprint comprises an area of 34.3 Ha.

Proposed Grid Connection

The Proposed Grid Connection underground cabling route comprises an area of 1.9Ha. Along the Proposed Grid Connection underground cabling route, a trench will be excavated for the emplacement of the grid connection cabling. Once installed, this trench will be backfilled and the road surface reinstated. As such, there will be no change in the permeability along this route.

Impact Assessment/Mitigation Measures

As summarised in Section 9.3.14 of the EIAR water Chapter (Appendix 2), the drainage design for the Proposed Wind Farm site includes for the release of any surface water captured within the interceptor drains to recharge back to ground, with a very nominal spatial diversion of the water (10's of metres). In doing so, all rainfall which falls on the Site will still infiltrate to ground. There will be no net increase in runoff from the Proposed Wind Farm site.

Proposed Mitigation by Design:

Proposed Wind Farm

The operational phase drainage system of the Proposed Wind Farm site will be installed and constructed in conjunction with the road and hardstanding construction work as described below:

- Interceptor drains will be installed up-gradient of proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it can be slowly re-distributed over the ground surface and infiltrate through the soil and subsoils;
- Swales/road side drains will be used to collect runoff from access roads and turbine hardstanding areas of the Proposed Wind Farm site, likely to have entrained suspended sediment, and channel it to infiltration areas for sediment settling; and,
- Check dams will be used along sections of access road drains to attenuate flows and intercept silts at source. Check dams will be constructed from a 4/40mm non-friable crushed rock.

Proposed Grid Connection

The trench associated with the Proposed Grid Connection underground cabling route will be backfilled and reinstated following the laying of the cable. As such, the permeability of the ground will remain unchanged.

Residual adverse effects: Due to the retention of groundwater recharge regime, with no surface water drainage from the Site, as well as the relative short displacement of any surface water before it infiltrates and the mitigation measures to ensure the quality of the surface water, there is no potential for residual

adverse effect on downstream European Sites as a result of increased run-off from the Site during operation.

6.2.2.2.2 *Potential Hydrological and Hydrogeological Effects on Designated Sites*

The potential water environment effects on designated sites from the Proposed Project are principally related to the construction process, through potential sources such as sediment generation, cement-based materials and hydrocarbon spillages and potential pathways created during the excavation and movement of soils/subsoils and in some cases bedrock.

During the operational phase of the Proposed Project, these potential sources and pathways no longer exist. Any potential impacts then on designated sites are related to the operational maintenance of the Proposed Wind Farm infrastructure.

Mitigation Measures:

Mitigation measures to protect designated sites during the operational phase of the Proposed Project include:

- Regular maintenance of the on-site drainage system; The maintenance schedule will be reduced once natural vegetation is re-established, which will provide consistent filtration through the soil/subsoil;
- The use of fuel storage bunds for any hydrocarbons (fuel/oils) and the ongoing maintenance of the bund structures; and,
- Any maintenance works which may involve soil movement (such as the removal of sediment from the settlement ponds) will take place during the dry months of the year (May - September).

Residual adverse effects: Based on the considerable reduction in the potential sources of impacts during the operational phase, as well as the ongoing mitigation measures, there is no potential for residual adverse effects on European Sites during operation of the Proposed Project.

6.2.2.3 Potential for Adverse Effects Associated with Decommissioning

Decommissioning is fully described in Chapter 4 of the EIAR (provided as Appendix 1). There will be no additional habitat loss associated with the decommissioning of the Proposed Project and therefore there will be no significant effects in this regard.

The wind turbines proposed as part of the Proposed Wind Farm site are expected to have a lifespan of approximately 30 years. Following the end of their useful life, the equipment may be replaced with a new technology, subject to planning permission being obtained, or the Proposed Wind Farm site may be decommissioned fully.

Upon decommissioning of the Proposed Wind Farm site, the wind turbines will be disassembled in reverse order to how they were erected. The turbines will be disassembled with a similar model of crane that was used for their erection. The turbine will likely be removed from Site using the same transport methodology adopted for delivery to Site initially. The turbine materials will be transferred to a suitable recycling or recovery facility.

The underground electrical cabling connecting the turbines to the on-site substation will be removed from the cable ducts. The cabling will be pulled from the cable ducts using a mechanical winch which will extract the cable and re-roll it on to a cable drum. This will be undertaken at the original cable jointing pits which will be excavated using a mechanical excavator 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. The cable materials will be transferred to a suitable recycling or recovery facility.

All above ground turbine components would be separated and removed off-site for recycling. Turbine foundations would remain in place underground and would be covered with earth and reseeded as appropriate. Leaving the turbine foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in unnecessary environment emissions such as noise, dust and/or vibration.

Site roadways could be in use for purposes other than the operation of the Proposed Project by the time the decommissioning of the Proposed Wind Farm site is to be considered, and therefore it may be more appropriate to leave the Site roads in situ for future use. It is envisaged that the roads will serve as agricultural roads for local landowners.

The Proposed Grid Connection underground cabling route including the 110kV onsite substation will remain in place as it will be under the ownership and control of the ESB and Eirgrid.

A Decommissioning Plan has been prepared (EIAR Chapter 4, Appendix 1) the detail of which will be agreed with the local authority prior to any decommissioning. The Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will agreed with the competent authority at that time. The potential for effects during the decommissioning phase of the Proposed Project has been fully assessed in this NIS.

As noted in the Scottish Natural Heritage report (SNH) *Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms* (SNH, 2013) reinstatement proposals for a wind farm are made approximately 30 years in advance, so within the lifespan of the Proposed Project, technological advances and preferred approaches to reinstatement are likely to change. According to the SNH guidance, it is therefore:

"best practice not to limit options too far in advance of actual decommissioning but to maintain informed flexibility until close to the end-of-life of the Proposed Wind Farm".

The same mitigation to prevent significant impacts on water quality and associated aquatic fauna and other terrestrial fauna during construction is likely to be applicable to the decommissioning phase. It can be concluded that following the implementation of preventative mitigation, there is no potential for the decommissioning of the Proposed Project to result in residual adverse effects on European Sites.

7. ASSESSMENT OF RESIDUAL ADVERSE EFFECTS

The potential for residual adverse effects on each of the individual relevant Qualifying Features of the Screened In European Sites following the implementation of mitigation, is assessed in this section of the report.

Based on the above, in view of best scientific knowledge, on the basis of objective information, there is no potential for adverse effect on the identified QIs/SCIs and their associated targets and attributes, or on any European Site Potential pathways for effect have been robustly blocked through measures to avoid impacts and the incorporation of best practice/mitigation measures into the project design.

Taking cognisance of measures to avoid impacts and best practice/mitigation measures incorporated into the project design which are considered in the preceding section, the Proposed Project will not have an adverse effect on the integrity of any European Site.

The Proposed Project will not prevent the QIs/SCIs of European Sites from achieving/maintaining favourable conservation status in the future as defined in Article 1 of the EU Habitats Directive. A definition of Favourable Conservation Status is provided below:

> *'conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within the territory referred to in Article 2; The conservation status will be taken as 'favourable' when:*
>
> - Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
> - The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
> - There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.'

Based on the above, it can be concluded in view of best scientific knowledge, on the basis of objective information that the Proposed Project will not adversely affect the Qualifying Interests/Special Conservation Interests associated with any European Site.

8. ASSESSMENT OF CUMULATIVE EFFECTS

A search and review in relation to plans and projects that may have the potential to result in cumulative and/or in-combination impacts on European Sites was conducted. This assessment focuses on the potential for cumulative in-combination effects on the European Sites where potential for adverse effects was identified in Section 4 of this report. This included a review of online Planning Registers, development plans and other available information and served to identify past and future plans and projects, their activities and their predicted environmental effects. A list of the plans and projects considered is provided in Appendix 6. The following Development Plans have been reviewed and taken into consideration as part of this assessment and the review is provided in Appendix 6:

- Galway County Development Plan 2022-2028
- 4th National Biodiversity Action Plan 2023-2027
- Northern and Western Regional Assembly Regional Spatial and Economic Strategy 2020-2032

The review focused on policies and objectives that relate to Natura 2000 sites and natural heritage. Policies and objectives relating to sustainable land use were also reviewed and are provided in Appendix 6.

8.1 Other Projects

Assessment material for this in-combination impact assessment was compiled on the relevant developments within the vicinity of the Proposed Project and was verified in February 2024. The material was gathered through a search of relevant online Planning Registers, reviews of relevant documents, planning application details and planning drawings, and served to identify past and future projects, their activities and their environmental impacts. All relevant projects were considered in relation to the potential for in-combination effects. All relevant data was reviewed (e.g. individual EISs/EIARs, layouts, drawings etc.) for all relevant projects where available.

The plans and projects considered include those listed in Appendix 6. The residual construction, operational and decommissioning impacts of the Proposed Project are considered cumulatively with other plans and projects. Particular focus has been placed on those plans and projects that are in closest proximity to the Proposed Project and those that could potentially result in impacts on SCI bird species, surface water, groundwater and QI habitats and species.

8.1.1 Other Projects within the Hydrological Sub catchment

The following paragraphs in Section 8.1.1.1, 8.1.1.2 and 8.1.1.3 are extracted from the hydrological cumulative impact assessment from the Chapter 9 'Water' of the accompanying EIAR (provided as Appendix 2).

8.1.1.1 Construction Phase

A detailed cumulative assessment has been carried out for all planning applications (granted and awaiting decisions) within a combined river sub-basin zone... This combined sub basin area encompasses an area of 184.43km^2 and includes river sub-basins within the Clare[Galway]_SC_040 sub-catchment as well as the southern half of Lough Corrib.. There will be no potential for cumulative effects beyond the southern edge of the cumulative boundary are due to increases in flow volume (as the catchment area increases) and increasing distance from the Proposed Project.

A total of 520 planning applications have been identified within the sub-basin zone. 380 no. of these applications are for new dwellings or renovations of existing dwellings, as well as a further 52 no. applications for erection of farm buildings and 44 no. for commercial units. 10 no. applications have been identified as energy related developments. Of these, 2 no. applications refer to solar farm PV developments; PL 191315, a 43Ha solar farm development at Cloonascragh, Tuam (0.5km south of Proposed grid Connection underground cabling route) and PL22647, a 2100 m^2 solar energy development at Knocknacarigeen (2.5km north of Wind Farm site).

The remaining energy related developments are associated with upgrade works to grid connections. There are no other Wind energy developments proposed or granted within the cumulative boundary area.

Based on the scale of the works, their proximity to the Proposed Project and the temporal period of likely works, no cumulative effects will occur as a result of the Proposed Project.

8.1.1.2 Operational Phase

During the operational phase of the proposed development, the main sources of potential environmental effects will not exist. There will be no exposed excavations and spoil management areas will not be in operation. There will be no sources of sediment to reach watercourses. There will be no use of cementitious materials. Fuels/oil will be kept to a minimum at the site. Any oils for turbine maintenance will be stored within bunded areas.

The underground electrical connection cabling route will be reinstated at the end of the construction phase and will remain in-situ during the operational phase. No maintenance of the electrical cabling is envisaged, however any minor maintenance will be completed from inspection points along the route.

During the operational phase of the project, there will be no cumulative effects with other planned projects within the sub-basin catchment zone.

8.1.1.3 Decommissioning

During the decommissioning phase, the potential cumulative effects are similar to the construction phase, but to a lesser degree with less ground disturbance. The substation and grid connection will remain in-situ and will not be decommissioned. There will be increased trafficking and an increased risk of disturbance to underlying soils at the Wind Farm Site, during the decommissioning phase. Any potential effects would be likely to be less than during the construction stage as the drainage system will be fully mature and would provide additional filtration of runoff. Any diesel or fuel oils stored on site will be bunded. During the decommissioning phase of the Proposed Project, the proposed access tracks may be used in the decommissioning process.

During the decommissioning phase, there will be no cumulative effects within the sub-basin zone.

The assessment undertaken above in this report outlines that adverse effects will not occur during the construction, operational and decommissioning works.

The hydrological cumulative assessment undertaken as part of the EIAR for the Proposed Project, as outlined above, has concluded that there is no potential for significant cumulative effect on hydrology or hydrogeology. Therefore, there is no potential for cumulative effects on the hydrology and hydrogeology environment nor on any hydrological or hydrogeological pathways to European Sites as a result of the Proposed Project within the Wind Farm Site and the associated Gird Connection underground cabling route.

8.1.2 Proposed Grid Connection Underground Cabling Route

A desk-based planning search was undertaken to identify permitted developments within 200m vicinity of the Proposed Grid Connection route using the Galway County Council planning portal on 2nd February 2024. The projects within this boundary are provided in Appendix 6. Sixteen projects were identified within this area and consisted of the construction of individual private dwellings, extensions to existing dwellings, an application by Eirgrid to undertake refurbishment of an overhead line circuit, a solar development at Cloonascragh Tuam, installation of a private wastewater treatment system, and construction of an agricultural shed. With regard to the solar development at Cloonascragh, Tuam, the NIS for the Proposed Project were reviewed (Blackstaff Ecology 2020). These reports contain mitigations to prevent identified impacts to biodiversity. No additional pathways for cumulative effects were identified in conjunction with the Proposed Project. The NIS (Tobin 2018) and ecological assessment (Wetland Surveys Ireland) for the proposed overhead line works (Eirgrid) were reviewed which prescribed mitigation measures and concluded that there was no potential for significant residual effects on the conservation status of the screened in receptors.

8.1.3 Other Wind Farm Projects

For the purposes of this cumulative assessment, wind farms within a 25-kilometre radius of the Proposed Project area were considered in further detail below. Details of wind farm projects within 25km of the Proposed Project are provided in Appendix 6 and are summarised below. Thirteen wind farms were identified within the cumulative study boundary.

Table 8-1 Wind farm projects within 25k of the Proposed Project

Pl. Ref.	Location and Distance from Proposed Project	Wind Farm	Decision	Status	Turbine No.
221175	Cloonascragh, Tuam c.7km	Cloonascragh Locally Owned Turbine	Granted by GCC	Permitted	1
09/1675	Montiagh South c. 9km	Domestic turbine	Granted by GCC	Existing	1
09/1571	Summerfield c. 10km	Domestic turbine	Granted by GCC	Existing	1
23/74	Park , Athenry , Co. Galway c.17km	Domestic turbine	Granted by GCC	Permitted	1
08/2407 ABP Ref. 07.232902	Cloonlusk c.9km	Cloonlusk Wind Farm	Granted by ABP	Existing	2
Pl Ref: 091239	Leitir Gungaid & Doire Crith c.22km	Lettergunnet Wind Farm	Granted by GCC	Existing	11 (Increased under Pl. Ref 10/1214)
Pl Ref: 10/1225	Shannagurraun & Truskaunnagappul c.25km	Letterpeak (Shannagurran) Wind Farm	Granted by GCC	Existing	7

Pl Ref: 14/1273	Knockalough, Finisklin & Laughil c. 22km	Knockalough Wind Farm	Granted by GCC	Existing	11
Pl Ref: 13/829	Cnoc Raithni (Knockranny) c. 21km	Knockranny Wind Farm	Granted by ABP	Permitted	11
ABP Ref: 303086	Ardderroo, Galway c. 23km	Ardderroo Windfarm	Granted by ABP	Permitted	25
ABP Ref. 307058	Clonberne c.19km	Clonberne Wind Farm	N/A	Pre-Application Stage	11
ABP Ref. 317307	Shancloon c.10km	Shancloon Wind Farm	N/A	Pre-Application Stage	13
ABP Ref. 316466	Cooloo c.18km	Cooloo Wind Farm	N/A	Pre-Application Stage	9

8.1.3.1.1 Cloonascragh Locally Owned Turbine

The potential for the Proposed Project to result in significant cumulative or in-combination effects when assessed alongside a domestic turbine at Cloonascragh was considered. The planning file[19] was reviewed on the Galway County Council Planning Register and an environmental impact assessment was reviewed. No residual adverse effects on European Sites were anticipated in the report for the locally owned turbine. Given the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effects.

8.1.3.1.2 Cloonlusk Wind Farm

This wind farm consists of 2 no. turbines and is approx. 9km from the Proposed Project site. The planning file[20] was reviewed on the Galway County Council Planning Register and a response to further information on flora and fauna was reviewed. Given the small scale of the Cloonlusk development and distance from the Proposed Project site, as well as the lack of residual adverse effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effect.

8.1.3.1.3 Domestic Turbine at Montiagh

The potential for the Proposed Project to result in significant cumulative or in-combination effects when assessed alongside Montiagh Domestic Turbine was considered. The planning file[21] was reviewed on the Galway County Council Planning Register. The domestic turbine at Montiagh is located within agricultural grassland. Given the small scale of the Montiagh development and distance from the Proposed Project site (c.9km), as well as the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effect.

[19] *http://www.eplanning.ie/GalwayCC/AppFileRefDetails/221175/0*
[20] *http://www.eplanning.ie/GalwayCC/AppFileRefDetails/082407/0*
[21] *http://www.eplanning.ie/GalwayCC/AppFileRefDetails/091675/0*

8.1.3.1.4 Domestic turbine at Summerfield

The potential for the Proposed Project to result in significant cumulative or in-combination effects when assessed alongside the Summerfield domestic turbine was considered. The planning file[22] was reviewed on the Galway County Council Planning Register. The domestic turbine at Summerfield is located within agricultural cultivated land, with agricultural grassland and cutover bog in the wider area. Given the small scale of the Summerfield development and distance from the Proposed Project site (c.10km), as well as the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effect.

8.1.3.1.5 Domestic turbine at Park

The potential for the Proposed Project to result in significant cumulative or in-combination effects when assessed alongside a domestic turbine at Park, Athenry was considered. The planning file[23] was reviewed on the Galway County Council Planning Register. Given the small scale of the Park development and distance from the Proposed Project site (c.17km), as well as the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effect.

8.1.3.1.6 Shancloon Wind Farm

The potential for the Proposed Project to result in significant cumulative or in-combination effects when assessed alongside Shancloon Wind Farm was considered. The planning file was reviewed on the An Bord Pleanála Register and no information regarding potential effects on European Sites was available due to this project being in the pre-planning stage and therefore, no impacts assessment has been completed. The indicative turbine locations for Shancloon are in an area that is predominantly agricultural grassland with smaller area of cutover bog and commercial forestry. Given the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effects.

8.1.3.1.7 Lettergunnet Wind Farm

The planning file was reviewed on the Galway County Council Planning Register[24], the EIS (Malachy Walsh and Partners 2015) was reviewed. Lettergunnet Wind Farm is located within predominately cutover bog, with smaller areas of commercial forestry and other agricultural habitats. Given the large distance between the Lettergunnet wind farm in Spiddal and the Proposed Project (c.22km), as well as the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effects.

8.1.3.1.8 Letterpeak (Shannagurran) Wind Farm

The NIS for the Shannagurran Wind Farm (MKO 2010) was reviewed. Given the lack of residual effects reported for the Shannagurran Wind Farm, the distance between the wind farm and the Proposed Project (>20km), as well as the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effects.

8.1.3.1.9 Knockalough Wind Farm

The NIS for the Knockalough wind farm (MKO 2014) was reviewed. Given the lack of significant residual effects reported for the Knockalough Wind Farm, the distance between the wind farm and the Proposed Project (>20km), as well as the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effects.

[22] *http://www.eplanning.ie/GalwayCC/AppFileRefDetails/091571/0*
[23] *http://www.eplanning.ie/GalwayCC/AppFileRefDetails/2374/0*
[24] *https://www.eplanning.ie/GalwayCC/AppFileRefDetails/13829/0*

8.1.3.1.10 *Knockranny Wind Farm*

The EIS for the Knockranny wind farm (Malachy Walsh and Partners 2015) was reviewed. Given the lack of significant residual effects reported for the Knockranny Wind Farm, the distance between the wind farm and the Proposed Project (>20km), as well as the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effects.

8.1.3.1.11 *Ardderroo Windfarm*

The NIS for the Arderroo wind farm (MKO 2018) was reviewed. Given the lack of significant residual effects reported for the Arderroo Wind Farm, the distance between the wind farm and the Proposed Project (>20km), as well as the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effects.

8.1.3.1.12 *Cooloo Wind Farm*

The potential for the Proposed Project to result in significant cumulative or in-combination effects when assessed alongside Cooloo Wind Farm was considered. No information regarding potential effects on biodiversity was available due to this project being in the pre-planning stage. However, given the location of the Cooloo wind farm, the nature of the habitats onsite (as reviewed on publicly available aerial photography) and the lack of residual adverse effects on European Sites associated with Proposed Project when considered on its own, significant cumulative or in-combination effects are not predicted.

8.1.3.1.13 *Clonberne Wind Farm*

The potential for the Proposed Project to result in significant cumulative or in-combination effects when assessed alongside Clonberne Wind Farm was considered. No information regarding potential effects on birds was available due to this project being in the pre-planning stage and therefore no planning application has been lodged and no impacts assessment has been completed. Clonberne Wind Farm is located within predominately improved agricultural grassland and cutover bog, with smaller areas of commercial forestry and other agricultural habitats. Given the lack of residual adverse effects associated with Proposed Project when considered on its own, significant cumulative or in-combination effects are not predicted.

8.1.3.2 Other EIA Projects

A total of 29 projects requiring EIA were identified within 25km of the Proposed Project and are listed in Appendix 6. These included quarrying activities, a proposed road development, the proposed Crown Square mixed-use development, alterations to a recovery facility, a number of large residential developments and apartment blocks, development of a medical device manufacturing facility and N63 road realignment scheme. Given the lack of residual adverse effects predicted as a result of the Proposed Project, no potential for significant cumulative effect in combination with these EIA projects is predicted.

8.1.3.3 Existing Habitats and Land Uses

The potential for the Proposed Project to result in a cumulative effect on European Sites was considered in relation to the existing land uses in the area.

The review of the relevant planning registers documented relevant general development planning applications in the vicinity of the Site, the majority of which relate to the provision and/or alteration of one-off rural housing and the provision of agricultural buildings. The OPW (www.floodinfo.ie) does not record the presence of any Arterial Drainage Schemes or Benefited Lands within the Proposed Wind Farm site or along the Proposed Grid Connection underground cabling route.

8.2 Conclusion of Cumulative Impact Assessment

Following the detailed assessment provided in the preceding sections, it is concluded that, the Proposed Project will not result in any residual adverse effects on any of the European Sites, their integrity or their conservation objectives when considered on its own. There is therefore no potential for the Proposed Project to contribute to any cumulative adverse effects on any European Site when considered in-combination with other plans and projects.

In the review of the projects that was undertaken, no connection, that could potentially result in additional or cumulative impacts was identified. Neither was any potential for different (new) impacts resulting from the combination of the various projects and plans in association with the Proposed Project.

Taking into consideration the reported residual impacts from other plans and projects in the area and the predicted impacts with the current proposal, no residual cumulative impacts have been identified with regard to any European Site.

9. CONCLUDING STATEMENT

This NIS has provided an assessment of all potential direct or indirect adverse effects on European Sites.

Where the potential for any adverse effect on any European Site has been identified, the pathway by which any such effect may occur has been robustly blocked through the use of avoidance, appropriate design and mitigation measures as set out within this report and its appendices. The measures ensure that the construction, operation and decommissioning of the Proposed Project will not adversely affect the integrity of European sites.

Therefore, it can be objectively concluded that the Proposed Project, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site.

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