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CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

APPENDIX 8.1

Natura Impact Statement
(NIS)

FEHILY TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

PROPOSED ANNAGH WIND FARM

REPORT TO INFORM THE APPROPRIATE ASSESSMENT PROCESS (SCREENING AND NATURA IMPACT STATEMENT)

Prepared for: EMPower

EMPower

Date: November 2021

Core House, Pouladuff Road, Cork
T12 D773, Ireland

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

CORK | DUBLIN | CARLOW

www.fehilytimoney.ie

REPORT TO INFORM THE APPROPRIATE ASSESSMENT PROCESS (SCREENING AND NATURA IMPACT STATEMENT)

ANNAGH WIND FARM, CO. CORK

User is responsible for Checking the Revision Status of This Document

Rev. No.	Description of Changes	Prepared by:	Checked by:	Approved by:	Date:
0	For Planning	JPG/MG	RM	JH	18.11.2021

Client: **EMPower Ltd.**

Keywords: Appropriate Assessment (AA), AA Screening, Natura Impact Statement (NIS), Article 6 of the Habitats Directive, European (Natura 2000) sites, Annagh Wind Farm, Annagh North, Coolcaum, Cooliney, Fiddane, County Cork

Abstract: This document is to inform the Competent Authority in carrying out their obligations relating to the Habitats Directive requirement for Appropriate Assessment. Appropriate Assessment is required under Article 6 (3) of the Habitats Directive of the implications for the European site concerned of any plan or project not directly connected with or necessary to the management of that site but likely to have a significant effect thereon, either individually or in combination with any other plans or projects prior to its approval.

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1. INTRODUCTION

Fehily Timoney and Company (FT) has prepared this Report for Appropriate Assessment on behalf of Annagh Wind Farm Limited, a subsidiary of EMP Energy Limited (EMPower). This report has been prepared in support of an application for planning permission for a proposed wind farm development comprising 6 no. wind turbine generators (WTGs), 1 no. permanent meteorological masts (PMM's), and 1 no. substation compound along with ancillary civil and electrical infrastructure in the townlands of Annagh North, Coolcaum, Cooliney and Fiddane County Cork in County Cork. Refer to Figure 1-1 for site location.

It is proposed to supply the power from Annagh Wind Farm to the Irish electricity network via an underground 38kV cable to the existing Charleville 110kV Substation within the townland of Rathnacally. The underground grid connection route (GCR) passes through the townlands of Annagh North, Coolcaum, Cooliney, Rathnacally, Farranshonikeen, Ardnageehy and Clashganniv. The grid connection and associated works are considered within this Appropriate Assessment Screening Report and Natura Impact Statement as the wind farm and grid connection form a single project. Refer to Figure 1-2 for GCR.

The proposed Turbine Delivery Route (TDR) passes through the following townlands of Cooliney, Rathnacally, Farranshonikeen, Ardnageehy, Clashganniv, Ballyhay before it enters the national primary road network at the N20 between Ballyhay and the Port of Foynes, County Limerick. Temporary accommodating works will be required at selected locations along the TDR to facilitate the delivery of large components to the site. Refer to Figure 1-3 for TDR.

Replacement replanting of forestry in Ireland is subject to license in compliance with the Forestry Act 2014 as amended. The consent for such replanting is covered by the Forestry Regulations 2017 (S.I. No. 191 of 2017). Consent (technical approval) is granted by the Forest Service for the replacement replanting of forestry permanently felled to facilitate the wind farm elements. These lands are located at Emlagh, County Clare. Refer to Figure 1-4 for site location.

The replant lands have been assessed independently (refer to Appendix 1 Appropriate Assessment screening report and Natura Impact Statement), however, have been incorporated into this assessment as part of the proposed project.

The main wind farm site, TDR, GCR and replant lands are all considered within this Appropriate Assessment Screening Report and Natura Impact Statement however planning consent is not being sought at this time for the TDR and the replanting lands. The replant lands will be consented pursuant to the Forestry Act 2014 as amended and the Forestry Regulations 2017 as amended.

This report has been prepared to inform the competent authority in completing their obligations in relation to Appropriate Assessment under Council Directive 92/43/EEC (Habitats Directive) as implemented in Ireland under *inter alia* the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended), and Part XAB of the Planning and Development Act, 2000 (as amended).

1.1 Legislative Context

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

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

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

Article 6 of the Habitats Directive is implemented by the provisions of sections 177U and 177V of the *Planning and Development Act, 2000* (as amended). Article 177U requires that before consent is given, the competent authority must carry out a screening for appropriate assessment to assess, in view of best scientific knowledge, if the development, individually or in combination with another plan or project is likely to have a significant effect on the European site. If it cannot be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site, an Appropriate Assessment of its implications for the Site(s) in view of the Site's conservation objectives is required to be carried out by the Competent Authority. The Appropriate Assessment will inform the decision of the Competent Authority as to whether the plan or project can be approved or not.

1.1 Statement of Competence

This report has been prepared by Jason Guile and Rita Mansfield. Jason is a Senior ecologist with Fehily Timoney and has over 10 years' experience in ecological assessment and holds a BSc in Marine Biology/Oceanography from the University of Wales, Bangor and a HND in Coastal Conservation with Marine Biology from Blackpool and Fylde College. Jason has prepared Appropriate Assessment Screening reports and Natura Impact Statements for numerous large scale infrastructure projects in the commercial, energy and transport sectors.

Rita is Principal ecologist with Fehily Timoney and has 17 years' experience in the field of ecological assessment. She holds a BSc (Hons) in Applied Ecology from University College Cork and a HDip. (Hons) in Environmental Protection and Pollution Control from Sligo Institute of Technology. Rita has prepared Natura Impact Statements for numerous large scale public infrastructure projects and plans in the waste, transport, energy, and water sectors (including flood relief schemes).

Aquatic surveys were undertaken by Ross Macklin and Bill Brazier of Triturus Environmental Ltd.

Ross Macklin PhD (Candidate) BSc (Hons) Applied Ecology HDip GIS Dip IPM MCIEEM IFM is an environmental scientist specialising in freshwater and fisheries ecology. He is currently completing his PhD in U.C.C. in fisheries ecology. He has undertaken river habitat, lake habitat, wetland habitat and fisheries assessments in professional work for 16 years. His specialist freshwater experience lies in biological and physiochemical water quality analysis, fisheries ecology, riparian habitat assessments, habitat mapping, protected species, geographical information systems, ecological design and invasive species. Ross has expert experience in identifying and assessing macrophyte plant, aquatic bryophytes, fish and macroinvertebrates from a variety of aquatic habitats. He routinely undertakes Habitat Regulations Assessments, Fisheries Assessments, Protected Species Surveys, Invasive Species Surveys, Habitat & Surface Water Management Plans, CEMP, EcIA and EIAR reporting.

Bill Brazier (Ph.D. (candidate), B.Sc. (Hons.) Applied Freshwater & Marine Biology, MIFM) is an environmental scientist specialising in freshwater and fisheries ecology. He studied Applied Freshwater & Marine Biology at Galway-Mayo IT and is currently completing a Ph.D. in fish ecology and genetics at University College Cork. He specialises in freshwater fisheries ecology, biology and water quality. He has considerable experience of over ten years in a wide range of ecological and environmental projects including EIAR, EcIA and AA/NIS reporting, as well as the areas of fisheries assessments, fish health screening, aquatic baselines, riparian habitat assessments, geographical information systems (GIS), habitat mapping, protected species surveys (e.g. otter, FWPM, white-clawed crayfish etc.), biodiversity enhancement, invasive species and fisheries management. Bill has extensive experience in identifying and assessing fish, macrophytes, aquatic bryophytes and macro-invertebrates from a variety of aquatic habitats. He routinely undertakes aquatic work for wind farm developments, flood relief schemes, road schemes, blueways/greenways and biodiversity projects

Avifauna surveys were undertaken by Joseph Adamson (MSc. Environmental Resource Management, MCIEEM), Sinéad Clifford (FT Ecologist; BSc. Wildlife Biology; GradCIEEM), Jonathon Dunn (FT Ecologist; BA Natural Sciences; MSc. Ecology, Evolution and Conservation, PhD Avian Ecology, MCIEEM), Luke Myers (FT Ecologist; BSc. Wildlife Biology), Jon Kearney (FT Principal Ecologist; BSc. Applied Ecology MSc. Ecological Management and Biological Conservation; MCIEEM), Sean Ronayne (FT Ecologist; BSc. Zoology; MSc. Marine Biology; MSc. Ecological Assessment), Ben O'Dwyer (FT Ecologist; BSc. Wildlife Biology), Orla Coffey (FT Ecologist; BSc. Botany; MSc. Biological Sciences), Rory Dalton (BSc. BSc. Environmental and Earth Science) and Barry O'Mahony (BSc. Zoology, Biochemistry, Microbiology, H.Dip. Education; Nat.Dip. Food Science & Technology; Licensed Bird Ringer).

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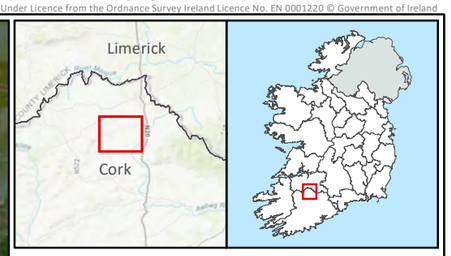

Legend

- Site Boundary
- Turbine Layout
- Underground Cable Route
- Construction Compound
- Substation
- Special Area of Conservation (SAC)

N W E S

0 0.5 1 2 Kilometers

TITLE:	Grid Connection		
PROJECT:	Annagh Wind Farm, Co. Cork		
FIGURE NO:	1.2		
CLIENT:	EMPower		
SCALE:	1:18000	**REVISION:**	0
DATE:	12/10/2021	**PAGE SIZE:**	A3

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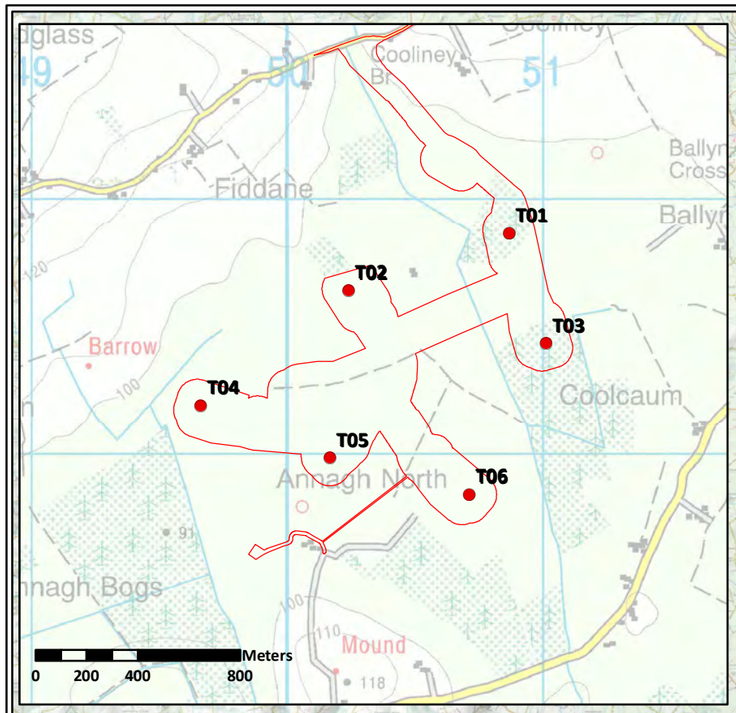

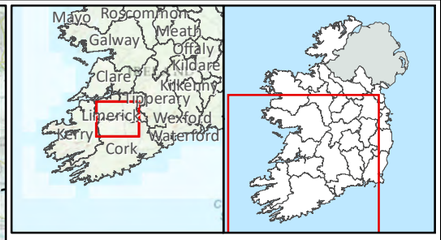

Legend

- County Boundaries
- Proposed Site Boundary
- Proposed Turbine Layout

Tipperary
Cork
Kerry

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FIGURE NO:	1.1		
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DATE:	14/10/2021	**PAGE SIZE:**	A3

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N W E S
Kilometers
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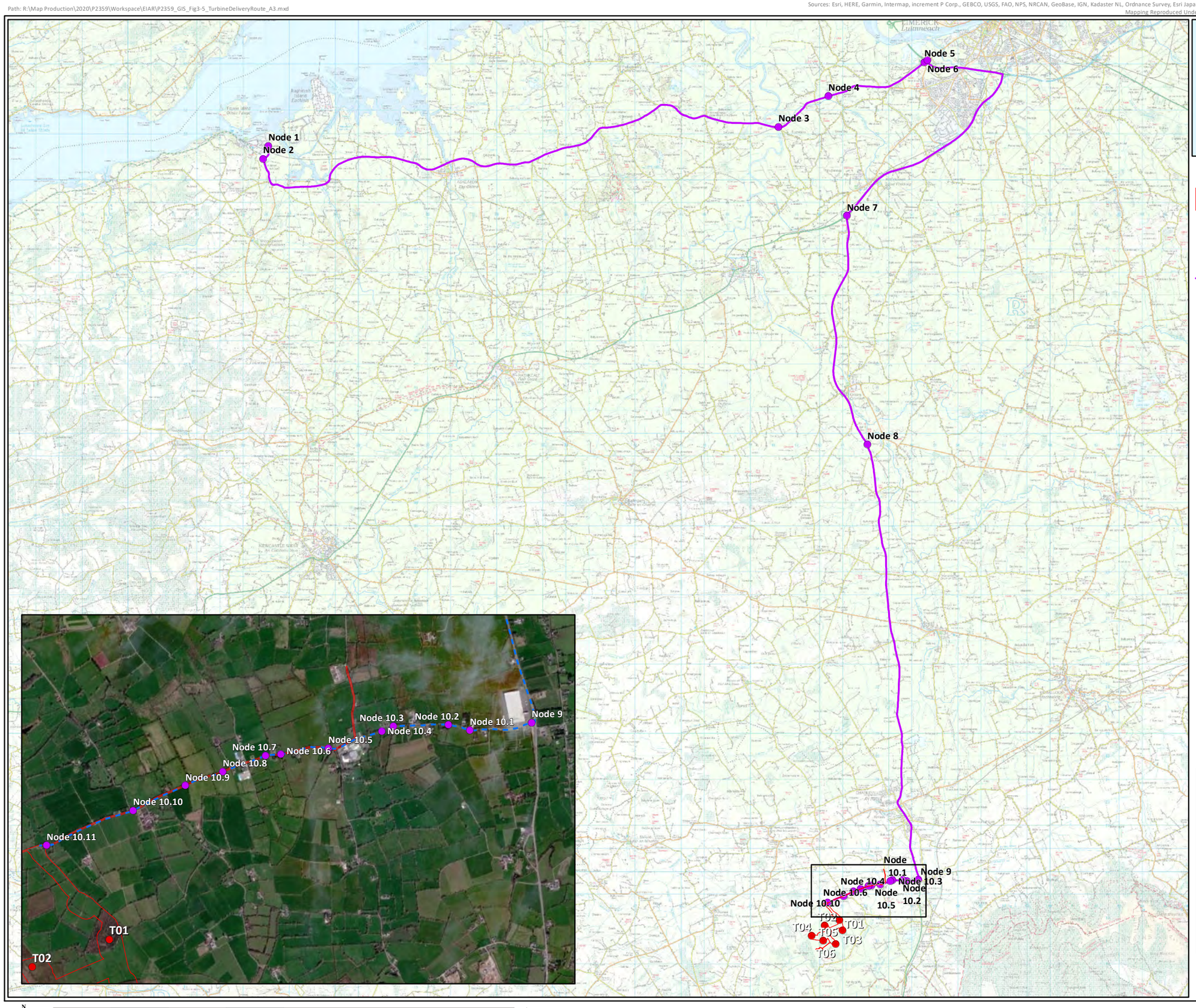

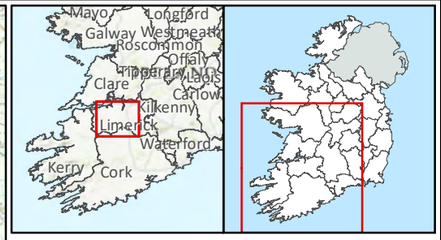

Legend

- Site Boundary
- Turbine Layout
- TDR Nodes
- Turbine Delivery Route

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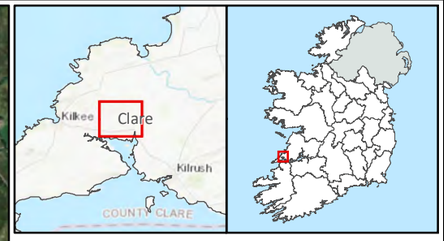

Legend

Emlagh Replant Lands

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1.2 Methodology

1.2.1 Guidance

The assessment was conducted in accordance with the following guidance :

- *Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*, Office for Official Publications of the European Communities, Luxembourg (EC, 2002). This document was updated by *Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC.* Commission Notice (2021) Brussels, 28.9.2021 C(2021) 6913 final;
- *Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin (2009, updated 2010);
- *Managing Natura 2000 sites. The provisions of Article 6 of the Habitats Directive 92/43/EEC*. European Commission (2018). Brussels, 21.11.2018 C (2018) 7621 final;
- *Interpretation Manual of European Union Habitats*. Version EUR 28. European Commission 2013;
- OPR Practice Note PN01 *Appropriate Assessment Screening for Development Management* Office of the Planning Regulator (March 2021).

1.2.2 Process

The process of determining the likelihood of significant effects from a proposed project on European sites is an iterative process centred around a Source-Pathway-Receptor assessment.

The assessment commences with a description of the project. All elements of the project are presented including the project location and existing baseline environment. The type of impacts which are likely due to the project are identified having regard to the spatial and temporal scale of the project, resource requirements and likely emissions. The zone of influence (ZoI) of the project is therefore defined, and the potential source-pathway-receptor (S-P-R) connectivity to European Sites and their qualifying interests / special conservation interests are identified.

The potential for in-combination effects with other plans and projects is also assessed having regard to the identified impacts of the project.

The likelihood of significant effects on the European Sites within the ZoI is determined having regard to the sensitivity of the Site to the impacts associated with the project on its own and in combination with other plans and projects. Having regard to the European Commission Communication on the Precautionary Principle (EC, 2000), where the likelihood of significant effects cannot be excluded on the basis of scientific evidence (e.g. through quantifiable cause and effect relationship), the precautionary principle is adopted and significant effects are assumed.

Where significant effects are determined to be likely, or where there is uncertainty regarding the likelihood of significant effects, the project will be required under law to be subjected to Appropriate Assessment.

Section 3 of this report presents an assessment of whether the proposed wind farm would be likely to have significant effects on European sites (either alone or in combination with other plans or projects) (Screening for Appropriate Assessment), and has concluded potential for significant effects. As such, having regard to Article 177T(4) of the Planning and Development Act, 2000 (as amended) a Natura Impact Statement (NIS) has been prepared. The NIS is included in **Section 4** of this report.

The European Commission Notice C(2018) 7621: '*Managing Natura 2000 sites The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC*' prescribes the content of the Appropriate Assessment and notes the following:

- it must be ensured that the appropriate assessment addresses all elements contributing to the site's integrity as specified in the site's conservation objectives and Standard Data Form, and is based on the best available scientific knowledge in the field;
- the information required should be up-to-date;
- The appropriate assessment should also include a comprehensive identification of all the potential effects of the plan or project likely to be significant on the site, taking into account cumulative and other effects likely to arise as a result of the combined action of the plan or project under assessment with other plans or projects.
- It should apply the best available techniques and methods to assess the extent of the effects of the plan or project on the integrity of the site(s).

The NIS as presented has been developed to address these requirements so as to present sufficient and up-to-date information to allow the Competent Authority to give full consideration of all elements contributing to the site integrity and allowing identification of potential impacts, mitigation measures and residual impacts.

1.2.3 Information Consulted in the Preparation of this Report

A desk study was carried out to collate available information on the wind farm site's natural environment. This comprised a review of the following publications, data and datasets:

- Draft Cork County Development Plan 2022-2028
- Cork County Development Plan 2014
- Clare County Development Plan 2017-2023
- Cork County Council Planning Enquiry System
- Clare County Council Planning Enquiry System
- An Bord Pleanála Planning Appeals https://www.pleanala.ie/en-ie/home/
- Forestry applications forestry-maps.apps.rhos.agriculture.gov.ie/
- Environmental Protection Agency (EPA) (on-line map-viewer) http://watermaps.wfdireland.ie/HydroTool/Authentication/Login.aspx?ReturnUrl=%2fHydroTool%2fDefault.aspx
- Department of Housing, Planning, and Local Government – online land use mapping www.myplan.ie/en/index.html;

- Department of Housing, Planning, and Local Government- EIA Portal https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal
- Environmental Protection Agency (EPA) – Water Quality www.epa.ie, http://gis.epa.ie/Envision;
- Geological Survey of Ireland – Geology, soils and Hydrogeology www.gsi.ie;
- Water Framework Directive website – www.catchments.ie;
- National Parks and Wildlife Service – online European site network information, including site conservation objectives www.npws.ie;
- National Parks and Wildlife Service – Information on the status of EU protected habitats in Ireland (Article 17 Reports)
- National Biodiversity Data Centre – www.biodiversityireland.ie;
- Ordnance Survey of Ireland – Mapping and Aerial photography www.osi.ie; and
- Inland Fisheries Ireland - https://www.fisheriesireland.ie/.

2. DESCRIPTION OF THE PROJECT

2.1 Project Location

The proposed wind farm site is located in north County Cork, approximately 45km north of Cork City. The Site is located approximately 6km south west of Charleville and approximately 8km north west of Buttevant.

The Site is located in a rural area. The settlement pattern in the area is linear, made up of one-off rural housing and farmyards generally located along the local road network. The nearest settlement is the village of Churchtown which is located approximately 3km to the south of the proposed windfarm site.

Access to the proposed wind farm is made from the L1322 local road which meets the N20 at Ballyhea, approximately 4km to the east of the proposed site entrance.

The lands proposed for development comprise a poorly drained level depression within the upper Awbeg River catchment west of the Ballyhoura Mountains.

Land use practices throughout the site are divided between improved agricultural pasture, broadleaved commercial afforestation and extensively grazed wet grassland. Also present are hedgerows, treelines and drainage ditches which delineate field boundaries. The proposed wind farm site is largely covered in broadleaved forestry plantation (comprising Ash *fraxinus excelsior*, pedunculate oak *Quercus robur*, Scot's pine *Pinus sylvestris* and alder *Alnus glutinosa)*, immature woodland dominated by pedunculate oak *Quercus robur*, with intermittent rows of birch *Betula Sp*., areas of drier, more heavily grazed fields in the central part of the site representative of a mix of wet grassland and improved agricultural grassland, and a mosaic of wet grassland/marsh in the western part of the site.

The hedgerows within the wind farm study area are of variable character and quality, ranging from mature hawthorn *Crataegus monogyna* and willow *Salix* Sp. hedges to the severely trimmed low hedgerows characteristic of over-zealous agricultural management. The established treelines marking field boundaries in drier parts of the study area are comprised primarily of ash *Fraxinus excelsior*, with occasional beech *Fagus sylvatica* and sycamore *Acer pseudoplatanus*. Alder *Alnus glutinosa* treelines flank sections of the Oakfront stream running through the study area. Lowland depositing rivers and drainage ditches flow through and adjacent to the site. The Oakfront River flows north-south through the eastern side of the proposed wind farm site. The river has a wet width of c. 2-3m and depth ranging from c. 5cm to 0.4m. The bed contains fine gravel and sand. Flows are dominated by shallow glides, with occasional riffles and pools. Parts of the stream had been extensively straightened historically although some limited natural features by way of meanders remain. The river is confirmed through electrofishing survey to support brown trout, European eel, three-spined stickleback and *Lampetra* sp. (ammocoetes). Drainage ditches are ubiquitous throughout the site. They vary in character and scale, ranging from small swales carrying trickles of water through old established channels carrying stream-like flows to large arterial ditches holding high volumes of stagnant water. The watercourses and drains flowing through and adjacent to the proposed wind farm site drain to the Awbeg which is part of the Blackwater River (Cork/Waterford) SAC.

The grid connection originates within the proposed wind farm site and traverses plantation woodland and agricultural fields before exiting the site to join the L1322 where it will be constructed within the road until it reaches its connection point at the Charleville 110 kV substation. The roads are predominantly bounded by hedgerows and treelines. One stream crossing is required along the public road (the Rathnacally Stream) which will be crossed by Horizontal Directional Drilling. A second stream crossing is located within the wind farm site and will consist of a clear-span bridge.

The habitats along the Turbine Delivery Route mainly comprise buildings and artificial surfaces (roads and walls), improved agricultural grassland, ornamental/non-native shrub, hedgerows, woodlands, dry meadows and grassy verges and amenity grassland. It will be necessary to cut back trees and hedgerows along the route to accommodate blade oversail.

2.2 Project Description - Overview

The proposed project will consist of a wind farm of 6 no. wind turbine generators (WTG's), 1 no. permanent meteorological mast (PMM), and 1 no. substation compound along with ancillary civil and electrical infrastructure.

The total Maximum Export Capacity (MEC) of the wind farm is up to 37.2 MW. The exact MEC will be dependent on the output power of the models available at procurement stage.

The associated grid connection route (GCR) will consist entirely of underground 38kV cable and will connect the on-site substation to the existing Charleville 110kV Substation within the townland of Rathnacally. The GCR will be approx. 5.7km in length including 3.4km to be constructed primarily within the existing road corridor and 2.3km of underground cables to be installed within private lands within the wind farm site. The proposed GCR arrangement is illustrated in Figure 1-2. The GCR includes one stream crossing within the wind farm site and one stream crossing on the L1322 local road, as indicated in Figure 1-2.

Large components associated with the wind farm construction will be transported to site via the identified turbine delivery route (TDR). It is proposed that turbine deliveries shall approach the site from the North via Foynes Port, the N69, the N18, the M20, the N20 and L1322. Temporary accommodating works will be required at selected locations along the TDR to facilitate the delivery of large components to the site. These works are described in detail in Section 3.5.6.

The construction of the project in its entirety is expected to take between 12 - 18 months.

In summary the proposed project will consist of the following:

- Erection of 6 no. wind turbines with a blade tip height of 175m, rotor diameter of 150m and a hub height of 100m;
- Construction of turbine foundations and crane pad hardstanding areas;
- Construction of new site tracks and associated drainage infrastructure;
- Upgrading of existing tracks and associated drainage infrastructure where necessary;
- Upgrade of existing entrance onto Local Road L1322;
- All associated drainage and sediment control including the installation of new watercourse or drain crossings and the re-use or upgrading of existing internal watercourse and drain crossings;
- Construction of 1 no. permanent onsite 38kV electrical substation to ESBN specifications including:
    - Control Building with welfare facilities;
    - Electrical infrastructure;
    - Parking;
    - Wastewater holding tank;

- Rainwater harvesting;
- Security fencing;
- All associated infrastructure, services and site works.

- Temporary accommodation works associated with the Turbine Delivery Route to facilitate the delivery of turbine components;
- 1 no. Temporary construction site compound and associated ancillary infrastructure including parking;
- Tree felling to facilitate construction and operation of the proposed development;
- Installation of underground medium voltage (20/33kV) and communication cabling between the proposed turbines and the proposed on-site substation and associated ancillary works;
- Erection of 1 no. permanent meteorological mast with a height of 100m above ground level and associated access track;
- Installation of medium voltage (up to 38kV) underground cabling between the proposed on-site substation and the existing Charleville substation and associated ancillary works. The proposed grid connection cable works will include 2 no. watercourse crossings and the installation of 9 no. pre-cast joint bays;
- All associated site development works;
- A 10 year planning permission and 35 year operational life from the date of commissioning of the entire wind farm.

2.3 Wind Farm Site

2.3.1 Turbine Description

The proposed turbines will have a tip height of 175m, a hub height of 100m and a rotor diameter of 150m. It is proposed to use the Vestas V150 model turbine.

The turbine will be of the generic three bladed, tubular tower model with horizontal axis. The rotor blades are bolted to the central hub, which is connected to a generator located in the nacelle.

A glass fibre reinforcing polyester hood covers the nacelle. Earthing and isolation protect all components from lightning strikes.

2.3.1.1 Turbine Blades

The blades of the proposed turbine model are made up of glass fibre reinforced polyester. They turn at between 5 and 15 revolutions per minute depending on wind speed. The V150 turbine begins generating electricity at a wind speed of 3m/s, with rated power generation at wind speeds of approximately 13 to 16.5m/s.

The turbines shut down at wind speeds greater than 25m/s. The yaw mechanism turns the nacelle and blades into and out of the wind. A wind vane on the nacelle controls the yaw mechanism. Blades are pitched to match the wind conditions.

2.3.1.2 Turbine Tower and Foundation

The tower of the turbine is a conical steel tube, with multiple painted finish. The first section is bolted to the steel base, which is cast into the concrete foundation. The proposed turbine foundations will be 22m in diameter and 4m in depth.

The upper sections of the tower are bolted to the lower ones in sequence. The base of the tower is 5.5m in diameter, tapering to approximately 2-3m, where it is attached to the nacelle.

2.3.1.3 Turbine Transformer

The turbine will have a transformer located within the tower. The turbine will generate electricity at approximately 660 volts, depending on the machine chosen. The turbine transformer will step up the voltage to 33kV to reduce the electrical loss on the cabling connector circuits that connect to the on-site substation.

2.3.1.4 Turbine Colour

The turbines have a multiple painted coating to protect against corrosion. They are coloured off-white to blend into the sky background.

2.3.1.5 Turbine Hardstandings

A turbine hardstanding area consists of a main crane pad hardstanding of 31m x 92m with a number of additional smaller hardstandings that act as set down and assembly areas, located as shown on the accompanying planning drawings. These smaller hardstanding areas surround the main hardstanding area and measure approx. 4,630 square meters. This area will accommodate a main crane and an assist crane during the assembly of the turbine, as well as during occasional maintenance periods during the operation of the wind farm.

2.3.2 Permanent Meteorological Mast

1 no. permanent meteorological (Met) mast shall be erected on site. The permanent met mast shall be of the following general configuration:

- 100m high free standing lattice steel mast with a shallow concrete foundation.

The mast will include a concrete base measuring 8m by 8m and will be up to 1.5m in depth.

The mast will be accessed from the south of the site via a proposed access track which will connect to an existing agricultural laneway. The section of new track will lead from the existing agricultural track to the met mast location. A turning head will be constructed adjacent the mast site. The met mast access track will be 3.5m in width and will include drainage (refer to Section 2.3.7).

2.3.3 Internal Access Tracks

4.5km of new internal access tracks will be required to be constructed and 0.38km of upgraded agricultural tracks will be required as part of the project. The proposed internal site track layout will permit access for vehicles during the construction phase, for maintenance during the operational phase and for vehicles to decommission the turbines at the end of the life of the project.

All access tracks at the main wind farm site will be 5m wide along straight sections and wider to 5.6m at bends. The tracks will be finished with a well graded aggregate. The drainage system will be installed adjacent to the internal access tracks. Existing drainage infrastructure will be maintained and upgraded (refer to Section 2.3.7).

The access track to the proposed met mast will be 3.5m in width, as larger vehicles will not be required to access this area.

The stone required for the construction of the internal access roads will be sourced from licenced quarries in the vicinity of the project.

The proposed new and upgraded internal access tracks will be founded. Founded access track formation will consist of 500mm hardcore on geo-textile membrane.

2.3.4 Wind Farm Site Entrance

Annagh Wind Farm shall have one main site entrance which will be used for both construction and operation. Access to the site shall be via an existing agricultural entrance on the L1322.

The site entrance will be upgraded and a section of treeline and hedgerow will require removal to allow for safe visibility and to accommodate a wider turning point for turbine delivery. The site entrance will form a bell mouth and land will be reprofiled to allow for safe vehicular entrance.

Access to the met mast for construction, operational maintenance and decommissioning will be made from the south of the site via an existing agricultural laneway, in the townland of Annagh North. This southern entrance will not be utilised for other elements of the proposed project and will not be linked to the proposed wind farm access track network.

Refer to Figure 2-1 for site layout.

2.3.5 Onsite Electricity Substation

A permanent onsite electricity substation will be constructed within the proposed wind farm site. This will provide a connection point between the wind farm and the proposed grid connection point at the existing Charleville Substation.

Electricity generated from wind turbines shall be collected at medium voltage (20/33 kV) by an internal circuit of buried cables which will follow on-site access tracks. This circuit shall terminate at a proposed onsite substation and be exported to the national grid via a 38 kV buried cable to the existing Charleville substation.

The dimensions of the substation compounds will be 50m x 25m and will include a substation control building and electrical components necessary to export the electricity generated from the wind farm to the national grid. The substation compound will be surrounded by a ca. 2.5 metre high steel palisade fence and internal fences will also be provided to segregate different areas within the main substation compound.

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

The control building located within the substation compound will measure 19m by 9m and 6m in height. The control building will include the Independent Power Production (IPP) and grid operator control rooms, an office space and welfare facilities for staff during the operational phase of the wind farm. Due to the nature of the project there will be a small water requirement for occasional toilet flushing and hand washing with a rainwater harvesting tank adjacent to the control building.

A wastewater holding tank will be provided outside the substation compound fence line so that it can be maintained where required without requiring access to the substation compound. The wastewater holding tank will be a sealed storage tank with all wastewater transported by tanker off site as required by an authorised waste collector to a wastewater treatment plant. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007, will be employed to transport wastewater away from the site. The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. The wastewater storage tank alarm will be part of a continuous stream of data from the site's turbines, wind measurement devices and electricity substation that will be monitored remotely 24 hours a day, 7 days per week.

2.3.6 On-site Electrical Cabling

Electricity generated from wind turbines shall be collected at medium voltage (20/33kV) by an internal circuit of buried cables which will follow on-site access tracks. This circuit shall terminate at the proposed onsite substation. Electricity generated from the site will be exported to the grid via a 38kV buried cable to the existing Charleville substation.

Internal collector circuit cable routes are shown on the planning application drawings and will generally follow the alignment of the internal access tracks.

The electricity will be transmitted as a three-phase power supply so there will be three individual conductors (or individual cables) in each cable circuit. The three conductors will each be laid in separate ducts which will usually be laid in a trefoil formation but shall also be laid in a flat formation at stream/drain crossings, or where cabling crosses other on-site cables. .

The width of a cable trench with a trefoil formation will be 600mm, a flat formation requires a wider trench width of 1,040mm. The depth of cover to the ducts carrying the cables will be 750mm cover to the top of the upper duct in public roadways and grassed areas.

The depth of trench for the cables will be 1220mm. However, in certain instances, for example when crossing a bridge with shallow cover or crossing existing services, a shallower depth of 450-950mm could be utilised.

Cables laid within the site in field locations will be laid to a depth of up to 1100mm to the top of the upper duct. The diameter of the ducting will be selected to suit the range of cross-sectional areas of electrical cables and will be 110mm outer diameter.

2.3.7 Drainage

The Annagh Wind Farm will use existing drainage alongside the implementation of Sustainable Drainage Systems (SuDS) for the proposed project. As such the existing drainage patterns throughout the site will not be altered.

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

2.3.8 Watercourse Crossings

There will be one new crossing over the Oakfront Stream and 13 over the field and forestry drains to be crossed for the purposes of the proposed windfarm development.

Minor drains such as manmade agricultural and forest drains will be crossed using piped culverts. Drainage design requires that these culverts are appropriately sized to take the 1 in 100-year flood flow with a 20% allowance for Climate Change.

There is one watercourse crossed by internal wind farm access tracks. This proposed crossing is on the Oakfront Stream (EPA name) which is a part of the Awbeg [Buttevant] sub-catchment. The method for crossing the Oakfront Stream will be by single-span concrete bridge. Bridge design is such that sufficient free-board is allowed for 1 in 100-year fluvial flood conditions plus a 20 % allowance for Climate Change.

Table 2-1: Hydrology Features

Feature ID	Existing / Proposed	Feature /activity	Proposed Method of Crossing
WF-HF1	Proposed	Pre-cast box culvert	New access track. Cable ducts installed above proposed pre-cast concrete box culvert. Existing culvert will be extended.
WF-HF2	Proposed	Pre-cast box culvert	New access track. Cable ducts installed above proposed pre-cast concrete box culvert.
WF-HF3	Proposed	Pre-cast box culvert	New access track. Cable ducts installed above proposed pre-cast concrete box culvert.
WF-HF4	Proposed	Pre-cast box culvert	New access track.

Feature ID	Existing / Proposed	Feature /activity	Proposed Method of Crossing
			Cable ducts installed above proposed pre-cast concrete box culvert.
WF-HF5	Proposed	Single span bridge over the Oakfront Stream	New access track. Cable ducts to be incorporated into proposed pre-cast concrete structure.
WF-HF6	Proposed	Pre-cast box culvert	New access track. Cable ducts installed above proposed pre-cast concrete box culvert.
WF-HF7	Proposed	Pre-cast box culvert	New access track. Cable ducts installed above proposed pre-cast concrete box culvert.
WF-HF8	Proposed	Pre-cast box culvert	New access track. Cable ducts installed above proposed pre-cast concrete box culvert.
WF-HF9	Proposed	Pre-cast box culvert	New access track. Cable ducts installed above proposed pre-cast concrete box culvert.
WF-HF10	Proposed	Pre-cast box culvert	New access track. Cable ducts installed above proposed pre-cast concrete box culvert.
WF-HF11	Proposed	Pre-cast box culvert	New access track. Cable ducts installed above proposed pre-cast concrete box culvert.
WF-HF12	Proposed	Pre-cast box culvert	New access track. Cable ducts installed above proposed pre-cast concrete box culvert.
WF-HF13	Proposed	Pre-cast box culvert	New access track. Cable ducts installed above proposed pre-cast concrete box culvert.
WF-HF15	Proposed	Pre-cast box culvert	New access track. Cable ducts installed above proposed pre-cast concrete box culvert.

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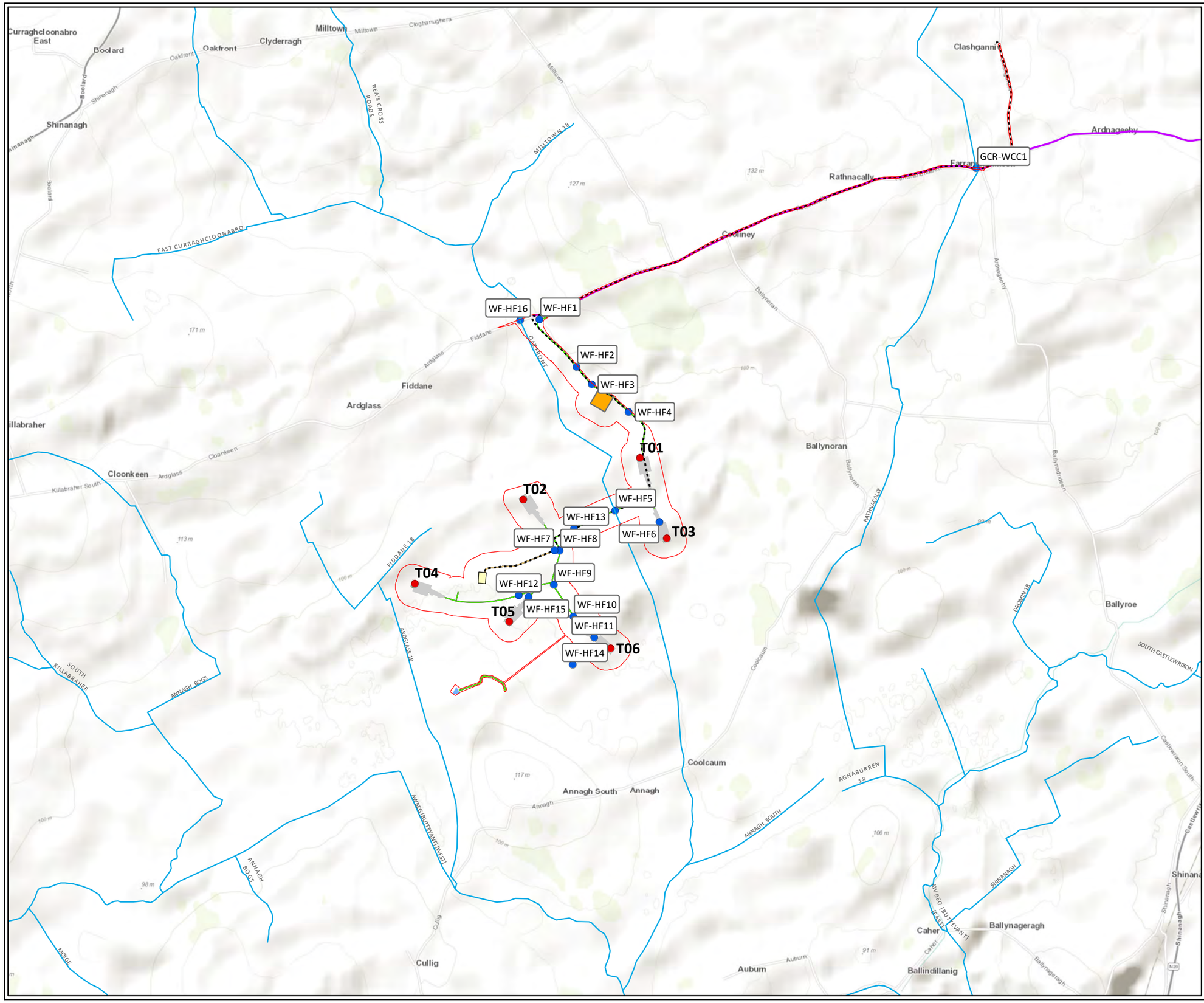

Legend

- Site Boundary
- Turbine Layout
- Met Mast
- Hydrological Features
- Rivers
- Turbine Delivery Route
- Underground Cable Route
- Substation
- Construction Compound
- Turbine Hardstanding

Roads

- New
- Upgrade

N W E S

0 0.5 1 2 Kilometers

TITLE: Hydrological Features Overview			
PROJECT: Annagh Wind Farm, Co. Cork			
FIGURE NO:	2.1		
CLIENT:	EMPower		
SCALE:	1:20000	**REVISION:**	0
DATE:	15/10/2021	**PAGE SIZE:**	A3

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2.3.9 Temporary Site Facilities

During the construction phase, it will be necessary to provide temporary facilities for construction personnel. The location of the temporary site compound is located between the site entrance and the wind farm site (refer to Figure 2-1).

The temporary compound shall be aggregate hard standings surrounded by security fencing. Temporary facilities will be removed and the lands reinstated on completion of the construction phase.

Facilities to be provided in the temporary site compounds will include the following:

- site offices, of Portacabin type construction
- portaloos
- bottled water for potable supply
- a water tanker to supply water used for other purposes
- canteen facilities
- storage areas
- employee parking
- bunded fuel storage
- contractor lock-up facility
- diesel generator
- waste management areas

2.3.10 Soil Management / Earthworks

There are no peat deposition areas required as part of this project as informed by geotechnical assessment of the site. Any soil excavated for the construction of access roads within the site will be re-used on site in berms and for landscaping purposes and along the margins of the access roads.

2.3.10.1 Temporary Stockpile Areas

Due to the possibility of soil-borne diseases, all topsoil recovered from each individual farm property within the proposed wind farm site will remain on the same property. The topsoil will be re-used for landscaping and will also be used for reinstatement purposes around turbine bases and hardstanding areas within the same farm property.

2.4 Tree Felling & Replant Lands

The proposed wind farm site comprises areas of broadleaf forestry plantations. Of the proposed 6 no. turbines, 4 no. are located within or partly within forestry and consequently tree felling will be required as part of the project. Permanent felling of approximately 12.6 ha of broadleaf forestry is required within and around the wind farm infrastructure to accommodate the construction of turbines, hardstands, crane pads, access tracks and the proposed onsite substation.

The felling will be the subject of a Felling Licence Application to the Forest Service prior to construction as per the Forest Service's policy on granting felling licenses for wind farm developments. The Forest Service Policy requires that a copy of the planning permission for the wind farm be submitted with a felling license application therefore the felling license cannot be applied for until planning permission is received for the proposed project site.

The license will include the provision of relevant replant lands to be planted in lieu of the proposed tree felling on the site. It should be noted that the forestry within the proposed wind farm site was originally planted as a commercial crop and will be felled should the project proceed or not.

Felling will not be required at the proposed temporary construction compound and meteorological mast as these elements do not fall within forestry plantation areas.

A potential replanting site has been identified at Emlagh County Clare. The total area identified for replanting is 14.5 ha. A technical approval application for the replant lands site has been submitted to the Forestry Service. If these replant lands become unavailable, other similarly suitable/approved lands will be used for replanting should the proposed project receive planning permission, and will be subject to the requirements of Regulation 42 of the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) as part of the licensing process

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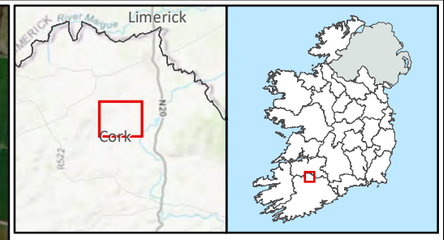

Legend

- Site Boundary
- Turbine Layout
- Met Mast
- Underground Cable Route
- Substation
- Construction Compound
- Turbine Hardstanding
- Turning Heads

Roads

- New
- Upgrade

N
W E
S

0.5 0.25 0 0.5 Kilometers

TITLE:	Wind Farm Site Layout		
PROJECT:	Annagh Wind Farm, Co. Cork		
FIGURE NO:	2.2		
CLIENT:	EMPower		
SCALE:	1:12500	**REVISION:**	0
DATE:	12/10/2021	**PAGE SIZE:**	A3

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2.5 Grid Connection Route

The proposed wind farm will have an export capacity of up to 37.2 MW, depending on final turbine technology installed. Connection will be sought under the Enduring Connection Process (ECP) grid access regime. The project will connect from the onsite substation via underground 38kV cable to the Charleville 110kV substation in the townland of Rathnacally, County Cork. The cable will be installed along the public road. No overhead lines are proposed for this connection.

The GCR travels from the proposed on-site substation along the proposed access tracks within private lands. The GCR leaves the site at the proposed site entrance on the L1322. The GCR then follows the public road for 3.4km running east along the L1322 and turning north along an unnamed local road, north of the Dawn Meats Facility, where it will enter the existing Charleville 110kV Substation in the townland of Rathnacally.

Grid connection works to Charleville substation will involve the installation of ducting, 9 no. joint bays, drainage and ancillary infrastructure and the subsequent running of cables predominantly along the existing road network. This will require delivery of plant and construction materials, followed by excavation, laying of cables and subsequent reinstatement of trenches.

2.5.1 Watercourse Crossings Along the GCR

There is one existing watercourse located along the proposed GCR. This watercourse is the Rathnacally Stream, also part of the Awbeg [Buttevant] sub-catchment. The existing road bridge at this point consists of a shallow concrete bridge with a 5.3m carriageway and 0.8m verge. The bridge cannot accommodate the cable due to lack of headroom. As such the stream will be directly crossed. The crossing will be by horizontal directional drilling (HDD).

2.5.2 Buried Drains and Service Crossings

For the crossing of other services, if encountered along this route, the following options for construction will be used:

- Piped Culvert Crossings – Where sufficient cover is available, the cable ducts will be laid above the culvert with a minimum separation distance of 300mm.
- Piped Culvert Crossings - Where sufficient cover is not available, the cable ducts will be laid under the culvert with a minimum separation distance of 300mm.
- Flatbed Formation over or under Culverts - where the cable duct is to be installed over an existing culvert where sufficient cover is not available, the ducts will be laid in a much shallower trench the depth of which will be determined by the location of the top of the culvert. The duct will be laid in this trench in a flatbed formation over the existing culvert and will be encased in 6mm thick steel galvanized plate with a 30N concrete surround.

2.5.3 Joint Bays

Joint bays are pre-cast concrete chambers where individual lengths of cables are joined to form one continuous cable. A joint bay is constructed in a pit. The bay will be 4.5m x 2m x 1.5m deep. A reinforced precast concrete slab is laid in the bay to accommodate the jointing enclosure.

It is expected that 9 no. joint bays will be required for the grid connection. Of these, 5 no. joint bays shall be located in public road corridor, 3 no. joint bays will be located within the wind farm site on private lands and 1 no. joint bay will be located at the Charleville 110kV substation.

Figure 2-3 shows a standard ESBN 38kV single circuit joint bay and communications chamber arrangement.

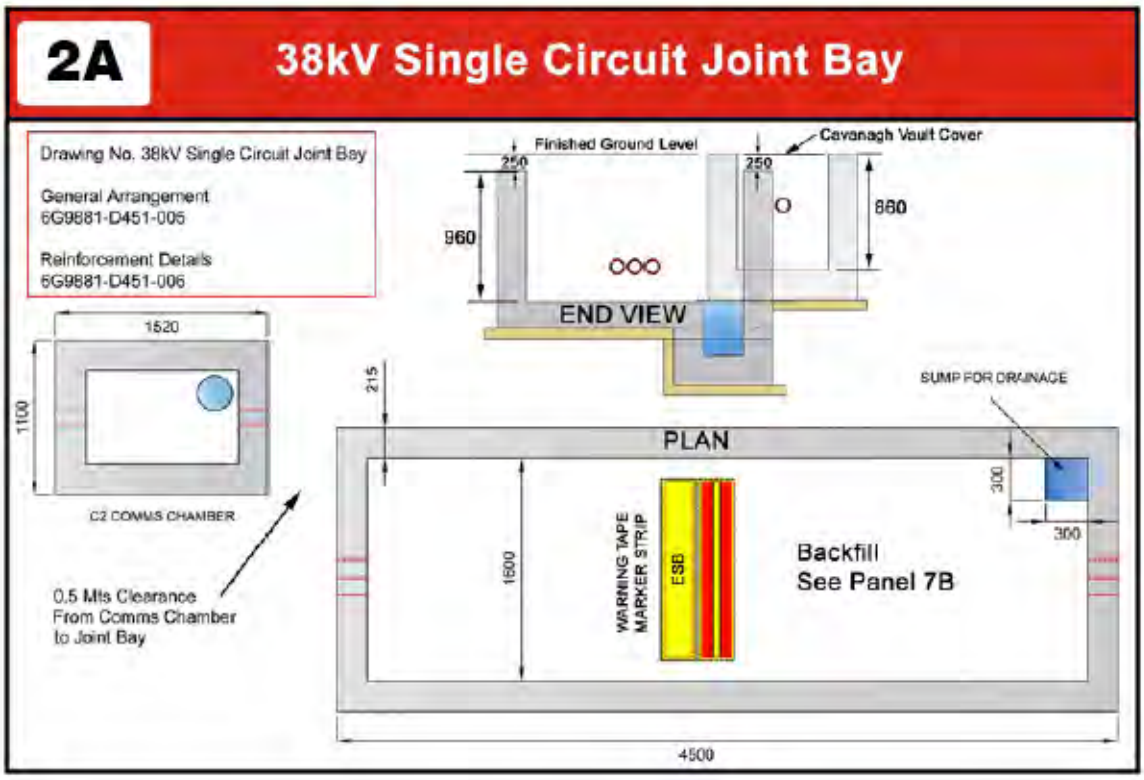

Figure 2-3: ESBN 38kV Single Circuit Joint Bay

2.6 Turbine Delivery Route

Large components associated with the wind farm construction will be transported to site via the identified turbine delivery route (TDR). The proposed access route to site is as follows:

- Loads will depart the Port of Foynes and turn left onto the N69 towards Limerick;
- Loads will travel onto the N18 and turn onto the M20/N21;
- Loads will turn onto the N20 and travel south through the town of Charleville
- The route then turns onto the L1322 local road at Ballyhea; and
- The route continues westwards on the L1322 for approx. 4km before entering the proposed wind farm site.

Temporary accommodation works required for the delivery of turbines are summarised in *Table 2-1: TDR Temporary Accommodation Works*.

The general location of accommodation works locations, or TDR nodes, are listed as "Points of Interest (POI's)". Many of the POIs can be accommodated through a road opening licence. POIs which require planning consent do not form part of this application for planning permission but are assessed as part of the project.

Table 2-2: TDR Temporary Accommodation Works

TDR Node Reference Number (POI__)	Location	Summary Description of Proposed Temporary Accommodation Works
2	Foynes Port Access Road/N69	Vegetation on right will require trimming to 2.5m over road level to boundary fence. Road sign will require temporary removal. Lampposts require temporary removal and vegetation on left will be trimmed above 1m in height for mid oversail. The top 40cm (approx.) of the wall on the left-hand side should be removed to allow for mid oversail.
4	Clarina Roundabout	Temporary hard surface in the form of compacted aggregate hard standing required on roundabout to provide a cut-through track through the centre island. This will require tree removal and temporary signage removal.
5	Mungret Interchange – West Roundabout	Temporary load bearing surface required on roundabout to provide a cut-through track through the centre island. This will require vegetation removal and temporary signage removal.
6	Mungret Interchange – East Roundabout.	Temporary load bearing surface required on roundabout to allow for turn and oversail. Temporary removal of signage and public lighting required.
7	M20- N20 off ramp Southbound	Temporary removal of signs and street lamp on left side and scrub clearance on left and right for mid and rear oversail.
8	N20 Right Curve. Ballymacrory	Vegetation trimming required to facilitate vehicle oversail on both sides of the road. Hedgerow to be lowered to 0.5m above road level on the right hand side to facilitate mid-oversail.
9	N20 – L1322 Junction, Ballyhea	Regrading and temporary load bearing surface required. Temporary removal of road signs to facilitate oversail.
10	L1322 Local Road – from Ballyhea to Site Entrance	Road will require upgrading and widening at various points to facilitate blade transport. There are ten POIs along the L1322 described below.
10.1	L1322	Temporary removal of fence and road markers to facilitate mid-oversail. Hedge trimming to facilitate vehicle oversail.
10.2	L1322	Vegetation trimming to facilitate vehicle oversail. Temporary removal of utility pole.
10.3	L1322	Vegetation trimming to tree canopy required. Vegetation removal to facilitated vehicle oversail.
10.4	L1322	Vegetation trimming to facilitate vehicle oversail.
10.5	L1322	Hedge and pump enclosure wall to be lowered to 0.5m above road level to facilitate vehicle oversail. Road narrows from this point onwards.

TDR Node Reference Number (POI__)	Location	Summary Description of Proposed Temporary Accommodation Works
10.6	L1322	Section of wall to be lowered to 0.5m above existing road level to facilitate mid-oversail.
10.7	L1322	Vegetation trimming and temporary removal of utility pole.
10.8	L1322	Hedgerow and tree branch trimming to facilitate vehicle oversail.
10.9	L1322	Hedgerow trimming required on both sides of the road throughout this section to facilitate vehicle oversail.
10.10	L1322	Hedgerow trimming on the right-hand side to facilitate vehicle oversail.
10.11	L1322	This node forms the main site entrance.

All temporary accommodation works associated with the project shall be fully reinstated following the construction stage. Overhead utilities and obstructions will need to be temporarily removed at several locations to provide adequate overhead clearance. The removal of overhead utilities will involve temporary disconnections. Such works will be carried out by the utility providers in advance of turbine delivery to site.

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

2.6.1 Turbine Delivery Route (TDR) Watercourse Crossings

The TDR crosses a number of watercourses along the route between the Port of Foynes and the proposed wind farm site. There are no specific accomodation works requried at bridge points along the TDR. Works will be requried at Node 10.5 in proximity to the Rathnacally Stream on the L1322. These works include hedgerow trimming and the lowering of a wall to accommodate vehicle oversail. There are no works requried within the stream.

2.7 Traffic Management

For the grid connection construction, cable trenching will be carried out with the aid of either lane closures or road closures, which will ensure that the trenching works are completed as expeditiously as possible. Road closures will be applied for by the appointed contractor and will outline local diversions whilst maintaining local access at all times for residents, farms and businesses. Road closures will be subject to the applicable statutory processes as implemented by the Roads Authority.

Road closures will be facilitated by the existing road network. 'Rolling road closures' will be implemented, whereby the site will progress each day along a road, which will have the effect of reducing the impact for local residents.

Turbine delivery will require the transportation of abnormal loads. This will be completed at off-peak times under agreement with the local authority and An Garda Siochána. A turbine delivery route assessment was carried out to identify the most appropriate transport route for turbine deliveries and includes the identification of temporary accommodation works required. Temporary accommodation works will be carried out with the use of lane closures or road closures, where required, and in agreement with the local authority. A programme for turbine deliveries will dictate dates and times of each component delivery. The deliveries will be escorted by An Garda Siochana to ensure greater road safety.

For construction of the proposed 100m met mast and associated access track, access will be made from the south of the site via an existing agricultural laneway. A banksman will control traffic at this entrance to maintain traffic safety

2.8 Operation and Lifespan

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

Scheduled services will occur twice a year and takes place over a 3-4 week period. The operation of the wind turbines will be monitored remotely, and a caretaker will oversee the day to day running of the proposed wind farm.

The expected physical lifetime of the turbines is approximately 35 years.

2.9 Decommissioning

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

The foundations will be covered over with soil and allowed to re-vegetate naturally. Leaving the turbine foundations in situ is considered a more environmentally sensible option as to remove the reinforced concrete associated with each turbine would result in environmental nuisances such as noise and vibration and dust.

It is proposed that the internal site access tracks and turbine hard standings will be left in place. These will continue to be used for forestry and agriculture access. Turbine hardstandings shall be covered over with topsoil and left to revegetate naturally.

It is expected that the temporary accommodation works along the TDR will not be required for the decommissioning phase as turbine components can be broken up on site and removed using standard HGVs.

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

It is expected that the decommissioning phase will take no longer than 6 months to complete.

2.10 Potential Interactions of the Project with the Natural Environment / Project Impact Factors

Having regard to the guidance set out in *'Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC'*, (European Commission, 2021), the features of the proposed project with potential for interaction with the natural environment are set out relative to the following headings:

- Size / Land-take / Overall Affected Area;
- Physical changes to the environment / change in existing environmental pressures;
- Resource requirements;
- Emissions, wastes and residues;
- Transportation requirements;
- Duration of construction, operation, decommissioning / Temporal Aspects;
- Distance from Natura 2000 sites.

These project features are further examined in defining the likely Zone of Influence (ZoI) of the project and in determining likely potential for significant effects through Source-Pathway-Receptor assessment (Section 3.)

Table 2-3: Proposed Project Features and Potential Impact Factors

Project Feature	Description	Potential Impact
Size and scale/ Land-take / Overall Affected Area	*Construction* Wind Farm Site Site clearance will be required within and around the wind farm infrastructure to accommodate the construction of turbines, hardstands, crane pads, access tracks and the proposed onsite substation. GCR The majority of the cable route will be within existing road, with limited requirement for vegetation removal. Where excavation is required within the road verge or road boundary (predominantly hedgerow) to accommodate the installation of the grid cable, the vegetation will be reinstated as part of the Local Authority requirement for road reinstatement. Any disturbance to vegetation will be temporary and localised. TDR Habitat disturbance to accommodate turbine delivery is limited to laying of temporary hardcore along road verges and grassed areas, lowering of walls, trimming of vegetation, hedgerow cutting and tree felling. There is limited requirement for vegetation removal to accommodate turbine delivery. Vegetation will be reinstated following the works. Replant Lands 14.5 ha of lands currently in use for cattle grazing will be afforested with broadleaf woodland. *Operation* The site will comprise 6 no. wind turbines with a tip height of 175m and a hub height of 100m.	The construction of the wind farm will result in the permanent removal of 14.47 ha of mixed broadleaf plantation woodland from within the proposed development site. Additionally, 2.62ha of wet grassland habitat (in mosaic with scrub, marsh, and agricultural land) will be permanently removed, and 2.31 ha of improved agricultural grassland will be permanently removed. The consent application for the wind farm is for a 35 year operational period. Decommissioning will reinstate turbine locations with topsoil and allowed to revegetate naturally. There is potential for recolonisation of broadleaf woodland in the long-term. The construction compound will require the temporary infilling of improved agricultural grassland with aggregate hard standings. This will be in place for the duration of the construction works (expected to take between 12 - 18 months). This hardstanding will be removed following the works, and reinstated as improved agricultural grassland. Approximately 250 m of hedgerow/ treeline will be removed from within the proposed wind farm site to accommodate the development. Vegetation disturbance associated with the GCR and TDR will be localised and temporary. The vegetation to be disturbed is marginal and of low ecological value. The proposed replant lands site comprises c. 15.5 ha of wet grassland, with 14.5 ha available for afforestation. There will be a long-term alteration of habitat due to afforestation.

Project Feature	Description	Potential Impact
	Decommissioning Internal site access tracks and turbine hard standings will be left in place. Turbine hard standings will be covered over with topsoil and left to revegetate naturally.	
Physical changes to the environment / change in existing environmental pressures	A number of drainage ditches are intersected by the proposed internal access tracks within the wind farm site. These minor watercourses and drains within the wind farm site will be crossed using piped culverts. Concrete or HDPE pipes will be used depending on the size of the watercourse to be crossed. The method for crossing the Oakfront Stream within the wind farm site is by single-span concrete bridge. The bridge design is such that it does not require in-stream works for its installation. Notwithstanding this, the site preparation works for the bridge installation will require ground disturbance. One watercourse crossing (of the Rathnacally Stream) is required for the installation of the grid cable route. The proposed crossing method is by HDD. The HDD crossing will require the excavation of an entry (pilot) pit and exit pit on either side of the river crossing point. These lands are currently in agricultural use. They will be reinstated following the works. It will not be necessary to remove / disturb riparian habitat to accommodate the HDD crossing. The excavations for turbine foundations has potential to alter the local hydrology. The Scottish Environmental Protection Agency (2017) specifies the zone of influence for Ground Water Dependent Terrestrial Ecosystems (GWDTE) from excavations deeper than 1m to be a 250m buffer around the works area. During construction there will be an increased level of activity within the site with potential for disturbance to species. Following construction, the development of the proposed windfarm will result in the long-term reduction in the density of broadleaf forest cover within the site in order to accommodate the construction of the proposed 6 no. wind turbines with a tip height of 175m and hub height of 100m.	Approximately 515 m of drainage ditch / small watercourse will be directly affected by the project. There will be a permanent loss of aquatic habitat associated with the installation of culverts within their footprint. There will be some disturbance to the streams/ drains immediately adjacent to the culvert locations caused by excavation. These area will be reinstated following the culvert installation. Construction of the Oakfront Stream bridge crossing and the installation of culverts on the drainage ditches / small watercourses within the wind farm site will result in the permanent loss of habitat within the footprint of the bridge foundations. Ruddock & Whitfield (2007) notes that animals' avoidance of humans or human activities can have several adverse effects on their distribution and abundance. The development of the wind farm has the potential to result in displacement of birds / mammals due to on-site construction activities coupled with long-term loss of suitable feeding and/or breeding/wintering habitat associated with site clearance. Potential for bird collision with turbine towers, blades (moving or stationary) and/or associated infrastructure; and barrier to dispersal, regular movements or migration for migratory bird species.
Resource requirements	The stone required for the construction of the internal access roads will be sourced from licenced quarries in the vicinity of the project.	N/A
Emissions	**Dust** *Construction* The principal sources of potential air emissions during the construction of the proposed project will be from dust arising from earthworks, tree felling activities, trench excavation along cable routes, construction of the new and upgrade of existing access tracks, the temporary storage of excavated materials, the movement of construction vehicles, loading and unloading of aggregates/materials, the movement of material around the site and nutrient release from felled areas. *Operation* Once the proposed wind farm and grid connection are constructed there will be no significant direct emissions to atmosphere. A diesel generator will be located at the proposed wind farm substation; however, this will only be operated as a back-up/emergency power supply in the unlikely event of an emergency. The emissions expected from the diesel generator include cardon dioxide(CO_2), nitrogen oxide (NO_x), and particulate matter. The generator if in use will produce approximately 2.6kg of CO_2 per litre of diesel which is not considered to be significant. .	The Institute of Air Quality Management 'Guidance on the Assessment of dust from demolition and construction' (Holman et al, 2014) states that "*Dust can have two types of effect on vegetation: physical and chemical. Direct physical effects include reduced photosynthesis, respiration and transpiration through smothering. Chemical changes to soils or watercourses may lead to a loss of plants or animals for example via changes in acidity. Indirect effects can include increased susceptibility to stresses such as pathogens and air pollution. These changes are likely to occur only as a result of long-term demolition and construction works adjacent to a sensitive habitat. Often impacts will be reversible once the works are completed, and dust emissions cease*". The guidance prescribes potential dust emission risk classes to ecological receptors. The guidance specifies that, for sensitive ecological receptors, sensitivity to dust is 'High' up to 20m from the source and reduces to 'Medium' over 50m from the source. The guidance (Holman et al, 2014) also stipulates that trackout may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The windfarm site would be considered a large site, as such the dust effects from tract out are likely to occur within 500m from the site exit.

Project Feature	Description	Potential Impact
	Decommissioning The decommissioning phase of the project will have much less potential for dust effects than the construction phase given the reduced level of ground disturbance required. There will be truck movements associated with removing the wind turbines from the wind farm resulting in vehicular emissions and also dust. However, the number of truck movements would be significantly less than the construction phase. There will also be emissions from machinery on site including for the movement of soil to cover the foundations.	
Emissions	**Noise** *Construction* There will be a short-term increase in noise levels during construction (expected to take between 12 - 18 months). The main aspects of the construction phase with the potential to generate noise include: • the construction of the turbine foundations, • the erection of the turbines, • the excavation of trenches for cables, • the construction of associated hard standings and access tracks, and construction of the substation, • the delivery of the turbine components, • the delivery of construction materials, notably aggregates, concrete and steel reinforcement, and • works associated with grid connection. *Operation* The wind turbines will introduce a new source of noise to the locality. *Decommissioning* The main aspects of the decommissioning phase with the potential to generate noise are similar to that of the construction phase, however a number of elements will be left in situ (see above) therefore impacts from noise will be lesser than during construction.	Disturbance to noise varies between species and is dependent on the nature of the noise source and sensitivity of the species e.g. the potential effects of anthropogenic sound on fish can range from direct mortality to no obvious behavioural responses and are dependent on the class of sound i.e. either continuous or impulsive (Popper et al. 2014, Popper & Hawkins 2019). Similarly, for birds disturbance response (e.g. becoming alert or a flight response) can vary depending on season, species sensitivity, and weather. The construction and demolition of the proposed wind farm has potential for noise disturbance to terrestrial and aquatic species. A level of acclimatisation to noise from the operation of the turbines would be expected over time.
Emissions	**Water Pollution** *Construction* Vegetation clearance / tree felling, new access tracks and upgrade of existing agricultural tracks, turbine hardstanding areas, the on-site substation, bridge/culvert crossings have the potential to contribute to the increase in runoff from the wind farm site. An increase in surface water runoff from the wind farm site during construction, particularly from areas of exposed soil, has the potential to result in increased sedimentation of the drains and watercourses within the site. Similarly, water in excavations could contain an increased concentration of suspended solids as a result of the disturbance of the underlying soils, dewatering of excavations has a potential to result in sedimentation of nearby drains / watercourses. The method for crossing the Oakfront Stream within the wind farm site is by single-span concrete bridge. The bridge design is such that it does not require in-stream works for its installation. Bridge construction however has potential to cause sedimentation of the watercourses.	Sedimentation of watercourses runoff has potential to temporarily degrade the quality of these watercourses and as such reduce the carrying capacity of the watercourses for aquatic species. HDD crossing of a watercourse for the GCR has potential to cause frac-out (an unintentional loss of drilling fluids during a drilling operation) which could result in a degradation of aquatic habitat quality. The release of cement / concrete to an aquatic environment can have the effect of altering the levels of pH, nitrate, phosphate, total solid, total suspended solids, total dissolved solids, turbidity and biological oxygen demand in the water. Cement products are particularly harmful to aquatic life due to the associated change in alkalinity in the water, which can cause burns to fish skin. The introduction of crayfish plague to the drains / streams in the upper Awbeg River catchment would likely be detrimental to the crayfish population in the catchment, as has been witnessed in other rivers in Ireland e.g. the River Suir and River Barrow.

Project Feature	Description	Potential Impact
	One watercourse crossing (of the Rathnacally Stream) is required for the installation of the grid cable route. This will be carried out by HDD. Cement based product will be used in turbine and substation foundations and hardstandings, and will also be used for constructing new watercourse / drain crossing structures (in particular for blinding of foundations). Cement-based products could lead to contamination of nearby watercourses. In-stream activities associated with the wind farm development has potential to result in the spread/introduction of Crayfish plague (*Aphanomyces astaci*), which hitherto is unrecorded from the wider Munster Blackwater catchment. Refueling activities / storage of fuel could result in fuel spillages which could pollute underground and surface water. *Operation* The design of the wind farm will include SuDS. As such the existing hydrology of the site will not be altered. Due to the grassing over of the drainage swales and revegetation of other exposed surfaces, and the non-intrusive nature of operations, there is a negligible risk of sediment release to the watercourses during the operational stage. The proposed development is located within areas of 'Low' susceptibility for slope slippage. There will be further disturbance of overburden post-construction. There is a low probability for slope failure during operation. *Decommissioning* The internal site access tracks and turbine hard standings will be left in place. Grid connection infrastructure including substation and ancillary electrical equipment shall form part of the national grid and will be left in situ. Temporary accommodation works along the TDR will not be required for the decommissioning phase as turbine components can be broken up on site and removed using standard HGVs. Replant Lands Site preparation and planting will require the mounding (2500 mounds per hectare) of soil above the existing vegetation layer. New drainage channels at regular intervals will direct surface water into the existing drainage network.	Hydrocarbons are toxic to flora and fauna, including fish, and these chemicals tend to be persistent in the environment. It is also a nutrient supply for adapted micro-organisms, which can rapidly deplete dissolved oxygen in waters, resulting in death of aquatic organisms.
	Waste Emissions It is envisaged that the following categories of waste will be generated during the construction of the project: • Municipal solid waste (MSW) from the office and canteen • Construction and demolition waste • Waste oil/hydrocarbons • Paper/cardboard • Timber • Steel	Sedimentation runoff has potential to temporarily degrade the quality of the watercourses and as such reduce the carrying capacity of the watercourse for aquatic species. The release of generated waste to an aquatic environment can have the effect of altering the levels of pH, nitrate, phosphate, total solid, total suspended solids, total dissolved solids, turbidity and biological oxygen demand in the water.

Project Feature	Description	Potential Impact
	When possible, materials will be re used onsite for other suitable purposes e.g.: • Re-use of shuttering etc. where it is safe to do so; • Re-use of rebar cut-offs where suitable; • Re-use of excavated materials for screening, berms etc.; • Re-use of excavated material etc. – where possible will be used as suitable fill elsewhere on site for site tracks, the hardstanding areas and embankments where possible;	
Transportation Requirements	All transport (e.g. plant and deliveries etc) for the proposed project will by via road. The construction phase for the entire project will lead to 15,340 additional HGV trips (two-way) over the duration of the construction works. Average daily increase of 50 HGV trips per day over a construction period of 12-18 months. This increases to an average of 78 HGV trips per day during the peak month which occurs in month 6 of the programme for HGV traffic. An average workforce of 30 persons is anticipated, increasing to 40 persons during peak periods. This is estimated to give rise to an increase of LGV traffic of 36 trips per day on average rising to 44 trips during peak construction periods which occur for LGV traffic during months 7, 8 and 9. The combined HGV and LGV average daily increase is 85 trips per day throughout the construction programme.	An air quality impact will not occur due to traffic associated with the proposed wind farm. The increase in traffic volumes fall below the screening criteria set out in the UK DMRB guidance (UK Highways Agency 2007). The guidance states that road links meeting one or more of the following criteria can be defined as being 'affected' by a project and should be included in the local air quality assessment: • Road alignment change of 5 metres or more; • Daily traffic flow changes by 1,000 AADT or more; • HGVs flows change by 200 vehicles per day or more; • Daily average speed changes by 10 km/h or more; or • Peak hour speed changes by 20 km/h or more. The combined HGV and LGV average daily increase is 88 trips per day. Therefore, the model is not required in this instance.
Duration of construction, operation, decommissioning / temporal aspects	The planning application is for a 10 year planning permission and 35 year operational life from the date of commissioning of the entire wind farm. The construction phase is estimated at 12-18 months. The decommissioning phase will take no longer than 6 months to complete.	Potential for seasonal displacement of birds due to loss of suitable feeding and/or breeding/wintering habitat during the construction and decommissioning stages. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Potential for seasonal displacement of QI species (i.e. otter) due to disturbance during key seasonal stages of the lifecycle during the construction and decommissioning stages. Disturbance to otter can occur up to 150m from the proposed works area (NRA guidance 2008). Potential for displacement of bird species due to the barrier effect of active wind farms, impacting regular movements or migration routes for migratory bird species causing species to exert more energy going around the site and finding new suitable locations. Potential for collision as the turbines will be much greater in height than the existing surrounding landscape.
In-combination with other plans and projects	The potential impacts of the proposed project are considered in combination with other relevant plans or projects within the zone of influence. A search was undertaken for all projects submitted for consent within the last 5 years. The search radius for large and energy project applications (including wind farms and large infrastructure) was 20km from the wind farm site. The search radius for residential applications was 2km from the wind farm site. The search radius for applications along the GCR and TDR was 250m. There are no proposed wind farms currently within the planning application system and eight operational within 20 km of the wind farm site. Along with six permitted solar farm applications located within 20km of the wind farm site.	If the construction of the proposed project were to occur in parallel with any or all of the projects within the search radius that have connectivity with the same European sites, there is potential for cumulative impacts to occur. The wind farm site and GCR are predominantly located within forestry and agricultural land. Potential impacts could arise if previously fertilised land were to be disturbed and mismanagement allowing nutrients / sediment to escape the site. Cumulative effects could occur if felling and construction activities at the wind farm site are undertaken in parallel with off-site forestry activities (particularly harvesting) and agricultural activities (particularly manure spreading) within the same catchment.

Project Feature	Description	Potential Impact
	Large Scale/Infrastructure Projects include: • upgrades to existing industrial waste water treatment plants (WWTP) • extension to an existing limestone quarry • six mast structure applications including retention and new structures (telecommunications and meteorological masts, ranging from 18-80m in height) • N/M20 Cork to Limerick Road Improvement Scheme The majority of housing consent applications pertain to one-off residential dwelling or farm building along the regional roads. There are also six applications for >20 no. residential units. Cork County Development Plan The County Development Plan is currently under review. The Draft Cork County Development Plan 2022-2028 has recently been published which will ultimately replace the Cork County Development Plan 2014 once adopted. The current plan includes several policies for the protection of wildlife and European sites, encouraging the appropriate assessment of potential effects from future development.	

3. SCREENING FOR APPROPRIATE ASSESSMENT

3.1 Introduction

This section of the report aims to determine if the proposed project is likely to have a significant effect upon European sites either alone or in combination with other plans or projects in view of the site's conservation objectives.

The screening assessment comprises four steps:

1. ascertaining whether the proposed project is directly connected with or necessary to the management of a Natura 2000 site - **The proposed project is not directly connected with or necessary to the management of a European site**;
2. identifying the relevant elements of the proposed project and their likely impacts (refer to Section 2 of this report);
3. identifying which (if any) Natura 2000 sites may be affected, considering the potential effects of the proposed project alone or in combination with other plans or projects(Section 3.2 of this report);
4. assessing whether likely significant effects on European sites can be ruled out, in view of the site's conservation objectives (Section 3.3 of this report).

3.2 Identification of European Sites That May be Affected by the Project

- European Commission Notice (2021) on the 'Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC, states that in identifying European sites (Natura 2000 sites) which may be affected by the project, the following should be identified: any Natura 2000 sites geographically overlapping with any of the actions or aspects of the plan or project in any of its phases, or adjacent to them;
- any Natura 2000 sites within the likely zone of influence of the plan or project. Natura 2000 sites located in the surroundings of the plan or project (or at some distance) that could still be indirectly affected by aspects of the project, including as regards the use of natural resources (e.g. water) and various types of waste, discharge or emissions of substances or energy;
- Natura 2000 sites in the surroundings of the plan or project (or at some distance) which host fauna that can move to the project area and then suffer mortality or other impacts (e.g. loss of feeding areas, reduction of home range);
- Natura 2000 sites whose connectivity or ecological continuity can be affected by the plan or project.

There are no European sites geographically overlapping with any aspects of the project. The Turbine Delivery Route will be along roads which traverse the following European sites:

- Lower River Shannon SAC (002165);
- Barrigone SAC (000432;
- Curraghchase Woods SAC (000174);
- Askeaton Fen Complex SAC (002279).

However, there are no works proposed at these locations for the purpose of turbine delivery and as such the movement of delivery vehicles along the road will have no effects on the European sites.

The European sites within the likely zone of influence (ZoI) of the project were identified having regard to CIEEM(2018) '*Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine'*. This guideline defines the ZoI as *"… the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities*." The likely spatial and temporal biophysical changes associated with the impacts (which was determined with reference to relevant published literature and guidance documents) are set out in Table 2-2. However, as a precautionary approach in defining the ecological features which may be affected, an initial buffer of 15km was first examined using Geographic Information System (GIS) Mapping (refer to *Figure 3-1: European Designated Sites within 15km of the wind farm sit*e and *Figure 3-2: European Designated Sites within 15km of the Replant Lands*) and the conservation interests of these European sites were examined in order to ascertain whether there could be potential physical or ecological connectivity to the Project and the associated likely project impacts. Additionally, any European sites with hydrological connectivity were also identified for further examination. The findings of the ZoI assessment are presented in Table 3-1.

Table 3-1: European Sites Within the Potential ZoI

European Site (code)	List of Qualifying Interest/Special Conservation Interest	Distance from Proposed Project (km)	Within the ZoI Y/N	Considered further in screening Y/N
Blackwater River (Cork/Waterford) cSAC (002170)	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] Margaritifera margaritifera (Freshwater Pearl Mussel) [1029] Austropotamobius pallipes (White-clawed Crayfish) [1092] Petromyzon marinus (Sea Lamprey) [1095] Lampetra planeri (Brook Lamprey) [1096]	0.65km to closest turbine 1.5km in-stream to node 10.5 on TRD route	Drainage ditches within the wind farm site (which flow to the Ardglass and Oakfront rivers) ultimately connect to the SAC downstream Rathnacally Stream adjacent to node 10.5 ultimately connects to the Blackwater River (Cork/Waterford) cSAC downstream. The proposed works along the TDR shall be non-invasive, including being limited to some minor vegetation trimming/ removal. The watercourses in the upper Blackwater catchment which will be crossed by or will be drained to by the proposed wind farm, although outside of the boundary of the SAC, have potential to provide breeding / nursery habitat for the aquatic conservation interests of the SAC. Freshwater aquatic QI habitats (e.g. Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]) and species (e.g. Margaritifera margaritifera (Freshwater Pearl Mussel) [1029], Austropotamobius pallipes (White-clawed Crayfish) [1092] and Salmo salar (Salmon) [1106]) are highly susceptible to potential changes in water quality as a result of potential emissions to air, water and waste emissions. Having regard to the Precautionary Principle and noting the proximity of the onsite drainage ditches (which flow to the Ardglass and Oakfront rivers, ultimately connecting	Y

European Site (code)	List of Qualifying Interest/Special Conservation Interest	Distance from Proposed Project (km)	Within the ZoI Y/N	Considered further in screening Y/N
	Lampetra fluviatilis (River Lamprey) [1099] Alosa fallax fallax (Twaite Shad) [1103] Salmo salar (Salmon) [1106] Lutra lutra (Otter) [1355] Trichomanes speciosum (Killarney Fern) [1421] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002170.pdf		to the Blackwater River (Cork/Waterford) cSAC downstream), it is determined that there is potential for emissions released to the drainage network to ultimately enter the SAC. Therefore the SAC is within the ZoI.	
Ballyhoura Mountains SAC (002036)	Northern Atlantic wet heaths with Erica tetralix [4010] European dry heaths [4030] Blanket bogs (* if active bog) [7130] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002036.pdf	8.2km to closest turbine	No. Having regard to the spatial scale of the potential project impacts set out in Table 2-2 and given the distance of the European site from project, coupled with the fact that there are no mobile conservation interests associated and there is no ecological continuity between these habitats and the project site, the European Site is assessed as outside of the ZoI of the project.	N
Kilcolman Bog SPA (004095)	Whooper Swan (Cygnus cygnus) [A038] Teal (Anas crecca) [A052] Shoveler (Anas clypeata) [A056] Wetland and Waterbirds [A999] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004095.pdf	9.1km to closest turbine	The SCI bird species are susceptible to habitat loss, noise and human presence during the construction stage. During the operational stage the SCI bird species are highly susceptible to collision risk with turbine towers, blades (moving or stationary) and/or associated infrastructure and the barrier effect to regular movements. The proposed site is outside the core feeding range (a defined range according to SNH 2016 and Johnson et al 2014) of the SCI species of Kilcolman Bog SPA.	Y

European Site (code)	List of Qualifying Interest/Special Conservation Interest	Distance from Proposed Project (km)	Within the ZoI Y/N	Considered further in screening Y/N
			Core feeding range: • Whooper swan up to 5km • Teal up to 8.4km • Shoveler up to 2.5km However, the primary site identified for Whooper Swan in the area was the Blackwater River SAC/Annagh Bridge, where flocks of this species have been observed feeding on improved agricultural grassland fields c. 1 km south of the proposed wind farm site. Flock sizes ranged between 6-107 birds (averaging 45 birds), recorded on seven occasions over winter 2019-20 and winter 2020-21 undertaken by FT. The primary site for Teal was identified as a Large Quarry Lake (Ballinadrideen) c. 2km east of the proposed wind farm site. Therefore, in adopting the Precautionary Principle it is considered that SCI for Kilcolman Bog SPA are within the ZoI.	
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161)	Hen Harrier (Circus cyaneus) [A082] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004161.pdf	17.8km to closest turbine	Hen Harrier have been observed within and without the site study area. There is no indication the species breeds on site or uses the site as a habitual winter roost. The site is also beyond the core feeding range of 2km to 10km (a defined range according to SNH (2016)) of the SCI of the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (closest SPA designated for this species).	Y

European Site (code)	List of Qualifying Interest/Special Conservation Interest	Distance from Proposed Project (km)	Within the ZoI Y/N	Considered further in screening Y/N
			However, in adopting the Precautionary Principle it is considered that the SCI for the **Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA** may be present on site. As such it is assessed that the **Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA** is within the ZoI.	
River Shannon and River Fergus Estuaries SPA (004077) and Lower River Shannon SAC (002165)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	1.8km (1.7 km in-stream) from Replant Lands	The Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA are located 1.7km (in-stream) downstream of the replant lands. Due to the slow flowing, settling nature of the onsite drainage network acting similar to siltation ponds, emissions to water are expected to settle within the drains before entering the Emlagh-27 (which is ultimately connected to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA) However, in adopting the Precautionary Principle it is considered that the aquatic qualifying features of the Lower River Shannon SAC may be present in the Emlagh-27. As such it is assessed that the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA are within the ZoI. The existing habitats on the replant lands site are unsuitable for SCI birds of the Shannon and River Fergus Estuaries SPA. However the proposed replant land site is inside the core range (a defined range according to SNH (2016)) of the SCI species of Shannon and River Fergus Estuaries SPA. The shortest foraging range is 1.3km and the greatest is 15km for the SCI's.	Y

European Site (code)	List of Qualifying Interest/Special Conservation Interest	Distance from Proposed Project (km)	Within the ZoI Y/N	Considered further in screening Y/N
			Therefore adopting the Precautionary Principle it is considered that the SCI birds species dependent on the aquatic species of the watercourses (prey) may be indirectly impacted due to changes in prey levels. As such it is assessed that the River Shannon and River Fergus Estuaries SPA is within the ZoI. Otter are assumed present within the Emlagh 27 watercourse. Therefore adopting the Precautionary Principle it is considered that the QI species may be impacted through disturbance or indirectly impacted due to changes in prey levels. As such it is assessed that the Lower River Shannon SAC is within the ZoI.	
Tullaher Lough and Bog SAC (002343)	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Transition mires and quaking bogs [7140] Depressions on peat substrates of the Rhynchosporion [7150] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002343.pdf	1.3km from Replant Lands	No – Having regard to the spatial scale of the potential project impacts set out in Table 2-2 and given the distance of the European site from project, coupled with the fact that there are no mobile conservation interests associated and there is no ecological continuity between these habitats and the project site, the European Site is assessed as outside of the ZoI of the project.	N
Kilkee Reefs SAC (002264)	Large shallow inlets and bays [1160] Reefs [1170] Submerged or partially submerged sea caves [8330] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002264.pdf	5.1km from Replant Lands	No Having regard to the spatial scale of the potential project impacts set out in Table 2-2 and given the distance of the European site from project, coupled with the fact that there are no mobile conservation interests associated and there is no ecological continuity between these habitats and the project site, the European Site is assessed as outside of the ZoI of the project.	N

European Site (code)	List of Qualifying Interest/Special Conservation Interest	Distance from Proposed Project (km)	Within the ZoI Y/N	Considered further in screening Y/N
Mid-Clare Coast SPA (004182)	7 SCI bird species 1 QI habitat https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004182.pdf	6.2km from Replant Lands	No –the replant lands are unsuitable for the SCI features e.g. waders, geese and cormorants who generally use coastal sites and large bodies of water (Balmer *et al* 2013)	N
Carrowmore Dunes SAC (002550)	Reefs [1170] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Vertigo angustior (Narrow-mouthed Whorl Snail) [1014] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002250.pdf	6.3km from Replant Lands	No- Having regard to the spatial scale of the potential project impacts set out in Table 2-2 and given the distance of the European site from project, coupled with the fact that there are no mobile conservation interests associated and there is no ecological continuity between these habitats and the project site, the European Site is assessed as outside of the ZoI of the project.	N
Carrowmore Point to Spanish Point and Islands SAC (001021)	Coastal lagoons [1150] Reefs [1170] Perennial vegetation of stony banks [1220] Petrifying springs with tufa formation (Cratoneurion) [7220] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001021.pdf	10.2km from Replant Lands	No - Having regard to the spatial scale of the potential project impacts set out in Table 2-2 and given the distance of the European site from project, coupled with the fact that there are no mobile conservation interests associated and there is no ecological continuity between these habitats and the project site, the European Site is assessed as outside of the ZoI of the project.	N
Illaunonearaun SPA (004114)	Barnacle Goose (Branta leucopsis) [A045] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004114.pdf	11.6km from Replant Lands	No – the replant lands are unsuitable for barnacle goose who feed on coastal grassland and seashores (Balmer *et al* 2013)	N

Having further examined the likely spatial and temporal biophysical changes associated with the project impacts, it was determined that the following European Sites are within the ZoI of the project:

- Blackwater River (Cork/Waterford) cSAC,
- Kilcolman Bog SAC
- Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA
- Lower River Shannon SAC
- River Shannon and River Fergus Estuaries SPA

Once the ZoI is defined, an assessment must be made of the sensitivity of the qualifying interests to such impacts and as such the potential for significant effects. To that end, a 'Source-Pathway-Receptor' model was applied to determine European sites which may potentially be significantly affected having regard to the pathway for impact and the sensitivity of the conservation interests to the effect of the impact (see Tables 3-3 to Table 3-5).

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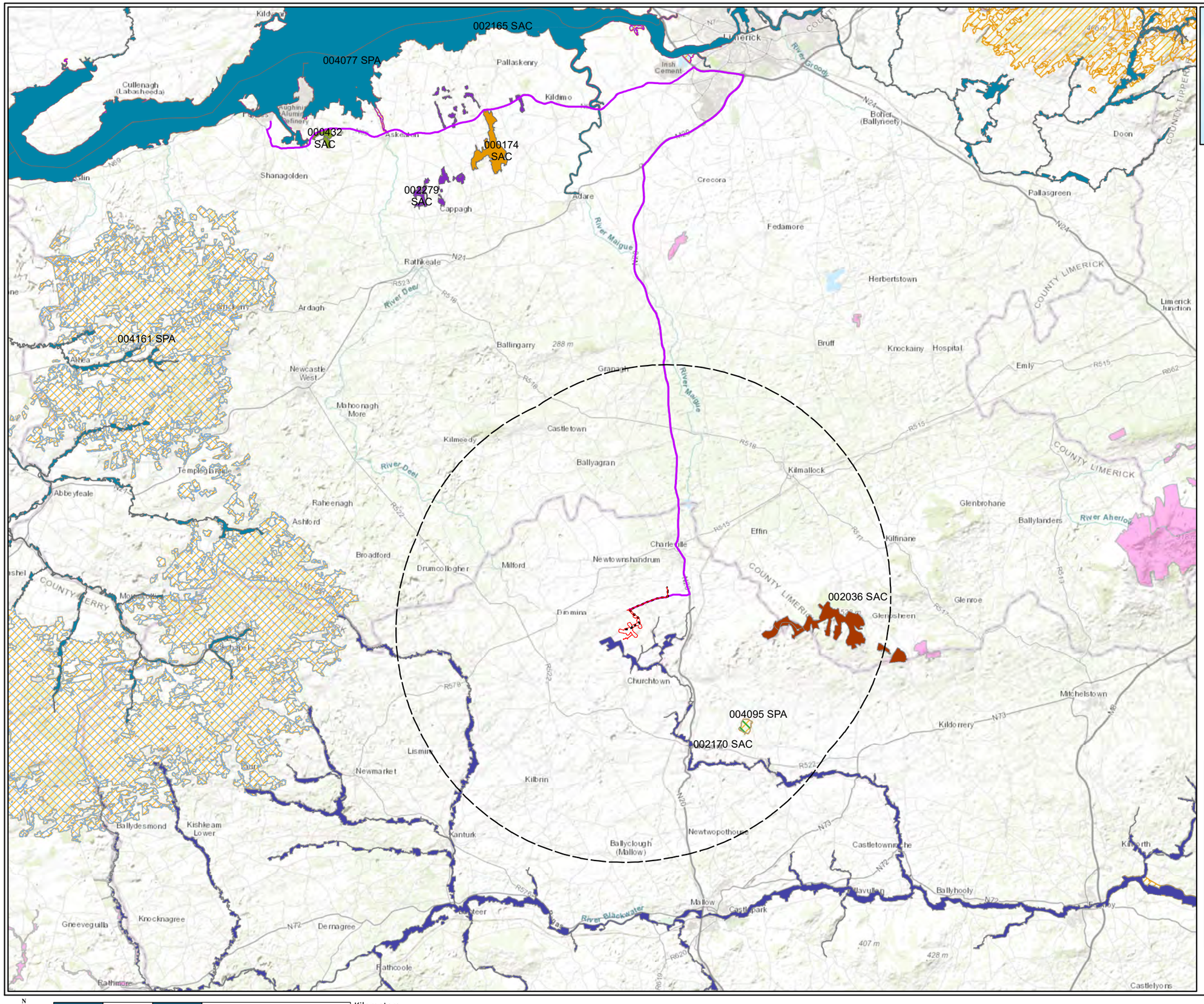

N
W E
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0 5 10 20 Kilometers

TITLE: European Sites within the Zone of Interest (ZoI)			
PROJECT: Annagh Wind Farm, Co. Cork			
FIGURE NO:	3.1		
CLIENT:	EMPower		
SCALE:	1:250000	**REVISION:**	0
DATE:	14/10/2021	**PAGE SIZE:**	A3

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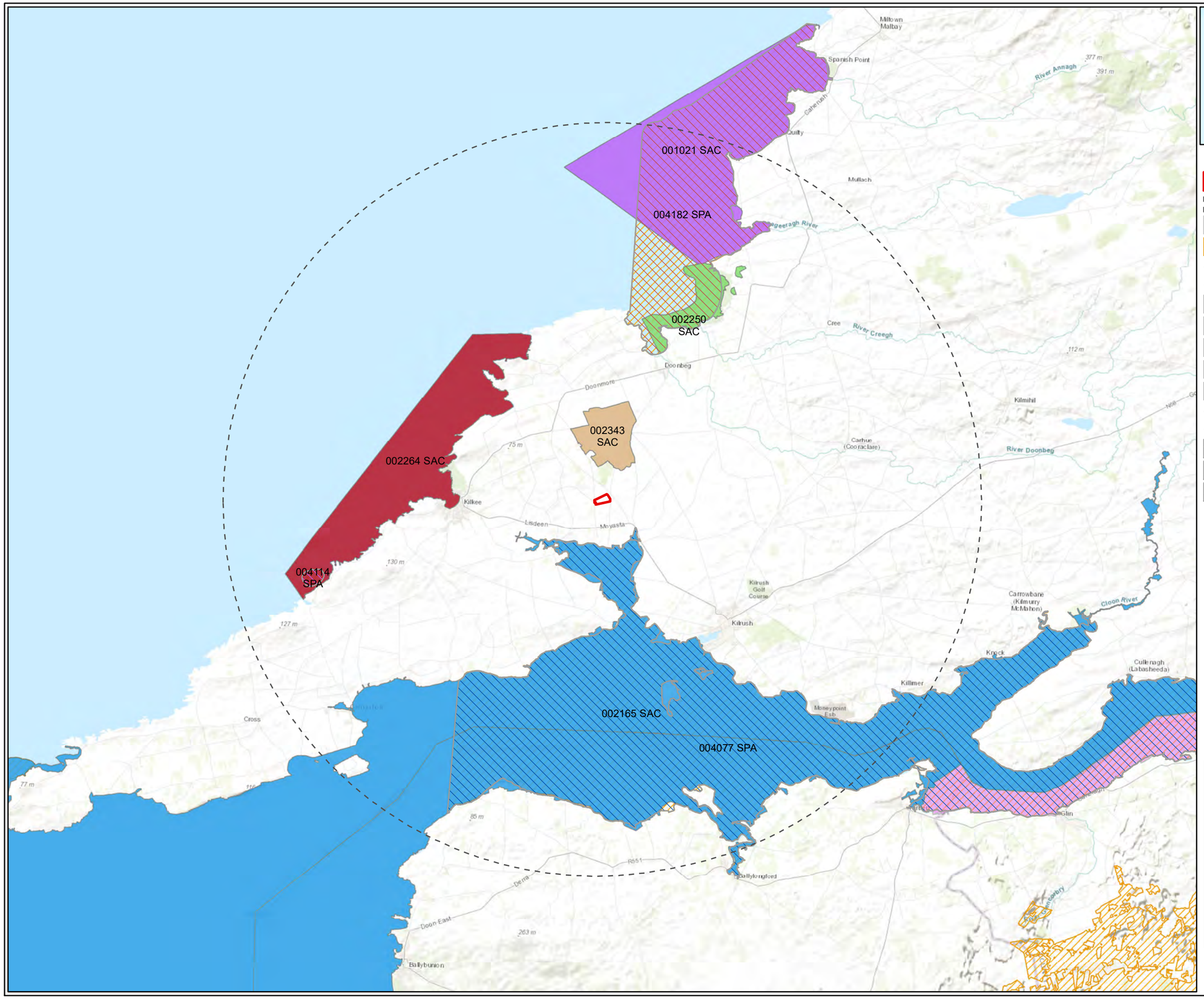
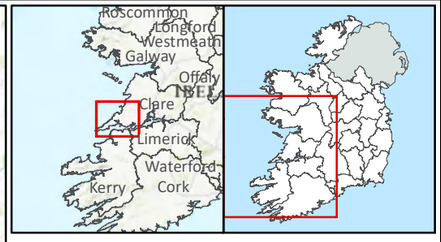
Path: R:\Map Production\2020\P2359\Workspace\EIAR\P2359_GIS_Fig3-2_ReplantLands_A3.mxd





Legend

- Emlagh Replant Lands
- Emlagh Replant Lands 15km Buffer
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)

SACs within 15km Buffer

Site Code and Site Name:

- 001021: Carrowmore Point To Spanish Point And Islands SAC
- 002165: Lower River Shannon SAC
- 002250: Carrowmore Dunes SAC
- 002264: Kilkee Reefs SAC
- 002343: Tullaher Lough And Bog SAC

SPAs within 15km Buffer

Site Code and Site Name:

- 004077, River Shannon and River Fergus Estuaries SPA
- 004114, Illaunonearaun SPA
- 004182, Mid-Clare Coast SPA

N W E S

0 2.5 5 10 15 Kilometers

TITLE: Designated Sites within 15km of the Replant Lands

PROJECT: Annagh Wind Farm, Co. Cork

FIGURE NO:	3.2		
CLIENT:	EMPower		
SCALE:	1:150000	**REVISION:**	0
DATE:	20/08/2021	**PAGE SIZE:**	A3

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3.3 Assessment of Likely Significant Effects

3.3.1 Source-Pathway-Receptor Assessment & Potential for Significant Effects

The Office of the Planning Regulator's Practice Note PN01 recommends that the zone of influence of a project should be considered using the Source-Pathway-Receptor model.

European sites which may potentially be significantly affected by the proposed project are identified using the 'source-pathway-receptor' (S-P-R) conceptual model. The S-P-R model is a standard tool in environmental assessment to determine links between sensitive features and sources of impacts. In order for an effect to occur, all three elements of this mechanism must be in place. The absence of one of the elements of the mechanism means there is no likelihood for the effect to occur e.g. if there is no ecological pathway or functional link between the proposed development and the European site, there is no potential for impact and as such no potential for significant effects.

An impact may occur without having a significant effect. An impact is essentially the 'source' in the S-P-R assessment. It is the biophysical change caused to the environment by the project e.g. increase in sediment runoff due to ground disturbance. For the effect to be significant, the Qualifying Interests / Special Conservation Interests of the European site must be sensitive to the biophysical change. The likely impacts of the proposed project are set out in Section 2.10 of this report. The European sites within the Zone of Influence of these impacts are determined as outlined in Table 3.1. The potential for the proposed project to have significant effects on the aforementioned European sites are assessed hereunder on the basis of the source-pathway-receptor connectivity, and the sensitivity of the European sites qualifying interests to the effects of the impacts: *Table 3-3: Potential for Significant Effects from the Site and GCR, Table 3-4: Potential for Significant Effects from the TDR* and *Table 3-5: Source-Pathway-receptor Assessment for Replant Lands* respectively.

Table 3-2: Potential for Significant Effects from the Site and GCR

Source	Pathway	Receptor	Potential for Significant Effects
Land take during construction The main wind farm Site will comprise the construction of the foundations for the 6 no. turbines and 1 no. permanent met mast along crane areas; new/upgrading of site tracks and associated drainage infrastructure; re-use or upgrading of existing and installation of new watercourse or drain crossings; and the construction of the electrical substation and associated compounds. The associated GCR will consist entirely of underground 38kV cable which will be laid within the existing road corridor or within private lands.	The onsite drainage ditches which flow to the Ardglass and Oakfront rivers, ultimately connect to the Blackwater River (Cork/Waterford) cSAC c. 0.65km and 0.74km downstream of the wind farm site and GCR respectively. The Blackwater River (Cork/Waterford) cSAC is designated for several aquatic species. Refer to Table 3-1 for the full list of pathways identified from the proposed project with potential to alter the physicochemical conditions of the Ardglass and Oakfront rivers which also have potential for similar effects in the downstream Blackwater River (Cork/Waterford) cSAC.	Given that the impact pathway is a hydrological one, the qualifying interests of the SAC which may be vulnerable to such impact are the aquatic habitats and species. The aquatic qualifying interests of the SAC require particular environmental conditions such as physical habitat structure and water quality to support their conservation objectives within the SAC. The release of sediment or pollutants to the Ardglass and Oakfront rivers could potentially impact the attributes needed to support the qualifying interests.	Potential for Significant Effects
Dust Earth works and movement of materials during construction of the site and GCR; and decommissioning of the site will generate dust.			Potential for Significant Effects
Emissions to Water Potential emissions to the local watercourse network from surface water include: • Inappropriately managed / located o Stockpiled materials (including brash) o Excavated materials o Wet concrete o Wash down areas o Municipal waste o Extraction racks • Pumped water from trenches (ingress of ground water) during excavation works • Exposed topsoil (e.g. newly laid areas) • Hydrocarbons • Previous land management practices. • New hardstanding redirecting surface water to new drainage network instead of allowing it enter the ground water table or existing drainage network			Potential for Significant Effects
In-combination with other plans and projects **Cumulative effects could occur if felling and construction activities at the wind farm site are undertaken in parallel with other projects including off-site forestry activities (particularly harvesting) and agricultural activities (particularly manure spreading) within the same catchment, ultimately adding potential nutrients to the Blackwater River (Cork/Waterford) cSAC and further impacting the aquatic qualifying interests.**			Potential for Significant Effects
Disturbance to bird species Construction will require the permanent loss of habitat, including felling of plantation areas and clearing of grassland and wetland habitats, within and around the wind farm infrastructure. The operation of the site will comprise 6 no. wind turbines with a tip height of 175m and **hub height of 100m**. The turbines will be much greater in height than the surrounding landscape.	There is potential for the disturbance/displacement of bird species during the construction stage through habitat loss, noise and human presence. As the turbines will be much greater in height than the surrounding landscape, there is potential for collision with turbine towers, blades (moving or stationary) and/or associated infrastructure; or a barrier effect to regular movements of species within the area of the turbines.	Given that the impact pathway is for migratory species, the SCI of the SPA may be vulnerable to such impacts. The displacement of birds from areas within and surrounding developments can effectively amount to habitat loss (Drewitt, A. L. and Langston, R. H., 2006). If a habitat is therefore avoided as a result of the disturbance, then effective habitat loss can occur.	Potential for Significant Effects

Source	Pathway	Receptor	Potential for Significant Effects
Noise levels within the site will increase during construction and decommissioning. The level of disturbance through noise generation is greater than the existing baseline environment.	The Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA is designated for Hen Harrier, which has been observed within and without the site. The Kilcolman Bog SPA is designated for SCI bird species that have been observed within 1km of the site.		

Table 3-3: Potential for Significant Effects from the TDR

Source	Pathway	Receptor	Potential for Significant Effects
Emissions to Water Potential emissions to the Rathnacally Stream **at Point of interest (POI) 5** from surface water include: • Inappropriately managed / located o Excavated materials o Wet concrete • Pumped water from trenches (ingress of ground water) during excavation works • Hydrocarbons • Invasive non-native species (INNS) The works proposed to be undertaken at **POI 5** are hedgerow trimming and the lowering of a wall to facilitate oversail. Therefore in-stream works are not required and any potential impacts will be minor and short term (less than 1 day).	The onsite drainage ditches which flow to the Ardglass and Oakfront rivers, ultimately connect to the Blackwater River (Cork/Waterford) cSAC c. 0.65km and 0.74km downstream of the site and GCR respectively. The Blackwater River (Cork/Waterford) cSAC is designated for several aquatic species. Inappropriate site management of excavations and accidental spillages could lead to loss of silt laden run-off, suspended solids and/or pollution and as such has potential to alter the physicochemical conditions of the Rathnacally Stream with potential for similar effects in the c. 1.5km downstream Blackwater River (Cork/Waterford) cSAC. However, the works proposed at this location are minor and short term (expected to be less than 1 day), therefore potential impacts will be limited and short term.	Given the works are short term and minor and do not include any in-steam works, emissions to water are expected to be assimilated into the stream bed before reaching the Blackwater River (Cork/Waterford) cSAC.	No potential for Significant Effects

Table 3-4: Source-Pathway-receptor Assessment for Replant Lands

Source	Pathway	Receptor	Potential for Significant Effects
Emissions to Water Any emissions due to excavation (mounding) is discharged into the existing drainage system. Surface water drainage from the site is collected in a series of collector drains and is directed to the Emlagh-27 (which is ultimately connected to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA). As part of the operation of the replant lands, new surface water drains will be constructed and will tie into the existing drainage which flows to the Emlagh-27.	The onsite drainage ditches which flow to the Emlagh-27, ultimately connect to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA c. 1.7km (insteam) downstream of the replant lands. The Lower River Shannon SAC is designated for several aquatic species and the River Shannon and River Fergus Estuaries SPA is designated for bird species which feed within the Lower River Shannon SAC and surrounding area. Inappropriate site management of excavations and accidental spillages could lead to loss of silt laden run-off, suspended solids and/or pollution and as such has potential to alter the physicochemical conditions of the Emlagh-27 with potential for similar effects in the Lower River Shannon SAC.	Given that the impact pathway is a hydrological one, the qualifying interests of the Lower River Shannon SAC which may be vulnerable to such impact are the aquatic habitats and species. The aquatic qualifying interests of the SAC require particular environmental conditions such as physical habitat structure and water quality to support their conservation objectives within the SAC. The release of sediment or pollutants to the Emlagh-27 could potentially impact the attributes needed to support the qualifying interests.	Potential for Significant Effects
Disturbance The planting schedule will generate noise through the use of plant machinery and human presence on the replant lands site.	There is potential for the disturbance/displacement of otter and bird species during the planting stage through habitat loss, noise and human presence.	The displacement of birds from areas within and surrounding the replant lands can effectively amount to habitat loss (Drewitt, A. L. and Langston, R. H., 2006). If a habitat is therefore avoided as a result of the disturbance, then effective habitat loss can occur. The aquatic qualifying interests of the Lower River Shannon SAC, in this case otter, require particular environmental conditions such as physical habitat structure and water quality to support their conservation objectives within the SAC. The disturbance through noise could potentially impact the attributes needed to support the qualifying interest.	Potential for Significant Effects

3.4 Conclusion Regarding Likely Significant Effects

The competent authority shall determine that an appropriate assessment of a proposed development is required if it cannot be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site.

In conclusion it cannot be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on the following European sites:

- Blackwater River (Cork/Waterford) cSAC (002170)
- Kilcolman Bog SPA (004095)
- Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161)

It can be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on the following European sites:

- Ballyhoura Mountains SAC (002036)
- River Shannon and River Fergus Estuaries SPA (004077) and Lower River Shannon SAC (002165)
- Tullaher Lough and Bog SAC (002343)
- Kilkee Reefs SAC (002264)
- Mid-Clare Coast SPA (004182)
- Carrowmore Dunes SAC (002550)
- Carrowmore Point to Spanish Point and Islands SAC (001021)
- Illaunonearaun SPA (004114)
- Lower River Shannon SAC (002165)
- Barrigone SAC (000432)
- Curraghchase Woods SAC (000174)
- Askeaton Fen Complex SAC (002279)

Therefore, these sites have been ‘Screened Out’ at Stage One of the AA process.

4. NATURA IMPACT STATEMENT

4.1 Introduction

The screening assessment (Section 3 of this report) carried out to determine the likelihood of significant effects on European sites from the proposed development has concluded as follows:

There is the possibility that there could be negative effects on the Blackwater River (Cork/Waterford) cSAC, Kilcolman Bog SPA and the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA as a result of indirect effects from the proposed project. In the absence of mitigation measures (which have not been considered at the screening stage), likely significant effects on the qualifying interests of the Blackwater River (Cork/Waterford) cSAC, Kilcolman Bog SPA and the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA cannot be excluded on the basis of objective scientific information. The likely pathway of the impacts are via:

- Blackwater River (Cork/Waterford) cSAC,
  - Land take during construction
  - Dust emissions
  - Emissions to Water
- Kilcolman Bog SPA
  - Disturbance to bird species
- Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA
  - Disturbance to bird species
- Lower River Shannon SAC
  - Emissions to Water
- River Shannon and River Fergus Estuaries SPA
  - Emissions to Water
  - Disturbance to bird species

Further consideration is given in this Natura Impact Statement (NIS) to the elements of the proposed project which might have adverse effects on the integrity of the aforementioned European sites with respect to each site's conservation objectives.
Due to the works proposed along the TDR no potential for significant effects were identified during the appropriate assessment screening, therefore the TDR route has not been carried forward within the Stage 2 Appropriate Assessment (Natura Impact Statement).

Refer to section 2 for the project description and baseline environment.

4.2 European Site Description

4.2.1 Blackwater River (Cork/Waterford) cSAC

The River Blackwater is one of the largest rivers in Ireland, draining a major part of Co. Cork and parts of counties Kerry, Limerick, Tipperary and Waterford. In total, the Blackwater is 169 km long and has a total catchment area of 3,324 km^2. The Blackwater rises in the east Kerry uplands where Namurian grits and shales build the low heather-covered plateaux. In the lowlands in the Mallow district it passes over limestone and later cuts through ridges of Old Red Sandstone to the south of Cappoquin. Main tributaries include the Rivers Lickey, Bride, Allow and Awbeg.

The cSAC supports important examples of a range of Annex I habitats, notably estuaries, intertidal mudflats and sandflats, perennial vegetation of stony banks, salt meadows, floating river vegetation, alluvial forests and oak woodlands. Most of these are of good quality and extensive in area. The Blackwater system is an important salmonid fishery and is of high conservation value for Atlantic salmon. Also supports important populations of lamprey (brook, river and sea) and twaid shad. Substantial populations of freshwater pearl mussel occur, while white-clawed crayfish is found in the Awbeg River. Otter is widespread throughout the cSAC and has been subject to detailed surveys. Killarney fern occurs at one location. Annex I bird species present in the cSAC include breeding little egret (*Egretta garzetta*), kingfisher (*Alcedo atthis*) and peregrine (*Falco peregrinus*) and wintering whooper swan and golden plover. A good diversity of other winter waterfowl species also occurs.

The main threats and pressures which may impact the Blackwater River (Cork/Waterford) cSAC are set out in the Natura 2000 Data Form and are presented in *Table 4-1: Threats, Pressures and Activities with Impacts on the Blackwater River (Cork/Waterford) cSAC.*

The qualifying interests of the cSAC and their potential to occur within the Awbeg sub-catchment survey area, including the Awbeg River (west), Ardglass River, Oakfront River and Rathnacally Stream are presented in *Table 4-2: Summary of the potential occurrence of qualifying interests of the Blackwater River (Cork/Waterford) cSAC within the Awbeg sub-catchment survey area*

Table 4-1: Threats, Pressures and Activities with Impacts on the Blackwater River (Cork/Waterford) cSAC

High Level (inside site)	High Level (outside site)	Medium Level (inside site)	Medium Level (outside site)	Low Level (inside site)	Low Level (outside site)
A04: grazing	A04: grazing	F02.03: Leisure fishing	E02: Industrial or commercial areas	G01.01: motorized nautical sports	C01.01: Sand and gravel extraction
A08: fertilization	A08: fertilization	I01: fire and fire suppression	J02.01: Landfill, land reclamation and drying out, general	J02.01: Landfill, land reclamation and drying out, general	G02: Sport and leisure structures
A03: mowing / cutting of grassland			B: Sylviculture, forestry	D01.04: railway lines, TGV	
			E01: Urbanised areas, human habitation	D01.02: roads, motorways	
			I01: fire and fire suppression	B: Sylviculture, forestry	
				E03.01: disposal of household / recreational facility waste	
				K01.01: Erosion	

Source: Blackwater River (Cork/Waterford) SAC (002170) Natura 2000 Data Form, https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF002170.pdf

4.2.1.1 Watercourses associated with the wind farm site, GCR and TDR

The Annagh wind farm site, GCR and nodes 9 to 10.11 are within the Southwestern River Basin District and within hydrometric area 18 (Blackwater (Munster)).

The following watercourses drain the wind farm site, GCR and TDR:

The Fiddane Stream is a small 1st order watercourse, historically modified tributary of the Ardglass River which runs along the north-western land ownership boundary for approx. 0.5km

The Ardglass River is a small 2nd order watercourse, historically modified tributary of the Awbeg River. The short watercourse (2.6km length) is fed by the 1st order watercourses the Ardglass 18 and Fiddane and flows in a loosely north-south direction, forming the western land ownership boundary. The lowermost c.1km point of the river is also the uppermost boundary of the Blackwater River SAC (002170) along this watercourse.

The Oakfront River is a small 2nd order watercourse, historically straightened tributary of the Awbeg River. The Oakfront if fed by the 1st order watercourses the Oakfront, Rea's Cross Roads and Milltown 18, north of the proposed wind farm and flows through the centre of the site in a loosely north-south direction. The lowermost 1.3km point of the river is also the uppermost boundary of the Blackwater River SAC (002170) along this watercourse.

The Rathnacally Stream is a small 1st order watercourse, historically straightened tributary of the Awbeg River (east branch). The GCR crosses this watercourse via a local road bridge at Rathnacally, near Ardnageehy Cross Roads. Works will be required at Node 10.5 of the TDR, in proximity to the Rathnacally Stream on the L1322.

The Awbeg River (west branch) is a 4th order watercourse and is the major watercourse associated with the proposed Annagh wind farm site, GCR and TDR. The watercourses associated with the wind farm site all flow into the Awbeg River (east and west branches). The convergent points for the Ardglass and Oakfront are on the western branch at Annagh Bridge (c. 1km south of the study boundary) and south of the bridge at Coolcaum (c. 1.3km) respectively. The Rathnacally Stream adjoins the main (western) branch of the Awbeg at Scart Bridge (c. 5km south of the GCR crossing point). The Awbeg flows in a loosely north-west-south-east direction and converges with the River Blackwater south of Castletownroche, approx. 37.5km downstream of the proposed wind farm site. Much of the river's course is located within the Blackwater River SAC (002170)

4.2.1.2 The Awbeg (Buttevant) sub-catchment

The wind farm site, GCR and TDR are hydrologically connected to the Awbeg River (west branch). There are no other stream crossings outside this sub-catchment.

There are two contributories of the Awbeg. The first rises in County Limerick as the Gralgne River and enters County Cork a half mile north-east of Ardskeagh Cross Roads, then flows west under a railroad bridge and south under Farran bridge on the Buttevant/Charlevllle road.

The second branch rises about two miles north of Liscarroll and flows south and then north and west under Annagh Bridge to join the first branch at Scart Bridge.

From there, the river flows south through Buttevant and east through Doneraile, turns south near Shanballymore and through Castletownroche to enter the Blackwater at Poulcormac near Bridgetown Abbey.

North of Buttevant the river flows through flat agricultural land, while south of Buttevant the river generally flows through a narrow, steep-sided valley with wooded sides.

The Awbeg River (west branch) forms part of the Blackwater River (Cork/Waterford) cSAC c.1.5km west of the closest turbine, while the Awbeg River (east branch) forms part of the Blackwater River (Cork/Waterford) cSAC c. 3.8km east of the closest turbine, east of Farran bridge.

The watercourses on which the aquatic survey sites were located are typically small, lowland depositing channels (FW2; Fossitt, 2000) which had been historically straightened and deepened as part of arterial drainage works. Land use practices in the wider survey area were dominated by agricultural pasture (CORINE 231) with localised pockets of broadleaved forests (311) and, less so, coniferous forests (312).

The following outlines the available water quality data obtained from the EPA open data website. Only recent EPA water quality (i.e. since 2018) is summarised below. There were no existing EPA biological monitoring data available for the Fiddane Stream (EPA code: 18F19), Ardglass River (18A23), Oakfront River (18O02) or Rathnacally Stream (18R32).

In the vicinity of the survey area, there was a total of two EPA biological monitoring stations on the Awbeg which have been recently monitored (since 2018 by the EPA). The uppermost of these (station code: RS18A090400) was located at survey site A3 (Annagh Bridge). This site achieved Q2-3 (poor status) water quality in 2018 by the EPA and thus failed to meet target good status (≥Q4) as set out under Water Framework Directive (2000/60/EC). However, station RS18A050550 (L1320 road crossing), located approx. 4km downstream of survey site A3 achieved Q4 (good status) water quality in 2018.

The WFD River Waterbodies Risk upstream of Annagh Bridge (on the south west boundary of the study area), the Awbeg (including the Ardglass River) was ‘at risk’ according to the EPA. Downstream of this point the River Waterbodies Risk for the Awbeg (Buttevant)_010 sub-catchment, which included the Awbeg River, Oakfront River, Milltown Stream and Rathnacally Stream, was ‘under review’ at the time of survey. The River Waterbody WFD Status for this sub-catchment in 2013-2018 period was ‘good’. It should be noted that the Oakfront status is currently unassigned.

According to the EPA, significant pressures along the Awbeg River (west) up and downstream of the confluent points of the Ardglass River, Oakfront River and Rathnacally Stream include agriculture (nutrient and organic pollution) and hydromorphology (sediment/siltation pollution and alteration to the physical environment).

Refer to Figure 4.1 for the map of waterbody catchments and watercourses

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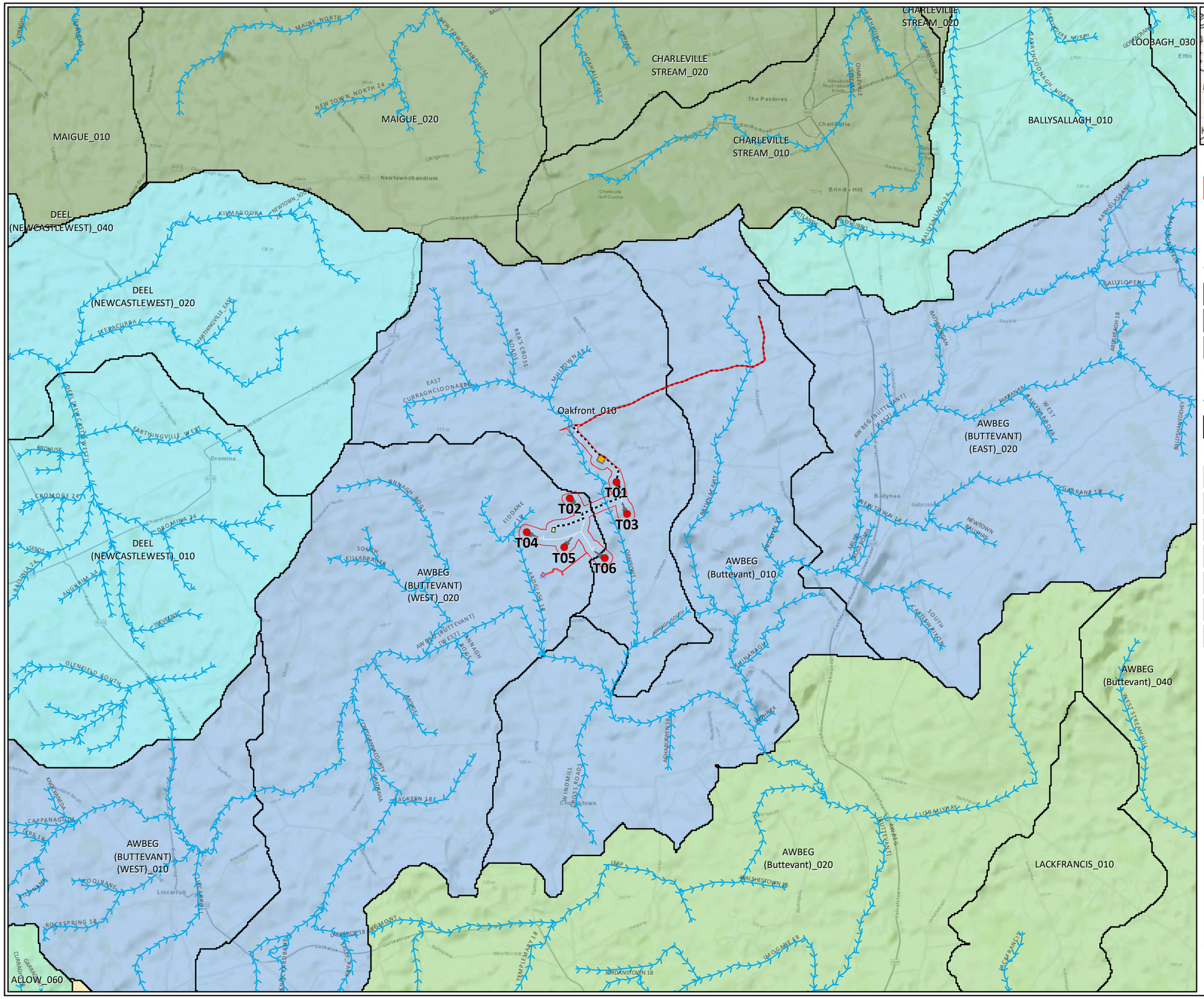

Legend

- Site Boundary
- Turbine Layout
- Met Mast
- Underground Cable Route
- Substation
- Construction Compound
- Turbine Hardstanding
- Site Internal Roads
- Rivers
- WFD River Sub Basins

WFD Sub Catchments

- Awbeg[Buttevant]_SC_010
- Awbeg[Buttevant]_SC_020
- Blackwater[Munster]_SC_060
- Dalua_SC_020
- Deel[Newcastlewest]_SC_010
- Maigue_SC_010
- Maigue_SC_020

TITLE: Waterbody Catchments			
PROJECT: Annagh Wind Farm, Co. Cork			
FIGURE NO:	4.1		
CLIENT:	EMPower		
SCALE:	1:50000	**REVISION:**	0
DATE:	15/10/2021	**PAGE SIZE:**	A3

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4.2.1.3 Aquatic Surveys

A suite of aquatic ecological surveys were undertaken by Triturus Environmental Ltd in September 2020 and April 2021, these included:

- Habitat Assessment
  - Physical watercourse/waterbody characteristics (i.e. width, depth etc.)
  - Substrate type, listing substrate fractions in order of dominance (i.e. bedrock, boulder, cobble, gravel, sand, silt etc.)
  - Flow type, listing percentage of riffle, glide and pool in the sampling area
  - An appraisal of the macrophyte and aquatic bryophyte community at each site
  - Riparian vegetation composition
- Catchment-wide electro-fishing
- White-clawed crayfish survey
- eDNA analysis (carried out in April 2021) for white-clawed crayfish and crayfish plague
- Freshwater pearl mussel survey
- Biological water quality (Q-sampling)
- Otter survey

Refer to Appendix 4 for the Aquatic Report and all associated methodologies used to undertake surveys.

4.2.1.3.1 Desktop study undertaken for the proposed project

A sensitive species data request of aquatic interest was submitted (20th January 2021) to the National Parks and Wildlife Service for the 10km grid squares containing and adjoining the proposed wind farm development (i.e. R41, R50, R51, R52 & R60) and was received on the 26th January 2021. Records for a number of rare or protected species were available although most did not overlap directly with the survey area.

Numerous records for white-clawed crayfish (*Austropotamobius pallipes*) were available from the Awbeg River. In the vicinity of the Awbeg [Buttevant]_SC_010 sub-catchment, the majority of crayfish records were for the Awbeg River (east branch), however, a low number of records were available for Annagh Bridge and the L1320 road bridge (2003-2012 period). The nearest crayfish record to the proposed wind farm with potential hydrological connectivity was at Annagh Bridge on the Awbeg River, located approx. 1.7km from the turbine T4 hardstand via the Ardglass River (c. 180m over-land and then c. 1.5km in-stream).

A single sea lamprey (*Petromyzon marinus*) record (spawning) was available for the Awbeg River (east branch) at Longford Bridge from NBDC. However, this location did not share any downstream hydrological connectivity with the proposed project (refer to Figure 3.1 of Appendix 4).

Although located within the Munster Blackwater *Margaritifera* sensitive area, there were no freshwater pearl mussel (*Margaritifera margaritifera*) records available for the respective 10 km search radius. The nearest downstream freshwater pearl mussel record was in the vicinity of Ballyhooly on the River Blackwater, >45km instream distance from the proposed wind farm site. Please refer to the freshwater pearl mussel report in Appendix B of the aquatic report (included in Appendix 4 of this report) for further details.

The closest records for otter (*lutra lutra*) with regards to the wind farm site and GCR are that of Annagh bridge (confluence of the Ardglass River and the Awbeg River) and Annagh South, near Churchtown (on the Oakfront River).

4.2.1.3.2 Results of surveys undertaken for the proposed project

Fish Surveys

Four species of fish were observed in total, namely: Lamprey sp., European Eel (*Anguilla anguilla*), Brown Trout (*Salmo trutta*) and Three-spined Stickleback (*Gasterosteus aculeatus*). All Lamprey records were located on the Oakfront River within the study boundary and on the northern most section of the Blackwater River (Cork/Waterford) cSAC of the Oakfront River.

Freshwater Pearl Mussel

No Freshwater Pearl Mussel or suitable habitats for this species were recorded within the study area during the aquatic surveys.

White-clawed Crayfish

No White-clawed Crayfish were detected within the study area; however, eDNA sampling undertaken c. 3km downstream of the wind farm site, indicated the presence of this species at cryptically low densities in both branches of the Awbeg river. As such this species is assumed to be present in the aquatic receiving environment of the wind farm and GCR.

Biological water quality

All 7 no. sampling locations surveyed achieved between Q2 (bad status) and Q3 (poor status). Two of the survey sites were not surveyed due to unsuitability of the channel for biological sampling.

Annex I Habitat

No aquatic flora communities with to the Annex I habitat '*Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation*' (3260) (i.e. 'floating river vegetation'), nor any other Annex 1 habitats, were present at any of the 11 no. survey locations.

Non-native invasive species

No invasive aquatic species were recorded during aquatic surveys at any of the 11 no. sampling points. The non-native species Montbretia (invasiveness not assessed) was recorded along the Oakfront River near the site entrance

Otter survey

No otter signs (e.g. spraint) were recorded at the watercourse crossings of the propose project. Signs were recorded on the Awbeg River at Scart Bridge (c. 3 km) and the L1320 road bridge (c. 4km) south of the wind farm site, as well as the Awbeg River (east branch) bridge at Caherconnor. An active otter holt was recorded near the Awbeg-Oakfront confluence c. 1.2km south of the wind farm site.

Table 4-2: Summary of the potential occurrence of qualifying interests of the Blackwater River (Cork/Waterford) cSAC within the Awbeg sub-catchment survey area

	Natura Code	Conservation Interest	Occurrence			
			Awbeg River (west) The watercourses associated with the wind farm site, GCr and TDR all flow into the Awbeg River (east and west branches).	Ardglass River (western boundary)	Oakfront River (flows through the centre of the site)	Rathnacally Stream (The TDR and GCR cross this watercourse)
Habitats	91A0	Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	The area of this designated habitat mapped by NPWS in Map 7 of the Conservation Objectives (NPWS, 2012) is restricted to a small number of sites within the SAC, however the map shows this designated habitat is not present along these watercourses.			
	91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	The area of this designated habitat mapped by NPWS in Map 7 of the Conservation Objectives (NPWS, 2012) is restricted to a small number of sites within the SAC, however the map shows this designated habitat is not present along these watercourses.			
	91J0	Taxus baccata woods of the British Isles	Only known to be present At Dromana, on the Lower Blackwater near Villierstown (NPWS 2012). This designated habitat is not present along these watercourses.			
	3260	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	The full distribution of this habitat in the SAC is not currently known (NPWS, 2012). However, this habitat occurs in areas of good water quality, the water quality in the Awbeg sub-catchment is not sufficient to support this habitat type and so it does not occur in these rivers.			
	1310	*Salicornia* and other annuals colonizing mud and sand	A coastal habitat – Habitat not fully known, recorded at Foxhole, Black Bog and Tourig. However, extent is un-mapped (NPWS, 2012). This habitat does not occur within the Awbeg sub-catchment as it is freshwater.			
	1330	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	A coastal habitat – Only present in the lower reaches downstream of the Blackwater (NPWS, 2011). This habitat does not occur within the Awbeg sub-catchment as it is freshwater.			
	1410	Mediterranean salt meadows (*Juncetalia maritimi*)	A coastal habitat – Only present in the lower reaches downstream of the Blackwater (NPWS, 2011). This habitat does not occur within the Awbeg sub-catchment as it is freshwater.			
	1220	Perennial vegetation of stony banks	A coastal habitat - Current area unknown. Only recorded area is from Ferrypoint, however, extent was not mapped. NB further un-surveyed areas maybe present within the SAC (NPWS 2012). This habitat does not occur within the Awbeg sub-catchment as it is freshwater.			
	1140	Mudflats and sandflats not covered by seawater at low tide	This habitat type only occurs in the lower tidal reaches of the River Blackwater (NPWS, 2011), it does not occur further inland than Newport / Ballinaclash, therefore it is not present in any of the watercourses of the Awbeg sub-catchment.			
	1130	Estuaries	Only occurs in the lower tidal reaches. The inner boundary of the estuaries habitat in the SAC is at Capoquin (NPWS, 2011). This habitat therefore does not occur in the Awbeg sub-catchment.			
Species	1095	Sea lamprey (*Petromyzon marinus*)	Widely distributed in the Awbeg River (east and west branches) (NPWS 2012 and NBDC). Surveys undertaken in 2020 (Appendix 3) recorded lamprey species within the Oakfront River, tributary of the Awbeg River (west)	Recorded in the Oakfront River in 2020.	Surveys undertaken in 2020 recorded lamprey species within the Oakfront River.	Recorded in the Oakfront River in 2020.
	1096	Brook lamprey (*Lampetra planeri*)				
	1099	River lamprey (*Lampetra fluviatilis)*				
	1106	Atlantic salmon (*Salmo salar*)	The river is known to support Atlantic salmon (Kelly et al., 2010, 2013). The species was not recorded during the 2020 surveys (Appendix 3). The species range has declined due to human activities that have degraded water quality, and the	Awbeg River known to support the species, however, species not recorded during 2020 surveys and suitable habitat determined as moderate at best.		

	Natura Code	Conservation Interest	Occurrence			
			Awbeg River (west) The watercourses associated with the wind farm site, GCr and TDR all flow into the Awbeg River (east and west branches).	Ardglass River (western boundary)	Oakfront River (flows through the centre of the site)	Rathnacally Stream (The TDR and GCR cross this watercourse)
			installation of weirs and other migratory barriers (Hendry & Cragg-Hine, 2003).			
	1103	Twaite shad (*Alosa alosa*)	Impassable barriers including the weir at Fermoy on the Blackwater prevent this species from accessing the rivers of the Awbeg sub-catchment (King 2004). This species therefore would not occur in the Awbeg sub-catchment.			
	1355	Otter (*Lutra lutra*)	Otter signs (spraint) were recorded on the Awbeg River at Scart Bridge (c. 3 km) and the L1320 road bridge (c. 4km) south of the wind farm site, as well as the Awbeg River (east branch) bridge at Caherconnor. An active otter holt was recorded near the Awbeg-Oakfront confluence c. 1.2km south of the wind farm site during 2020 surveys (Appendix 3).	Otter signs (spraint) were recorded on the Awbeg River at Scart Bridge and the L1320 road bridge, as well as the Awbeg River (east branch) bridge at Caherconnor. An active otter holt was recorded near the Awbeg-Oakfront confluence during 2020 surveys. This species is likely to occur in this watercourse.	An active otter holt was recorded near the Awbeg-Oakfront confluence (c. 1.2km south of the wind farm site) during 2020 surveys.	Otter signs (spraint) were recorded on the Awbeg River at Scart Bridge and the L1320 road bridge, as well as the Awbeg River (east branch) bridge at Caherconnor. An active otter holt was recorded near the Awbeg-Oakfront confluence during 2020 surveys. This species is likely to occur in this watercourse.
	1092 *	White-clawed crayfish (*Austropotamobius pallipes*)	Within the Blackwater River system, white-clawed crayfish is present only on the Awbeg River. The main Blackwater is considered chemically unsuitable for the crayfish. On the Awbeg, the crayfish is found along the whole length of the designated part of the river (NPWS 2012). The Environmental Protection Agency (EPA) river quality monitoring on the Awbeg did not detect any crayfish in 2009. However, large numbers were found during river maintenance work in 2009 upstream of Buttevant and these were translocated to undisturbed habitat (Williams, 2009). Detected using eDNA analysis during 2021 surveys Appendix 3).	Species not observed within the watercourse during 2020 / 2021 surveys. Although the river has poor habitat suitability for this species, due to the recorded presence within the Awbeg River (east and west branches) this species is assumed to be present in the aquatic receiving environment of the wind farm and GCR	Species not observed within the watercourse during 2020 / 2021 surveys. Although the river has poor habitat suitability for this species, due to the recorded presence within the Awbeg River (east and west branches) this species is assumed to be present in the aquatic receiving environment of the wind farm and GCR	Species not observed within the watercourse during 2020 / 2021 surveys. Although the river has poor habitat suitability for this species, due to the recorded presence within the Awbeg River (east and west branches) this species is assumed to be present in the aquatic receiving environment of the wind farm and GCR
	1029	Freshwater pearl mussel (*Margaritifera margaritifera*)	The freshwater pearl mussel is known from the main Blackwater River, two tributaries (Owentaraglin and Allow) and the Licky River, which discharges to the Upper Blackwater Estuary (S.I. No. 296/2009). This species is not present in the Awbeg sub-catchment.			
	1421	Killarney Fern (*Trichomanes speciosum*)	Records in the SAC are from the lower reaches of the Blackwater according to Map 10 of Conservation Objectives (NPWS, 2012). This species is not expected to occur in the Awbeg sub-catchment.			

Having regard to Table 4-2 the qualifying interests of the Blackwater River (Cork/Waterford) cSAC which may potentially be within the zone of influence of the wind farm site, GCR and TDR are:

- White-clawed crayfish (*Austropotamobius pallipes*) - eDNA sampling c. 3km downstream of the wind farm site
- Lamprey (*Petromyzon marinus / Lampetra planeri / Lampetra fluviatilis*) - Within the Oakfront River running through the wind farm site
- Atlantic salmon (*Salmo salar) - Awbeg River known to support the species*
- Otter (*Lutra lutra*) - An active otter holt was recorded near the Awbeg-Oakfront confluence c. 1.2km south of the wind farm site

White-clawed crayfish

The Awbeg is one of few sites in county Cork to support a significant population of white-clawed crayfish. There are historic records of the species in both the Awbeg and River Blackwater as outlined by the NPWS mapping in the SAC Conservation Objectives (NPWS, 2012). There had been an improvement or no deterioration in the in the range and habitat quality and population of white-clawed crayfish in Ireland prior to the introduction of crayfish plague. Crayfish are recognized as being tolerant of moderate pollution levels and are classed as Group C organisms in the EPA Q-Value biotic index. This species is evaluated as being of overall 'Bad' conservation status nationally with a 'deteriorating' trend (NPWS, 2019a). As the White-clawed crayfish is an aquatic species any changes to water quality will impact the species.

Lamprey

Brook lamprey is the smallest of the three lamprey species native to Ireland and it is the only one of the three species that is non-parasitic and spends all its life in freshwater (Maitland & Campbell, 1992). Sea lamprey and river lamprey are anadromous species, spending part of their life cycle in the marine environment and returning to natal watercourses to spawn. All three species of lamprey spawn in fresh waters, and juveniles of all three species, known as ammocoetes, are found within the same catchments, using similar microhabitats, but with varying geographical distribution. Lampreys show a preference for gravel-dominated substratum for spawning, and mainly silt and sand-dominated substratum for nursery habitat (Harvey & Cowx, 2003).

The spawning season of brook lamprey starts when the water temperatures reach 10–11ºC. This usually occurs in March/April. King and Linnane (2004) gives the distribution of the three species of lampreys in the Blackwater River (Cork/Waterford) cSAC with all three lamprey species being widely distributed in the Awbeg River, including the Awbeg sub-catchment and lamprey having been recorded in the Oakfield River. The main threats to the brook lamprey population are the pollution of surface waters, dredging of and the removal of sediment (which lamprey inhabit). brook lamprey is evaluated as being of 'Favourable' conservation status nationally (NPWS, 2019a). The NPWS (2019a) overall assessment of the conservation status of sea lamprey is 'Bad', with the overall trend in conservation status 'Stable'. Habitat for the species is 'Inadequate'. The NPWS (2019a) overall assessment of the conservation status of river lamprey is 'Unknown' but the habitat for the species is assessed as 'Favourable'.

Atlantic salmon

The Atlantic salmon is listed under Annexes II and V of the EU Habitats Directive and Appendix III of the Bern Convention.

The Atlantic salmon is an anadromous species. Atlantic salmon populations in Ireland have been recently assessed as being 'inadequate' by NPWS in the 2019 Article 17 Conservation Status Assessments (2019a). The Salmon Conservation Limit (CL) in any river is the number of spawning salmon required to maintain a sustainable population and is used to indicate the number of salmon in a river system above which a harvestable surplus can be considered.

The Munster Blackwater is famous for being one of the best salmon fishing rivers in Ireland (Igoe and Murphy 2015). There are historic records of the species in both the Awbeg and River Blackwater as outlined by the NPWS mapping in the SAC Conservation Objectives (NPWS, 2012).

The conservation status of salmon in the Awbeg River is dependent on good water quality status; as this species requires clean water (Q4) for spawning and early life stages, however, north of Annagh bridge the water quality, according to the EPA is poor. The main threat to the salmon population is the pollution of surface water, which severely impacts spawning. NPWS (2013) notes the 'high importance' threats and pressures on the salmon population as being – Agricultural intensification, disposal of household/ recreational facility waste, poaching, diffuse pollution to surface waters due to agricultural and forestry activities diffuse pollution to surface waters due to household sewage and waste waters.

Otter

The Otter is listed on Annex II and Annex IV of the EU Habitats Directive (Council Directive 92/43/EEC), thus making it a species of European importance. The Munster Blackwater is one of 44 SACs designated for the Otter in Ireland.

A survey was conducted by Smiddy in 2016 to determine the distribution of otter in the Munster River Blackwater catchment. This included the Awbeg River sub-catchment. Of the 275 sites surveyed 184 (66.9%) proved positive and 91 (31%) proved negative for otter presence. Otter was present across the catchment from the estuarine area extending into the foothills of the mountain ranges. Within the study it was found that there were fewer positive sites on streams of less than 4m in width. However, the author did note that otters make extensive use of small streams but leave no spraint evidence therefore, the importance of this habitat might be underestimated within the survey. The results of the survey (Smiddy, 2016) found that there is no evidence that otter had withdrawn from any part of the Blackwater catchment during the last 25 years, and the overall distribution of positive sites is almost identical to that described by O'Sullivan (1991) for the period 1988-90.

Water quality issues in the Awbeg River are likely to be indirectly affecting the otter population due to the adverse effects it may be having on prey species. Although otter are opportunistic predators and can vary their diet according to the prey species available in their territory, much of their prey is aquatic and a varied diet would not fully offset this impact.

4.2.2 Kilcolman Bog SPA

Kilcolman Bog is situated on the southern foothills of the Ballyhoura Mountains. It occupies a glacially eroded hollow in Carboniferous limestone. The site comprises a quaking fen fed by calcareous groundwater, with areas of reedswamp, freshwater marsh and wet grassland. There is a small permanent lake but in winter a large flooded area is usual. The site has been managed for conservation since the 1970s. The surrounding landuse is mostly intensive agriculture.

Kilcolman Bog is an important site for wintering waterfowl, with nationally important populations of (qualifying interests) whooper swan, teal and shoveler (refer to Table 4.4). The shoveler population is of particular note as it comprises over 6% of the national total.

Other species with important populations include widgeon (*Anas Penelope*), coot (*Fulica atra*) and northern lapwing (*Vanellus vanellus*). The site formerly supported a small population of Greenland white-fronted geese (*Anser albifrons flavirostris*), but the flock has now abandoned the area. The site is a Nature Reserve and is managed for the benefit of birds. The bird populations have been intensively monitored since the 1970s. The site supports golden dock (*Rumex maritimus*), a Red Data Book species.

The main threats and pressures which may impact the Kilcolman Bog SPA are set out in the Natura 2000 Data Form and are presented in *Table 4-3: Threats, Pressures and Activities with Impacts on the Kilcolman Bog SPA.*

The qualifying interests of the SPA and their potential to occur within the area of the proposed project are presented in *Table 4-4: Summary of the potential occurrence of Species of Conservation Interests of the Kilcolman Bog SPA within the area of the proposed project.*

Table 4-3: Threats, Pressures and Activities with Impacts on the Kilcolman Bog SPA

High Level (inside site)	Medium Level (inside site)	Low Level (inside site)
A08: Fertilisation		K01.03: Drying out

Source: Kilcolman Bog SPA (004095) Natura 2000 Data Form, https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF004095.pdf

4.2.2.1 Avifauna Surveys

A suite of avifauna surveys were undertaken by Fehily Timoney as part of this application.
The field surveys comprised two main elements; vantage point (VP) watches and targeted distribution and abundance surveys which comprised:

- VP watches undertaken over two years at 2 VPs (winter 2019/20, winter 2020/21, summer 2019, summer 2020)
- Transect/point count surveys (winter 2019/20, winter 2020/21, summer 2019, summer 2020)
- Hinterland surveys (winter 2019/20, winter 2020/21, summer 2019, Summer 2020) including Kilcolman Bog SAC
- Evening/nocturnal transect survey and watch for Woodcock (summer 2020, summer 2021)
- Habitat assessment and nocturnal transect survey for Nightjar (summer 2021).

Refer to Appendix 2 for the methodologies used to undertake the avifauna surveys.

4.2.2.1.1 Desktop Study

The search for historical records of bird species from NPWS and NBDC identified whooper swan, teal and shoveler present within a 10 km search radius of the study area.

4.2.2.1.2 Survey results for the proposed project

During hinterland surveys conducted outside the flight activity survey area, a total of 34 hinterland survey target species were recorded. Hinterland target species were primarily those within the groupings of wetland and water birds, swan, waders, raptors and gulls.

Whooper swan were recorded at the Blackwater River SAC/Annagh Bridge, where flocks of this species were observed feeding in improved agricultural grassland fields c. 1 km south of the proposed wind farm site. Flock sizes ranged between 6-107 birds , recorded on 11 occasions over winter 2019-20 and winter 2020-21.
Whooper swan were also recorded at Kilcolman Bog SPA on three occasions (flock of 8 recorded in 2019 and flocks of 22 and 23 recorded in 2021).

Target species recorded at Kilcolman Bog SPA included mute swan, mallard, little grebe, greylag goose, moorhen, tufted duck, grey heron, coot, garganey, teal, wigeon, shoveler, sparrowhawk and buzzard.

Whooper swan, teal and shoveler were only observed during the hinterland surveys. They were not observed during the flight activity surveys within the study area. As these species were not observed within the study area, they were not considered in the collision risk model.

Table 4-4: Summary of the potential occurrence of Species of Conservation Interests of the Kilcolman Bog SPA within the area of the proposed project

Natura Code	Conservation Interest	Occurrence
A038	Whooper Swan (*Cygnus cygnus*)	Wind farm site not within the core foraging range of Kilcolman Bog SPA for this species (less than 5km) (SNH 2016). However, this species has been recorded within 1km of the site. Therefore, this species is being carried forward within the assessment.
A052	Teal (*Anas crecca*)	Wind farm site not within the core foraging range of Kilcolman Bog SPA for this species. Mean foraging distance for this species is identified as between 0.8 and 8.4km (Johnson et al. 2014). Not observed during the flight activity surveys within the study area. Therefore, this species is not being carried forward within the assessment.
A056	Shoveler (*Anas clypeata*)	Wind farm site not within the core foraging range of Kilcolman Bog SPA for this species. Mean foraging distance for this species is 2.5 km (Johnson et al. 2014). Not observed during the flight activity surveys within the study area. Therefore, this species is not being carried forward within the assessment.
A999	Wetland and Waterbirds	There is no hydrological connectivity to the SPA. This qualifying interest will not be carried forward within the assessment.

Having regard to Table 4-4 the qualifying interests of the Kilcolman Bog SPA which may potentially be within the zone of influence of the wind farm site are:

- Whooper swan (*Cygnus cygnus*) - observed feeding in improved agricultural grassland fields c. 1 km south of the proposed wind farm site

4.2.3 Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA

This SPA is a very large, upland site, centred on the borders between the counties of Cork, Kerry and Limerick. The peaks are not notably high or indeed pronounced, with a maximum of 451 m at Knockhefa. Many rivers rise within the site, notably the Blackwater, Feale, Clydagh, Oolagh, and Smerlagh. The site consists of a variety of upland habitats, though almost half (45%) is afforested. The coniferous forest includes first and second rotation plantations, with both pre-thicket stands present as well as clearfell areas. A substantial part (28%) of the site is unplanted blanket bog and heath, with both wet and dry heath present. The remainder of the site is largely rough grassland that is used for hill farming. Some areas of scrub and deciduous woodland occur, especially within the river valleys.

Supports c. 21% of the all-Ireland population of hen harrier (only qualifying interest for this site), which is the largest concentration in the country for the species. Habitat excellent for both nesting and foraging purposes. Short-eared owl (*Asio flammeus*), a rare breeding bird in Ireland, has nested in the past and has been recorded intermittently in recent years. Merlin (*Falco columbarius*) has a presence though the size of the population is unknown. Willow ptarmigan (*Lagopus lagopus*), a Red Data Book species, occurs.

The main threats and pressures which may impact the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA are set out in the Natura 2000 Data Form and are presented in *Table 4-5: Threats, Pressures and Activities with Impacts on the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA.*

The qualifying interests of the SPA and their potential to occur within the area of the proposed project are presented in *Table 4-6: Summary of the potential occurrence of Species of Conservation Interests of the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA within the area of the proposed project.*

Table 4-5: Threats, Pressures and Activities with Impacts on the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA

High Level (inside site)	Medium Level (inside site)	Low Level (inside site)
B: Sylviculture, forestry	C01.03: Peat extraction	A09: Irrigation
		D01.01: paths, tracks, cycling tracks
		D01.02: roads, motorways
		E01.03: dispersed habitation

Source: Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161) Natura 2000 Data Form, https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF004161.pdf

4.2.3.1 Avifauna Surveys

A suite of avifauna surveys were undertaken by Fehily Timoney as part of this application. The field surveys comprised two main elements; vantage point (VP) watches and targeted distribution and abundance surveys which comprised:

- VP watches undertaken over two years at 2 VPs (winter 2019/20, winter 2020/21, summer 2019, summer 2020)
- Transect/point count surveys (winter 2019/20, winter 2020/21, summer 2019, summer 2020)
- Hinterland surveys (winter 2019/20, winter 2020/21, summer 2019, Summer 2020) including Kilcolman Bog SAC
- Evening/nocturnal transect survey and watch for Woodcock (summer 2020, summer 2021)
- Habitat assessment and nocturnal transect survey for Nightjar (summer 2021).

4.2.3.1.1 Desktop Study

Information arising from the NPWS data request (March 2021) included details of four confirmed Hen Harrier breeding sites within 5-10 km of the main wind farm in 2015 and four confirmed and three possible Hen Harrier breeding sites in the same area in 2010. The 10 km search buffer also intersects one of nine non-designated but regionally important breeding areas for Hen Harrier (Ballyhoura Mountains), as established in the 2015 National Hen Harrier Survey (noted in NPWS data request response email received 22nd March 2021).

4.2.3.1.2 Survey results for the proposed project

Summer Season 2019, 2020

Hen harrier was not recorded during Summer 2019 or Summer 2020.

Winter Season 2019-20, 2020-21

An incidental observation of a ringtail hen harrier commuting low (0-10m) over wet grassland for six seconds within the buffer zone south of T04 was recorded on 21st January 2020. The flight was below the rotor-swept height band.

There were two sightings of hen harrier during the winter period of 2020-21. One on October 14th 2020 was observed during transect surveys. It was observed flying below the rotor-swept height band (25-175m / lowest to highest point of the blade tip) within the buffer zone, after being flushed from wet grassland/marsh by the surveyor during a winter transect survey. The second observation was on the 18th of December 2020. This ringtail (female / immature bird) hen harrier was observed flying low from outside the buffer to roost within the buffer zone. It appeared to go to ground (in wet grassland) a short distance to the west of the met mast. Subsequent dusk surveys throughout the winter season confirmed the site is not a habitual roosting location for hen harrier.

Hinterland Surveys

No observations of hen harrier were recorded during hinterland surveys, including searches of the Ballyhoura mountains.

Table 4-6: Summary of the potential occurrence of Species of Conservation Interests of the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA within the area of the proposed project.

Natura Code	Item Description	Occurrence
A082	Hen Harrier (*Circus cyaneus*)	Wind farm site not within the core foraging range of the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA for this species. However, the site is within the core feeding range of nine non-designated but regionally important breeding areas for Hen Harrier (Ballyhoura Mountains), as established in the 2015 National Hen Harrier Survey. Therefore this species is being carried forward within the assessment.

Having regard to Table 4-6 the qualifying interests of the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA which may potentially be within the zone of influence of the wind farm site are:

- Hen Harrier (*Circus cyaneus*)

4.2.4 Lower River Shannon SAC

This significant large SAC 120 km in length, encompassing: the drained river valley which forms the River Shannon estuary; the broader River Fergus estuary, plus a number of smaller estuaries e.g. Poulnasherry Bay; the freshwater lower reaches of the Shannon River, between Killaloe and Limerick, plus the freshwater stretches of much of the Feale and Mulkear catchments; a marine area at the mouth of the Shannon estuary with high rocky cliffs to the north and south; ericaceous heath on Kerry Head and Loop Head; and several lagoons. The underlying geology ranges from carboniferous limestone (east of Foynes) to Namurian shales and flagstones (west of Foynes) to old red sandstone (at Kerry Head). The salinity of the system varies daily with the ebb and flood of the tide and with annual rainfall fluctuations seasonally.

The SAC contains many Annexed habitats (refer to Table 4-8 below), including the most extensive area of estuarine habitat in Ireland. A good range of Annexed species are also present, including the only known resident population of Common bottlenose dolphin in Ireland, all three Irish species of lamprey, and a good population of Atlantic salmon.

The main threats and pressures which may impact the Lower River Shannon SAC are set out in the Natura 2000 Data Form and are presented in *Table 4-7: Threats, Pressures and Activities with Impacts on the Lower River Shannon SAC.*

The qualifying interests of the SAC and their potential to occur within the area of the proposed Emlagh Replant Lands are presented in *Table 4-8: Summary of the potential occurrence of qualifying interests of the Lower River Shannon SAC within the Emlagh replant lands and the Emlagh 27 watercourse.*

Table 4-7: Threats, Pressures and Activities with Impacts on the Lower River Shannon SAC

Medium Level (inside site)	Medium Level (outside site)	Low Level (inside site)
E03: Discharges	H04: Air pollution, air-borne pollutants	C01.01.02: removal of beach materials
J02.01.01: polderisation	E03: Discharges	F01: Marine and Freshwater Aquaculture
A04: grazing	J02.01.02: reclamation of land from sea, estuary or marsh	J02.12.01: sea defense or coast protection works, tidal barrages
A08: Fertilisation	E01: Urbanised areas, human habitation	G01.01: nautical sports
	A08: Fertilisation	J02.10: management of aquatic and bank vegetation for drainage purposes
	K02.03: eutrophication (natural)	F03.01: Hunting
		B: Sylviculture, forestry
		D01.01: paths, tracks, cycling tracks
		I01: invasive non-native species
		C01.03.01: hand cutting of peat

Source: Lower River Shannon SAC (002165) Natura 2000 Data Form, https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF002165.pdf

Table 4-8: Summary of the potential occurrence of qualifying interests of the Lower River Shannon SAC within the Emlagh replant lands and the Emlagh 27 watercourse

	Natura Code	Item Description	Occurrence
Habitats	91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	The area of this QI habitat mapped by NPWS in Map 14 of the Conservation Objectives (NPWS, 2012) contains five identified sites c. 50 east of the replant lands. This designated habitat is not present along the watercourse within the catchment area of the replant lands.
	1110	Sandbanks which are slightly covered by sea water all the time	Only known to be present in the Shannon Estuary south of Rhinevilla. This designated habitat is not present along the watercourse within the catchment area of the replant lands.
	1170	Reefs	Only known to be present in the Shannon. This designated habitat is not present along the watercourse within the catchment area of the replant lands.
	3260	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	Three sub-habitats of high conservation value are known to occur in the SAC. These have been mapped by NPWS in Map 13 of the Conservation Objectives (NPWS, 2012). This designated habitat is not present along the watercourse within the catchment area of the replant lands.
	1310	*Salicornia* and other annuals colonizing mud and sand	A coastal habitat – The closest area of this designated habitat mapped by NPWS in Map 12 of the Conservation Objectives (NPWS, 2012)is c. 7km south west. This designated habitat is not present along the watercourse within the catchment area of the replant lands.
	1330	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	A coastal habitat –Ten sub-sites that supported Atlantic salt meadow were mapped and additional areas of potential saltmarsh were identified by NPWS in Map 12 of the Conservation Objectives (NPWS, 2012). The closest known extent of this designated habitat is at the confluent point of the Limuse and Shannon estuary. This designated habitat is not present along the watercourse within the catchment area of the replant lands.
	1410	Mediterranean salt meadows (*Juncetalia maritimi*)	A coastal habitat – Eight sub-sites that support Mediterranean salt meadow were mapped and additional areas of potential saltmarsh have been identified by NPWS in Map 12 of the Conservation Objectives (NPWS, 2012). This designated habitat is not present along the watercourse within the catchment area of the replant lands.

	Natura Code	Item Description	Occurrence
	1220	Perennial vegetation of stony banks	A coastal habitat - The locations of this designated habitat mapped by NPWS in Map 10 of the Conservation Objectives (NPWS, 2012) identify the closest area as Carrigaholy Bay c. 14km south west. This designated habitat is not present along the watercourse.
	1230	Vegetated sea cliffs of the Atlantic and Baltic coasts	Sea cliffs - Lisheenrony is the closest sea cliff located approximately 10.5 km from site. This designated habitat is not present along the watercourse within the catchment area of the replant lands.
	1160	Large shallow inlets and bays	The area of this designated habitat mapped by NPWS in Map 7 of the Conservation Objectives (NPWS, 2012) identifies its closest point as that of the confluence point with the Limuse c. 1km south. This designated habitat is not present along the watercourse within the catchment area of the replant lands.
	1150	Coastal lagoons	The area of this designated habitat mapped by NPWS in Map 6 of the Conservation Objectives (NPWS, 2012) contains four identified sites. This designated habitat is not present along the watercourse within the catchment area of the replant lands.
	1140	Mudflats and sandflats not covered by seawater at low tide	This habitat type only occurs in the lower tidal reaches of the SAC. The closest location of this habitat is the confluent point of the Limuse and the Shannon estuary c. 1.7km in-stream south of the replant lands. There are two bridges narrowing the channel (influence) of the Shannon estuary and a culvert below the N67 reducing the direction of flow from the Limuse into the estuary. This designated habitat is not present in the watercourse within the catchment area of the replant lands.
	1130	Estuaries	This habitat type only occurs in the lower tidal reaches of the SAC. The closest location of this habitat is the confluent point of the Limuse and the Shannon estuary c. 1.7km in-stream south of the replant lands. There are two bridges narrowing the channel (influence) of the Shannon estuary and a culvert below the N67 reducing the direction of flow from the Limuse into the estuary. This designated habitat is not present in the watercourse within the catchment area of the replant lands.
Species	1095	Sea lamprey (*Petromyzon marinus*)	Due to the proximity of the replant lands and the SAC along with no major barrier to movement, these species are assumed to be present in the Emlagh 27.
	1096	Brook lamprey (*Lampetra planeri*)	
	1099	River lamprey (*Lampetra fluviatilis)*	

	Natura Code	Item Description	Occurrence
	1106	Atlantic salmon (*Salmo salar*)	Due to the proximity of the replant lands and the SAC along with no major barrier to movement, this species are assumed present in the watercourse.
	1355	Otter (*Lutra lutra*)	Recordings of otter approximately 2 km away from Mammals of Ireland 2016-2025. 250m commuting buffer mapped by NPWS in Map 17 of the Conservation Objectives (NPWS, 2012) reaches the confluent point of the Limuse and the Shannon estuary c. 1.7km in-stream south of the replant lands). Otter territories known to be food dependant and can stretch to 15km (NPWS leaflet 14) . This species is assumed to be present in the watercourse.
	1029	Freshwater pearl mussel (*Margaritifera margaritifera*)	Known population Associated with Cloon River a separate catchment. This species is not present in the watercourse.
	1349	Common Bottlenose Dolphin (*Tursiops truncates*)	Marine species not present in the 1st order watercourse.

Source: Giorria Environmental Services (August 2021) Natura Impact Statement for Proposed afforestation project CN88795 located at Emlagh, Co. Clare (Appendix 1).

Having regard to Table 4-8 the qualifying interests of the Lower River Shannon SAC which may potentially be within the zone of influence of the replant lands are:

- Brook lamprey (*Lampetra planeri*)
- Atlantic salmon (*Salmo salar)*
- Otter (*Lutra lutra*)

4.2.5 River Shannon and River Fergus Estuaries SPA

The River Shannon and River Fergus Estuaries form the largest estuarine complex in Ireland (refer to Table 4-10 for the conservation interests). The SPA comprises all of the estuarine habitat west from Limerick City and south from Ennis, extending west as far as Killadysert and Foynes on the north and south shores of the Shannon respectively (a distance of some 25 km from east to west). Also included are several areas in the outer Shannon estuary, notably Clonderalaw Bay and Poulnasherry Bay. The SPA has vast expanses of intertidal flats. The main macro-invertebrate community is a Macoma-Scrobicularia-Nereis community which provides a rich food resource for the wintering birds. Eelgrass (Zostera spp.) is present in places. The intertidal flats are often fringed with salt marsh vegetation, areas which provide important high tide roost sites for the birds. In the innermost parts of the estuaries, the tidal channels or creeks are fringed with species such as Phragmites australis and Scirpus spp. *Spartina anglica* is frequent in parts.

This is the most important coastal wetland site in the country and regularly supports in excess of 50,000 wintering waterfowl. It has internationally important populations of Dunlin, Black-tailed godwit and Redshank. A further 16 species have populations of national importance. The SPA is particularly significant for Dunlin (11% of national total), Grey Plover (7.5% of total), Lapwing (6.5% of total), Redshank (6.1% of total) and Shelduck (6.0% of total). It has Whooper Swan, Golden Plover and Bar-tailed Godwit in significant numbers. The SPA was formerly frequented by a population of Greenland White-fronted Geese (*Anser albifrons flavirostris*) but these have now abandoned the area. The SPA provides both feeding and roosting areas for the wintering birds and habitat quality for most of the estuarine habitats is good.

The main threats and pressures which may impact the River Shannon and River Fergus Estuaries SPA are set out in the Natura 2000 Data Form and are presented in *Table 4-9: Threats, Pressures and Activities with Impacts on the River Shannon and River Fergus Estuaries SPA.*

The qualifying interests of the SAC and their potential to occur within the area of the proposed Emlagh Replant Lands are presented in *Table 4-10: Summary of the potential occurrence of Species of Conservation Interest and Annex 1 habitats of the River Shannon and River Fergus Estuaries SPA within the replant lands and surrounding environment.*

Table 4-9: Threats, Pressures and Activities with Impacts on the River Shannon and River Fergus Estuaries SPA

High Level (inside site)	High Level (outside site)	Medium Level (inside site)
E03: Discharges	E02: Industrial or commercial areas	F01: Marine and Freshwater Aquaculture
	A08: Fertilisation	D03.02: Shipping lanes
	E01: Urbanised areas, human habitation	**E03:** Discharges

Source: River Shannon and River Fergus Estuaries SPA (004077) Natura 2000 Data Form, https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF004077.pdf

Table 4-10: Summary of the potential occurrence of Species of Conservation Interest and Annex 1 habitats of the River Shannon and River Fergus Estuaries SPA within the replant lands and surrounding environment.

Species Code	Item Description	Occurrence
A179	Black-headed Gull *Chroicocephalus ridibundus*	SPA designated for over wintering Black-headed Gull. Records of over wintering within 10 km2 of site (NBDC). Proposed replant lands unsuitable for this coastal species that will feed on arable fields. Unlikely to be present within the replant lands.
A141	Grey Plover *Pluvialis squatarola*	SPA designated for over wintering Grey Plover. Records of wintering species within 10 km2 of site (NBDC). Exclusively coastal species. Unlikely to be present within the replant lands.
A038	Whooper Swan *Cygnus cygnus*	SPA designated for wintering Whooper swan. Records of wintering species within 10 km2 of site (NBDC). Proposed replant lands unsuitable for this winter visitor that will use freshwater and brackish lakes and feed on grassland varying from traditional callows to intensive pasture and at times arable land. Unlikely to be present within the replant lands.
A140	Golden Plover *Pluvialis apricaria*	SPA designated for over wintering Golden Plover. Records of wintering species within 10 km2 of site (NBDC). Feed on inland improved agricultural fields (but not rough, rushy pasture as is within the proposed afforestation site) and usually feed on coastal habitats. Unlikely to be present within the replant lands.
A048	Shelduck *Tadorna tadorna*	SPA designated for over wintering Shelduck. Records of wintering species within 3 km of site (NBDC). Proposed replant lands unsuitable for this winter visitor that will primarily winter on the coast in sheltered estuaries and tidal mudflats. Unlikely to be present within the replant lands.
A157	Bar-tailed Godwit *Limosa lapponica*	SPA designated for over wintering Bar-tailed Godwit. Records of wintering species within 10 km2 of site (NBDC). Wader which is coastal and generally found near estuaries. Unlikely to be present within the replant lands.
A046	Light-bellied Brent Goose *Branta bernicla hrota*	SPA designated for wintering of Light-bellied Brent geese. Records of wintering species within 1.6 km of proposed afforestation site (NBDC). Primarily coastal species. Unlikely to be present within the replant lands.
A137	Ringed Plover *Charadrius hiaticula*	SPA designated for over wintering Ringed Plover. Records of wintering species within 10 km2 of site (NBDC). Proposed replant lands unsuitable for this winter visitor which is primarily a coastal wader. Unlikely to be present within the replant lands.
A156	Black-tailed Godwit *Limosa limosa*	SPA designated for over wintering Black-tailed Godwit. Records of wintering species within 10 km2 of site (NBDC). Species winters along coastal (particularly estuaries) and inland wetlands. Proposed replant lands unsuitable for this winter visitor which is primarily a coastal (particularly estuaries) and inland wetlands inhabitant. Unlikely to be present within the replant lands.

Species Code	Item Description	Occurrence
A160	Curlew *Numenius arquata*	SPA designated for over wintering Curlew. Records of wintering species within 10 km2 of site (NBDC). Wader that uses both coastal and inland wetlands. They breed on upland and lowland bogs, wet grassland and unimproved/semi-improved pasture. In addition to bogs, damp pastures grazed lightly by cattle with a mixed sward height and a scattering of rush or tussocks is a favoured habitat. Due to the unsuitability of the afforestation site this species is unlikely to be present within the replant lands.
A164	Greenshank *Tringa nebularia*	SPA designated for over wintering Greenshank. Records over wintering within 5 km of site (NBDC). Proposed replant lands unsuitable for this winter visitor which is primarily a coastal wader. Unlikely to be present within the replant lands.
A050	Wigeon *Anas penelope*	SPA designated for over wintering wigeon. Records of wintering species within 2.5 km of site. Found on coastal (estuaries, brackish lagoons, and bays) and inland (lakes, callows, rivers, turloughs) wetland locations, therefore the replant lands are unsuitable. Unlikely to be present within the replant lands.
A162	Redshank *Tringa totanus*	SPA designated for over wintering Redshank. Records over wintering within 3 km of site (NBDC). Mainly coastal wader (though it will use lakes and large rivers). Unlikely to be present within the replant lands.
A142	Lapwing *Vanellus vanellus*	SPA designated for over wintering Lapwing. Records of wintering species within 5 km of site (NBDC). Large flocks regularly recorded in a variety of habitats, including most of the major wetlands, pasture and rough land adjacent to bogs. Likely to be present within the replant lands and surrounding environment.
A017	Cormorant *Phalacrocorax carbo*	SPA designated for breeding and wintering Cormorants. No records of breeding with 10 km2 of site, however there are records of wintering species within 10 km2 of site (NBDC). The proposed afforestation site is unsuitable this species, a seabird that will use lakes and larger waterbodies, therefore the species is unlikely to be present within the replant lands.
A056	Shoveler *Anas clypeata*	SPA designated for over wintering Shoveler. Records of wintering species within 10 km2 of site (NBDC). Proposed replant lands unsuitable for this species found in coastal and inland wetlands. Unlikely to be present within the replant lands.
A052	Teal *Anas crecca*	SPA designated for over wintering Teal. Records of wintering species within 2 km of site (NBDC). Species which occur both coastal and inland locations including coastal lagoons and estuaries and inland marshes, lakes, ponds and turloughs. Unlikely to be present within the replant lands.
A143	Knot *Calidris canutus*	SPA designated for over wintering Knot. Records of wintering species within 10 km2 of site (NBDC). Coastal wader, therefore proposed replant lands unsuitable for this species. Unlikely to be present within the replant lands.
A062	Scaup	SPA designated for over wintering Scaup. Records of wintering species within 10 km2 of site (NBDC). Winters on coastal estuaries and bays,

Species Code	Item Description	Occurrence
	Aythya marila	on brackish lagoons and in shallow marine waters. Unlikely to be present within the replant lands.
A054	Pintail *Anas acuta*	SPA designated for over wintering Pintail. Records of wintering species within 10 km2 of site (NBDC). Proposed replant lands unsuitable for this species which occurs in coastal/estuarine locations or inland on lakes or callows. Unlikely to be present within the replant lands.
A149	Dunlin *Calidris alpina*	SPA designated for over wintering Dunlin. Records of breeding species within 2 km of site (NBDC). Coastal wader, therefore proposed replant lands unsuitable for this species. Unlikely to be present within the replant lands.
A999	*Wetlands*	Direct hydrological connection from project site to SPA. Site lies approximately 327 m from Emlagh 27 River (EPA code: IE_SH_27M040900), which forms hydrological link to River Shannon and River Fergus Estuaries SPA. The habitat type is identified as a resource for the regularly-occurring migratory waterbirds that utilise it. As no SCI species identified using the replant land site, along with there being are two bridges narrowing the channel (influence) of the estuary and a culvert below the N67 reducing the direction of flow from the Limuse into the estuary. This designated habitat is not present in the replant lands or the watercourse within the catchment area of the replant lands.

Having regard to Table 4-10 the qualifying interests of the River Shannon and River Fergus Estuaries SPA which may potentially be within the zone of influence of the replant lands are:

- Lapwing *Vanellus vanellus* – Likely to be present due to suitable habitats

4.3 Potential For Adverse Effects on Site Integrity

The potential for the proposed project (in the absence of mitigation) to adversely affect the integrity of the Blackwater River (Cork/Waterford) cSAC (002170), the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161), the Lower River Shannon SAC (002165) and River Shannon and River Fergus Estuaries SPA (004077) is assessed hereunder.

The qualifying interests of the Blackwater River (Cork/Waterford) cSAC are:

- white-clawed crayfish,
- lamprey species and
- Atlantic salmon

The qualifying interests of the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA:

- hen harrier

The qualifying interests of the Lower River Shannon SAC:

- lamprey species,
- Atlantic salmon and
- otter

the qualifying interests of the River Shannon and River Fergus Estuaries SPA

- Lapwing

The conservation conditions required by these species are defined by attributes and targets set out in the Conservation Objectives Reports. No other qualifying interests of the aforementioned European sites were determined to be within the zone of influence of the proposed project having regard to the potential for the affected areas to support the qualifying features.

NPWS, in their Article 17 reporting (NPWS, 2019b) and Article 12 reporting (NPWS 2012) define the favourable conservation status of an Annex I habitat as achieved when:

- its natural range, and area it covers within that range, are stable or increasing,
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of an Annex II species (habitats Directive) and Annex I species (Birds Directive) is achieved when:

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

4.3.1 Potential Impacts

The elements of the proposed project which were identified as posing a pressure on the Awbeg River (wind farm site and GCR) and Emlagh 27 watercourse (replant lands) are identified as:

Emissions to water via the following pathways:

Construction

Surface water runoff

Tree felling, new access tracks and upgrade of existing tracks, turbine hardstanding areas, the on-site substation and all other new hard surfaces have the potential to contribute to the increase in runoff.

Suspended solids

Potential sources of sediment laden water include:

- Standing water in excavations could contain an increased concentration of suspended solids as a result of the disturbance of the underlying soils.
- Haul roads passing close to watercourses could allow the migration of silt laden runoff into watercourses.
- Silt carried on the wheels of vehicles leaving the main wind farm site could be carried onto the public road.
- A blockage in the proposed roadside drains could allow a break out of silt laden runoff to reach adjacent watercourses or streams.
- Runoff from the borrow pit area could be silt laden, with the risk of draining into receiving watercourses, given the exposed nature of the borrow pit areas due to the excavation and haulage of stone from the area.
- Overland flow entering excavations could increase the quantity of surface water to be treated for sediment removal.
- Inappropriate management of excavations could lead to loss of suspended solids to surface waters.
- Inappropriate management of the excavated material could lead to loss of suspended solids to surface waters.
- Surface water inflows and minor groundwater seepages may occur in turbine base excavations. Pumped water from the excavations will most likely contain suspended solids.
- To accommodate the access to the locations of the propose turbines, a total of 1 new crossing over the wind farm site watercourses will be constructed. During the construction there is a potential to release suspended solids into the watercourse. Works leading to erosion of the river banks/bed could result in the release of suspended solids.
- Horizontal directional drilling (HDD) in public road to allow for the GCR water crossing. Watercourses crossed by directional drilling are at risk of suspended solid releases, hydrocarbon pollution and escapement of drilling lubricants (e.g. bentonite).

Release of hydrocarbons

- Refueling activities could result in fuel spillages which could pollute underground and surface water, especially during the construction of new culverts/bridges.
- There is the potential for fuel spill/leaks from storage tanks which will be stored on main wind farm site for plant machinery. Fuel spill/leaks could infiltrate underground and pollute underground water. Fuel spills/ leaks could be drained to watercourses and pollute them.
- Tree felling process require trafficking of heavy machinery which can lead to pollution of watercourses due to spillage of fuels and hydrocarbons

Contamination from Wastewater Disposal

Release of effluent from domestic wastewater treatment systems has the potential to impact surface. For low permeability of the subsoils at the site, surface waters are more vulnerable to impact rather than groundwater.

Release of Cement-Based Products

Cement-based products could lead to contamination of receiving waters and groundwaters.

Release of Nutrients

Tree felling could lead to an increase in sediment and nutrients in the surface water runoff, if the brash is left in place in the riparian buffer zones.

Spread of Invasive Non-native Species (INNS)

Moderate and high impact invasive plant species have been recorded within the wind farm site, also along the GCR and TDR. Due to the locations of the INNS there is potential for spread within the proposed project working areas.

Potential Impacts Associated with Construction GCR

The following potential impacts could result from the construction activities related to grid route installation and watercourse crossings:

- Suspended solids drained to watercourse could potentially lead to siltation and physical effect on flora and fauna.
- Excavated soil could be mobilised in the surface water runoff during an extreme rainfall event.
- The excavation of trenches for cable laying, and the launch and reception areas for directional drilling, could lead to silt laden surface water run-off.
- Inadequate storage of fuels and oils could lead to contamination of surface water.
- Refuelling activities could result in fuel spillage.
- Works leading to erosion of the riverbanks/bed could negatively impact on the fisheries habitat.
- Drilling fluids associated with watercourse crossing works could pollute watercourse.
- Sediment laden runoff during the launch pit and reception pit excavation works.
- Hydrocarbons.

Operation and Maintenance

During the operation stage, small quantities of oil will be used in cooling the transformers associated with the facility. There is therefore a potential for small oil spills during maintenance works.

Decommissioning

In the event of decommissioning, activities would take place in a similar fashion to the construction phase. Potential impacts would be similar to the construction phase but to a lesser degree.

There would be increased trafficking and an increased risk of disturbance to underlying soils at the wind farm, during the decommissioning phase, in this instance, leading to the potential for silt laden run-off entering receiving watercourses from the wheels of vehicles.

Any such potential impacts would be likely to be less than during the construction stage as the drainage swales would be fully mature and would provide additional filtration of runoff. Any diesel or fuel oils stored on main wind farm site would be bunded.

For access tracks and turbine foundations it is proposed that they are left in place and covered with local topsoil and revegetated. Removal of this infrastructure would result in considerable disruption to the local environment in terms of an increased possibility of sedimentation. It is considered that leaving the turbine foundations hardstanding areas in-situ will cause less environmental damage than removing them.

The on-site substation and grid connection cables will be left in the ground, therefore no potential impacts during decommissioning stage are likely to occur.

Potential Impacts Associated with Replant Lands

Potential emissions to the local watercourse network from surface water during preparation and operation of replant lands:

Inappropriate site management of mounding areas, chemicals (herbicides / fertiliser) and onsite drainage network could lead to silt laden run-off and/or suspended solids to surface waters of the surrounding watercourse networks.

The elements of the proposed project which were identified as posing a pressure on QI / SCI species:

Collision Risk

1. Potential for collision with turbine towers, blades (moving or stationary) and/or associated infrastructure; and barrier to dispersal during the operational phase.

Disturbance / Displacement

1. Potential displacement of birds due to loss of suitable feeding and/or breeding/wintering habitat.
2. Potential displacement of otters due to lie-up sites being disturbed during planting at the replant lands

Indirect impacts of the proposed project which were identified as posing a pressure on QI / SCI species identified as having connectivity:

1. Reduction in prey due to impacts from emissions to water as identified above.

4.3.2 Plans and Projects which Might Act In-combination

The pathways for potential effects on the Blackwater River (Cork/Waterford) cSAC are via the surrounding water courses feeding into the Awbeg River.

The pathway for potential effects on the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA are via the Emlagh 27 watercourse. These are due to the watercourses being the receptor for water emissions from the proposed project.

There is potential for in combination effects on the quality of the watercourses from the proposed project and potentially therefore effects on the conservation objectives of the aforementioned European sites.

Projects

As part of the assessment of in combination effects a search was undertaken for all projects submitted for consent within the last 5 years.

The search radius for large and energy project applications (including wind farms and large infrastructure) was 20km. The search radius for residential applications was 2km. The search radius for applications along the GCR and TDR was 250m. These study areas were considered appropriate due to the limited size and extent of the project, the nature of the impacts and the limited extent of the potential impacts associated with the various aspects of the project, including the works proposed at the wind farm site and GCR, and the works associated with the TDR. The following sources were referred:

- Cork County Council planning viewer https://www.corkcoco.ie/en/planning/planning-enquiry-online-submissions;
- Clare County Council planning viewer www.clarecoco.ie/services/planning/applications/view/planning-lists/
- An Bord Pleanála (Strategic infrastructure development (SID) applications, Strategic Housing Development (SHD) applications and major project applications including wind farms) https://www.pleanala.ie/en-ie/home;
- Irish Wind Energy Association (IWEA) https://www.iwea.com/
- Department of Department of Housing, Local Government and Heritage's EIA Portal https://www.gov.ie/en/publication/9f9e7-eia-portal/.

Only the projects identified as having potential for in-combination effects are set out hereunder.

The grid connection route for the Fiddane solar farm overlaps part of the proposed Annagh wind farm GCR; The two cables will be installed in separate trenches at different times. The Fiddane solar farm grid cables will be installed in the bridge deck at the Rathnacally crossing point, while the proposed Annagh GCR will be routed under the stream bed. Therefore no potential for significant in-combination / cumulative effects with the proposed development..

The N/M20 Cork to Limerick Road Improvement Scheme is currently at the route selection stage (stage 2) of the process. This project will involve the construction of a new motorway and/or the improvement of an existing major route (N20). If the construction of this project were to occur in the catchment of the Blackwater River (Cork/Waterford) cSAC in parallel with the proposed project cumulative impacts are likely to occur upon the SAC.

Silviculture and Agriculture

The proposed wind farm site and GCR are predominantly located within forestry and agricultural land. As outlined in *Table 2-2: Potential Impacts of the Proposed Project* potential impacts could arise if previously fertilised land were to be disturbed and in the event of mismanagement allowing nutrients / sediment to escape the site. Cumulative effects could occur if felling and construction activities at the wind farm site are undertaken in parallel with off-site forestry activities (particularly harvesting) and agricultural activities (particularly manure spreading) within the same catchment, ultimately adding potential nutrients to the Blackwater River (Cork/Waterford) cSAC and further impacting the aquatic qualifying interests.

Replant Lands

Forestry Applications

Two applications have been approved and three applications are pending. The total area to be afforested equates to 29.03 ha, with 10.46 ha recently planted, and 3.39 ha classed as clearfell and thinning. If the pending afforestation projects were to be carried out at the same time as the proposed project, it is possible that cumulative impacts of sedimentation could arise.

In-combination effects can occur where a project results in individually insignificant effects that, when considered in-combination with impacts of other proposed or permitted plans and projects, can result in significant effects.

Plans

Cork County Development Plan

The County Development Plan is currently under review. The Draft Cork County Development Plan 2022-2028 has recently been published which will ultimately replace the Cork County Development Plan 2014 once adopted.

The current plan includes several policies for the protection of wildlife and European sites, encouraging the appropriate assessment of potential effects from future development.

The proposed project has been assessed with regards to Volume 1 – Main Policy Material[1], Volume 3 – North Cork[2] and Volume 6 – Environmental Reports[3]. No potential for in-combination effects were determined.

Clare County Development Plan

The current plan includes several policies for the protection of wildlife and European sites, encouraging the appropriate assessment of potential effects from future development. No potential for in-combination effects were determined.

[1] https://www.corkcoco.ie/sites/default/files/2021-05/volume-1-main-policy-material-2.pdf

[2] https://www.corkcoco.ie/sites/default/files/2021-04/volume-3-north-cork-fermoy-kanturk.pdf

[3] https://www.corkcoco.ie/sites/default/files/2021-05/volume-6-environmental-assessment.pdf

4.3.3 Potential for Adverse Effects

An assessment of the proposed project to have adverse effects on the integrity of the identified European sites is presented hereunder with respect to the qualifying interests which have been identified to be within the zone of influence of the project. An evaluation as to whether there is potential for the conservation objectives to be affected by the proposed project in-combination with other plans or projects is also included.

Table 4-11: Conservation Objectives and Structure and Functions for Relevant Qualifying Interests / Species of Conservation Interest.

	Species	Conservation Objective	Attribute	Measure	Target	Potential For Adverse Effects on Site Integrity from proposed Project	Potential effect in-combination with other plans or projects	Duration of Effect in the absence of mitigation	Conclusion
Blackwater River (Cork/Waterford) cSAC	*Austropotamobius pallipes* (White-clawed Crayfish) [1092]	To maintain the favourable conservation condition	Distribution	Occurrence	No reduction from baseline	**Potential for Adverse Effects** White-clawed crayfish are considered present along the full length of the Awbeg River (NPWS 2012). eDNA sampling undertaken c. 3km downstream of the wind farm site, indicated the presence of this species at cryptically low densities in both branches of the Awbeg river. As such this species is assumed to be present in the aquatic receiving environment of the wind farm and GCR. Having regard to Section 4.2.1.3, the existing water quality in the Awbeg River north of Annagh Bridge (c. 1km south of the study boundary) has been scored by the EPA as Q3 (poor). Annagh bridge (station code: RS18A090400) has an EPA score Q2-3 which is insufficient to support while-clawed crayfish. While the section of the river downstream of Annagh bridge to Scart bridge (c. 5km south of the GCR crossing point) is rated as good. Scart bridge (station RS18A050550) c. 4km downstream of Annagh bridge the water quality is rated ≥Q4 which is sufficient to support white-clawed crayfish. Habitat heterogeneity in the Awbeg River is poor owing to wider catchment pressures (refer to Table 4-1). In the event of emissions to water via the pathways as explained in section 4.3.1, a potential negative effect resulting in reduction in population structure and habitat quality exists in the absence of appropriate mitigation.	Yes potential to affect this target by contributing to a cumulative reduction in population density exists.	Permanent due to the impact on species population	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
			Population structure: recruitment	Percentage occurrence of juveniles and females with eggs	Juveniles and/or females with eggs in at least 50% of positive samples		Yes potential to affect this target by contributing to a cumulative reduction in in juvenile density exists.	Permanent due to the impact on species population Permanent due to the rapid rate of spread of the non-native invasive, outcompetes native species reducing biodiversity and restricts waterways	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
			Negative indicator species	Occurrence	No alien crayfish species		No	Permanent due to the non-native invasive outcompeting native species	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
			Disease	Occurrence	No instances of disease		No	Permanent due to the impact on species population	Yes, potential for the project to affect this target either alone or in-combination with other

Species	Conservation Objective	Attribute	Measure	Target	Potential For Adverse Effects on Site Integrity from proposed Project	Potential effect in-combination with other plans or projects	Duration of Effect in the absence of mitigation	Conclusion
								plans or projects exists
		Water quality	EPA Q value	At least Q3-4 at all sites sampled by EPA		Yes potential to affect this target by contributing to a deterioration in water quality exists.	Temporary due to the duration of a runoff event from the project	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
		Habitat quality: heterogeneity	Occurrence of positive habitat features	No decline in heterogeneity or habitat quality		Yes potential to affect this target by contributing to siltation of riverbeds and nutrient inputs exists.	Temporary due to the duration of a runoff event from the project	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
Petromyzon marinus (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099]	To restore the favourable conservation condition of Sea lamprey and to maintain the favourable conservation condition of Brook and River lamprey.	Distribution: extent of Anadromy [1095] Distribution [1096, 1099]	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary [1095] Access to all watercourses down to first order streams [1096, 1099]	**Potential for Adverse Effects** Widely distributed in the Awbeg River (east and west branches) (NPWS 2012 and NBDC). Surveys undertaken in 2020 (Appendix 3) recorded lamprey species within the Oakfront River, tributary of the Awbeg River (west). The quality of lamprey habitat was significantly impacted by siltation pressures in the vicinity of the proposed wind farm site. Lampetra sp. ammocoetes were recorded from a total of three sites, all on the Oakfront River. However, these were present in very low densities (both 0.67 ammocoetes per m2 of ammocoete habitat fished). Lamprey ammocoetes require the deposition of fine, organic rich sediment ≥5cm in depth in which to burrow and mature. Whilst such habitat was widespread in the watercourses within the vicinity of the proposed wind farm, spawning habitat for adult lamprey was appreciably sparse and invariably of poor quality due to significant siltation pressures. Owing to their relatively small morphologies, Lampetra species such as brook lamprey require clean, fine gravels in which to dig their redds although areas may also include fractions of sand, larger gravels, and cobble. Furthermore, at the beginning of dispersal, young Lampetra spp. larvae appear to favour and burrow in fine gravel substrata soon after hatching, until they are better able to burrow in soft sediment. Larval lamprey distribution and settlement is passive and entirely regulated by local, dynamic hydrographical (flow) regimes. Thus, a paucity of suitable spawning sites (i.e. sources of larvae) can often counteract the presence of even widespread ammocoete burial habitat (i.e. soft sediment) and limit the success of local populations.	Yes potential to affect this target by contributing to a cumulative negative effect on distribution of species exists.	Temporary due to the duration of proposed works within the vicinity of the Oakfield stream	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
		Population structure of juveniles	Number of age/size groups	At least three age/size groups present		Yes potential to affect this target by contributing to a cumulative negative effect on population structure of juveniles exists.	Permanent due to the impact on species population	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists

Species	Conservation Objective	Attribute	Measure	Target	Potential For Adverse Effects on Site Integrity from proposed Project	Potential effect in-combination with other plans or projects	Duration of Effect in the absence of mitigation	Conclusion
		Juvenile density in fine sediment	Juveniles/m²	Juvenile density at least 1/m² [1095] Mean catchment juvenile density of brook/river lamprey at least 2/m² [1096, 1099]	This was exemplified at surveys sites on the Awbeg River, Milltown Stream, Rathnacally Stream and Oakfront River, where, despite a presence of suitable ammocoete habitat none were recorded, presumably due to spawning habitat pressures within these watercourses (Appendix 3). In the event of emissions to water via the pathways as explained in section 4.3.1, a potential negative effect resulting in reduction in population structure and extent of spawning / juvenile habitats exists in the absence of appropriate mitigation.	Yes potential to affect this target by contributing to a cumulative negative effect on population structure of juveniles exists.	Permanent due to the impact on species population	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
		Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds		Yes potential to affect this target by contributing to a cumulative negative effect on spawning habitat exists.	Temporary due to the duration of a runoff event from the project	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
		Availability of juvenile habitat	Number of positive sites in 3rd order [1095], 2nd order [1096, 1099] channels (and greater), downstream of spawning areas	More than 50% of sample sites positive		Yes potential to affect this target by contributing to a cumulative negative effect on juvenile habitat exists.	Temporary due to the duration of a runoff event from the project	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
Salmo salar (Salmon) [1106]	To restore the favourable conservation condition	Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary	**Potential for Adverse Effects** In general, salmonid habitat in the vicinity of the proposed Annagh wind farm was poor due to historical drainage pressures, low or intermittent/seasonal flows and often excessive siltation. Whilst some better-quality salmonid habitat was present at sites on the middle reaches of the Oakfront River, this was highly localised in areas of faster flow and the small brown trout populations recorded present were evidently at risk from significant siltation and water quality pressures in the catchment. The Awbeg River within the vicinity of the wind farm site has poor water quality (Q2-3) for salmon presence due to agriculture and hydromophology. Diffuse siltation is one of the greatest threats to salmonid populations, particularly in agricultural catchments such as that of the proposed Annagh wind farm.	Yes potential to affect this target by contributing to a cumulative negative effect on distribution of species exists.	Temporary due to the duration of a runoff event	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
		Adult spawning fish	Number	Conservation Limit (CL) for		Yes		

Species	Conservation Objective	Attribute	Measure	Target	Potential For Adverse Effects on Site Integrity from proposed Project	Potential effect in-combination with other plans or projects	Duration of Effect in the absence of mitigation	Conclusion
				each system consistently exceeded	The downstream-connecting Awbeg River is known to support a healthy population of both brown trout and Atlantic salmon, at least in the middle and lower reaches of the river (Appendix 3). The proposed project will not impede fish access along the watercourse channels. In the event of emissions to water via the pathways as explained in section 4.3.1, a potential negative effect resulting in potential reduction in availability of spawning habitat, salmonfry abundance, smolt abundance and the reduction in number and distribution of redds on the Awbeg River in the absence of appropriate mitigation.	potential to affect this target by contributing to a cumulative reduction in availability of spawning habitat for adult salmon exists.		
		Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling		Yes potential to affect this target by contributing to a cumulative reduction in salmon fry abundance exists.		
		Out-migrating smolt abundance	Number	No significant decline		Yes potential to affect this target by contributing to a cumulative reduction in smolt abundance exists.		
		Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes		Yes potential to affect this target by contributing to a cumulative reduction in the number and distribution of		

Species	Conservation Objective	Attribute	Measure	Target	Potential For Adverse Effects on Site Integrity from proposed Project	Potential effect in-combination with other plans or projects	Duration of Effect in the absence of mitigation	Conclusion
						redds quality exists.		
		Water quality	EPA Q value	At least Q4 at all sites sampled by EPA		Yes potential to affect this target by contributing to a cumulative deterioration in water quality exists.		
Lutra lutra (otter) [1355]	To restore the favourable conservation condition	Distribution	Percentage positive survey sites	No significant decline	**Potential for Adverse Effects** Otter signs (spraint) were recorded on the Awbeg River at Scart Bridge and the L1320 road bridge, as well as the Awbeg River (east branch) bridge at Caherconnor. An active otter holt was recorded near the Awbeg-Oakfront confluence during 2020 surveys. As the species are mobile and will build holts etc throughout the territory, there is potential for the species to potentially be using the watercourses on and adjacent to the wind farm site. In the event of disturbance/ displacement of species present a decline in positive survey sites may occur in the absence of mitigation. In the event of emissions to water via the pathways as explained in section 4.3.1, a potential negative effect resulting in potential reduction in fish biomass availability may occur in the absence of appropriate mitigation.	Yes potential to affect this target by contributing to a cumulative increase in works taking place exists.	Temporary due to the duration of the proposed project.	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
		Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 103ha above high water mark (HWM); 1165.7ha along river banks/ around ponds		Yes potential to affect this target by contributing to a reduction in terrestrial habitat exists.	Temporary due to the duration of the construction phase of the proposed project.	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
		Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 647.2ha		No, as the marine extent of the objective does not include the Blackwater[Munster] sub-catchments.	N/A	No potential for the project to affect this target either alone or in-combination with other plans or projects exists

	Species	Conservation Objective	Attribute	Measure	Target	Potential For Adverse Effects on Site Integrity from proposed Project	Potential effect in-combination with other plans or projects	Duration of Effect in the absence of mitigation	Conclusion
			Extent of freshwater (river) habitat	Kilometers	No significant decline. Length mapped and calculated as 599.54km		Yes potential to affect this target by contributing to a reduction in freshwater habitat exists.	Temporary due to the duration of the construction phase of the proposed project.	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
			Extent of freshwater (lake/lagoon) habitat	Hectares	No significant decline. Area mapped and calculated as 25.06ha		No as there are no lakes/lagoons within the project footprint	N/A	No potential for the project to affect this target either alone or in-combination with other plans or projects exists
			Couching sites and holts	Number	No significant decline		No as no couching site or holts were identified within the study area	N/A	No potential for the project to affect this target either alone or in-combination with other plans or projects exists
			Fish biomass available	Kilograms	No significant decline		Yes potential to affect this target by contributing to a cumulative reduction of fish numbers exists.	Temporary due to the duration of a runoff event	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists

	Species	Conservation Objective	Attribute	Measure	Target	Potential For Adverse Effects on Site Integrity from proposed Project	Potential effect in-combination with other plans or projects	Duration of Effect in the absence of mitigation	Conclusion
			Barriers to connectivity	Number	No significant increase		Yes potential to affect this target by contributing to barriers in the form of fences during the construction phase.	Temporary due to the duration of the construction phase	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
Kilcolman Bog SPA	*Cygnus cygnus* (Whooper swan) [A038]	Generic conservation objectives To maintain or restore the favourable conservation condition				**No Potential for Adverse Effects** This species has a proposed zone of sensitivity (can experience disturbance impacts) of 600m (Mc Guinness et al. 2015). However, the identified forging area for this species is c. 1km south of the wind farm site, therefore beyond the impact of disturbance. This species could potentially forage in the improved agricultural grassland on site, however no observations indicating this occurs were recorded during the avifauna surveys conducted by FT during the 2019 – 2021 survey period. As swans show high fidelity to foraging sites, their absence from the site and presence elsewhere can effectively be interpreted as there being no foraging habitat for this species onsite. Magnitude of effects is assessed as **Negligible** (<1% habitat lost), species sensitivity is **Very High**, overall effect significance is **Low** (Criteria: Percival, 2003). The proposed impact of habitat loss will be a ***Long-term Imperceptible impact*** (Criteria: EPA, 2017) Whooper Swan were not recorded in the flight activity study area during VP surveys conducted by FT during the 2019 – 2021 survey period, therefore, the predicted collision risk is effectively zero. Any barrier effect to migrating birds will be imperceptible and as such no likely significant operational effects were identified for this SCI of the SPA.	No, as indicated in the previous column - As swans show high fidelity to foraging sites, their absence from the site and presence elsewhere can effectively be interpreted as there being no foraging habitat for this species onsite. Therefore no potential for in-combination effects.	N/A	No potential for the project to affect this SCI either alone or in-combination with other plans or projects exists

	Species	Conservation Objective	Attribute	Measure	Target	Potential For Adverse Effects on Site Integrity from proposed Project	Potential effect in-combination with other plans or projects	Duration of Effect in the absence of mitigation	Conclusion
Stack' s to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA	*Circus cyaneus* (Hen harrier) [A082]	Generic conservation objectives To maintain or restore the favourable conservation condition				**No Potential for Adverse Effects** Hen Harrier was observed once during winter 2019-20 surveys and twice during winter 2020-21 surveys (FT 2021). Ringtail was seen flying in from the south to land in wet grassland to the west of the [existing] met mast. A ringtail, noted as likely to be an adult female was flushed from marsh south of T04. The observation in winter 2019-20 was of a bird commuting. There is however, no evidence the species breeds on site or uses the site as a habitual winter roost. Wind farm site not within the core foraging range (Core range of 2km, with maximum range of 10km) of the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA for this species. However, the site is within the core feeding range of nine non-designated but regionally important breeding areas for Hen Harrier (Ballyhoura Mountains), as established in the 2015 National Hen Harrier Survey. Effects on winter hunting habitat will be minimal loss of 2.25 Ha/2.1% of improved grassland, loss of 2.17 Ha/3.6% of wet grassland). The habitats are common in the surrounding area. Magnitude effects is assessed as **Low** (1-5% habitat lost), species sensitivity is **Very High**, overall effect significance is **Medium** (Criteria: Percival, 2003). The proposed impact of habitat loss will be a ***Long-term Slight Impact*** (Criteria: EPA, 2017) There will be felling activities and the permanent loss of plantation woodland which is common in the area and disturbance during felling and construction works for birds hunting within site and birds breeding/hunting nearby the site. Probability of temporary to short-term impacts. Sensitivity: **Very High**. Magnitude assessed as **Negligible**. Overall significance assessed as **Low**. (Criteria: Percival, 2003). Disturbance and/or habitat loss will be a ***Short-term Slight Impact*** (Criteria: EPA, 2017). Although barrier effect has been documented in at least one study in the European context; recent evidence suggests that birds continue to use wind farms post construction (Whitfield and Madders, 2006) (Robinson et al., 2012) indicating wind farms may not be significant barriers. It is also noted the turbine layout features large gaps (minimum of c. 460m) between individual turbines, avoiding a 'wall' or barrier effect. Barrier Effect during operation: Magnitude of effects is assessed as **Negligible** (< 1% population/ habitat lost), species sensitivity is **Very High**, overall effect significance is **Low** (Criteria: Percival, 2003). Magnitude to birds in terms of energy expenditure assessed as ***Not Significant***; magnitude of daily barrier effect assessed as ***Not Significant***; overall significance considered ***Long-term not significant impact*** (Criteria: EPA, 2017).	No, as the proposed development is not within the core foraging range of the SCI for this SPA. The potential species identified are therefore not considered part of the SPA population and the targets for the SPA will not be affected.	N/A	No potential for the project to affect this SCI either alone or in-combination with other plans or projects exists

	Species	Conservation Objective	Attribute	Measure	Target	Potential For Adverse Effects on Site Integrity from proposed Project	Potential effect in-combination with other plans or projects	Duration of Effect in the absence of mitigation	Conclusion
Lower River Shannon SAC	*Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099]	To restore the favourable conservation condition of Sea lamprey and to maintain the favourable conservation condition of Brook and River lamprey.	Distribution: extent of Anadromy [1095] Distribution [1096, 1099]	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary [1095] Access to all watercourses down to first order streams [1096, 1099]	**Potential for Adverse Effects** Due to the proximity of the replant lands to the SAC (1.7km in-stream), no major barrier to movement and the watercourse as yet to be assigned a WFD status, these species are assumed present in the Emlagh 27 watercourse. In the event of emissions to water via the pathways as explained in section 4.3.1, a potential negative effect resulting in reduction in population structure and extent of spawning / juvenile habitats exists in the absence of appropriate mitigation.	No, as there are barriers to movement proposed as part of the afforestation works.	N/A	No potential for the project to affect this target either alone or in-combination with other plans or projects exists
			Population structure of juveniles	Number of age/size groups	At least three age/size groups present		Yes potential to affect this target by contributing to a cumulative negative effect on population structure of juveniles exists.	Permanent due to the impact on species population	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
			Juvenile density in fine sediment	Juveniles/m²	Juvenile density at least 1/m² [1095] Mean catchment juvenile density of brook/river lamprey at least 2/m² [1096, 1099]		Yes potential to affect this target by contributing to a cumulative negative effect on population structure of juveniles exists.	Permanent due to the impact on species population	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
			Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds		Yes potential to affect this target by contributing to a cumulative negative effect on spawning habitat exists.	Temporary due to the duration of a runoff event from the project	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists

Species	Conservation Objective	Attribute	Measure	Target	Potential For Adverse Effects on Site Integrity from proposed Project	Potential effect in-combination with other plans or projects	Duration of Effect in the absence of mitigation	Conclusion
		Availability of juvenile habitat	Number of positive sites in 3rd order [1095], 2nd order [1096, 1099] channels (and greater), downstream of spawning areas	More than 50% of sample sites positive		Yes potential to affect this target by contributing to a cumulative negative effect on juvenile habitat exists.	Temporary due to the duration of a runoff event from the project	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
Salmo salar (Salmon) [1106]	To restore the favourable conservation condition	Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary	**Potential for Adverse Effects** Due to the proximity of the replant lands to the SAC (1.7km in-stream), no major barrier to movement and the watercourse as yet to be assigned a WFD status, this species are assumed present in the Emlagh 27 watercourse. In the event of emissions to water via the pathways as explained in section 4.3.1, a potential negative effect resulting in potential reduction in availability of spawning habitat, salmonfry abundance, smolt abundance and the reduction in number and distribution of redds on the Awbeg River in the absence of appropriate mitigation.	No as there are barriers to movement proposed as part of the afforestation works.	N/A	No potential for the project to affect this target either alone or in-combination with other plans or projects exists
		Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded		Yes potential to affect this target by contributing to a cumulative reduction in availability of spawning habitat for adult salmon exists.	Temporary due to the duration of emissions to water	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
		Salmon fry abundance	Number of fry/5minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling		Yes potential to affect this target by contributing to a cumulative reduction in salmon fry abundance exists.		

Species	Conservation Objective	Attribute	Measure	Target	Potential For Adverse Effects on Site Integrity from proposed Project	Potential effect in-combination with other plans or projects	Duration of Effect in the absence of mitigation	Conclusion
		Out-migrating smolt abundance	Number	No significant decline		Yes potential to affect this target by contributing to a cumulative reduction in smolt abundance exists.		
		Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes		Yes potential to affect this target by contributing to a cumulative reduction in the number and distribution of redds quality exists.		
		Water quality	EPA Q value	At least Q4 at all sites sampled by EPA		Yes potential to affect this target by contributing to a cumulative deterioration in water quality exists.		
Lutra lutra (Otter) [1355]	To restore the favourable conservation condition	Distribution	Percentage positive survey sites	No significant decline	**Potential for Adverse Effects** Due to the proximity of the replant lands to the SAC (1.7km in-stream) and no major barrier to movement, this species is assumed present in the watercourses within the vicinity of the replant lands. As the species are mobile and will build holts etc throughout the territory, there is potential for the species to potentially be using the watercourses on and adjacent to the Emlagh replant lands. In the event of disturbance/ displacement of species present a decline in positive survey sites may occur in the absence of mitigation.	Yes potential to affect this target by contributing to a cumulative increase in works taking place exists.	Temporary due to the duration of the proposed project.	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
		Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as		Yes potential to affect this target by	Permanent due to the duration of the the	Yes, potential for the project to affect this target either

Species	Conservation Objective	Attribute	Measure	Target	Potential For Adverse Effects on Site Integrity from proposed Project	Potential effect in-combination with other plans or projects	Duration of Effect in the absence of mitigation	Conclusion
				596.8ha above high water mark (HWM); 958.9ha along river banks/ around ponds	In the event of emissions to water via the pathways as explained in section 4.3.1, a potential negative effect resulting in potential reduction in fish biomass availability may occur in the absence of appropriate mitigation.	contributing to a reduction in terrestrial habitat exists.	proposed project.	alone or in-combination with other plans or projects exists
		Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 4,461.6ha		No, as the marine extent of the objective does not include the proposed afforestation site	N/A	No potential for the project to affect this target either alone or in-combination with other plans or projects exists
		Extent of freshwater (river) habitat	Kilometers	No significant decline. Length mapped and calculated as 500.1km		No as there are no works proposed within the watercourses bordering the proposed affectation site	N/A	No potential for the project to affect this target either alone or in-combination with other plans or projects exists
		Extent of freshwater (lake/lagoon) habitat	Hectares	No significant decline. Area mapped and calculated as 125.6ha		No as there are no lakes/lagoons within the project footprint	N/A	No potential for the project to affect this target either alone or in-combination with other plans or projects exists
		Couching sites and holts	Number	No significant decline		No as no couching site or holts were identified within the proposed affectation site	N/A	No potential for the project to affect this target either alone or in-combination with other plans or projects exists

	Species	Conservation Objective	Attribute	Measure	Target	Potential For Adverse Effects on Site Integrity from proposed Project	Potential effect in-combination with other plans or projects	Duration of Effect in the absence of mitigation	Conclusion
			Fish biomass available	Kilograms	No significant decline		Yes potential to affect this target by contributing to a cumulative reduction of fish numbers exists.	Temporary due to the duration of a runoff event	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists
			Barriers to connectivity	Number	No significant increase		No as there are no barriers to movement proosed within the project footprint	N/A	No potential for the project to affect this target either alone or in-combination with other plans or projects exists
River Shannon and River Fergus Estuaries SPA	*Vanellus vanellus* (Lapwing) [A142]	To maintain the favourable conservation condition	Population trend	Percentage change	Long term population trend	**Potential for Adverse Effects** This species has a proposed zone of sensitivity (can experience disturbance impacts) of 800m (Mc Guinness et al. 2015). However, the SPA is c. 1km (1.7km in-stream) south of the proposed replant lands site, therefore beyond the impact of disturbance. This species could potentially forage in the proposed replant lands site, however no observations indicating this occurs were recorded during the replant land walkover surveys conducted by Giorria Environmental Services in May 2021 Due to the eclectic habitat preference of the SCI and there being suitable habitats in the surrounding area of the replant lands, impacts on the integrity of the SCI will not occur due to disturbance/ displacement from the replant lands. In the event of emissions to water via the pathways as explained in section 4.3.1, a potential negative effect resulting in potential reduction in prey availability may occur, therefore reducing the intensity of the use of the area, in the absence of appropriate mitigation.	No as explained in the previous column - Due to the eclectic habitat preference of the SCI and there being suitable habitats in the surrounding area of the replant lands, impacts on the integrity of the SCI will not occur due to disturbance/ displacement from the replant lands. Therefore, no in-combination effects will occur with the	N/A	No potential for the project to affect this target either alone or in-combination with other plans or projects exists

Species	Conservation Objective	Attribute	Measure	Target	Potential For Adverse Effects on Site Integrity from proposed Project	Potential effect in-combination with other plans or projects	Duration of Effect in the absence of mitigation	Conclusion
						proposed project.		
		Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by lapwing other than that occurring from natural patterns of variation		Yes potential to affect this target by contributing to a cumulative reduction watercourse quality exists.	Temporary due to the duration of emissions to water	Yes, potential for the project to affect this target either alone or in-combination with other plans or projects exists

4.3.4 Conservation interests identified as needing to be mitigated

Having regard to Table 4-12 the qualifying interests of the European sites which may potentially be impacted by the proposed project in the absence of mitigation measures are:

- Blackwater River (Cork/Waterford) cSAC
  - White-clawed Crayfish
  - Lamprey
  - Salmon
  - Otter
- Lower River Shannon SAC
  - Lamprey
  - Salmon
  - Otter
- River Shannon and River Fergus Estuaries SPA
  - Lapwing

4.4 Mitigation

Mitigation is prescribed in accordance with the EPA draft guidance on EIAR (EPA, 2017) which requires mitigation by avoidance as a first approach. Where this is not feasible, measures to prevent impacts from giving rise to adverse effects should be adopted (e.g. design of bunded storage for chemicals). Where impacts cannot be avoided, mitigation by reduction of impact is required to limit the exposure of the receptor to an acceptable level (often achieved by interrupting the pathway between the source and receptor) such that adverse effects on site integrity of the European site does not occur.

4.4.1 Mitigation by Avoidance and design

The following measures are incorporated into the proposed wind farm design to reduce impacts on designated sites, flora and fauna through avoidance and design:

- The hard-standing area of the wind farm has been kept to the minimum necessary for the maximum turbine envelope proposed, including all site clearance works to minimise land take of habitats and flora.
- Site design and layout deliberately avoided direct impacts on designated sites.
- All cabling for the project will be placed underground; this significantly reduces collision risk to birds over the lifetime of the wind farm (Drewitt and Langston, 2006).
- The grid connection routes have been selected to minimise land take of potentially sensitive habitats by following the site access tracks and public roads.
- Care has been taken to ensure that sufficient buffers are in place between wind farm infrastructure and hydrological features such as rivers and streams.

- One new stream crossing shall be required within the main wind farm site. A clear-span design has been selected to avoid instream works, and to minimise disturbance of banks and associated indirect effects such as siltation.
- Directional drilling (HDD) is the proposed installation method where the grid connection crosses the Rathnacally stream. As such, in-stream works will not be required and the potential for contaminant or pollutant input will be greatly reduced as a result.
- The grid cable will be incorporated in the clear span bridge where it crosses the Oakfront stream within the proposed site.
- The design of the grid connection was also carried out with cognisance to ecological features. Cables are to be placed underneath public roads where possible to avoid impact to roadside hedgerows.

Further mitigation measures prescribed to avoid or reduce potential for the proposed project to have an adverse effect on the integrity / conservation objectives of the Blackwater River (Cork/Waterford) cSAC (002170), the Lower River Shannon SAC (002165) and River Shannon and River Fergus Estuaries SPA (004077) are assessed hereunder.

4.4.2 Mitigation Measures

Table 4-12: Details of Mitigation Measures to be Implemented for Proposed Project

No.	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Level of Success	Monitoring scheme to prevent mitigation failure
		Mitigation Measures to be Implemented Prior to Construction		
1	The Construction and Environment Management Plan (CEMP) (located in Appendix 5)	The CEMP sets out the key environmental management measures associated with the construction, operation and decommissioning of the proposed wind farm, to ensure that during these phases of the development, the environment is protected, and any potential impacts are minimised. The contractor is not permitted to omit or alter mitigation measures set out in the CEMP. The CEMP and all management plans within, will reduce the risk of impacts from the proposed project including the potential impacts to the conservation objectives outlined in Table 4-12.	Mitigation measures will be implemented in full by the Client through the Contractor awarded the contract to construct the wind farm. All required mitigation measures outlined below and in the CEMP will be included as a contractual obligation on the contractor, in combination with competent supervisory staff overseeing the works. High probability of success.	The Project Manager, Environmental Manager and Qualified Ecologist will monitor the implementation of the mitigation measures outlined in the CEMP. • Further mitigation measures pertaining to the proposed project are outlined in the CEMP in Appendix 4 including detailed management plans that form part of the whole document.
2	A Project Ecologist/Ecological Clerk of Works (ECoW) The Project Ecologist/ECoW will ensure successful implementation of all mitigation measures for biodiversity management.	A Project Ecologist/Ecological Clerk of Works (ECoW) with appropriate experience and expertise (in implementing ecological mitigation measures for wind farm developments) will be employed for the duration of the construction and decommissioning phases to ensure that all the mitigation measures outlined in relation to the environment are implemented. The Project Ecologist/ECoW will be awarded the authority to stop construction activity if there is potential for adverse ecological effects to occur.	A Project Ecologist/Ecological Clerk of Works (ECoW) will be employed by the Client through the Contractor awarded the contract to construct the wind farm. All mitigation will be implemented in full. High probability of success.	The Project Ecologist/ECoW will monitor the implementation of the mitigation measures detailed below and in accordance with the relevant management plans within the CEMP. Regular reporting to client and contractor as per each management plan.
3	Communication with IFI	A line of communication with IFI will be established by the ECoW and fisheries officers will be invited to inspect mitigation measures at the site. This will ensure transparency, encourage proactive culture around implementation of measures and facilitate input from key stakeholders if required.	ECoW will open a line of communication upon appointment. Mitigation measure will be implemented in full. High probability of success.	ECoW to provide reports of communication and/or site visit findings to update the client and contractor of input from key stakeholders.
4	Water baseline and monitoring Establish baseline biological water quality in order to detect change throughout the lifetime of the proposed project.	Biological sampling (SSRS or Q sampling as applicable) will be carried out at the established baseline sampling points as determined within the aquatic ecology report (Appendix 3) for the duration of the construction and operational phases of the project. Establish baseline biological water quality so regular monitoring can detect any long-term changes in water and aquatic habitat quality which could be missed by grab sampling for physico-chemical parameters only.	Mitigation measure will be implemented in full by the Client.	Monitoring program will be bi-weekly for the duration of construction and decommissioning and will be yearly for the duration of the operation of the proposed project. Regular reporting to client and contractor
5	Invasive Species Eradication of invasive species will be completed prior to construction. Measures shall be in accordance with the invasive species management plan (ISMP) (Appendix 5) and Regulation 49 of the EC (Birds & Natural Habitats) Regulations (2011).	Prior to works commencing an invasive species survey will be undertaken in the previously identified areas of the project to reconfirm the extend of the non-native invasive species and to ensure they have not spread to any new areas within the footprint of the proposed project. The invasive species management plan will be adhered to for all works in areas confirmed as containing non-native invasive species. The plan is intended to be a working document and will be updated during the construction, operational and decommissioning phases. The main objective of the invasive species management strategy are containment, treatment and eradication including: • Cordoning off the area – this shall include a buffer of 5m surrounding the area of infection to ensure that seeds are not transported to other sections of the site via vehicular traffic, equipment or PPE.	Mitigation measure will be implemented in full by the Client. High probability of success.	The plan will be updated and implemented prior to construction and then updated through all stages of the project lifecycle. During construction, it will be updated by the contractor to form the detailed invasive species management plan which will form part of the detailed CEMP. Following construction, the plan will be updated for the operational phase, taking into account the results of the detailed construction invasive species management plan and operational maintenance requirements. During decommissioning it will be updated if new

No.	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Level of Success	Monitoring scheme to prevent mitigation failure
		• No machinery or personnel shall be allowed within this restricted area. Similarly, there shall be no storage of materials within or adjacent to this restricted area. • There shall be no vegetation clearance or trimming within the cordoned area (except where undertaken in accordance with the invasive species management plan) as this can lead to the species recolonising other areas via the wind, water if displaced into drains, or soil and vegetation attached to machinery, vehicles or personnel. • No soil or vegetation shall be removed from this area unless it is securely contained and is transported under licence to a suitably licenced facility for treatment. • Informing all site staff through toolbox talk as part of site inductions. • Any new sightings of the species shall by relayed to construction staff and the contractor via the project ecologist/ECoW. These areas shall follow the same protocol as described above. • Reporting sighting(s) to the NPWS and NBDC and liaising with the NPWS		areas are identified to have been within the footprint of the works.
6	Environmental Manager The Environmental Manager will ensure successful implementation of all mitigation measures for water control and management.	A suitably qualified Environmental Manager (competent in the implementation and management of environmental mitigation measures for wind farms) will be appointed to ensure the effective operation and maintenance of drainage and other mitigation measures associated with water control and management during the construction process. The operations management of the proposed project will include regular monitoring of the drainage system and maintenance. The Environmental Manager will be awarded the authority to stop construction activity if there is potential for adverse effects to water control and/or management.	An environmental manager will be employed by the Client through the Contractor awarded the contract to construct the wind farm and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed below and in accordance with the relevant management plans within the CEMP ensuring successful implementation. Regular reporting to client and contractor as per each management plan.
7	Silt traps and silt fencing The main purpose of the silt traps and drain blocking is to slow water flow, increase residence time, and allow settling of silt in a controlled manner.	Silt traps and silt fencing measures for the proposed wind farm site will be provided at outfalls from roadside swales to silting ponds, at the end of the drainage channels, to the outside of the tree felling buffer zone and strategically placed down-gradient within forestry drains near streams. The traps and fences will be maintained regularly ensuring that they are clear of sediment build-up and are not severely eroded. Additional silt fencing will be kept on site in case of an emergency break out of silt laden run-off. This measure will reduce the risk of sediment runoff reaching waterways within the catchment of the main wind farm site. This in turn will avoid adverse effects on the surrounding water courses and aforementioned SAC's.	Mitigation measures will be implemented in full by the Client through the Contractor awarded the contract to construct the wind farm. All required mitigation measures will be included as a contractual obligation on the contractor. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures as detailed and in accordance with the relevant management plans within the CEMP. Regular reporting to client and contractor as per each management plan.
8	Settlement ponds The main purpose of the settlement ponds is to increase residence time, and prevent sediment reaching the watercourses.	Settlement ponds as detailed in the surface water management plan within the CEMP, will be put in place in advance of works as construction progresses across the site. The settlement ponds have a diffuse outflow and will mitigate any increase in surface water run-off and treat suspended solids in the surface water runoff. This will prevent sediment reaching the waterways within the catchment of the main wind farm site This in turn will avoid adverse effects on the watercourse network.	Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the wind farm. All required mitigation measures will be included as a contractual obligation on the contractor. High probability of success	The Environmental Manager will monitor the implementation of the mitigation measures as detailed and in accordance with the relevant management plans within the CEMP. Regular reporting to client and contractor as per each management plan. Settlement ponds are to be cleared of deposits regularly and when requested by the ECoW and/or the Environmental Manager to ensure their ongoing functioning and maintenance of excess capacity.
Construction Phase Mitigation Measures				

No.	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Level of Success	Monitoring scheme to prevent mitigation failure
9	Habitats or flora	The area of the proposed works will be kept to the minimum necessary, including all site clearance works, to minimise disturbance to habitats and flora. In this case, the footprint of the proposed development has been kept to the minimum necessary, including the use of layout design methods (e.g. existing roads and stream crossings to minimise excavation works). No disturbance to habitats or flora outside the proposed project area will occur. All works will be restricted to the immediate footprint of the development, which will be wholly within the development site boundary and kept separate from any key areas for biodiversity. Machinery, and equipment will be stored within the site compound. Designated access points will be established within the site and all construction traffic will be restricted to these locations. Access to the site will be primarily via the existing local road L1322. HGVs shall approach the site via this road from the East. Exclusion zones will be demarcated and no site traffic will enter the area.	A Project Ecologist/Ecological Clerk of Works (ECoW) will be employed by the Client through the Contractor awarded the contract to construct the wind farm. All mitigation will be implemented in full. High probability of success.	The Project Ecologist/ECoW will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP. Regular reporting to client and contractor as per each management plan.
10	Avifauna	The removal of vegetation and scrub as well as trimming of trees along the TDR will be undertaken outside of the bird breeding season (March 1st to August 31st inclusive) in order to protect nesting birds.	Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the wind farm. All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Project Ecologist/ECoW will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP. Regular reporting to client and contractor.
11	Lighting	Construction operations will take place during the hours of daylight to minimise disturbances to active nocturnal species. This is in line with best practice recommendations for mitigation measures in regard to nocturnal species (birds, bats, otters) and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt and Langston, 2006). Limited operations such as concrete pours, turbine erection and installation of the grid connection require night-time operating hours; full consideration of BCT guidance note 08/18 will be implemented when determining appropriate lighting for works to take place during night-time hours. Works will be supervised by the project ecologist/ECoW.	Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the wind farm. All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Project Ecologist/ECoW will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP. Regular reporting to client and contractor.
12	Toolbox talk Will ensure all personnel present receive the relevant information for the areas they are working on each given day.	Toolbox talks will be undertaken with construction staff on disturbance to key species during construction. This will help minimise disturbance.	Toolbox talks will be provided to all staff by the ECoW daily before the start of any works.	The ECoW will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.
13	Plant and vehicles Will prevent contamination within the site.	All site plant will be inspected at the beginning of each day prior to use. Defective plant shall not be used until the defect is satisfactorily fixed. All major repair and maintenance operations will take place off site. Vehicles entering the site should be in good working order, free from leakage of fuel or hydraulic fluid.	Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the wind farm.	Inspection of plant on site will be maintained throughout the lifetime of the project.

No.	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Level of Success	Monitoring scheme to prevent mitigation failure
			All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	
14	Pollution incident control response. Will ensure appropriate training to all personnel and knowledge of emergency response plans	All personnel working on site will be trained in pollution incident control response. An emergency response plan (refer to the CEMP) will ensure that appropriate information will be available on site outlining the spillage response procedure and a contingency plan to contain silt. A regular review of weather forecasts of heavy rainfall (>10mm/hour) is required. A record will be kept of daily visual inspections of drains, silt ponds, etc on site and weekly inspections of streams which receive flows from the main wind farm site, during the construction phase.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans detailed in the CEMP. Regular reporting to client and contractor as per each management plan.
15	Surface water	A self-imposed buffer zone of 50m will be maintained for all watercourses with the exception of existing road upgrades. The site drainage has been designed to complement existing overland flow and existing onsite drainage. A three-stage treatment train (swale – settlement pond – diffuse outflow) is required to retain and treat the discharges from all hard surface areas. Settlement ponds are required to be cleared of deposits generated by aggregate used for access tracks or other sediment regularly. Cleared material shall be interred securely to prevent ingress into the drainage network. This measure will reduce the risk of sediment runoff or pollutants reaching waterways within the catchment of the proposed project. This in turn will avoid adverse effects on the surrounding water courses and aforementioned SAC's.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP. Daily visual inspections of drains, silt ponds, etc on site and weekly inspections of streams will be performed during the construction period. This will ensure suspended solids are not entering the streams and rivers alongside the work area. These inspections will identify any obstructions to channels and allow for appropriate maintenance of the existing roadside drainage regime. If suspended solids in water courses exceed the baseline levels construction work will be stopped, and remediation measures will be put in place immediately.
16	Felling schedule (License)	Tree felling will be the subject of a felling license from the Forest Service and to the conditions of such a license. A Felling License will be in place prior to works commencing on site. To ensure a tree clearance method that reduces the potential for sediment and nutrient run-off, the construction methodology will follow the specifications set out in the following guidance documents: • DAFM (2019). Standards for Felling and Reforestation; • Forestry Service (2000a). Forest Service Forestry and Water Quality Guidelines; • Forestry Service (2000b). Forest Harvesting and Environmental Guidelines; • DAFM (2018). Draft Plan for Forestry and Freshwater Pearl Mussel in Ireland	Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the wind farm. All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager and/or ECoW will monitor the implementation of the mitigation measures in accordance with permitted license. Regular reporting to client and contractor as per license requirement.
17	Felling schedule (aquatic zone of main wind farm site)	In accordance with the Forest Service Code of Practice and in the FSC Certification Standard for the installation of buffer zones adjacent to aquatic zone (Forestry Service, 2000a, 2000b). Given the close proximity of felling areas to receiving watercourses and potential source-receptor pathways (i.e. drainage channels), a minimum buffer zone for felling areas of 15-20m will be applied. Silt fences will be required within the drainage channels. These will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded.	Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the wind farm. All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager and/or ECoW will monitor the implementation of the mitigation measures in accordance with permitted license and in accordance with the relevant management plans detailed in the CEMP. Regular reporting to client and contractor as per license requirement.

No.	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Level of Success	Monitoring scheme to prevent mitigation failure
18	Felling schedule (timber extraction rack)	Where damage or serious rutting has started to occur, timber extraction will be suspended immediately. Relocation of the extraction rack will be used to remedy the situation. This will avoid timber extraction routes acting as conduits for surface water flows. This in turn will avoid adverse effects on the surrounding water courses via emissions to water.	Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the wind farm. All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager and/or ECoW will monitor the implementation of the mitigation measures in accordance with permitted license and in accordance with the relevant management plans detailed in the CEMP. Regular reporting to client and contractor as per license requirement.
19	Felling schedule (felling)	Felling will be undertaken in the spring to facilitate the sowing of grass seeds post-harvest to aid sediment filtration and nutrient absorption, using native grass species e.g. *Holcus lanatus and Agrostris capilaris* (DAFM, 2018).	Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the wind farm. All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager and/or ECoW will monitor the implementation of the mitigation measures in accordance with permitted license and in accordance with the relevant management plans detailed in the CEMP. Regular reporting to client and contractor as per license requirement.
20	Felling schedule (machine operations)	Machine operations will not take place in the 48 hour period before predicated heavy rainfall (>10mm/hour), during heavy rainfall or in the 48 hour period following heavy rainfall (DAFM, 2018).	Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the wind farm. All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager and/or ECoW will monitor the implementation of the mitigation measures in accordance with permitted license and in accordance with the relevant management plans detailed in the CEMP. Regular reporting to client and contractor as per license requirement.
21	Felling schedule (removal of debris)	Removal of branch lop-and-top and other debris (brash) from felling areas within 20m of forestry drains (i.e. up-slope of active pathways to larger downstream watercourses) will be carried out to reduce nutrient seepage immediately post-felling and in the proceeding years after felling has occurred (DAFM, 2019). Brash mats will be used to support vehicles on soft ground and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place before they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring, extraction will be suspended during periods of high rainfall.	Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the wind farm. All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager and/or ECoW will monitor the implementation of the mitigation measures in accordance with permitted license and in accordance with the relevant management plans detailed in the CEMP. Regular reporting to client and contractor as per license requirement.
22	Road / access track construction	It is proposed to construct approximately 3.4km of new internal access tracks and carry out upgrades to 1.4km of existing agricultural tracks (including bend widening) to facilitate site access and construction activities. All track widening will be undertaken using clean uncrushable stone with a minimum of fines to reduce the risk of suspended solid releases to receiving watercourses. Still traps will be placed in the new roadside swales. Proposed new tracks will be drained as via roadside swales with stilling ponds at the end of the swale. These grassed swales will serve to detain flow and reduce the velocities of surface water flows. The swales will be 0.3 m deep with a bottom width of 0.5 m and side slope of 1 in 3. The swales will be constructed in accordance with CIRIA C698 Site Handbook for the Construction of SuDS which can be used in conjunction with CIRIA C753 The SuDS Manual. Where roadside drains are laid at slopes greater than 2%, check dams will be provided.	Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the wind farm. All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.

No.	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Level of Success	Monitoring scheme to prevent mitigation failure
		Site drainage, including silt traps and settlement ponds, will be put in place in parallel with or ahead of construction, such that excavation for new infrastructure will have functional drainage system in place. The settlement ponds will remain in place during construction phase. The settlement ponds will drain diffusely overland, over existing vegetated areas, within the site boundary. Tracks will be capped as soon as practicably possible to cover exposed subsoils and as such reduce the concentration of suspended solids in the run-off.		
23	Main wind farm drainage	The 11 no. surface water drains within the site boundary to be crossed during the construction phase will be via precast box culverts. Silt Protection Controls (SPCs) are proposed at the location of the drain crossings. It is recommended that the SPCs will consist of a minimum of silt traps containing filter stone and filter material staked across the width of the swales and upstream of the outfall to any watercourse. No interference with natural watercourses will occur. Drains around hard-standing areas will be shallow to minimise the disturbance to sub-soils. Permanent roadside drainage will be installed as part of the construction stage. This will include the use of interceptor drains, swales, check dams and stilling ponds. These measures will buffer site run-off during periods of high rainfall by retaining the water until the storm hydrograph has receded. Site drainage, including silt traps and stilling ponds, will be put in place in parallel with or ahead of construction, such that excavation for new infrastructure will have functional drainage system in place. The stilling ponds will remain in place during construction phase. The stilling ponds will drain diffusely overland, over existing vegetated areas, within the site boundary. The stilling ponds will be back-filled and the swales that were connected to them will be re-connected to the outfall once construction is completed. Site access roads have been laid out to reduce the longitudinal slope of roadside drains and to follow natural flow paths. Where roadside drains are laid at slopes greater than 2%, check dams will be provided. Where existing tracks will be used to access the site, roadside drains alongside these tracks will be cleared of obstructions only where strictly necessary (i.e. if flooding occurs). Vegetation and other obstructions provide sediment arrest and flow attenuation functions and as such will not be interfered with unless absolutely necessary.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.
24	Wheel wash facilities	Wheel wash facilities will be located at the site entrance to reduce construction traffic fouling public roads. The wheel wash will come with an additional water tank which will be filled regularly. These units will be self-contained and will filter the waste for ease of disposal. Waste will be removed from each unit and from site by a permitted contractor to a licensed facility. Measures will be in accordance with the invasive species management plan (ISMP) (Appendix 5) and Regulation 49 of the EC (Birds & Natural Habitats) Regulations (2011).	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.
25	Concrete	Major construction works including concrete pours onsite will be timed to occur outside periods where heavy rainfall would be expected. A regular review of weather forecasts of heavy rainfall is required, and the site contingency plan will be updated in accordingly before and after such events.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.

No.	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Level of Success	Monitoring scheme to prevent mitigation failure
		Concrete washout will be carried out in a dedicated area of the temporary compound. Only the washing of chutes will be permitted. Every concrete truck delivering concrete to the site must use the concrete washout facility prior to leaving the site. Chutes will be washed out at the designated area with a settlement lagoon provided to receive all run-off. During construction concrete will be kept out of all watercourses and drains.		
26	Management of hydrocarbons	Any diesel, fuel or hydraulic oils stored at the temporary site compound will be bunded. The bund capacity will be sufficient to contain 110% of the tank's maximum capacity. Fuels, lubricants and hydraulic fluids for equipment used on the site will be carefully handled to avoid spillage. Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of; Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling; and Appropriate spill control equipment, such as oil soakage pads, will be kept within the refuelling areas and in each item of plant to deal with any accidental spillage.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.
27	Refueling	Refueling of plant and fuel bowsers during construction will be carried out at the primary refueling station which will be located at the main temporary site compound. The station will be fully equipped for a spill response and a specially trained and dedicated environmental and emergency spill response team will be appointed before commencement on site. In addition to the above, onsite refueling of machinery will be carried out 100m from watercourses using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refueling trailer will be re-filled off site or at the primary refueling station at the main site compound and will be towed by a 4x4 jeep to designated refueling areas near to where machinery is located but at distances of greater than 100m from watercourses. Drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.
28	Spill control	Appropriate spill control equipment, such as oil soakage pads, will be kept within the construction area and in each item of plant to deal with any accidental spillage. All staff will be trained in appropriate spill control measures. See Emergency spill plan within the CEMP.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.
29	Welfare utilities	Portaloos and / or containerised toilets and welfare units will be used to provide toilet facilities for site personnel. Sanitary waste will be removed from site via a licensed waste disposal contractor.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.
30	Minor water course crossing – dry conditions	Duct installation will only take place during dry periods to ensure no in-stream works and an environmental monitor shall supervise the works.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.
31	Standing water	Standing water, which could arise during excavations, has the potential to contain a high concentration of suspended solids as a result of the disturbance to soils. This water will be pumped into the site drainage system (but not directly into settlement ponds – minimum setback 20m upstream of settlement pond), which will be constructed at site clearance stage, in advance of excavations for the turbine bases.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.

No.	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Level of Success	Monitoring scheme to prevent mitigation failure
		In situations where space for drainage infrastructure or suitable treatment measures are not available (e.g. during grid cable installation) excess water from excavations will be required to be removed by tanker for disposal at licensed facility).		
32	Cross-drains	Suitably sized cross-drains will be provided for drainage crossings to convey flows from agricultural drains and forestry drains across the access tracks, to prevent a risk of clogging.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.
33	Flooding	Settlement ponds are to be provided as part of the drainage system for the development. The settlement ponds, together with the swales, will serve to reduce velocities in the surface water runoff draining from the access tracks and hardstanding areas and will provide retention of the flows. This will also mitigate any increase in the risk of flooding. No construction personnel, operation or maintenance personnel will be permitted on site during extreme flood events.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.
34	Excavated material	Excavated material will be re-used on-site where possible for berms etc. Surplus material will be removed from the site to an appropriately licensed or permitted facility. Surplus soil or rock excavated during the course of the works will be used on site in the form of landscaping including low berms, where appropriate. A setback distance of at least 100m from watercourses will be adhered to when storing temporary spoil. Temporary spoil heaps will be compacted and covered to minimise sediment-laden runoff. No spoil stockpiles will be left on site after construction. Temporary stockpiles of sand/stone and other materials will be covered with sheeting when not in use to prevent washout of fines during rainfall. All stockpile material will be bunded adequately and protected from heavy rainfall to reduce silt runoff, where necessary. Adequate security will be provided to prevent spillage as a result of vandalism.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.
35	Contaminated material	Any contaminated soils will be handled, removed and disposed of in accordance with statutory requirements for the handling, transportation and disposal of waste. In particular, the following measure will be implemented: Contaminated material will be left in-situ and covered, where possible until such time as WAC (Waste Acceptance Criteria) testing is undertaken in accordance with recommended standards and in-line with the acceptance criteria to a suitably licenced landfill or treatment facility as detailed in the waste treatment management plan within the CEMP. This will determine firstly the nature of the contamination and secondly the materials classification i.e. inert, non-hazardous or hazardous.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.
36	Traffic management	All traffic will adhere to the traffic management plan within the CEMP.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	Monitoring will be in accordance with the traffic management plan within the CEMP.
37	Grid Connection Route (GCR)	In addition to the crossing on 5 no. drainage channels, there will be a requirement for 2 no. riverine watercourse crossings along the GCR in total. These are on the Rathnacally Stream (GCR-WCC1) and Oakfront River (WF-HF5).	Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the GCR.	The Environmental Manager and/or EcoW will monitor the implementation of the mitigation measures in accordance with permitted license

No.	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Level of Success	Monitoring scheme to prevent mitigation failure
		The crossing of the Rathnacally Stream on the L1322 will be via horizontal directional drilling (HDD), Although no-instream works are proposed, the drilling works will only be completed during a dry period between July and September (as required by Inland Fisheries Ireland for in-stream works) to avoid the salmonid spawning season and sensitive life stage period. Mitigation measure 38 will be implemented. A pre-construction otter survey to reconfirm the findings of the FT surveys undertaken in 2021 will be undertaken to ensure than no breeding or resting areas are located within 150m of the drilling locations. Should an otter breeding (holt) or resting area (couch) be detected, a derogation licence will need to be obtained from the NPWS to facilitate drilling works. Excavation of the grid route trench will require excavation of soils/subsoils which has the potential to impact the water quality and aquatic habitat of receiving watercourses. Excavated spoil emanating from the cut trenches, where appropriate (i.e. when trenching within private tracks or the public road verge) will be used to back-fill the trenches. Any excess will be disposed of off-site, at an appropriate licenced facility. All excavated material emanating from trenches within the public road network will be disposed at an appropriate licenced facility. Mitigation measures to prevent the escapement of suspended solids to receiving watercourses (e.g. silt fences, interceptor drains, stilling ponds, drain blocking etc.) are outlined above. On the Rathnacally Stream, silt curtains and floating booms will also be used where deemed to be appropriate, in consultation with IFI. An Ecological Clerk of Works (ECoW) will monitor both turbidity and observe the riverbed during the drilling process to detect any leakage (frac-out) of drilling fluid. Should this leakage be observed, works will cease immediately. The GCR crossing of the Oakfront River (WF-HF5) will be via a single span, pre-cast concrete bridge. This will avoid the requirement for instream works. Nevertheless, installation will only be completed during a dry period between July and September (as required by Inland Fisheries Ireland for in-stream works) to avoid the salmonid spawning season and sensitive life stage period. Potential releases of sediment-laden surface run-off as a result of bank clearance works to facilitate bridge installation/access will be mitigated against through the water quality mitigation measures applied elsewhere on site.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	and in accordance with the relevant management plans detailed in the CEMP. Regular reporting to client and contractor as per license requirement.
38	Horizontal Directional Drilling	An Environmental Engineer with a “stop work” authority will be engaged to monitor the construction phase of the development when the water crossing is being undertaken. The working area around the bridge/culvert crossings will be fenced off prior to the commencement of works to avoid damage to bankside habitat Watercourses will be visually inspected Should increase levels of siltation be recorded within the watercourses during the course of the construction phase, the environmental auditor will seek to halt construction works until the source of the pressure can be found and remediated Surplus material will be removed from the site to an appropriate facility. There will be no stockpiling of excavated material. A setback distance of at least 20 m from watercourses will be adhered to when storing temporary spoil Prior to any works taking place near water courses the Inland Fisheries Ireland will be consulted. Construction works onsite will be timed to occur outside periods where heavy rainfall would be expected	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the relevant management plans within the CEMP.

No.	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Level of Success	Monitoring scheme to prevent mitigation failure
		Silt traps will be regularly maintained during the construction phase. All personnel working onsite will be trained in pollution incident control response. Appropriate signage will be placed along the proposed route outlining the spillage response procedure and a contingency plan to contain silt. A regular review of weather forecasts of heavy rainfall is required, and the contractor is required to prepare a contingency plan for before and after such events Visual inspection to take place at all times along the bore path of the alignment. Silt fences will be constructed around proposed work areas prior to commencement of works. No refuelling will take place within 50m of the stream zone or any sensitive habitats. During the drilling process, a mixture of a natural, inert and fully biodegradable drilling fluid will be used.		
		Replant Lands Mitigation Measures		
39	Best practice measures	To 108inimise environmental impacts, it is important in the first instance that the following general principles are taken on board: • Implementation of good forestry work practices on site (e.g. Environmental Requirements for Afforestation and Forestry Standards Manual). • Working in accordance with relevant legislation, for example, (Wildlife Acts 1976 to 2021 and European Communities (Birds and Natural Habitats) Regulations 2011-2021). • Contractors shall ensure adequate site supervision and security. Contract workers shall be briefed to ensure that environmental issues are taken into consideration and that guidelines and codes of practice are followed. •	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager and EcoW will monitor the implementation of the mitigation measures detailed and in accordance with the license and relevant management plans within the CEMP.
40	Disturbance to Lapwing and otter	No cleaning of vegetation from any section of such watercourses within 20 m of the aquatic zone. No woody weed removal within 20 m of an aquatic zone or 10m of a relevant watercourse. No works will be carried out at night.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager and EcoW will monitor the implementation of the mitigation measures detailed and in accordance with the license and relevant management plans within the CEMP.
41	Afforestation	The project will adhere to all water protection measures, set out in the Environmental Requirements for Afforestation, December 2016 (DAFM, 2016) and Forestry Standards Manual (DAFM, 2015), which include: Apply a 10-metre wide (minimum) uncultivated and unplanted water setback along aquatic zones and 5 metres at relevant watercourses (as defined in Circular 12/2017) located within or adjoining the site. This setback is to remain undisturbed during establishment and throughout the forest rotation. Apply and maintain as per details set out in Tables 5 and 6 of the Environmental Requirements for Afforestation (DAFM, 2016). Adhere to all water protection measures relating to cultivation, herbicide application, the location of onsite storage depots and the disposal of waste, set out in the Environmental Requirements for Afforestation (DAFM, 2016). There will be no woody weed removal within 50 m of an aquatic zone or 20 m of a relevant watercourse. Silt fences will be used along drains.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager and EcoW will monitor the implementation of the mitigation measures detailed and in accordance with the license and relevant management plans within the CEMP.

No.	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Level of Success	Monitoring scheme to prevent mitigation failure
42	Fertiliser	Fertiliser will not be applied within the water setback of an aquatic zone, or within 20 metres of the aquatic zone, whichever is greatest. Manual application only is permitted from this point back to 50 metres from the aquatic zone. Fertiliser will not be applied within the water setback of all other water features. Fertiliser will not be applied if heavy rainfall is predicted, or during heavy rainfall and / or high winds.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager and EcoW will monitor the implementation of the mitigation measures detailed and in accordance with the license and relevant management plans within the CEMP.
43	Herbicide	Herbicide will not be applied within the water setback of an aquatic zone, or within 20 metres of the aquatic zone, whichever is greatest.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager and EcoW will monitor the implementation of the mitigation measures detailed and in accordance with the license and relevant management plans within the CEMP.
44	Water quality	**Exclusion zones for machinery** • Exclusion zones for machinery must ensure that machines do not traverse within 5m of watercourses on site during forestry operations. • With respect to exclusion zones, measures outlined in Section 3.5 of the Environmental Requirements for Afforestation (December 2016), will be adhered to. o Water setbacks o Retained habitat setbacks o Archaeological setbacks o Public road setbacks o Utilised building setbacks o Landscape setbacks **Silt and sediment control** • Silt traps will be deployed to control movement of silt and sediment, as outlined in Section 4.3 of Environmental Requirements for Afforestation (December 2016). Silt traps will be constructed at end of mound drains at 50 m intervals. • Silt traps will be maintained throughout all planting works, ensuring that they are clear of sediment build-up. **Drainage and cultivation** • All drains must protect aquatic zones (order 1 – Emlagh Stream 27) from any sediment and nutrients contained in water draining off the site as outlined in section 3.7.1 of Environmental Requirements for Afforestation (December 2016) • Drains will be maintained throughout all planting works, ensuring that they are clear of sediment build-up and are not severely eroded. • There will be no vegetation removal within 20 m of a drainage ditch. **Afforestation** • A setback area of 5m will be applied along the relevant watercourses present in the project area (there are three that run west-east into the Emlagh Stream 27), as specified in Section 4.4 of the Environmental Requirements for Afforestation (December 2016)	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager and EcoW will monitor the implementation of the mitigation measures detailed and in accordance with the license and relevant management plans within the CEMP.

No.	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Level of Success	Monitoring scheme to prevent mitigation failure
		Setbacks • A 5-metre-wide (minimum) setback will be applied along relevant watercourses located within or adjoining the site. This setback is to remain undisturbed during establishment and throughout the forest rotation. This will be applied and maintained as per details set out in Tables 5 and 6 of the Environmental Requirements for Afforestation (DAFM, 2016). • A setback of 10 m from the aquatic zone, Emlagh stream which runs along the eastern boundary of the site for 240 m will be applied. • There shall be no mounding or machine work within 10m of Aquatic Zone • There shall be no mounding or machine work within 5 m of Relevant Water Course (RWC). **Chemical use** • Chemical use will be kept to an absolute minimum, depending on site requirements; chemicals will only be applied in dry weather. • Chemicals shall not be applied within 20m of the aquatic zone or within watercourses setbacks or other sensitive areas.		
		Operational Phase Mitigation Measures		
45	Inspections	Quarterly inspections of the erosion and sediment control measures on site (i.e. drains, swales, outfalls to field drains) will be undertaken for the first year following construction and annually thereafter to ensure operational efficiency.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the license and relevant management plans within the CEMP.
46	Management of hydrocarbons	Oil used in transformers (at the substation and within each turbine) and storage of oils in tanks at the substation could leak during the operational phase and impact on groundwater quality. The substation transformer and oil storage tanks will be in a concrete bunded capable of holding 110% of the oil in the transformer and storage tanks. Turbine transformers are located within the turbines, so any leaks will be contained. Further management of hydrocarbons will be as detailed in mitigation measure no. 27 above.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the license and relevant management plans within the CEMP.
47	Settlement ponds	Settlement ponds will be left in place during the operational phase to be further utilised during the decommissioning phase. Ponds will be fenced to restrict access.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the license and relevant management plans within the CEMP.
48	Invasive Species Management Plan (Appendix 5)	Invasive species will continue to be treated within the project area according to the invasive species management plan for as long as they persist within the site.	Mitigation measure will be implemented in full by the Client. High probability of success.	The plan will be updated and implemented prior to construction and then updated through all stages of the project lifecycle. During construction, it will be updated by the contractor to form the detailed invasive species management plan which will form part of the detailed CEMP. Following construction, the plan will be updated for the operational phase, taking into account the results of the detailed construction invasive species management plan and operational maintenance requirements. During decommissioning it will be updated if new areas are identified to have been within the footprint of the works.

No.	Mitigation Measure	How Measure Will Avoid/Reduce Adverse Effects	Implementation of Mitigation Measure and Level of Success	Monitoring scheme to prevent mitigation failure
49	Lighting on turbines	Turbines identified during the design process will be illuminated with medium intensity flashing red obstacle lights of 2000 candelas where required by the IAA. Lighting will be fitted with baffles to ensure that the light is directed skywards and will not be discernible from the ground.	Mitigation measures will be implemented by the Client through the Contractor awarded the contract to construct the wind farm. All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	Monitoring will be in line with Fatality monitoring program. See avifauna monitoring program below.
50	Vegetation-free buffer zones	The vegetation-free buffer zones around all turbines will be managed and maintained during the operational life of the development. These will be kept clear by mechanical means only; no chemical methods will be used.	All required mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	The Environmental Manager will monitor the implementation of the mitigation measures detailed and in accordance with the license and relevant management plans within the CEMP.
Decommissioning Phase Mitigation Measures				
All prior to and construction phase mitigation will be implemented during the decommissioning phase.				

Water Quality Monitoring Plan

A monitoring programme will be established to ensure that the water quality is maintained. This programme will ensure that designed measures are working to ensure water quality is not affected. The details of this programme are outlined below.

Daily visual inspections of drains and outfalls will be performed during the construction period to ensure suspended solids are not entering the streams and rivers of the site, to identify any obstructions to channels, and to allow for appropriate maintenance of the drainage regime. If excessive suspended solids are noted, construction work will be stopped, and remediation measures will be put in place immediately.

Visual inspections will be continued during the operational period until vegetation is established on site.

A detailed water quality monitoring programme will be undertaken during the construction phase of the proposed development, in addition to the visual inspections outlined above, so as to ensure the effective implementation of the proposed mitigation measures. Field measurements and grab samples will be taken at suitable locations. The field measurements will be recorded at the site and will include measurement of the following parameters, electrical conductivity (µs/cm), pH, temperature (ºC), suspended solids (mg/l) and dissolved oxygen (mg/l). The field measurements will be taken on a weekly basis during the site clearance and earthworks stage of the construction period.

An ECOW will compare the results with the pre work levels and ensure that designed mitigation measures are working.

Avifauna Monitoring program

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

In addition, published recommendations on swans and wind farms (Rees, 2012) suggests that systematic post construction monitoring; adapted to quantify collision, barrier and displacement, be conducted over a period of sufficient duration to allow for annual variation or in combination effects. The following individual components are proposed.

1) Fatality Monitoring (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction)- A comprehensive fatality monitoring programme is to be undertaken following published best practice including as below; the primary components are as follows:

    a. Initial carcass removal trials to establish levels of predator removal of possible fatalities. This will be done following best recommended practice and with due cognisance to published effects such as predator swamping, whereby excessive placement of carcasses increases predator presence and consequently skews results (Shawn *et al.*, 2010). No turbines which are used for carcass removal trials are to be used for subsequent fatality monitoring. Carcass removal trials shall be continued for the duration of fatality searches.

    b. Turbine searches for fatalities are to be undertaken following best practice (Fijn *et al.*, 2012 and Grunkorn, 2011) in terms of search area (minimum radius hub height) and at intervals selected to effectively sample fatality rates based on carcass removal rates (e.g. 1 per month).

To be conducted during years 1, 2, 3, 5, 10 and 15 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring to be agreed with NPWS.

c. A standardised approach with a possible control group and/or variation in search techniques such as straight line transects/ randomly selected spiral transects/ dog searches will be undertaken. This will provide a means of robustly estimating the post construction collision fatality impact (if any).

d. Recorded fatalities to be calibrated against known predator removal rates to provide an estimate of overall fatality rates.

Reports will be submitted to the competent authority and NPWS following each round of surveys.

2) Flight Activity Survey (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction) - A flight activity survey is to be undertaken during the summer and winter months to include both Vantage Point and hinterland surveys as Per SNH (2017) guidance:

a. Record any barrier effect i.e. the degree of avoidance exhibited by species approaching or within the wind farm (Drewitt and Langston, 2006). Target species to be all raptors and owls, all wild goose and duck species, all swan species and all wader species.

b. Record changes in flight heights of key receptors post construction.

Reports will be submitted to the competent authority and NPWS following each round of surveys. This survey will be conducted during years 1, 2, 3, 5, 10 and 15 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring requirements will be agreed with NPWS.

3) Monthly Wildfowl Census (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction). A monthly wildfowl census, following the methods utilised for the baseline survey, is to be repeated on a monthly basis during the winter period.

This aims to:

a. Assess displacement levels (if any) of wildfowl such as swans post construction

b. Assess overall habitat usage changes within the vicinity of the Annagh Wind Farm Development post construction.

This survey is to be conducted during years 1, 2, 3, 5, 10 and 15 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring requirements will be agreed with NPWS. Reports will be submitted to the competent authority and NPWS following each round of surveys.

4) Breeding Bird Survey (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction). A breeding bird survey (moorland breeding bird and Common Bird Census), following methods used in the baseline survey to be repeated yearly between early April to early July.

This aims to:

a. Assess any displacement effects such as those recorded on breeding birds. Overall density of breeding birds to be annually recorded.

5) Breeding Wader Survey (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction). A breeding bird survey, following methods used in the baseline survey to be repeated yearly April-May-June.

Both of the above surveys are to be conducted during years 1, 2, 3, 5, 10 and 15 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring requirements will be agreed with NPWS.

4.5 Residual Effects on the Integrity of the Sites within the Potential Zone of Influence of the Proposed Project

Taking cognisance of measures incorporated into the project design and mitigation measures to avoid effects which are considered in the preceding section, the proposed project will not have any residual adverse effect on the integrity the Blackwater River (Cork/Waterford) cSAC, the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA in light of the site's conservation objectives and status.

It should be noted that that irrespective of the condition of the un-classified waterbody (Rathnacally Stream and Emlagh 27) if it was categorised, the proposed project with the implementation of the proposed mitigation will not cause it to deteriorate and will not in any way prevent it meeting the biological and chemical characteristics for good status.

4.6 Conclusion

For the reasons set out in detail in this NIS, in the light of the best scientific knowledge in the field, all aspects of the proposed project which, by itself, or in combination with other plans or projects, which may affect the relevant European Sites have been considered.

The NIS contains information which the competent authority, may consider in making its own complete, precise and definitive findings and conclusions and upon which it is capable of determining that all reasonable scientific doubt has been removed as to the effects of the proposed project on the integrity of the relevant European sites.

In the light of the conclusions of the assessment which it shall conduct on the implications for the European sites concerned, the competent authority is enabled to ascertain that the proposed project will not adversely affect the integrity of any of the European sites concerned.

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FEHILY TIMONEY

CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

APPENDIX 1

Replant Lands - Appropriate Assessment Screening Report and Natura Impact Statement

Appropriate Assessment Screening Report

for Proposed afforestation project CN88795 located at Emlagh, Co. Clare

Compiled by: Dr. Karina Dingerkus, Giorria Environmental Services

Completion date: 23rd August 2021

Contents

Section 1: GENERAL DETAILS

Details of Author(s)	
Name	Dr. Karina DIngerkus
Address	Ardacarha, Bohola. Claremorris. Co Mayo, F12 VW94
Company name *(If relevant)*	Giorria Environmental Services
Tel. no.	0863620928
E-mail	karina@giorria.com
Details of relevant qualifications / affiliations / years of experience (Provide additional details on separate a sheet)	*PhD. 1997* The Ecology and Distribution of the Irish hare in Northern Ireland, Queen's University, Belfast. Has over 27 years experience as working ecologist for local authorities, wildlife charities and consultancies. Established Giorria Environmental Services, an ecological consultancy based in County Mayo in 2005. Has been completing Appropriate Assessments for over 12 years for private and public clients. Has been contract to the Coillte NIS project since 2020.
Describe scope of contribution in preparing this AA Pre-Screening Report	Ecological assesment

Details of Author(s)	
Name	Ciaran Ryan
Address	Lahard, Beaufort, Killarney, Co. Kerry
Company name *(If relevant)*	(Kerry Ecological Services – sole trader)
Tel. no.	064-6624577; 085-7168019
E-mail	Ciaranryan5@hotmail.com
Details of relevant qualifications / affiliations / years of experience (Provide additional details on separate a sheet)	B.Sc. Analytical Science; M.Sc. (Environmental Science) Over 25 years' experience in ecological survey (including SAC & SPA designations), SAC & SPA Management Plans, Commonage Framework Plans, SAC Appeals, Natura 2000 site assessments and reports (NIS) and general environmental consultancy. I am an accredited Native Woodland Scheme ecologist.

Describe scope of contribution in preparing this AA Pre-Screening Report	Ecological

Details of Author(s)	
Name	Éamonn Ó Curraoin
Address	Ballybroder, Loughrea, Co. Galway. H62F432
Company name *(If relevant)*	The Forestry Company
Tel. no.	087-2472302
E-mail	eamonn@theforestrycompany.ie
For each author: Provide details of his / her relevant qualifications / affiliations / years of experience Describe the scope of his / her contribution in preparing this NIS.	B. Agriculture. Sc. (Forestry) MSIF AIFC ACA 34 years experience in forest management NW Course completed in 2006 Forestry

Project location & general details*		
County: Clare	Nearest village: Moyasta	
Townland: Emlagh	6 inch OS Map number: CE56	
Proposed activity (tick):	Afforestation	ü
	Forest road construction	
	Thinning (incl. CCF)	
	Clearfell & Reforestation	
	Clearfell & No Reforestation	
	Aerial fertilisation	
	Other (specify)	
Project area (hectares)):	14.58 hectares	

Indicate (tick) the nature of the application:	Application for forestry licence only	
	Application for forestry licence & scheme support	Yes ü

1.1 The Appropriate Assessment Process

Natura 2000 is a European network of important ecological sites. The EU Habitats Directive (92/43/EEC) placed an obligation on Member States of the EU to establish the Natura 2000 network. The network is made up of Special Protection Areas (SPAs), established under the EU Birds Directive (2009/147/EC), and Special Area of Conservation, (SACs), established under the Habitats Directive itself.

An AA is required of the implications for the European site concerned in view of the site's conservation objectives of any plan or project not directly connected with or necessary to the management of that site but likely to have a significant effect thereon, either individually or in combination with any other plans or projects.

The assessment procedure is based on a four-stage approach, where the outcome at each successive stage determines whether a further stage in the process is required.

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 or in-combination with other plans or projects, could have significant effects on a Natura 2000 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 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.

An Appropriate Assessment:

(i) must identify, in the light of the best scientific knowledge in the field, all aspects of the 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 development will not adversely affect the integrity of any relevant European site where the competent authority decides (on the basis of complete, precise and definitive findings and conclusions) that no reasonable scientific doubt remains as to the absence of the identified potential effects. If adverse impacts can be satisfactorily avoided or successfully mitigated at this stage, so that no reasonable doubt remains as to the absence of the identified potential effects, then the process is complete.

If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must proceed to stage three and, if necessary, stage four.

Stage Three of the potential process arises where adverse effects on the integrity of a European site cannot be excluded and examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the European site.

Stage Four is the derogation process of Article 6(4), which examines whether there are imperative reasons of overriding public interest [IROPI] for allowing a project to proceed where adverse effects on the integrity of a European site have been predicted. Compensatory measures must be proposed and assessed as part of this stage and the EU Commission must be informed of the compensatory measures.

Several guidance documents on the appropriate assessment process have been referred to during the preparation of this AA Screening report. These are:

- Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (NPWS 2009, Revised February 2010)

- Circular NPW 1/10 & PSSP 2/10 (March 2010)
- EU Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC (2007)
- Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (Nov. 2001 – published 2002)
- Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (2000).
- Office of the Planning Regulator (2021). Appropriate Assessment Screening for Development Management. OPR Practice Note PN01.

Screening for appropriate assessment is the first stage of the AA process (Stage One), in which the possibility of there being a significant effect on a European site is considered. Plans or projects that have no appreciable effect on a European site are thereby excluded, or screened out, at this stage of the process. Where screening concludes that there is the potential for significant effects, then it is necessary to carry out an AA (Stage Two) for the purposes of Article 6(3), and a Natura Impact Statement (NIS) is produced.

The guidance for Appropriate Assessment (NPWS, 2009, revised February 2010) states:

"AA is an impact assessment process that fits within the decision-making framework and tests of Articles 6(3) and 6(4) and, for the purposes of this guidance, it comprises two main elements. Firstly, a Natura Impact Statement – i.e. a statement of the likely and possible impacts of the plan or project on a Natura 2000 site (abbreviated in the following guidance to "NIS") must be prepared. This comprises a comprehensive ecological impact assessment of a plan or project; it examines the direct and indirect impacts that the plan or project might have on its own or in combination with other plans and projects, on one or more Natura 2000 sites in view of the sites' conservation objectives. Secondly, the competent authority carries out the AA, based on the NIS and any other information it may consider necessary. The AA process encompasses all of the processes covered by Article 6(3) of the Habitats Directive, i.e. the screening process, the NIS, the AA by the competent authority, and the record of decisions made by the competent authority at each stage of the process, up to the point at which Article 6(4) may come into play following a determination that a plan or project may adversely affect the integrity of a Natura 2000 site".

1.2 Appropriate Assessment Stages

The European Commission's Guidance promotes a four-stage process to complete the Appropriate Assessment.

Stage 1 – Screening Process

Stage 2 – Appropriate Assessment

Stage 3 – Assessment of alternative Solutions

Stage 4 – Assessment where no alternative solutions exist and where adverse impacts remain.

Stage 1 and 2 deal with the main requirements of assessment under Article 6.3. Stage 3 may be part of Article 6.3 or a necessary precursor to Stage 4.

Screening determines whether appropriate assessment is necessary by examining:

1. Whether a plan or project can be excluded from AA requirements because it is directly connected with or necessary to the management of the site, and

2. The potential effects of a project or plan, either alone or in combination with other projects or plans, on a Natura 2000 site in view of its conservation objectives and considering whether these effects will be significant.

Screening involves the following:
1. Description of plan or project, and local site or plan area characteristics.
2. Identification of relevant Natura 2000 sites, and compilation of information on qualifying interests and conservation objectives.
3. Assessment of likely effects – direct, indirect on the basis of available information as a desk study and/or field survey and/or primary research as necessary.
4. Screening statement and conclusion.

1.3 Methods

Zone of influence

The Zone of Influence of a project may be defined as area(s) over which ecological features may be affected by the biophysical changes caused by the proposed project and associated activities (CIEEM 2016). The zone of influence can extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries.

The NPWS (2010) recommends that: "*the distance should be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in combination effects*.". Generally, all European sites within 15km of the proposed project (NPWS 2010) are examined. In some circumstances it may be necessary to go beyond this distance (e.g. hydrologically connect site).

Recent guidance from Office of the Planning Regulator (2021) indicates that the zone of influence of a proposed development is the geographical area over which it could affect the receiving environment in a way that could have significant effects on the Qualifying Interests of a Natura 2000 Site. It indicates that this should be established on a case-by-case basis using the Source-Pathway-Receptor framework.

Desk-top study

A desk study was carried out to gather information available on Natura 2000 sites in the vicinity of the proposed project. The Environmental Protection Agency Appropriate Assessment GeoTool application was used to gather data about SACs and SPAs from the National Parks and Wildlife Service (NPWS). The Environmental Sensitivity Mapping tool (ESM tool) was also consulted (https://airomaps.geohive.ie/ESM/). The NPWS and National Biodiversity Data Centre online databases were consulted concerning designated conservation areas in the vicinity of the proposed development and protected species. The Clare County Council website online planning access (www.eplanning.ie/ClareCC/searchtypes), An Bord Pleanála (https://www.pleanala.ie/en-ie/home) and the EIA portal (https://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1) were consulted for information on other plans or projects in the area, which may result in an in-combination impact when considered with the proposed development. Other databases consulted include:

- Information on other plans or projects in the projects Zone of Influence from www.myplan.ie
- Information on soils, geology and hydrogeology in the projects Zone of Influence www.gsi.ie
- National Biodiversity Action Plan 2017–2021 (Department of Culture, Heritage and the Gaeltacht, 2017)
- Clare County Development Plan 2017-2023
- National Biodiversity database maps https://maps.biodiversityireland.ie/
- Environmental Protection Agency - https://gis.epa.ie/EPAMaps/

Section 2: DESCRIPTION OF PROJECT AREA & OPERATION

Site description - Site visit 20/5/2021

A multidisciplinary walkover survey was conducted on the 20/05/2021 following NRA (2009) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes) by ecologist Cieran Ryan. All habitats were identifiable (Smith, G.F., O'Donoghue, P., O'Hora, K., & Delaney E. 2011). The walkover surveys were designed to detect the presence, or likely presence, of a range of protected species. The survey included a search of all potentially suitable habitat for protected species that are likely to occur in the vicinity of the project. Habitats were identified in accordance with the Heritage Council's 'Guide to Habitats in Ireland' (Fossitt, 2000). Plant nomenclature for vascular plants follows 'New Flora of the British Isles' (Stace, 2010). 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 also conducted.

The site is located in the townland of Emlagh, 2.8 km from the village of Moyasta in Co. Clare. The site (size 14.58 ha) lies at an elevation of < 40m sloping gently from west to east. The soil is mostly peaty gley and surface water gley (acid, deep, poorly drained mineral) based on Namurian shale, sandstone, siltstone and coal bedrock. There are no major seepage areas or wet depressions. The land is currently used for cattle grazing and comprises of 20 small fields with an average size of 0.7 ha (range 1.2 ha to 0.38 ha).

The principal habitat present is wet grassland (GS4) dominated by Soft Rush (*Juncus effusus* – c.75+ %) with Creeping Buttercup (*Ranunculus repens*), Meadow Buttercup (*Ranunculus acris*), Meadowsweet (*Filipendula ulmaria),* Silverweed (*Potentilla anserina*), Ribwort Plantain (*Plantago lanceolata*), Dandelion (*Taraxacum officinale* agg.), Common Sorrel (*Rumex acetosa*), Dock (*Rumex* sp.), Horsetail (*Equisitum palustre*), Knapweed (*Centauria nigra),* Thistle (*Cirsium vulgare*), typical grasses (e.g. *Holcus lantus, Anthoxanthum odoratum, Agrostis capillaris, Festuca rubra*), occasional orchid (*Orchis mascula*) and some invading Bramble (*Rubus fruticosus*) and Common Gorse (*Ulex europaeus*). There is a small area of peaty wet grassland (GS4) to the north-east where Purple Moorgrass (*Molinia caerulea*), Carnation Sedge (*Carex panicea*) and Marsh Thistle (*Cirsium palustre*) are evident, along with typical wet grassland species, notably Jointed/Sharp-flowered Rush (*Juncus articulatus/acutiflorus*), Meadowsweet and Cuckooflower (*Cardamine pratensis*). It should be noted that the heathy wet grassland habitat does not consist of any EU Annex I habitat.

There is one natural watercourse (FW2) present on site flowing along the north-eastern boundary (length along boundary 240 m). This is approximately 0.5m deep (down a 1m bank), slow flowing in a southerly direction and with a silt and gravel substrate. It is little vegetated except along its banks where some Bramble, Willow (*Salix* sp.), Gorse, rush and Nettle (*Urtica dioica*) occur. It flows south eastward, discharging into Poulnasherry Bay (Lower River Shannon SAC), near Moyasta up to 3 km downstream. Drainage channels (FW4) present are approximately 1m deep, 1m wide but with little water flow, being clogged with vegetation and silt. They discharge/filter into the on-site natural watercourse.

WFD River Moyasta forms a hydrological link from the project site to SAC and SPA. Moyasta_10 is currently classed as under review / unassigned status.

Sparse, low-growing hedgerows (WL1) of mostly Bramble and scattered Willow and Common Gorse
occur on low banks along field boundaries, with occasional Hawthorn (*Crataegus monogyna*).

There were no Annex I habitats recorded within the project site boundary and no protected species were recorded during the site visit. Notable species recorded within Q96 10 km grid include Badger, Otter, Hare, Stoat, Pine Marten, bat species, Peregrine, Hen Harrier, Merlin, Barnacle Goose, Brent Goose, Greenland White-fronted Goose, Greylag Goose, Whooper Swan, Golden Plover, Kingfisher, Curlew, Lapwing, Snipe, Chough, Marsh Fritillary and Narrow mouthed Whorl Snail. However, this grid extends to the coast around Doonbeg and White Strand. Within the 2km grid encompassing the site lands, the only notable species recorded are Badger, Hare, Stoat, and bats. None of these species are known to regularly utilise the site lands. There are no large trees present suitable for roosting bats, although the scattered, low hedgerow may provide some foraging habitat. The wet grassland habitat present is not species-rich and is common locally and nationally.

It is considered desirable that the small area of peaty wet grassland to the north-east of the site be retained, connecting with the nearby aquatic buffer either by open habitat or native trees. This area is somewhat distinctive from surrounding Soft Rush dominated wet grassland habitat. It will also serve to provide an open habitat that can be utilised by native fauna. A Habitat Map is attached.

The project site lies approximately 1.7 km upstream distance of Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Tullaher Lough and Bog SAC lies over 1.3 km north of project site. Kilkee Reefs SAC lies over 5 km north-west of project site. Both Carrowmore Dunes SAC and Mid-Clare Coast SPA lies over 6 km north of project site. All other European sites lies over 10km from the site with Carrowmore Point to Spanish Point and Islands SAC to the north and llaunonearaun SPA to the south-west of project site.

Surrounding land use includes forestry to the north. Improved pasture to the south, east and west. Access will from a minor road which comes off the N67.

Summary of habitats on site

Wet grassland (GS4)

Natural watercourse (FW2)

Drainage channels (FW4)

Hedgerows (WL1)

No Annex I habitats recorded within the project site boundary.

Proposed Operations

Work on this site will comprise of planting 85 % Sitka spruce and 15% native broadleaves.

Site Preparation and planting

Mounding: Small mounds are excavated and placed at 2 metre intervals. The drains that are formed by removing the mounds are spaced at 12 metre intervals, giving 2500 mounds (trees) per hectare.

Mounding will be completed by a tracked excavator. The excavator will create small mounds of soil. The mound loosens any compacted soil, as well as raising the planting position of the young trees which reduces the impact of competing vegetation.

Trees will be sourced from a recognised forest nursery. Planting will occur manually. A slit will be made in the centre of each mound with a spade and the roots of the young tree placed in the opening. The loose soil will then be backed filled with the spade and firmed in, making sure that the tree is straight. The tree will be firmed in by foot. Care will be taken to ensure trees are planted to the correct depth (i.e. root collar) and all roots are placed fully into the soil. Where possible trees will be planted between November and March during their dormant season.

All setbacks along aquatic zone, relevant water courses, roads and dwelling house will be measured and marked by machine operator prior to work commencing.

Fencing

The perimeter of the site will be fenced with stock fencing consisting of NSAI stakes and strainers and high tensile barbed wire.

Fertiliser

Due to inherent levels of fertility, no fertiliser application is required to promote the establishment and growth of the newly planted trees.

Management

Regular site visits and monitoring will occur. Management will involve carrying out vegetation control, checking for browsing or frost damage, carry out broadleaf shaping and checking drains, firebreaks and fence-lines. Manual maintenance will occur annually. Maintenance will involve trampling by stamping on weeds around the trees. Were necessary spot spraying with Glyphosate will occur in year 2 where dense vegetation is impeding tree growth.

Beating Up: Replacement of failures in Year 2 and 3.

Section 3: INDIVIDUAL EFFECT ON EUROPEAN SITES

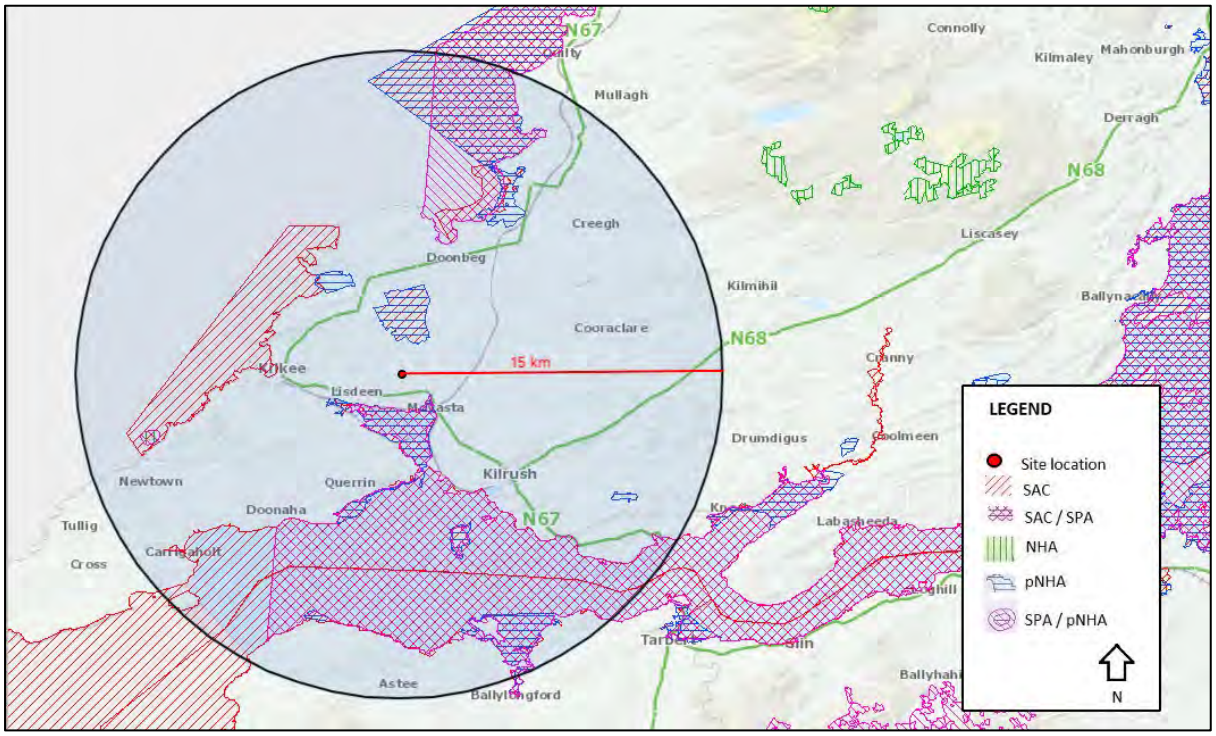
The aim of this section of the report is to identify any significant impacts of the proposed development on all relevant Natura 2000 sites. This report covers Stage 1 screening for appropriate assessment and has been prepared in accordance with the current guidance (NPWS 2009, revised February 2010 and Office of the Planning Regulator 2021).

The proposed project involves afforestation of agricultural grassland area at Emlagh, Moyasta, Co. Clare (see photograph 1). The proposed area is approximately 14.48 hectares.

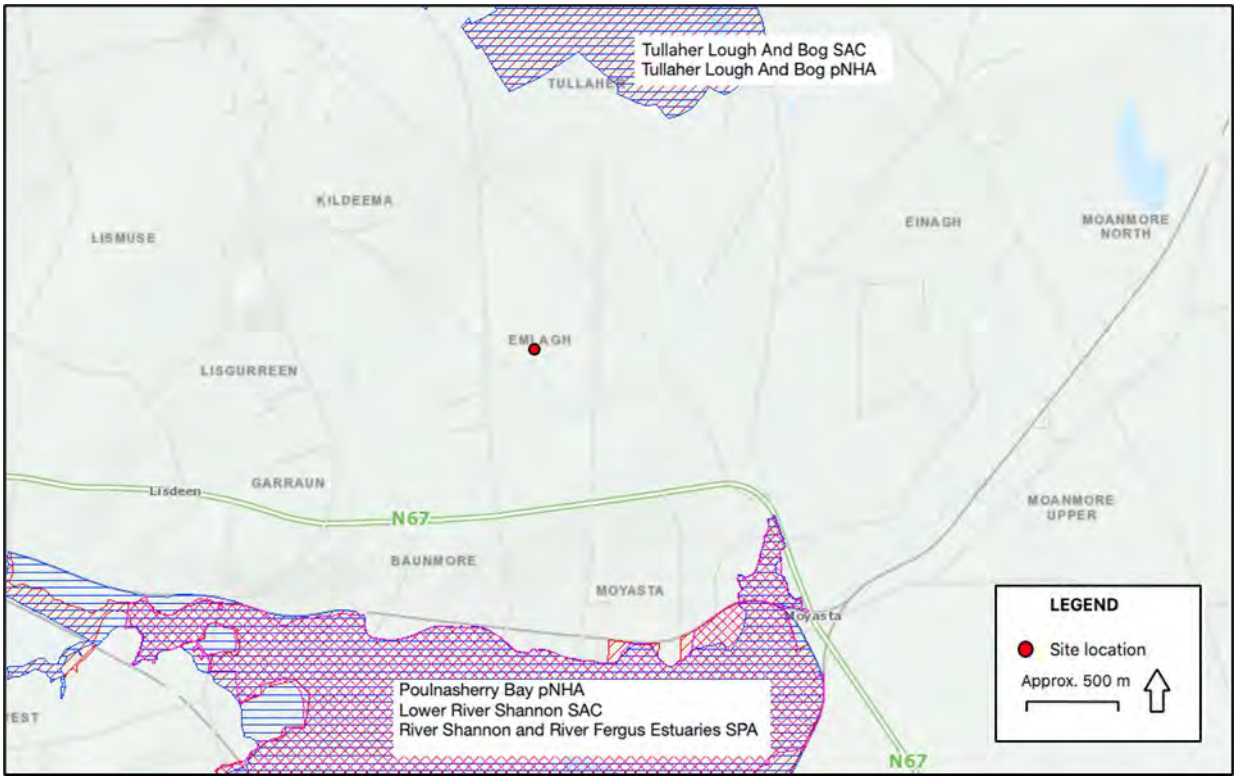
Diagram 1: Site location at Emagh, Co Clare

Due to the scale and nature of the proposed project the zone of influence is highly unlikely to extend to 15 km. However, in order to ensure no impact on Natura 2000 sites occurring within 15 km of the project site or any hydrologically linked beyond 15km, all were considered for the initial assessment.

The closest Natura 2000 sites are Tullaher Lough and Bog SAC, River Shannon and River Fergus Estuaries SPA and the Lower River Shannon SAC. The proposed project is situated within 1337.11 m of the Tullaher Lough and Bog SAC, 1770.16 m of River Shannon and River Fergus Estuaries SPA and 1766.93 m of Lower River Shannon SAC. Six other Natura 2000 sites fall within a 15km radius of the site. See Table 1 below for details.



Map 1 Showing Natura 2000 sites within 15km radius of site
(Map source: http://dahg.maps.arcgis.com/apps/webappviewer)



Map 2. Showing Natura 2000 sites in close proximity to development site
(Map source - https://www.npws.ie/maps-and-data)

Table 1: Individual Effect on European Sites

List all European Site(s) within 15 km of the project area, & European Site(s) beyond 15 km but where potential pathway with the project may exist* **Include the site name & code, & also the link to the relevant webpage for this protected site, at www.npws.ie/†** **The AA tool publicly available on the EPA website will assist in identifying these European Sites – for guidance, see Appendix 4 of the NIS Guidance & Template‡.**	**For each European Site(s), list the Qualifying Interests (QIs) (if SAC) and the Special Conservation Interests (SCIs) (if SPA), for which the site is designated.**	**Based on potential sources & pathways, the nature of the receptor*, & *excluding any mitigation measure†*, is there a possibility of the project *itself* (i.e. 'alone') having a significant effect, on this European Site(s)?**	**Describe the evidence / rationale for this position.** **Where relevant, detail the evidence / rationale in relation to individual QIs / SCIs.**
Tullaher Lough and Bog SAC (site code: 002343) http://www.npws.ie/sites/default/files/protected sites/conservation_objectives/CO002343.pdf Distance: 1316.24 m	**Habitats** 7110 Active raised bogs* 7120 Degraded raised bogs still capable of natural regeneration 7140 Transition mires and quaking bogs 7150 Depressions on peat substrates of the Rhynchosporion	No	Due to distance from project site to SAC being over 1.3 km, no direct hydrological connection, terrestrial nature of the habitats, the size and nature of the proposed project and the forestry operations being contained within the project site boundary there is no possibility for significant effects on this SAC and it's QIs
Lower River Shannon SAC (site code: 002165) http://www.npws.ie/sites/default/files/protected sites/conservation_objectives/CO002165.pd Distance: 1768.70 m	**Habitats** 1110 Sandbanks which are slightly covered by sea water all the time 1130 Estuaries 1140 Mudflats and sandflats not covered by seawater at low tide 1150 Coastal lagoons*	Yes	Possible effect as there is hydrological ink to this SAC. Site lies approximately 327 m from Emlagh 27 River (EPA code: IE_SH_27M040900), which forms hydrological link to Lower River Shannon SAC. Downstream distance of approximately 1.7 km to SAC.

	1160 Large shallow inlets and bays 1170 Reefs 1220 Perennial vegetation of stony banks 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts 1310 Salicornia and other annuals colonising mud and sand 1330 Atlantic salt meadows (GlaucoPuccinellietalia maritimae) 1410 Mediterranean salt meadows (Juncetalia maritimi) 3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation 6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) 91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)* **Species** 1029 Freshwater Pearl Mussel (*Margaritifera margaritifera*) 1099 River Lamprey (Lampetra fluviatilis) 1349 Common Bottlenose Dolphin (*Tursiops truncatus*) 1355 Otter (*Lutra lutra*) 1096 Brook Lamprey (*Lampetra planeri)*		

	1095 Sea Lamprey (*Petromyzon marinus*) 1106 Salmon (***Salmo salar***)		
Kilkee Reefs SAC (site code: 002264) http://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002264.pdf Distance: 5160.88 m	**Habitats** 1160 Large shallow inlets and bays 1170 Reefs 8330 Submerged or partially submerged sea caves	No	Due to distance from project site to SAC being over 5 km, the size and nature of the proposed project and the forestry operations being contained within the project site boundary and with no direct hydrological connection there is no possibility for significant effects on this SAC and it's QIs. There is a potential indirect connection through the sea. However, the assimilation capacity of the sea means there is no possibility for significant effects on this SAC and it's QIs.
Carrowmore Dunes SAC (site code: 002250) http://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002250.pdf Distance: 6318.43 m	**Habitats** 1170 Reefs 2110 Embryonic shifting dunes 2120 Shifting dunes along the shoreline with Ammophila arenaria (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)* **Species** 1014 Narrow-mouthed Whorl Snail *(Vertigo angustior)*	Yes	Due to distance from project site to SAC being over 6 km, no direct hydrological connection, the size and nature of the proposed project and the forestry operations being contained within the project site boundary there is no possibility for significant effects on this SAC and it's QIs. There is no possibility for impact on Narrow-mouth Whorl snail due to the unsuitability of the project site for this species (Moorkens & Killeen 2011). There is a potential indirect connection through the sea. However, the assimilation capacity of the sea means there is

			no possibility for significant effects on this SAC and it's QIs.
Carrowmore Point to Spanish Point and Islands SAC (site code: 001021) http://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001021.pdf Distance: 10272.82 m	**Habitats** 1150 Coastal lagoons* 1170 Reefs 1220 Perennial vegetation of stony banks 7220 Petrifying springs with tufa formation (Cratoneurion)*	No	Due to distance from project site to SAC being over 10 km, no direct hydrological connection, the size and nature of the proposed project and the forestry operations being contained within the project site boundary there is no possibility for significant effects on this SAC and it's QIs. There is a potential indirect connection through the sea. However, the assimilation capacity of the sea means there is no possibility for significant effects on this SAC and it's QIs.
River Shannon and River Fergus Estuaries SPA (site code: 004077) http://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf Distance: 1772.01 m	**Birds** A179 Black-headed Gull (*Chroicocephalus ridibundus*) A141 Grey Plover (*Pluvialis squatarola)* A038 Whooper Swan (*Cygnus cygnus)* A140 Golden Plover (*Pluvialis apricaria)* A048 Shelduck (*Tadorna tadorna*) A157 Bar-tailed Godwit (*Limosa lapponica)* A046 Light-bellied Brent Goose (*Branta bernicla hrota*) A137 Ringed Plover (*Charadrius hiaticula)* A156 Black-tailed Godwit (*Limosa limosa)* A160 Curlew (*Numenius arquata*)	Yes	Possible effect as there is a hydrological link to this SAC. Site lies approximately 327 m from Emlagh 27 River (EPA code: IE_SH_27M040900), which forms hydrological link to River Shannon and River Fergus Estuaries SPA. Downstream distance of approximately 1.7 km to SPA.

	A164 Greenshank (*Tringa nebularia*) A050 Wigeon (*Anas penelope*) A162 Redshank (*Tringa totanus*) A142 Lapwing (*Vanellus vanellus*) A017 Cormorant (*Phalacrocorax carbo*) A056 Shoveler (*Anas clypeata*) A052 Teal (*Anas crecca*) A143 Knot (*Calidris canutus*) A062 Scaup (*Aythya marila*) A054 Pintail (*Anas acuta*) A149 Dunlin (*Calidris alpina*) **Habitats** Wetlands		
Mid-Clare Coast SPA (site code: 004182) http://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004182.pdf Distance: 6174.10 m	**Birds** A017 Cormorant *(Phalacrocorax carbo)* A045 Barnacle Goose *(Branta leucopsis)* A169 Turnstone *(Arenaria interpres)* A148 Purple Sandpiper *(Calidris maritima)* A137 Ringed Plover *(Charadrius hiaticula)* A149 Dunlin *(Calidris alpina)* A144 Sanderling *(Calidris alba)* **Habitats** Wetlands	No	Due to distance from project site to SPA being over 6km, no direct hydrological connection, the size and nature of the proposed project, the unsuitability of the area for waders, geese and cormorants who generally use on coastal sites and large bodies of water (Balmer *et al* 2013), and the forestry operations being contained within the project site boundary there is no possibility for significant effects on this SPA and it's QIs. There is a potential indirect connection through the sea. However, the assimilation capacity of the sea means there is no possibility for significant effects on this SAC and it's QIs.
Illaunonearaun SPA (site code: 004114)	**Birds**	No	Due to distance from project site to SPA being over 11 km, no direct hydrological connection, the size

http://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004114.pdf Distance: 11632.11 m	A045 Barnacle Goose (Branta leucopsis		and nature of the proposed project, the unsuitability of the site for barnacle goose who feed on coastal grassland and seashores (Balmer *et al* 2013), and the forestry operations being contained within the project site boundary there is no possibility for significant effects on this SPA and it's QIs. There is a potential indirect connection through the sea. However, the assimilation capacity of the sea means there is no possibility for significant effects on this SAC and it's QIs.

3.1 Assessment of Likely Effects

The proposed afforestation is not directly connected with or necessary to the management of a Natura 2000 site. In light of this the site must be subject to AA screening for its implications for the Natura 2000 sites in view of the site's conservation objectives The assessment is based on a preliminary assessment using available information and data (e.g. NPWS data, water quality data etc.), supplemented with local site information and ecological surveys. A multidisciplinary walkover survey was conducted on the 20/05/2021 following NRA (2009) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes) by ecologist Cieran Ryan. All habitats were identifiable (Smith, G.F., O'Donoghue, P., O'Hora, K., & Delaney E. 2011). The walkover surveys were designed to detect the presence, or likely presence, of a range of protected species. The survey included a search of all potentially suitable habitat for protected species that are likely to occur in the vicinity of the project aera. Habitats were identified in accordance with the Heritage Council's 'Guide to Habitats in Ireland' (Fossitt, 2000). Plant nomenclature for vascular plants follows 'New Flora of the British Isles' (Stace, 2010). 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 also conducted.

In order, 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 Natura 2000 site in view of the site's conservation objectives.

3.2 Direct, indirect or secondary impacts

The screening analysis below considers each qualifying interest of Tullaher Lough and Bog SAC, Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA and lists the potential pathway and potential threat source and whether it is likely to have a significant effect on the qualifying habitats or species of special conservation interest.

Table 2: Lower River Shannon SAC – Screening analysis (using source-pathway-receptor model) to identify SAC qualifying habitats and any "Likely Significant Effects" of impacts on Natura 2000 site, based on current project proposals.

Qualifying Interests (QI) and code (*Potential receptors*)	**Conservation objectives**	**Pathway / Comment**	**Source of potential threats**	**Likelihood of significance**
1029 Freshwater Pearl Mussel (*Margaritifera margaritifera)*	To restore the favourable conservation condition of Freshwater Pearl Mussel in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Surface water pathway.	Species is very sensitive to water quality and sediment or pollution run-off	This conservation objective applies to the freshwater pearl mussel population in the Cloon River, Co. Clare only. The Cloon population is confined to the main channel and is distributed from Croany Bridge to approx. 1.5km upstream of Clonderalaw Bridge (Ross, 2008; DEHLG, 2010) (National Parks and Wildlife Service 2012) There is no potential for significant effects due to the freshwater pearl mussel population in the Cloon River being over 22 km from the proposed forestry site and being situated in a different river sub-catchment. The forestry site is situated in sub-catchment Wood-SC_010, while the pearl mussel site in Cloon River is situated in sub-catchment Cloon (Clare)SC_010. The area between these catchments includes the large Shannon Estuary and the pearl mussel populations are upstream along the Cloon River.
1095 Sea Lamprey *Petromyzon marinus*	To restore the favourable conservation condition of Sea Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at	Surface water pathway.	Water pollution	Records of Sea lamprey 23 km from site (National Biodiversity Data Centre records). Probably under recorded (Kelly & King, 2001).

	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf			Potential for significant effects cannot be excluded.
1096 Brook Lamprey *(Lampetra planeri)*	To maintain the favourable conservation condition of Brook Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Surface water pathway.	Water pollution	Records of Brook lamprey 65 km from site (National Biodiversity Data Centre records). Probably under recorded (Kelly & King, 2001). Potential for significant effects cannot be excluded.
1110 Sandbanks which are slightly covered by sea water all the time	To maintain the favourable conservation condition of Sandbanks which are slightly covered by sea water all the time in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Surface water pathway.	Water pollution	Mapped sandbanks are located approximately 8km from project site (National Parks and Wildlife Service 2012). However, examination of aerial photographs suggest habitat could lie within 1.7 km of site. Potential for significant effects cannot be excluded if sediment or pollution run-off occurs.
1106 Atlantic Salmon *Salmo salar* (only in fresh water)	To restore the favourable conservation condition of Salmon in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Surface water pathway. No hydrologi-cal connection from project site to SAC	Water pollution	Salmon are widespread in the River Shannon system (National Parks and Wildlife Service 2012). Potential for significant effects cannot be excluded if sediment or pollution run-off occurs.
1099 River Lamprey	To maintain the favourable conservation condition of River Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Surface water pathway.	Water pollution, sedimentation	Records of River lamprey 64 km from site (National Biodiversity Data Centre records). Probably under recorded (Kelly & King, 2001).

				Potential for significant effects cannot be excluded if sediment or pollution run-off occurs.
1130 Estuaries	To maintain the favourable conservation condition of Estuaries in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Surface water pathway.	Sediment or pollution run-off	Mapped estuaries are located approximately 8.7 km south-east of project site (National Parks and Wildlife Service 2012). However, examination of aerial photographs suggest habitat could lie within 1.7 km of site. Potential for significant effects cannot be excluded if sediment or pollution run-off occurs.
1140 Mudflats and sandflats not covered by seawater at low tide	To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Surface water pathway.	Sediment or pollution run-off	Estuaries are located approximately 1.8 km from project site (National Parks and Wildlife Service 2012). Potential for significant effects cannot be excluded if sediment or pollution run-off occurs.

1150 *Coastal lagoons	To restore the favourable conservation condition of Coastal lagoons in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Surface water pathway.	Sediment or pollution run-off	Four coastal lagoons within SAC. The closest two are Scattery lagoon located approximately 7.7 km from project site and Cloononeen Pool approximately 15.57 km (National Parks and Wildlife Service 2012). Due to distance from site, and the assimilation capacity of the sea, there is no potential for significant effects
1160 Large shallow inlets and bays	To maintain the favourable conservation condition of Large shallow inlets and bays in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Surface water pathway.	Sediment or pollution run-off	Habitat is located 1.8 km from project site (National Parks and Wildlife Service 2012). Potential for significant effects cannot be excluded if sediment or pollution run-off occurs.
1170 Reefs	To maintain the favourable conservation condition of Reefs in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Surface water pathway.	Sediment or pollution run-off	Closest reef is located 1.89 km from project site (National Parks and Wildlife Service 2012). Potential for significant effect cannot be excluded
1220 Perennial vegetation of stony banks	To maintain the favourable conservation condition of Perennial vegetation of stony banks in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Land air path-way	Removal of material	Closest perennial vegetation is Ballymacrinan Bay, which is approximately 11.2 km away. Bunaclugga Bay lies within 13 km (National Parks and Wildlife Service 2012). . Due to coastal and terrestrial nature of this habitat there is no potential for significant effects

1230 Vegetated sea cliffs of the Atlantic and Baltic coasts	To maintain the favourable conservation condition of Vegetated sea cliffs in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Land air path-way.	Invasive species	Nine sub-sites were identified (National Parks and Wildlife Service 2012). Lisheenrony is the closest sea cliff located approximately 10.5 km from site. Adjacent are the Moyarta cliffs which are 12.2 km away. Due to coastal and terrestrial nature of this habitat there is no potential for significant effects
1310 Salicornia and other annuals colonizing mud and sand	To maintain the favourable conservation condition of Salicornia and other annuals colonizing mud and sand in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Surface water pathway.	Sediment or pollution run-off	Habitat recorded at five of the ten sub- sites surveyed and mapped, further un-surveyed areas maybe present within the site (National Parks and Wildlife Service 2012). Potential for significant effect cannot be excluded if sediment or pollution run-off occurs.
1330 Atlantic salt meadows *(Glauco-Puccinellietalia maritimae)*	To restore the favourable conservation condition of Atlantic salt meadows (Glauco-Puccinellietalia maritimae) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Land air path-way	Invasive species, terres-trial trampling	Ten sub-sites that supported Atlantic salt meadow were mapped, the closest has been mapped approximately 2 km away (National Parks and Wildlife Service 2012). Due to coastal and terrestrial nature of this habitat and site works being contained within project site boundary, There is no potential for significant effects
1349 Bottlenose Dolphin (*Tursiops truncates)*	To maintain the favourable conservation condition of Bottlenose Dolphin in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at	Surface water pathway.	Sediment or pollution run-off Disturbance.	Records of Bottlenose Dolphin approximately 7km from project site (National Biodiversity Data Centre records).

	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Land/Air pathway - Disturbance		Due to the marine nature of this species which spends its time at sea there will be no disturbance impacts. Due to the size and scale of the proposed project and the assimilation capacity of the sea there is no potential for significant effects.
1355 Otter (*Lutra lutra)*	To restore the favourable conservation condition of Otter in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Water pollution. Land/Air pathway - Disturbance	Disturbance, destruc-tion of holts	Recordings of otter approximately 2km away (National Biodiversity Data Centre records). Potential for significant effect cannot be excluded
1410 Mediterranean salt meadows (*Juncetalia maritimi)*	To restore the favourable conservation condition of Mediterranean salt meadows (Juncetalia maritimi) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Land / air pathway	Invasive species, terres-trial trampling	Eight sub-sites that support Mediterranean salt meadow were mapped (National Parks and Wildlife Service 2012). The closest site is located approximately 14 km from project site. Due to terrestrial nature of this habitat, project works being contained within site boundary, the size and scale of the proposed project and terrestrial separation distance of more than 1.7 km, there is no potential for significant effects.
3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	To maintain the favourable conservation condition of Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at	Surface water pathway.	Sediment or pollution run-off	The full distributions of this habitat and its sub-types in this site are currently unknown. Review of the available data had identified three high conservation elements (sub-types) in the site, namely: 1. *Groenlandia densa* (L.) Fourr.,

	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf			Opposite-leaved Pondweed 2. *Schoenoplectus triqueter* (L.) Palla, Triangular Club-rush 3. Bryophyte-rich streams and rivers. The first two sub-types are associated with tidal reaches of rivers, while the latter sub-type is found in fast-flowing stretches of unmodified streams and rivers. (NPWS, 2012a). There is therefore potential for sub-types of this habitat to lie downstream of project site. Potential for significant effects cannot be excluded if water quality is impacted by project.
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 (Molinion caeruleae) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Land / air pathway	Over grazing, burning	Full extent of habitat within SAC has not been mapped. Due to terrestrial nature of this habitat, project works being contained within site boundary, the size and scale of the proposed project and terrestrial separation distance of more than 1.7 km, there is no potential for significant effects
91E0 *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Land/Air pathway	Invasive species, pollution	Five surveyed sites. Located approximately 52 km away (National Parks and Wildlife Service 2012). Due to a terrestrial separation distance of more than 50km, project works being contained within site boundary, the size and scale of the proposed project, there is no potential for significant effects

Table 3: River Shannon and River Fergus Estuaries SPA – Screening analysis (using source-pathway-receptor model) to identify SAC qualifying habitats and any "Likely Significant Effects" of impacts on Natura 2000 site, based on current project proposals.

Qualifying Interests (QI) and code (*Potential receptors*)	**Conservation objectives**	**Pathway / Comment**	**Source of potential threats**	**Likelihood of significance**
A017 Cormorant *Phalacrocorax carbo*	To maintain the favourable conservation condition of Cormorant in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for breeding and over wintering. Cormorants. No records of breeding with 10 km^2 of site, however there are records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works. Potential for significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.

A038 Whooper Swan *Cygnus cygnus*	To maintain the favourable conservation condition of Whooper Swan in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for over wintering of Whooper swans. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works. Potential for significant indirect effects cannot be excluded, due to hydrological connection from project site to SPA.
A046 Light-bellied Brent Goose Branta *bernicla hrota*	To maintain the favourable conservation condition of Light-bellied Brent Goose in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for over wintering of Light bellied Brent geese. Records of wintering species within 1.6 km of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts

				if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works. Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A048 Shelduck *Tadorna tadorna*	To maintain the favourable conservation condition of Shelduck in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for over wintering of Shelduck. Records of wintering species within 3 km of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works. Potential significant indirect effects cannot be excluded if water quality

				is impacted, due to hydrological connection from project site to SPA.
A050 Wigeon *Anas penelope*	To maintain the favourable conservation condition of Wigeon in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for over wintering of Wigeon. Records of wintering species within 2.5 km of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works. Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A052 Teal *Anas crecca*	To maintain the favourable conservation condition of Teal in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for over wintering of Teal. Records of wintering species within 2 km of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds

				can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works. Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A054 Pintail *Anas acuta*	To maintain the favourable conservation condition of Pintail in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for over wintering of Pintail. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works.

				Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A056 Shoveler *Anas clypeata*	To maintain the favourable conservation condition of Shoveler in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for over wintering of Shoveler. Records of wintering species within 10 km^2 of site. Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works. Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A062 Scaup *Aythya marila*	To maintain the favourable conservation condition of Scaup in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for over wintering of Scaup. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds

				can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works. Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A137 Ringed Plover *Charadrius hiaticula*	To maintain the favourable conservation condition of Ringed Plover in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for over wintering of Ringed Plover. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works.

				Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A140 Golden Plover *Pluvialis apricaria*	To maintain the favourable conservation condition of Golden Plover in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for breeding of Golden Plover. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works. Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A141 Grey Plover *Pluvialis squatarola*	To maintain the favourable conservation condition of Grey Plover in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for wintering of Grey Plover. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if

	sites/conservation_objectives/CO004077.pdf			disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works. Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A142 Lapwing *Vanellus vanellus*	To maintain the favourable conservation condition of Lapwing in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for wintering of Lapwing. Records of wintering species within 5 km of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct

				effects due to disturbance during proposed works. Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A143 Knot *Calidris canutus*	To maintain the favourable conservation condition of Knot in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for wintering of Knot. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works. Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A149 Dunlin *Calidris alpina*	To maintain the favourable conservation condition of Dunlin in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast	SPA designated for breeding Dunlin. Records of breeding species within 2 km of site (National Biodiversity Data Centre records).

	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf		Noise during works	Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works. Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A156 Black-tailed Godwit *Limosa limosa*	To maintain the favourable conservation condition of Black-tailed Godwit in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for over wintering of Black – tailed Godwit. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no

				potential for significant direct effects due to disturbance during proposed works. Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A157 Bar-tailed Godwit *Limosa lapponica*	To maintain the favourable conservation condition of Bar-tailed Godwit in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for over wintering of Bar – tailed Godwit. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works. Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A160 Curlew *Numenius arquata*	To maintain the favourable conservation condition of Curlew in the River Shannon and River Fergus Estuaries SPA, which is	Surface water pathway.	Sediment or pollution run-off from proposed works to nearby drain and from there to coast	SPA designated for wintering Curlew. Records of wintering species

	defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Land/Air pathway – Disturbance	Noise during works	within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works. Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A164 Greenshank *Tringa nebularia*	To maintain the favourable conservation condition of Greenshank in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for over wintering of Greenshank. Records over wintering within 5 km of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj

				1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works. Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A162 Redshank *Tringa totanus*	To maintain the favourable conservation condition of Redshank in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway. Land/Air pathway – Disturbance	Sediment or pollution run-off from proposed works to nearby drain and from there to coast Noise during works	SPA designated for over wintering of Redshank. Records over wintering within 3 km of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works. Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A179 Black-headed Gull *Larus ridibundus*	To maintain the favourable conservation condition of Black-headed Gull in the River	Surface water pathway.	Sediment or pollution run-off from proposed	SPA designated for breeding of Black headed Gull. Records of over

	Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Land/Air pathway – Disturbance	works to nearby drain and from there to coast Noise during works	wintering within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effects due to disturbance during proposed works. Potential significant indirect effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.
A999 Wetlands	To maintain the favourable conservation condition of the wetland habitat in the River Shannon and River Fergus Estuaries SPA as a resource for the regularly-occurring migratory waterbirds that utilise it. This is defined by the following attribute and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Surface water pathway	Sediment or pollution run-off from proposed works to nearby drain and from there to coast	Direct hydrological connection from project site to SPA. Site lies approximately 327 m from Emlagh 27 River (EPA code: IE_SH_27M040900), which forms hydrological link to River Shannon and River Fergus Estuaries SPA. Potential significant effects cannot be excluded if water quality is impacted, due to hydrological connection from project site to SPA.

Section 4: IN-COMBINATION EFFECT

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 Natura 2000 site in view of the site's conservation objectives.

A review of plans and projects was undertaken. This review focuses on the potential for cumulative in-combination effects on the European Sites where potential for adverse effects has been identified in the preceding sections of this report. This included a review of online Planning Registers, development plans, forestry applications and other available information.

Where the potential for significant effects on European Sites has been identified in the preceding sections of this report, there is potential for the proposed afforestation project to result in in-combination effect. Where no pathway for effect on a particular European Site was identified, there is no potential for effects to occur because of the current proposed afforestation project when considered on its own. Therefore, it cannot contribute to any in-combination effects on that site when considered in combination with other plans and projects and no further assessment is required.

4.1 Review of other Plans

The potential for the proposed afforestation project to contribute to a cumulative impact on European Sites was considered for the following plans:

- Water Framework Directive (WFD)
- County Development Plan
- Shannon River Basin District Management Plan

This project lies in a rural landscape in the townland Emlagh, Co. Clare in the WFD Sub-Catchment WOOD_SC_010. Two out of four river water bodies within this sub-catchment are AT RISK: Wood_010 due to Poor biological status and; Wood_020 due to poor biological status and elevated phosphate and ammonia concentrations. Moyasta_010 and Termon East_010 are under REVIEW due to their unassigned status. Agriculture was identified as a significant pressure within Wood_010 and Wood_020. In addition, forestry (notably clearfelling), a golf course and urban run-off were also highlighted as significant pressures within Wood_020. Further local catchment assessments are required for REVIEW water bodies so as to determine whether any issues exist.

WFD River Moyasta_10 forms a hydrological link from the project site to SAC and SPA. While agriculture has been highlighted as a significant pressure for Moyasta_10, forestry and notably clearfelling has been highlighted as pressure for Wood_020 only. The project area overlapping the sub-basin measures 14.48 ha. When planted this area will equate to 0.33 % of the sub-basin.

Further details on the sub-catchment assessment can be found here: https://catchments.ie/wp-content/files/subcatchmentassessments/27_4%20Wood_SC_010%20Subcatchment%20Assessment%20WFD%20Cycle%202.pdf

The county development plan and the Shannon River Basin District Management Plan were also reviewed. See Table 4 below.

Table 4: Other Plans

Plan	Possible impacts from plans	Is there a risk of significant in combination effects from the plans
Clare county development plan 2017 - 2023	No negative impacts envisaged	AA concluded not possible to rule out significant effects so NIS was required and carried out. Upon implementation of mitigation measures no adverse effects on European Sites are predicted. https://www.clarecoco.ie/services/planning/publications/clare-county-development-plan-2017-2023-aa-concluding-statement-24220.pdf Note: Emlagh noted as rural area under pressure
Shannon River Basin District Management Plan 2018-2021	No negative impacts envisaged	River Basin Management Plan 2018-2021 Possible effects predicted but with the implementation of mitigation measures the RBMP will not adversely affect the integrity of any European site. https://assets.gov.ie/131983/0c065785-ce94-4f61-b1c3-2bbe10a4761b.pdf

In reviewing the above plans and the best objective information, no effects were identified as a result of the proposed plans that could act in combination with the proposed project to cause potential significant effects. No projects or plans with the potential for significant in-combination effects with the proposed development were identified.

4.2 Review of other Projects

Planning applications occurring within the townlands of the Moyasta-010 River sub-basin with hydrological connection to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA were searched for possible in-combination impacts using Clare County Council planning search facility (www.eplanning.ie/ClareCC/searchtypes). See Table 6 below for details. Townlands included: Lisgurreen, Garraun Emlagh, Baunmore, Kilkee, Kilrush, Moanmore North and South and Upper and Lower, and town of Moyasta. This search criteria was used as these sites are hydrologically linked to same Natura 2000 sites as project site and could act in combination with the proposed project to cause potential potential significant effects on these sites.

No plans or projects were found for the area within the EIA portal which was searched on the 10th August 2021 (housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1).

Table 5: Planning application near proposed development site (Data source: www.clarecoco.ie/services/planning/applications/view/planning-lists/, date of search 3rd September 2021, Search townlands of Lisgurreen, Garraun Emlagh, Baunmore, Kilkee, Kilrush, Moanmore North and South and Upper and Lower, and town of Moyasta for 2020-2021)

Clare County Council Planning Application Number	Description	Is there a risk of significant impact or in combination effects from the plans
2039 Tullaher, Moyasta, Co. Clare	Construction of a forest action road entrance with all ancillary site works.	There is unlikely to be any significant impacts or 'in combination' effect on the SACs and SPAs as Planners Report - concluded the proposed development, by itself or in combination with other development in the vicinity, would not be likely to have a significant effect on European site(s).
20448 Einagh, Moyasta, Co. Clare	Construct a new dwelling house, private garage, site entrance, sewage treatment system and all with all ancillary site works.	Permission granted and no AA requested.
21685 San Clemente, Lisdeen, Kilkee, Co.Clare	Retain existing conservatory extension at the western side of the dwelling, retention of front porch and private garage.	No AA issues arise, therefore the proposed dwelling by itself or in combination with other development in the vicinity, would not be likely to have a significant effect on European sites.
20164 At Einagh, Kilrush, Co. Clare	Construction of extension and alternatives to existing house dwelling.	There is no potential for there to be any significant impacts or 'in combination' effect on the SACs and SPAs as Planners Report - concluded the proposed development, by itself or in combination with other development in the vicinity, would not be likely to have a significant effect on European sites.
20146 The Old School House, Corbally, Kilkee, Co.Clare	Construct a link corridor between house and out building at the old school house, which will also act as a wind break.	No AA issues arise, therefore the proposed dwelling by itself or in combination with other development in the vicinity, would not be likely to have a significant effect on European sites.
21257 Tarmon West, Kilkee, Co.Clare	Design changes to the house including but not limited to floor plans, elevations and fenestration, personal home office space 23 m^2 and basement space 14m^2 and access driveway along with all ancillary site works and landscaping.	No AA issues arise, therefore the proposed dwelling by itself or in combination with other development in the vicinity, would not be likely to have a significant effect on European sites.

21247 Carrowncalla South, Kilrush , Co. Clare	Extended the proposal of P15-848 for the construction of a cubicle house, slatted tank, milking parlour and plant, office space and all ancillary site works	Extension to previous AA received on 22nd March 2021, for additional 5 years. The authority is satisfied once the development will be completed within a reasonable time.
2027 Carrowncalla South, Kilrush, Co. Clare	Demolition of derelict shed, and construction of new proposed shed along with all ancillary site works.	No AA issues arise, therefore the proposed dwelling by itself or in combination with other development in the vicinity, would not be likely to have a significant effect on European sites.
20352 Ballyurra, Kilrush, Co. Clare	Retain existing dwelling house, and permission to construct extension to the side rear of the existing dwelling house, along with all ancillary site works.	There is no potential for there to be any significant impacts or 'in combination' effect on the SACs and SPAs as Planners Report - concluded the proposed development, by itself or in combination with other development in the vicinity, would not be likely to have a significant effect on European sites.
20596 Leadmore East, Kilrush, Co. Clare	Retention of change of use of the existing linked private garage to residential en-suite along with all ancillary site works.	No AA issues arise, therefore the proposed dwelling by itself or in combination with other development in the vicinity, would not be likely to have a significant effect on European site(s).

This same search criteria were used in search of An Bord Pleanála Planning Appeals as for planning applications in Table 5 above.

Table 6: An Bord Pleanála Planning Appeals near proposed development site

(Data source: https://www.pleanala.ie/en-ie/home/, date of search 3rd September 2021, Search townlands of Lisgurreen, Garraun Emlagh, Baunmore, Moanmore North and South and Upper and Lower, and town of Moyasta for 2016-2021)

Application Number	**Description**	**Is there a risk of significant impact or in combination effects from the plans**
300375: Moyasta, Kilrush, Co. Clare (P17/705) Clare County Council	Retain existing cattle crush and plinths, construction of extension to livestock slatted house to accommodate calf pens and all ancillary site works	Having regard to the nature and scale of the proposed development and the development it is proposed to retain and to the nature of the receiving environment and proximity to the River Shannon and River Fergus Estuaries Special Protection Areas (Site Code 004077) and the Lower River Shannon Special Area of Conservation (Site Code 002165), no Appropriate Assessment issues arise and it is not considered that the proposed development would be likely to have a significant effect individually or in combination with other plans or projects on the European sites.

In reviewing the above projects and the best objective information, no cumulative effects were identified as a result of the proposed projects that could cause significant effects. No projects or plans with the potential for significant in-combination effects with the proposed development were identified.

Forest application occurring within and having a hydrological link with the Moyasta-010 river sub basin were examined for possible in-combination impacts. See Table 6 below.

Table 6: Forestry applications
(Data source: forestry-maps.apps.rhos.agriculture.gov.ie/) Search conducted on the 10/8/2021)

Application number and address	Size of application (ha)	Date approved	Type of application	Assessment
CN83355 Moyasta, Clare	10.46	3/4/2019	Afforestation - planted	Plot lies approximately 700 m south of current project site. Stream along northern boundary of application CN83355 is part of the Moyasta_10 WFD system.
CN87378 Lisgurreen, Emlagh, Clare	12.17	Decision pending	Afforestation	Plot lies approximately 600 m west of current project site. Stream along eastern boundary of application CN87378 is part of the Moyasta_10 WFD system.
CN88624 Lisgurreen, Clare	7.5	Decision Pending	Afforestation	Plot lies approximately 780 m west of current project site. Stream lying 225m to the east of application CN88624 is part of the Moyasta_10 WFD system.
CN82783 Lisgurreen, Clare	9.36	Decision Pending	Afforestation	Plot lies approximately 900 m west of current project site. Stream lying 250 m to the east of application CN82783 is part of the Moyasta_10 WFD system.
TFL00440819 Kildeema, Lisgurreen, Clare	7.39	10/6/2021	Private Clearfell and Thinning	Plot lies approximately 750 m north-west of current project site. Stream along eastern boundary of application TFL00440819 is part of the Moyasta_10 WFD system.

The total area to be afforested equates to 29.03 ha, with 10.46 ha recently planted, and 3.39 ha classed as clearfell and thinning. If the pending afforestation projects were to be carried out at the same time as the proposed project, it is possible that cumulative impacts of sedimentation could arise. In-combination effects can occur where a project results in individually insignificant effects that, when considered in-combination with impacts of other proposed or permitted plans and projects, can result in significant effects.

In reviewing the above forestry projects potential cumulative effects were identified as a result of the proposed projects that could cause significant effects on water quality.

Section 5: DECLARATION

Based on the information contained in this Screening Report, it was not considered possible to rule out the potential for significant effects of the proposed project on the conservation objectives of the following European sites, whether alone or in-combination with other plans or projects

- Lower River Shannon SAC (002165)
- River Shannon and River Fergus Estuaries SPA (004077)

Signed:

Karina Dingerkus (Ecologist)

Dated: 23/8/2021

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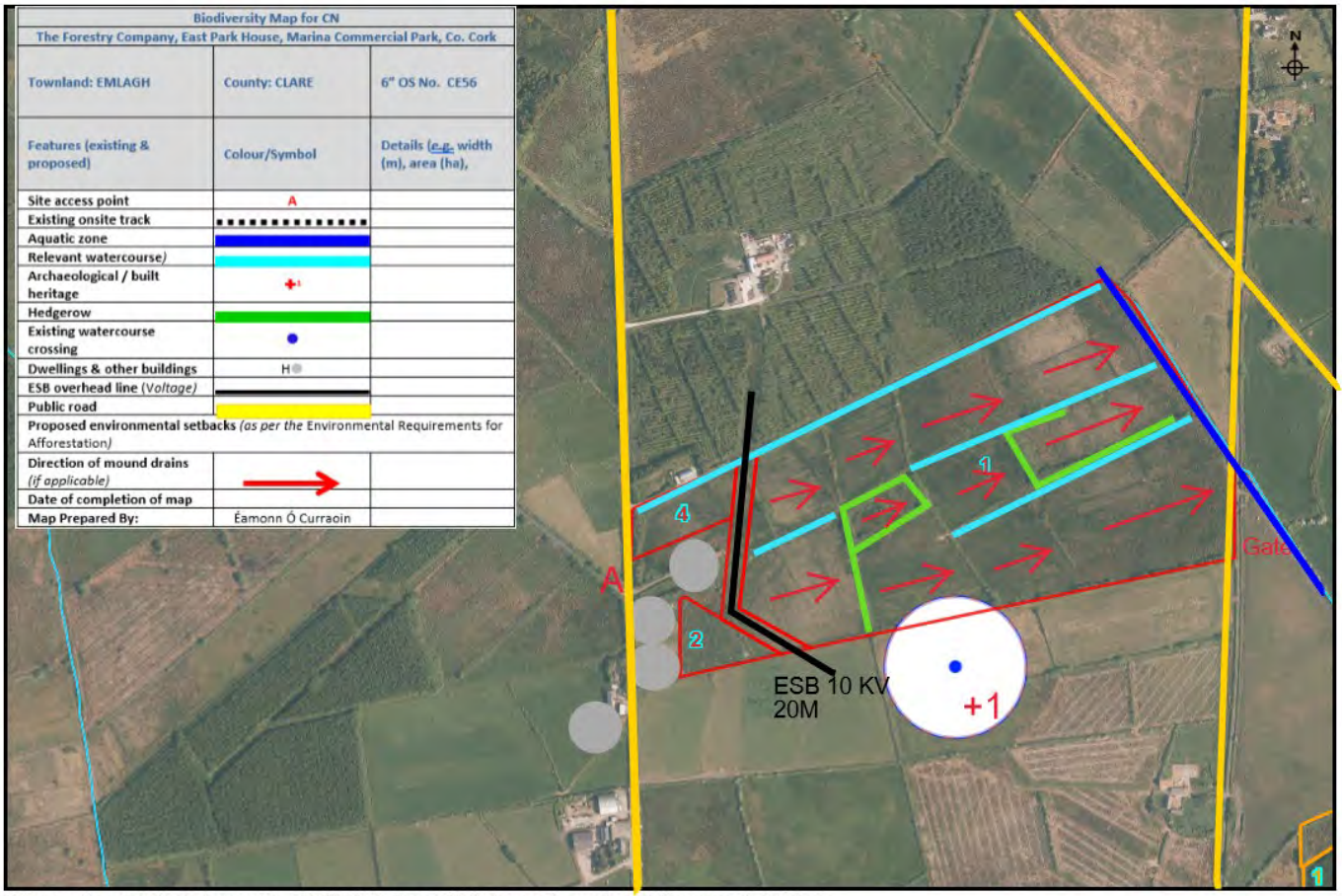
APPENDICES

Biodiversity Map



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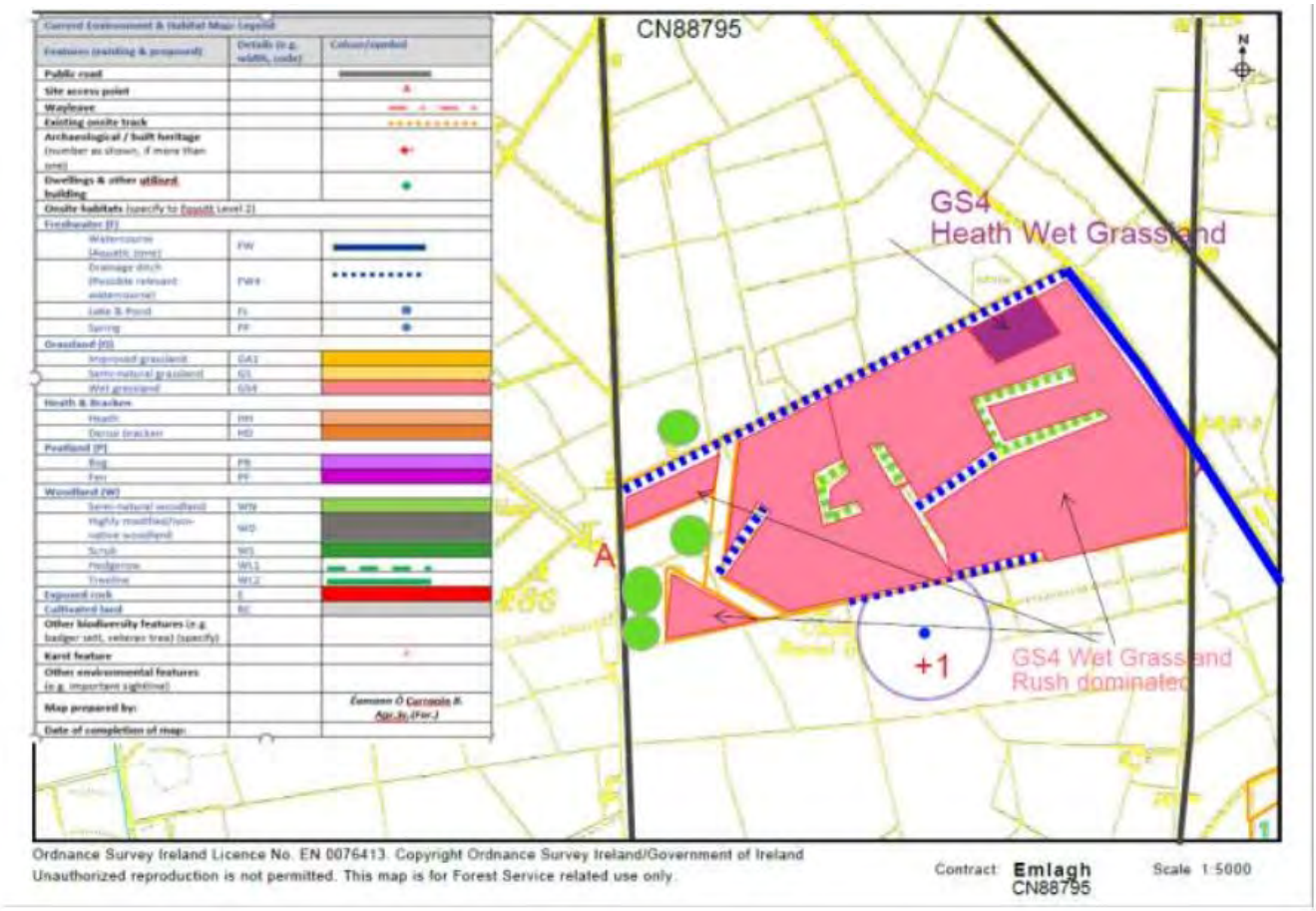
Contract: **Emlagh** Scale 1:5000

Habitat Map


CN88795
GS4
Heath Wet Grassland
GS4 Wet Grassland
Rush dominated
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N
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Biodiversity Records

Table Showing Biodiversity records in the vicinity of the site

Species	Date of record	Approximate Distance from site	Grid Reference	Data set
Common Bottlenose Dolphin *(Tursiops truncatus)*	14/06/2014	7 km	Q863621	IWDG Casual Cetacean Sightings
Otter *(Lutra lutra)*	02/05/2017	3.5km	Q986547	Mammals of Ireland 2016-2025
Dunlin (C*alidris alpina)*	17/12/2005	2 km	Q9358	Clare Biological Records Centre Dataset 2004-2007
Black-headed Gull (*Larus ridibundus)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Grey Plover *(Pluvialis squatarola)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Whooper Swan *(Cygnus cygnus)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Golden Plover *(Pluvialis apricaria)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Shelduck *(Tadorna tadorna)*	17/12/2005	3 km	Q9357	Clare Biological Records Centre Dataset 2004-2007
Bar-tailed Godwit *(Limosa lapponica)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Light-bellied Brent Goose *(Branta bernicla hrota)*	04/04/2006	1.6 km	Q949571	Clare Biological Records Centre Dataset 2004-2007
Ringed Plover *(Charadrius hiaticula)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Black-tailed Godwit *(Limosa limosa)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Curlew *(Numenius arquata)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Greenshank *(Tringa nebularia)*	2007 - 2011	5 km	Q95H	Bird Atlas 2007 - 2011

Wigeon *(Anas penelope)*	17/12/2005	2.5 km	Q9557	Clare Biological Records Centre Dataset 2004-2007
Redshank *(Tringa totanus)*	2007 - 2011	3 km	Q95N	Bird Atlas 2007 - 2011
Lapwing *(Vanellus vanellus)*	2007 - 2011	5 km	Q95H	Bird Atlas 2007 - 2011
Cormorant *(Phalacrocorax carbo)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Shoveler *(Anas clypeata)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Teal *(Anas crecca)*	2007 - 2011	2 km	Q96K	Bird Atlas 2007 - 2011
Knot *(Calidris canutus)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Scaup *(Aythya marila)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Pintail *(Anas acuta)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011

end

Natura Impact Statement

for Proposed afforestation project CN88795

located at Emlagh, Co. Clare

Compiled by: Dr. Karina Dingerkus, Giorria Environmental Services

Completion date: 23rd August 2021

Contents

SECTION 1: GENERAL DETAILS

Details of Author(s)	
Name	Dr. Karina DIngerkus
Address	Ardacarha, Bohola, Calremorris, Co. Mayo, F12 VW94
Company name *(If relevant)*	Giorria Environmental Services
Tel. no.	0863620928
E-mail	karina@giorria.com
For each author: Provide details of his / her relevant qualifications / affiliations / years of experience	*PhD. 1997* The Ecology and Distribution of the Irish hare in Northern Ireland, Queen's University, Belfast. Has over 27 years experience as working ecologist for local authorities, wildlife charities and consultancies. Established Giorria Environmental Services, an ecological consultancy based in County Mayo in 2005. Has been completing Appropriate Assessments for over 12 years for private and public clients. Has been contract to the Coillte NIS project since 2020.
Describe the scope of his / her contribution in preparing this NIS.	Ecological assessment

Details of Author(s)	
Name	Ciaran Ryan
Address	Lahard, Beaufort, Killarney, Co. Kerry
Company name *(If relevant)*	(Kerry Ecological Services – sole trader)
Tel. no.	064-6624577; 085-7168019
E-mail	Ciaranryan5@hotmail.com
Details of relevant qualifications / affiliations / years of experience (Provide additional details on separate a sheet)	B.Sc. Analytical Science; M.Sc. (Environmental Science) Over 25 years experience in ecological survey (including SAC & SPA designations), SAC & SPA Management Plans, Commonage Framework Plans, SAC Appeals, Natura 2000 site assessments and reports (NIS) and general environmental consultancy. I am an accredited Native Woodland

	Scheme ecologist.
Describe scope of contribution in preparing this AA Pre-Screening Report	Ecological

Project location & general details*		
County: Clare	Nearest village: Moyasta	
Townland: Emlagh	6 inch OS Map number: CE56	
Proposed activity (tick):	Afforestation	ü
	Forest road construction	
	Thinning (incl. CCF)	
	Clearfell & Reforestation	
	Clearfell & No Reforestation	
	Aerial fertilisation	
	Other (specify)	
Project area (hectares)):	14.58 hectares	

Indicate (tick) the nature of the application:	Application for forestry licence only	
	Application for forestry licence & scheme support	Yes ü

Indicate the origin of this NIS:	NIS was sought by the FS-DAFM *via* a NIS Request Letter.	
	NIS submitted with the licence / scheme application, based on the results of a screening exercise.	Yes ü
	Other (describe):	

Introduction

Giorria Environmental Services has been commissioned to prepare a Natura Impact Statement to allow the competent authority to conduct an Appropriate Assessment of the proposed afforestation at Emlagh, Co Clare.

An Appropriate Assessment Screening Report has been prepared for the proposed afforestation project. This Article 6(3) Appropriate Assessment Screening Report has identified the European Sites for which the proposed development has the potential to result in significant effects and the pathways by which those effects may occur. It has also identified the qualifying interests / special conservation interests that have the potential to be affected by the proposed development.

The report was prepared in accordance with the following guidance documents:

- Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (NPWS 2009, Revised February 2010)
- Circular NPW 1/10 & PSSP 2/10 (March 2010)
- EU Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC (2007)
- Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (Nov. 2001 – published 2002)
- Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (2000).
- Office of the Planning Regulator (2021). Appropriate Assessment Screening for Development Management. OPR Practice Note PN01.

The impact of a project or plan alone and in combination with other projects or plans on the integrity of the Natura 2000 sites is considered with respect to the conservation objectives of the site and to its structure and function.

Summary of Article 6(3) Appropriate Assessment Screening Report

The Stage 1 Screening concluded that there was potential for the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA to be affected by the project (see Appropriate Assessment Screening Report), due to the potential for sediment run off and pollution from the site into the adjacent waterbody that is hydrologically connected to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Therefore, it is necessary to prepare a Natura Impact Statement that describes mitigation measures to prevent sediment run-off and pollution.

Description of the Project Area (i.e. site of proposed works) Site visit 20/5/2021

A multidisciplinary walkover survey was conducted on the 20/05/2021 following NRA (2009) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes) by ecologist Cieran Ryan. All habitats were identifiable (Smith, G.F., O'Donoghue, P., O'Hora, K., & Delaney E. 2011). The walkover surveys were designed to detect the presence, or likely presence, of a range of protected species. The survey included a search of all potentially suitable habitat for protected species that are likely to occur in the vicinity of the project aera. Habitats were identified in accordance with the Heritage Council's 'Guide to Habitats in Ireland' (Fossitt, 2000). Plant nomenclature for vascular plants follows 'New Flora of the British Isles' (Stace, 2010). 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 also conducted.

The site is located in the townland of Emlagh, 2.8 km from the village of Moyasta in Co. Clare. The site (size 14.58 ha) lies at an elevation of < 40m sloping gently from west to east. The soil is mostly peaty gley and surface water gley (acid, deep, poorly drained mineral) based on Namurian shale, sandstone, siltstone and coal bedrock. There are no major seepage areas or wet depressions. The land is currently used for cattle grazing and comprises of 20 small fields with an average size of 0.7 ha (range 1.2 ha to 0.38 ha).

The principal habitat present is wet grassland (GS4) dominated by Soft Rush (*Juncus effusus* – c.75+ %) with Creeping Buttercup (*Ranunculus repens*), Meadow Buttercup (*Ranunculus acris*), Meadowsweet (*Filipendula ulmaria),* Silverweed (*Potentilla anserina*), Ribwort Plantain (*Plantago lanceolata*), Dandelion (*Taraxacum officinale* agg.), Common Sorrel (*Rumex acetosa*), Dock (*Rumex* sp.), Horsetail (*Equisitum palustre*), Knapweed (*Centauria nigra),* Thistle (*Cirsium vulgare*), typical grasses (e.g. *Holcus lantus, Anthoxanthum odoratum, Agrostis capillaris, Festuca rubra*), occasional orchid (*Orchis mascula*) and some invading Bramble (*Rubus fruticosus*) and Common Gorse (*Ulex europaeus*). There is a small area of peaty wet grassland (GS4) to the north-east where Purple Moorgrass (*Molinia caerulea*), Carnation Sedge (*Carex panicea*) and Marsh Thistle (*Cirsium palustre*) are evident, along with typical wet grassland species, notably Jointed/Sharp-flowered Rush (*Juncus articulatus/acutiflorus*), Meadowsweet and Cuckooflower (*Cardamine pratensis*). It should be noted that the heathy wet grassland habitat does not comply with any EU Annex I habitat.

There is one natural watercourse (FW2) present on site flowing along the north-eastern boundary (length along boundary 240 m). This is approximately 0.5m deep (down a 1m bank), slow flowing in a southerly direction and with a silt and gravel substrate. It is little vegetated except along its banks where some Bramble, Willow (*Salix* sp.), Gorse, rush and Nettle (*Urtica dioica*) occur. It flows south eastward, discharging into Poulnasherry Bay (Lower River Shannon SAC), near Moyasta up to 3 km downstream. Drainage channels (FW4) present are approximately 1m deep, 1m wide but with little water flow, being clogged with vegetation and silt. They discharge/filter into the on-site natural watercourse.

WFD River Moyasta forms a hydrological link from the project site to SAC and SPA. Moyasta_10 is currently classed as under review / unassigned status.

Sparse, low-growing hedgerows (WL1) of mostly Bramble and scattered Willow and Common Gorse occur on low banks along field boundaries, with occasional Hawthorn (*Crataegus monogyna*).

There were no Annex I habitats recorded within the project site boundary and no protected species were recorded during the site visit. Notable species recorded within Q96 10 km grid include Badger,

Otter, Hare, Stoat, Pine Marten, bat species, Peregrine, Hen Harrier, Merlin, Barnacle Goose, Brent Goose, Greenland White-fronted Goose, Greylag Goose, Whooper Swan, Golden Plover, Kingfisher, Curlew, Lapwing, Snipe, Chough, Marsh Fritillary and Narrow mouthed Whorl Snail. However, this grid extends to the coast around Doonbeg and White Strand. Within the 2km grid encompassing the site lands, the only notable species recorded are Badger, Hare, Stoat, and bats. None of these species are known to regularly utilise the site lands. There are no large trees present suitable for roosting bats, although the scattered, low hedgerow may provide some foraging habitat. The wet grassland habitat present is not species-rich and is common locally and nationally.

It is considered desirable that the small area of peaty wet grassland to the north-east of the site be retained, connecting with the nearby aquatic buffer either by open habitat or native trees. This area is somewhat distinctive from surrounding Soft Rush dominated wet grassland habitat. It will also serve to provide an open habitat that can be utilised by native fauna. A Habitat Map is attached.

The project site lies approximately 1.7 km upstream distance of Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Tullaher Lough and Bog SAC lies over 1.3 km north of project site. Kilkee Reefs SAC lies over 5 km north-west of project site. Both Carrowmore Dunes SAC and Mid-Clare Coast SPA lies over 6 km north of project site. All other European site lies over 10km from the site with Carrowmore Point to Spanish Point and Islands SAC to the north and llaunonearaun SPA to the south-west of project site.

Surrounding land use includes forestry to the north. Improved pasture to the south, east and west. Access will from a minor road which comes off the N67.

Summary of habitats on site

Wet grassland (GS4)

Natural watercourse (FW2)

Drainage channels (FW4)

Hedgerows (WL1)

No Annex I habitats recorded within the project site boundary.

Proposed Operations

Afforestation and any subsequent harvesting will follow best practice Forest Service policies, strategic guidance documents, as well as Coillte guidance documents, including the documents listed below. This will ensure that newly planted trees remain viable, and afforestation provides minimal potential impacts to the receiving environment.

- Land Types for Afforestation (2016)
- Environmental Requirements for Afforestation (2016)
- Forest Operations & Water Protection Guidelines (2009)

- Methodology for Clear Felling Harvesting Operations (2009)
- Forestry and Water Quality Guidelines (2000)
- Forestry and the Landscape Guidelines (2000)
- Forestry and Archaeology Guidelines (2000)
- Forestry Biodiversity Guidelines (2000)
- Forestry Protection Guidelines (2002)
- Forestry Harvesting and Environmental Guidelines (2000)

Planting will be carried out in accordance with the 'Forestry Schemes Manual' (Forest Service, 2011), which gives guidance on ground cultivation, stocking and spacing, plant handling, planting dates, fencing, fire, and weed control.

Work on this site will comprise of planting 100% native broadleaves.

Site Preparation and planting

Mounding: Small mounds are excavated and placed at 2 metre intervals. The drains that are formed by removing the mounds are spaced at 12 metre intervals, giving 2500 mounds (trees) per hectare.

Mounding will be completed by a tracked excavator. The excavator will create small mounds of soil. The mound loosens any compacted soil, as well as raising the planting position of the young trees which reduces the impact of competing vegetation.

Silt traps constructed at end of mound drains at 50 m intervals.

Trees will be sourced from a recognised forest nursery. Planting will occur manually. A slit will be made in the centre of each mound with a spade and the roots of the young tree placed in the opening. The loose soil will then be backed filled with the spade and firmed in, making sure that the tree is straight. The tree will be firmed in by foot. Care will be taken to ensure trees are planted to the correct depth (i.e. root collar) and all roots are placed fully into the soil. Where possible trees will be planted between November and March during their dormant season.

All setbacks along aquatic zone, relevant water courses, roads and dwelling house will be measured and marked by machine operator prior to work commencing.

Fencing

The perimeter of the site will be fenced with stock fencing consisting of NSAI stakes and strainers and high tensile barbed wire.

Fertiliser

Due to inherent levels of fertility, no fertiliser application is required to promote the establishment and growth of the newly planted trees.

Management

Regular site visits and monitoring will occur. Management will involve carrying out vegetation control, checking for browsing or frost damage, carry out broadleaf shaping and checking

drains, firebreaks and fence-lines. Manual maintenance will occur annually. Maintenance will involve trampling by stamping on weeds around the trees. Were necessary spot spraying with Glyphosate will occur in year 2 where dense vegetation is impeding tree growth. Beating Up: Replacement of failures in Year 2 and 3.

SECTION 2: SCREENED-IN EUROPEAN SITES – POTENTIAL IMPACTS & PROPOSED MITIGATION

2.1 Conservation Objectives of Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.

Article 2 of the Habitats Directive

1. The aim of this Directive shall be to contribute towards ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora in the European territory of the Member States to which the Treaty applies.

2. Measures taken pursuant to this Directive shall be designed to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest.

According to the EU Habitats Directive, favourable conservation status of a habitat is achieved when:

- Its natural range, and area it covers within that range, is stable or increasing.
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future.
- The conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

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

The weblink to the Conservation Objectives of Lower River Shannon SAC (002165) are listed in Table 1 below.

The weblink to the Conservation Objectives of River Shannon and River Fergus Estuaries SPA (004077) are listed in Table 2 below.

SCREENED-IN EUROPEAN SITES – POTENTIAL IMPACTS AND PROPOSED MITIGATION

Table 1: Screened-in European Sites – Lower River Shannon SAC - Potential Impacts and Proposed Mitigation

Lower River Shannon SAC (site code: 002165)			
List each of the Qualifying Interest(s) (if SAC) / Special Conservation Interest(s) (if SPA) for this European Site. **Assign each QI / SCI its own row.**	**Set out components of the Conservation Objectives (relevant information including attributes, conservation status & locations) for this European Site relevant to this project.**	**Considering the QI / SCI & the Conservation Objective(s), and supporting habitats and species(*), is it likely that the project will have an adverse effect on this QI / SCI & the achievement of the corresponding Conservation Objective?** **If 'yes', describe the nature, severity, mechanism & timeline of the adverse effect.**	**If the potential for an adverse effect on this QI / SCI exists, detail the necessary mitigation to avoid, reduce or prevent this potential, and describe the mechanism through which this is achieved.**
1110 Sandbanks which are slightly covered by sea water all the time	To maintain the favourable conservation condition of Sandbanks which are slightly covered by sea water all the time in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Examination of aerial maps indicates that potential habitat lies 1.7 km downstream of project site. Potential indirect effects cannot be excluded if mitigation measures to eliminate sediment or pollution run-off are not implemented. Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could	To protect this aquatic habitat, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
1130 Estuaries	To maintain the favourable conservation condition of Estuaries in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Examination of aerial maps/photography indicates that potential estuarine habitat lies 1.7 km downstream of project site. Potential indirect effects cannot be excluded if mitigation measures to eliminate sediment or pollution run-off are not implemented. Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	To protect this aquatic habitat, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.
1140 Mudflats and sandflats not covered by seawater at low tide	To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Habitat has not been mapped in detail. However, observation of aerial maps indicates that potential mudflats and sandflats not covered by seawater at low tide habitat lies 1.7 km downstream of project site. Potential indirect effects cannot	To protect this aquatic habitat, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		be excluded if mitigation measures to eliminate sediment or pollution run-off are not implemented. Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
1150 Coastal lagoons*	To restore the favourable conservation condition of Coastal lagoons in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Four coastal lagoons within SAC. The closest two are Scattery lagoon located approximately 7.7 km from project site and Cloononeen Pool approximately 15.57 km National Parks and Wildlife Service 2012). Due to distance from site, and the assimilation capacity of the sea, there is no possibility of significant effects cannot be excluded.	Not required
1160 Large shallow inlets and bays	To maintain the favourable conservation condition of Large shallow inlets and bays in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Habitat is located 1.8 km from project site (National Parks and Wildlife Service 2012). Potential indirect significant effects cannot be excluded if mitigation measures to eliminate sediment or pollution run-off are not implemented. Threats include:	To protect this aquatic habitat, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		• Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
1170 Reefs	To maintain the favourable conservation condition of Reefs in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Closest reef is located 1.89 km from project site (National Parks and Wildlife Service 2012). Potential indirect significant effects cannot be excluded if mitigation measures to eliminate sediment or pollution run-off are not implemented. Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	To protect this aquatic habitat, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.
1220 Perennial vegetation of stony banks	To maintain the favourable conservation condition of Perennial vegetation of stony banks in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at	Closest perennial vegetation is Ballymacrinan Bay, which is approximately 11.2 km away. Bunaclugga Bay lies approximately	None required

	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	13 km (National Parks and Wildlife Service 2012). Due to distance from site, the fact that work will only occur within site boundary, and the terrestrial nature of this coastal habitat there will be no significant effect on this QI and so no mitigation is required.	
1230 Vegetated sea cliffs of the Atlantic and Baltic coasts	To maintain the favourable conservation condition of Vegetated sea cliffs in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Nine sub-sites were identified (National Parks and Wildlife Service 2012). Lisheenrony is the closest sea cliff located approximately 10.5 km from site. Adjacent are the Moyarta cliffs which are 12.2 km away. Due to coastal and terrestrial nature of this habitat and site works being contained within project site boundary there will be no significant effect on this QI and so no mitigation is required.	None required
1310 Salicornia and other annuals colonising mud and sand	To maintain the favourable conservation condition of Salicornia and other annuals colonizing mud and sand in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Habitat recorded at five of the ten sub- sites surveyed and mapped, further un-surveyed areas maybe present within the site (National Parks and Wildlife Service 2012). Examination of aerial maps/photography indicates that potential habitat lies 1.7 km downstream of project site. Potential indirect significant effects cannot be excluded if mitigation measures to eliminate	To protect this aquatic habitat, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		sediment or pollution run-off are not implemented. Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
1330 Atlantic salt meadows (GlaucoPuccinellietalia maritimae)	To restore the favourable conservation condition of Atlantic salt meadows (Glauco-Puccinellietalia maritimae) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Ten sub-sites that supported Atlantic salt meadow are mapped for this SAC, the closest has been approx. 2 km away (National Parks and Wildlife Service 2012). Due to coastal and terrestrial nature of this habitat and site works being contained within project site boundary , the size and scale of the proposed project and terrestrial separation distance of 2 km, there will be no potential for significant effect on this QI and so no mitigation is required.	None required
1410 Mediterranean salt meadows (Juncetalia maritimi)	To maintain the favourable conservation condition of Bottlenose Dolphin in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at	Eight sub-sites that support Mediterranean salt meadow were mapped (National Parks and Wildlife Service 2012). The closest	None required

	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	site is located approximately 14 km from project site. Due to coastal and terrestrial nature of this habitat and site works being contained within project site boundary, the size and scale of the proposed project and terrestrial separation distance of more than 1.7 km, there will be no potential for significant effects on this QI and so no mitigation is required.	
3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	To maintain the favourable conservation condition of Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	The full distributions of this habitat and its sub-types in this site are currently unknown. Review of the available data had identified three high conservation elements (sub-types) in the site, namely: 1. *Groenlandia densa* (L.) Fourr., Opposite-leaved Pondweed 2. *Schoenoplectus triqueter* (L.) Palla, Triangular Club-rush 3. Bryophyte-rich streams and rivers. The first two sub-types are associated with tidal reaches of rivers, while the latter sub-type is found in fast-flowing stretches of unmodified streams and rivers. (NPWS, 2012a). There is therefore potential for sub-types of this habitat to lie downstream of project site. Potential indirect significant effects cannot be	To protect this aquatic habitat, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		excluded if water quality is impacted by project. Potential indirect impact if mitigation measures to eliminate sediment or pollution run-off are not implemented. Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
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 (Molinion caeruleae) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Full extent of habitat within SAC has not been mapped. Due to terrestrial nature of this habitat, project works being contained within site boundary, the size and scale of the proposed project and terrestrial separation distance of more than 1.7 km, there is no potential for significant effectson this QI and so no mitigation is required.	None required

91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)*	To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Five surveyed sites mapped within SAC. Located approximately 52 km away (National Parks and Wildlife Service 2012). Due to a terrestrial separation distance of more than 50km, project works being contained within site boundary, the size and scale of the proposed project, there is no potential for significant effects on this QI and so no mitigation is required.	None required
1029 Freshwater Pearl Mussel *(Margaritifera margaritifera)*	To restore the favourable conservation condition of Freshwater Pearl Mussel in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	This conservation objective applies to the freshwater pearl mussel population in the Cloon River, Co. Clare only. The Cloon population is confined to the main channel and is distributed from Croany Bridge to approx. 1.5km upstream of Clonderalaw Bridge (Ross, 2008; DEHLG, 2010) (National Parks and Wildlife Service 2012) The freshwater pearl mussel population in the Cloon River is over 22 km from the proposed forestry site and is situated in a different river sub-catchment. Forestry site is situated in sub-catchment Wood-SC_010, while the pearl mussel site in Cloon River is situated in sub-catchment Cloon (Clare)SC_010. The area between these catchments	None required

		includes the large Shannon Estuary and the pearl mussel populations are upstream along the Cloon River. Due to distance from project site and no direct hydrological connectivity there will be no potential for significant effects on this QI and so no mitigation is required.	
1099 River Lamprey *(Lampetra fluviatilis)*	To maintain the favourable conservation condition of River Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Records of River lamprey 64 km from site (National Biodiversity Data Centre records). Probably under recorded (Kelly & King, 2001). Potential habitat for this species lies downstream of project site. Potential indirect significant effects cannot be excluded if mitigation measures to eliminate sediment or pollution run-off are not implemented. Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	To protect this aquatic habitat, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

1349 Common Bottlenose Dolphin *(Tursiops truncatus*	To maintain the favourable conservation condition of Bottlenose Dolphin in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Records of Bottlenose Dolphin approximately 7 km from project site (National Biodiversity Data Centre records). Due to the marine nature of this species which spends its time at sea there will be no disturbance impacts. Due to the size and scale of the proposed project and the assimilation capacity of the sea there is no potential for significant effect on this QI and so no mitigation is required.	None required
1355 Otter *(Lutra lutra)*	To restore the favourable conservation condition of Otter in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Recordings of otter approximately 2 km away (National Biodiversity Data Centre records - Mammals of Ireland 2016-2025). Potential indirect significant effects cannot be excluded on prey species if mitigation measures to eliminate sediment or pollution run-off are not implemented. Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water.	To protect this aquatic species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below. In addition, bankside habitat needs to be protected. See proposed mitigations in section 2.2 below.

		• Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses. Bank side habitat (potential lie up sites) needs to be protected.	
1096 Brook Lamprey *(Lampetra planeri)*	To maintain the favourable conservation condition of Brook Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Records of Brook lamprey 65 km from site (National Biodiversity Data Centre records). Probably under recorded (Kelly & King, 2001). Potential habitat for this species lies downstream of project site. Potential indirect significant effects cannot be excluded if mitigation measures to eliminate sediment or pollution run-off are not implemented. Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	To protect this aquatic habitat, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.
1095 Sea Lamprey *(Petromyzon marinus)*	To restore the favourable conservation condition of Sea Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at	Records of Sea lamprey 23 km from site (National Biodiversity Data Centre records). Probably under recorded (Kelly & King, 2001).	To protect this aquatic habitat, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving

	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Potential habitat for this species lies downstream of project site. Potential indirect significant effects cannot be excluded if mitigation measures to eliminate sediment or pollution run-off are not implemented. Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	waters. See proposed mitigations in section 2.2 below.
1106 Salmon *(Salmo salar)*	To restore the favourable conservation condition of Salmon in the Lower River Shannon SAC, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	Salmon are widespread in the River Shannon system (National Parks and Wildlife Service 2012). Potential habitat for this species lies downstream of project site. Potential indirect significant effects cannot be excluded if mitigation measures to eliminate sediment or pollution run-off are not implemented. Threats include: • Release of sediment to receiving waters.	To protect this aquatic species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		• Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	

Table 2: Screened-in European Sites – River Shannon and River Fergus SPA - Potential Impacts and Proposed Mitigation

River Shannon and River Fergus SPA (site code: 004077)			
List each of the Qualifying Interest(s) (if SAC) / Special Conservation Interest(s) (if SPA) for this European Site. **Assign each QI / SCI its own row.**	**Set out components of the Conservation Objectives (relevant information including attributes, conservation status & locations) for this European Site relevant to this project.**	**Considering the QI / SCI & the Conservation Objective(s), and supporting habitats and species(*), is it likely that the project will have an adverse effect on this QI / SCI & the achievement of the corresponding Conservation Objective?** **If 'yes', describe the nature, severity, mechanism & timeline of the adverse effect.**	**If the potential for an adverse effect on this QI / SCI exists, detail the necessary mitigation to avoid, reduce or prevent this potential, and describe the mechanism through which this is achieved.**
A017 Cormorant *Phalacrocorax carbo*	To maintain the favourable conservation condition of Cormorant in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for breeding and wintering Cormorants. No records of breeding with 10 km^2 of site, however there are records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997) Due to distance of SPA to project site (over 1.7 km), and the unsuitability for the project site for cormorant, a seabird	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		that will use lakes and larger waterbodies, there is no potential for significant direct effects due to disturbance during proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A038 Whooper Swan *Cygnus cygnus*	To maintain the favourable conservation condition of Whooper Swan in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for wintering Whooper swan. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.1 below.

		(over 1.7 km), and the unsuitability of the project site for this winter visitor that will use freshwater and brackish lakes and feed on grassland varying from traditional callows to intensive pasture and at times arable, there is no potential for significant direct effects due to disturbance during proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A046 Light-bellied Brent Goose Branta *bernicla hrota*	To maintain the favourable conservation condition of Light-bellied Brent Goose in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for wintering of Light-bellied Brent geese. Records of wintering species within 1.6 km of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km), and the unsuitability of the project site for this primarily coastal species, there is no potential for significant direct effects due to disturbance during proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A048 Shelduck *Tadorna tadorna*	To maintain the favourable conservation condition of Shelduck in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for over wintering Shelduck. Records of wintering species within 3 km of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997) Due to distance of SPA to project site (over 1.7 km), the unsuitability of the project site for this species which primarily winters on the coast in sheltered estuaries and tidal mudflats, there is no potential for significant direct effects due to disturbance during proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A050 Wigeon *Anas penelope*	To maintain the favourable conservation condition of Wigeon in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for over wintering wigeon. Records of wintering species within 2.5 km of site Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour.	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km), and the unsuitability of the project site for this species which is found on coastal (estuaries, brackish lagoons, and bays) and inland (lakes, callows, rivers, turloughs) wetland locations, there is no potential for significant direct effects due to disturbance during proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A052 Teal *Anas crecca*	To maintain the favourable conservation condition of Teal in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets	SPA designated for over wintering Teal. Records of wintering species within 2 km	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals

	at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) and the unsuitability of the project site for this species which occur both coastal and inland locations including coastal lagoons and estuaries and inland marshes, lakes, ponds and turloughs, there is no potential for significant direct effects due to disturbance during proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water.	to receiving waters. See proposed mitigations in section 2.2 below.

		• Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A054 Pintail *Anas acuta*	To maintain the favourable conservation condition of Pintail in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for over wintering Pintail. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) and the unsuitability of the project site for this species which occurs in coastal/estuarine locations or inland on lakes or callows, there is no potential for significant direct effectsdue to disturbance during proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA Threats include: • Release of sediment to receiving waters.	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		• Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A056 Shoveler *Anas clypeata*	To maintain the favourable conservation condition of Shoveler in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for over wintering Shoveler. Records of wintering species within 10 km^2 of site. Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km), and the unsuitability of the project site for this species, which is found in coastal and inland wetlands, there is no potential for significant direct effects due to disturbance during proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA. Threats include:	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		• Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A062 Scaup *Aythya marila*	To maintain the favourable conservation condition of Scaup in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for over wintering Scaup. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) and the unsuitability of the project site for this bird which winters on coastal estuaries and bays, on brackish lagoons and in shallow marine waters, there is no potential for significant direct effects due to disturbance during proposed works. Potential indirect significant effects cannot be excluded if water quality is	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		impacted as project area is hydrologically connected to SPA Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A137 Ringed Plover *Charadrius hiaticula*	To maintain the favourable conservation condition of Ringed Plover in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for over wintering Ringed Plover. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km) and the unsuitability of the project site to be used by this coastal wader, there is no potential for significant direct effects due to disturbance during proposed works.	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A140 Golden Plover *Pluvialis apricaria*	To maintain the favourable conservation condition of Golden Plover in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for over wintering Golden Plover. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km), and the unsuitability of the site for Golden plover, who will feed on inland improved agricultural fields (but not rough, rushy pasture as is within project site) and usually feed on coastal	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		habitats there is no potential for significant direct effects due to disturbance during proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A141 Grey Plover *Pluvialis squatarola*	To maintain the favourable conservation condition of Grey Plover in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for over wintering Grey Plover. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km), and the unsuitability of the	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		project site for this exclusively coastal species, there is no potential for significant direct effect due to disturbance during proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A142 Lapwing *Vanellus vanellus*	To maintain the favourable conservation condition of Lapwing in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for over wintering Lapwing. Records of wintering species within 5 km of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Lapwing tend to feed at night.	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below. As a precaution no work shall be carried out at night during the winter.

		Due to distance of SPA to project site (over 1.7 km) there is no potential for significant direct effect due to disturbance during the proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A143 Knot *Calidris canutus*	To maintain the favourable conservation condition of Knot in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for over wintering Knot. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		(over 1.7 km) and the unsuitability of the project site for this coastal wader, there is no potential for significant direct effect due to disturbance during proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A149 Dunlin *Calidris alpina*	To maintain the favourable conservation condition of Dunlin in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for over wintering Dunlin. Records of breeding species within 2 km of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997).	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		Due to distance of SPA to project site (over 1.7 km), the unsuitability of the project site for this species, which is a coastal wader, there is no potential for significant direct effect due to disturbance during the proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA. Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A156 Black-tailed Godwit *Limosa limosa*	To maintain the favourable conservation condition of Black-tailed Godwit in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for over wintering Black-tailed Godwit. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997;	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km), the unsuitability of the project site for this species which winters along coastal (particularly estuaries) and inland wetlands there is no potential for significant direct effect due to disturbance during the proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA. Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A157 Bar-tailed Godwit *Limosa lapponica*	To maintain the favourable conservation condition of Bar-tailed Godwit in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for over wintering Bar-tailed Godwit. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km), the unsuitability of the project site for this wader, which is coastal and generally found near estuaries, there is no potential for significant direct effect due to disturbance during proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A160 Curlew *Numenius arquata*	To maintain the favourable conservation condition of Curlew in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for over wintering Curlew. Records of wintering species within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour.	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km), the unsuitability of the project side for this wader which uses both coastal and inland wetlands, there is no potential for significant direct effects due to disturbance during proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA. Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A164 Greenshank *Tringa nebularia*	To maintain the favourable conservation condition of Greenshank in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/prot	SPA designated for over wintering Greenshank. Records over wintering within 5 km of site (National Biodiversity Data Centre records).	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

	ected-sites/conservation_objectives/CO004077.pdf	Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km), and the unsuitability of the project site for this coastal wader, there is no potential for significant direct effect due to disturbance during proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA. Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A162 Redshank *Tringa totanus*	To maintain the favourable conservation condition of Redshank in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and	SPA designated for over wintering Redshank. Records over wintering within	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals

	targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	3 km of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km), and the unsuitability of the project site for this mainly coastal wader (though it will use lakes and large rivers), there is no potential for significant direct effect due to disturbance during proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA. Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	to receiving waters. See proposed mitigations in section 2.2 below.

A179 Black-headed Gull *Larus ridibundus*	To maintain the favourable conservation condition of Black-headed Gull in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	SPA designated for over wintering Black-headed Gull. Records of over wintering within 10 km^2 of site (National Biodiversity Data Centre records). Birds can be impacted by human or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Due to distance of SPA to project site (over 1.7 km), and the unsuitability of the project area for this coastal species that will feed on arable fields, there is no potential for significant direct effect due to disturbance during the proposed works. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water.	To protect this water dependent species, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

		• Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	
A999 Wetlands	To maintain the favourable conservation condition of the wetland habitat in the River Shannon and River Fergus Estuaries SPA as a resource for the regularly-occurring migratory waterbirds that utilise it. This is defined by the following attribute and targets at https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	Direct hydrological connection from project site to SPA. Site lies approximately 327 m from Emlagh 27 River (EPA code: IE_SH_27M040900), which forms hydrological link to River Shannon and River Fergus Estuaries SPA. Potential indirect significant effects cannot be excluded if water quality is impacted as project area is hydrologically connected to SPA Threats include: • Release of sediment to receiving waters. • Release of levels of nutrients into the water, which could lead to oxygen depletion in the water. • Release of chemicals (pesticides, fuels, hydraulic oils) into watercourses.	To protect this aquatic habitat, mitigation measures are required to ensure no release of silt/sediment, nutrients, or chemicals to receiving waters. See proposed mitigations in section 2.2 below.

2.2 Measures to Mitigate Potential Adverse Impacts

Mitigation refers to *measures taken to avoid or reduce negative impacts and effects* (CIEEM 2018).

The evaluation of likely significant impacts of the proposed afforestation includes recommendations for specific measures to avoid and reduce any negative impacts of a project (i.e. mitigation measures). These measures are considered necessary to minimise environmental impacts associated with the proposed afforestation. Avoiding and/or minimising negative impacts is best achieved through consideration of potential impacts of the proposed project from the initial stages.

To minimise environmental impacts, it is important in the first instance that the following general principles are taken on board:

- Implementation of good forestry work practices on site (e.g. Environmental Requirements for Afforestation and Forestry Standards Manual).
- Working in accordance with relevant legislation, for example, (Wildlife Acts 1976 to 2021 and European Communities (Birds and Natural Habitats) Regulations 2011-2021).
- Contractors shall ensure adequate site supervision and security.
- Contract workers shall be briefed to ensure that environmental issues are taken into consideration and that guidelines and codes of practice are followed.

See also Appendix 5 for how mitigation measures will be implemented and monitored.

2.2.1 Disturbance

Birds can be impacted by human activity or noise disturbance particularly if disturbance impacts on foraging or nesting behaviour. Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Scarton 2018; Maarten & Henkensj 1997). Noise during the afforestation phase shall not impact shorebirds adversely due to the distance to the SPA and SAC and the scale of development, so no mitigation is proposed. Once complete and any maintenance activities associated with the project will cause no disturbance to the protected birds of qualifying species.

In addition, the project site does not provide suitable habitat for the birds of special conservation interest, with the exception of lapwing who could potentially use the site for foraging. Lapwing however forage at night (BirdWatch Ireland). As a precautionary measure it is recommended that no works will be carried out at night. Once trees are established there will be a small loss of potential foraging habitat to these birds. However, as the size of the area is relatively small (just over 14 ha) and as fields themselves are small in size and are rushy, they are not ideally suited to lapwing who prefer open fields (Snow & Perrines, 1998) where they can easily detect approaching predators. There is also other potential foraging habitat just south of the site, which is more suited as field sizes are larger and are not dominated by rushes.

Otters do not tolerate disturbance at or near holts that are in active use (NRA, 2008). No otter holts were recorded during field survey. Potential commuting and foraging habitat for otter was recorded within the project site but which lies outside of the SAC. Otters are highly mobile species and are crepuscular in nature (Hayden, & Harrington, 2000) and are unlikely to be adversely impacted by the proposed works.

Based on the above review of scientific literature (Table 2) and the prescribed mitigation measures in section 2.2 the potential for adverse impact on the integrity of the bird and otter populations associated with Lower River Shannon SAC and the River Shannon and River Fergus SPA as a result of the proposed project can be excluded.

2.2.2 Species impact

Potential lie-up sites for otters will also need to be protected. There will be no cleaning of vegetation from any section of such watercourses within 20 m of the aquatic zone (order 1 - Emlagh Stream 27). There will be no woody weed removal within 20 m of an aquatic zone or 10m of a relevant watercourse. On a precautionary basis works shall not be carried out during hours of darkness to avoid any potential disturbance of lapwing that may use the site for feeding. See also 2.2.1 above. No direct species impacts are predicted if water quality is not impacted. Water quality is dealt with in 2.2.3 below.

2.2.3 Water Quality

Mitigation measures will ensure to eliminate both the discharge of polluting materials (e.g. fuel or oil from vehicles; concrete etc.) and the mobilisation of silts and sediments into the watercourses. Pollution may occur following accidents that result in spillage of fuel or other materials. Strict pollution prevention measures must be implemented during forestry works to avoid siltation or discharge of pollutants.

Exclusion zones for machinery

- Exclusion zones for machinery must ensure that machines do not traverse within 5m of watercourses on site during forestry operations.
- With respect to exclusion zones, measures outlined in Section 3.5 of the Environmental Requirements for Afforestation (December 2016), will be adhered to (See Appendix 4 and www.iai.ie/wp-content/uploads/2016/03/EnvReqs-for-Afforestation-Dec16.pdf).

Silt and sediment control

- Silt traps will be deployed to control movement of silt and sediment, as outlined in Section 4.3 of Environmental Requirements for Afforestation (December 2016). Silt traps will be constructed at end of mound drains at 50 m intervals (see Appendix 4).
- Silt traps will be maintained throughout all planting works, ensuring that they are clear of sediment build-up.

Drainage and cultivation

- All drains must protect aquatic zones (order 1 - Emlagh Stream 27) from any sediment and nutrients contained in water draining off the site as outlined in section 3.7.1 of Environmental Requirements for Afforestation (December 2016) (See www.iai.ie/wp-content/uploads/2016/03/EnvReqs-for-Afforestation-Dec16.pdf).

- Drains will be maintained throughout all planting works, ensuring that they are clear of sediment build-up and are not severely eroded.
- There will be no vegetation removal within 20 m of a drainage ditch.

Afforestation

- A setback area of 5m will be applied along the relevant watercourses present in the project area (there are three that run west-east into the Emlagh Stream 27), as specified in Section 4.4 of the Environmental Requirements for Afforestation (December 2016) (See www.iai.ie/wp-content/uploads/2016/03/EnvReqs-for-Afforestation-Dec16.pdf).

Setbacks

- A 5-metre-wide (minimum) setback will be applied along relevant watercourses (as defined in Circular 12/2017) located within or adjoining the site. This setback is to remain undisturbed during establishment and throughout the forest rotation. This will be applied and maintained as per details set out in Tables 5 and 6 of the Environmental Requirements for Afforestation (DAFM, 2016) (See www.iai.ie/wp-content/uploads/2016/03/EnvReqs-for-Afforestation-Dec16.pdf).
- A setback of 10 m from the aquatic zone, Emlagh stream which runs along the eastern boundary of the site for 240 m will be applied.
- There shall be no mounding or machine work within 10m of Aquatic Zone
- There shall be no mounding or machine work within 5 m of Relevant Water Course (RWC).

Chemical use

- Chemical use will be kept to an absolute minimum, depending on site requirements; chemicals will only be applied in dry weather.
- Chemicals shall not be applied within 20m of the aquatic zone or within watercourses setbacks or other sensitive areas.

SECTION 3: IN-COMBINATION EFFECT

A review of plans and projects was undertaken. This review focuses on the potential for cumulative in-combination effects on the European Sites where potential for adverse effects has been identified in the preceding sections of this report. This included a review of online Planning Registers, development plans, forestry applications and other available information.

4.1 Review of other Plans

The potential for the proposed afforestation project to contribute to a cumulative impact on European Sites was considered for the following plans:

- Water Framework Directive (WFD)
- County Development Plan
- Shannon River Basin District Management Plan

This project lies in a rural landscape in the townland Emlagh, Co. Clare in the WFD Sub-Catchment WOOD_SC_010. Two out of four river water bodies within this sub-catchment are AT RISK: Wood_010 due to Poor biological status and; Wood_020 due to poor biological status and elevated phosphate and ammonia concentrations. Moyasta_010 and Termon East_010 are under REVIEW due to their unassigned status. Agriculture was identified as a significant pressure within Wood_010 and Wood_020. In addition, forestry (notably clearfelling), a golf course and urban run-off were also highlighted as significant pressures within Wood_020. Further local catchment assessments are required for REVIEW water bodies so as to determine whether any issues exist.

WFD River Moyasta_10 forms a hydrological link from the project site to SAC and SPA. While agriculture has been highlighted as a significant pressure for Moyasta_10, forestry and notably clearfelling has been highlighted as pressure for Wood_020 only.

Further details on the sub-catchment assessment can be found here: https://catchments.ie/wp-content/files/subcatchmentassessments/27_4%20Wood_SC_010%20Subcatchment%20Assessment%20WFD%20Cycle%202.pdf

The county development plan and the Shannon River Basin District Management Plan were also reviewed. See Table 4 below.

Table 3: Other Plans

Plan	Possible impacts from plans	Is there a risk of significant in combination effects from the plans
Clare county development plan 2017 - 2023	No negative impacts envisaged	AA concluded not possible to rule out impacts so NIS was required and carried out. Upon implementation of mitigation measures no adverse effects on European Sites are predicted.

		https://www.clarecoco.ie/services/planning/publications/clare-county-development-plan-2017-2023-aa-concluding-statement-24220.pdf Note: Emlagh noted as rural area under pressure
Shannon River Basin District Management Plan	No negative impacts envisaged	River Basin Management Plan 2018-2021 Possible impacts predicted but with the implementation of mitigation measures the RBMP will not adversely affect the integrity of any European site. https://assets.gov.ie/131983/0c065785-ce94-4f61-b1c3-2bbe10a4761b.pdf

In reviewing the above plans and the best objective information, no cumulative effects were identified as a result of the proposed project plans that could cause significant effects in combination with the proposed project. No aspects of the proposed development have been identified which can, by itself or in-combination with other plans or projects, affect the conservation objectives of any European site.

4.2 Review of other Projects

Planning applications occurring within the townlands of the Moyasta-010 River sub-basin with hydrological connection to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA were searched for possible in-combination impacts using Clare County Council planning search facility (www.eplanning.ie/ClareCC/searchtypes). See Table 6 below for details. Townlands included: Lisgurreen, Garraun Emlagh, Baunmore, Kilkee, Kilrush, Moanmore North and South and Upper and Lower, and town of Moyasta. This search criteria was used as these sites are hydrologically linked to same Natura 2000 sites as project site and could have potential cumulative effects on these sites.

No plans or projects were found for the area within the EIA portal which was searched on the 10th August 2021 (housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1).

Table 4: Planning application near proposed development site
(www.clarecoco.ie/services/planning/applications/view/planning-lists/, date of search 3rd September 2021, Search townlands of Lisgurreen, Garraun Emlagh, Baunmore, Kilkee, Kilrush, Moanmore North and South and Upper and Lower, and town of Moyasta for 2020-2021)

Clare County Council Planning Application Number	Description	Is there a risk of significant impact or in combination effects from the plans
2039 Tullaher, Moyasta, Co. Clare	Construction of a forest action road entrance with all ancillary site works.	There is unlikely to be any significant impacts or 'in combination' effect on the SACs and SPAs as Planners Report - concluded the proposed development, by itself or in combination with other development in the vicinity, would not be likely to have a significant effect on European site(s).
20448 Einagh, Moyasta, Co. Clare	Construct a new dwelling house, private garage, site entrance, sewage treatment system and all with all ancillary site works.	Permission granted and no AA requested.
21685 San Clemente, Lisdeen, Kilkee, Co.Clare	Retain existing conservatory extension at the western side of the dwelling, retention of front porch and private garage.	No AA issues arise, therefore the proposed dwelling by itself or in combination with other development in the vicinity, would not be likely to have a significant effect on European sites.
20164 At Einagh, Kilrush, Co. Clare	Construction of extension and alternatives to existing house dwelling.	There is no potential for there to be any significant impacts or 'in combination' effect on the SACs and SPAs as Planners Report - concluded the proposed development, by itself or in combination with other development in the vicinity, would not be likely to have a significant effect on European sites.
20146 The Old School House, Corbally, Kilkee, Co.Clare	Construct a link corridor between house and out building at the old school house, which will also act as a wind break.	No AA issues arise, therefore the proposed dwelling by itself or in combination with other development in the vicinity, would not be likely to have a significant effect on European sites.
21257 Tarmon West, Kilkee, Co.Clare	Design changes to the house including but not limited to floor plans, elevations and fenestration, personal home office space 23 m^2 and basement space 14m	No AA issues arise, therefore the proposed dwelling by itself or in combination with other development in the vicinity, would not be likely to have a significant effect on European sites.

	^{2} and access driveway along with all ancillary site works and landscaping.	
21247 Carrowncalla South, Kilrush , Co. Clare	Extended the proposal of P15-848 for the construction of a cubicle house, slatted tank, milking parlour and plant, office space and all ancillary site works	Extension to previous AA received on 22nd March 2021, for additional 5 years. The authority is satisfied once the development will be completed within a reasonable time.
2027 Carrowncalla South, Kilrush, Co. Clare	Demolition of derelict shed, and construction of new proposed shed along with all ancillary site works.	No AA issues arise, therefore the proposed dwelling by itself or in combination with other development in the vicinity, would not be likely to have a significant effect on European sites.
20352 Ballyurra, Kilrush, Co. Clare	Retain existing dwelling house, and permission to construct extension to the side rear of the existing dwelling house, along with all ancillary site works.	There is no potential for there to be any significant impacts or 'in combination' effect on the SACs and SPAs as Planners Report - concluded the proposed development, by itself or in combination with other development in the vicinity, would not be likely to have a significant effect on European sites.
20596 Leadmore East, Kilrush, Co. Clare	Retention of change of use of the existing linked private garage to residential en-suite along with all ancillary site works.	No AA issues arise, therefore the proposed dwelling by itself or in combination with other development in the vicinity, would not be likely to have a significant effect on European site(s).

Planning appeals occurring within the townlands of the Moyasta-010 River sub-basin with hydrological connection to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA were searched and examined for possible in-combination impacts using An Bord Pleanála search facility. See Table 5 below This same search criteria were used in search of An Bord Pleanála Planning Appeals as for planning applications in Table 4 above.

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Table 5: An Bord Pleanála Planning Appeals near proposed development site

(Data source: https://www.pleanala.ie/en-ie/home/, date of search 11th August 2021, Search townland of Emlagh and town of Moyasta for 2016-2021)

Application Number	Description	Is there a risk of significant impact or in combination effects from the plans
300375: Moyasta, Kilrush, Co. Clare (P17/705) Clare County Council	Retain existing cattle crush and plinths, construction of extension to livestock slatted house to accommodate calf pens and all ancillary site works	Having regard to the nature and scale of the proposed development and the development it is proposed to retain and to the nature of the receiving environment and proximity to the River Shannon and River Fergus Estuaries Special Protection Areas (Site Code 004077) and the Lower River Shannon Special Area of Conservation (Site Code 002165), no Appropriate Assessment issues arise and it is not considered that the proposed development would be likely to have a significant effect individually or in combination with other plans or projects on the European sites.

In reviewing the above projects and the best objective information, no cumulative effects were identified as a result of the proposed projects that could cause significant effects. No aspects of the proposed development have been identified which can, by itself or in-combination with other plans or projects, affect the conservation objectives of any European site.

Forest application occurring within and having a hydrological link with the Moyasta-010 river sub basin were examined for possible in-combination impacts. See Table 6 below.

Table 6: Forestry applications

(Data source: (forestry-maps.apps.rhos.agriculture.gov.ie/). Search conducted on the 10/8/2021)

Application number and address	Size of application (ha)	Date approved	Type of application	Assessment
CN83355 Moyasta, Clare	10.46	3/4/2019	Afforestation - planted	Plot lies approximately 700 m south of current project site. Stream along northern boundary of application CN83355 is part of the Moyasta_10 WFD system.
CN87378	12.17	Decision pending	Afforestation	Plot lies approximately 600 m west of current project site. Stream along eastern boundary of application

Lisgurreen, Emlagh, Clare				CN87378 is part of the Moyasta_10 WFD system.
CN88624 Lisgurreen, Clare	7.5	Decision Pending	Afforestation	Plot lies approximately 780 m west of current project site. Stream lying 225m to the east of application CN88624 is part of the Moyasta_10 WFD system.
CN82783 Lisgurreen, Clare	9.36	Decision Pending	Afforestation	Plot lies approximately 900 m west of current project site. Stream lying 250 m to the east of application CN82783 is part of the Moyasta_10 WFD system.
TFL00440819 Kildeema, Lisgurreen, Clare	7.39	10/6/2021	Private Clearfell and Thinning	Plot lies approximately 750 m north-west of current project site. Stream along eastern boundary of application TFL00440819 is part of the Moyasta_10 WFD system.

The total area to be afforested equates to 29.03 ha, with 10.46 ha recently planted, and 3.39 ha classed as clearfell and thinning. If the pending afforestation projects were to be carried out at the same time as the proposed project, it is possible that cumulative impacts of sedimentation could arise. In-combination effects can occur where a project results in individually insignificant effects that, when considered in-combination with impacts of other proposed or permitted plans and projects, can result in significant effects.

In reviewing the above forestry projects potential cumulative effects were identified as a result of the proposed projects that could cause significant effects on water quality. However, mitigations measures highlighted in this report will ensure any impacts of sedimentation on water quality are eliminated.

No aspects of the proposed development have been identified which can, by itself or in-combination with other plans or projects, affect the conservation objectives of any European site.

SECTION 4: CONCLUSION

For the reasons set out in detail in this NIS, in the light of the best scientific knowledge in the field, all aspects of the proposed project which, by itself, or in combination with other plans or projects, which may affect the relevant European Sites have been considered.

The NIS contains information which the competent authority, may consider in making its own complete, precise and definitive findings and conclusions and upon which it is capable of determining that all reasonable scientific doubt has been removed as to the effects of the proposed project on the integrity of the relevant Natura 2000 sites.

In conclusion, in the light of the conclusions of the assessment which it shall conduct on the implications for the European sites concerned, the competent authority is enabled to ascertain that the proposed project will not adversely affect the integrity of any of the European sites concerned.

SECTION 5: COLLATED MITIGATION MEASURES

The following collates the various mitigation measures identified above, deemed necessary following the examination of the potential adverse effects of the proposed project on the QIs / SCIs and Conservation Objectives of the various screened-in European Sites, taking into account and in-combination effects (i.e. Sections 2-4 above).

1. Exclusion zones for machinery

- Exclusion zones for machinery must ensure that machines do not traverse within 5m of watercourses on site during forestry operations.
- With respect to exclusion zones, measures outlined in Section 3.5 of the Environmental Requirements for Afforestation (December 2016), will be adhered to (See Appendix 4 and www.iai.ie/wp-content/uploads/2016/03/EnvReqs-for-Afforestation-Dec16.pdf).

2. Silt and sediment control

- Silt traps will be deployed to control movement of silt and sediment, as outlined in Section 4.3 of Environmental Requirements for Afforestation (December 2016). Silt traps will be constructed at end of mound drains at 50 m intervals (see Appendix 4).
- Silt traps will be maintained throughout all planting works, ensuring that they are clear of sediment build-up.

3. **Drainage and cultivation**

- All drains must protect aquatic zones (order 1 - Emlagh Stream 27) from any sediment and nutrients contained in water draining off the site as outlined in section 3.7.1 of Environmental Requirements for Afforestation (December 2016) (See www.iai.ie/wp-content/uploads/2016/03/EnvReqs-for-Afforestation-Dec16.pdf).
- Drains will be maintained throughout all planting works, ensuring that they are clear of sediment build-up and are not severely eroded.
- There will be no vegetation removal within 20 m of a drainage ditch.

4. Afforestation

- A setback area of 5m will be applied along the relevant watercourses present in the project area (there are three that run west-east into the Emlagh Stream 27), as specified in Section 4.4 of the Environmental Requirements for Afforestation (December 2016) (See www.iai.ie/wp-content/uploads/2016/03/EnvReqs-for-Afforestation-Dec16.pdf).

5. Setbacks

- A 5-metre-wide (minimum) setback will be applied along relevant watercourses (as defined in Circular 12/2017) located within or adjoining the site. This setback is to remain undisturbed during establishment and throughout the forest rotation. This will be applied and maintained

as per details set out in Tables 5 and 6 of the Environmental Requirements for Afforestation (DAFM, 2016) (See www.iai.ie/wp-content/uploads/2016/03/EnvReqs-for-Afforestation-Dec16.pdf).

- A setback of 10 m from the aquatic zone, Emlagh stream which runs along the eastern boundary of the site for 240 m will be applied.
- There shall be no mounding or machine work within 10m of Aquatic Zone
- There shall be no mounding or machine work within 5 m of Relevant Water Course (RWC).

6. Chemical use

- Chemical use will be kept to an absolute minimum, depending on site requirements; chemicals will only be applied in dry weather.
- Chemicals shall not be applied within 20m of the aquatic zone or within watercourses setbacks or other sensitive areas.

7. Otter

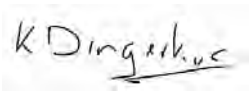
- There will be no cleaning of vegetation from any section of such watercourses within 20 m of the aquatic zone (order 1 - Emlagh Stream 27). There will be no woody weed removal within 20 m of an aquatic zone or 10m of a relevant watercourse.

8. Birds

- No work to be carried out during hours of darkness.

All guidance specified in Section 3.7.3 of the Environmental Requirements for Afforestation (December 2016), will be adhered to (See www.iai.ie/wp-content/uploads/2016/03/EnvReqs-for-Afforestation-Dec16.pdf)..

SECTION 6: AUTHOR DECLARATION

It is objectively concluded, in light of the above objective scientific information, that, when the above mitigation measure(s) is / are implemented, the project, individually or in combination with other plans and projects, will not have an adverse effect on the integrity of any of the European Sites listed in Section 2 above, in view of their conservation objectives and in view of best scientific knowledge.		
I declare that this Natura Impact Statement accurately reports on the scientific examination of the project within the context of any relevant European Site(s) and on the findings of that scientific examination.		
Author name	***Signature***	***Date***
1. Dr. Karina Dingerkus		23rd August 2021

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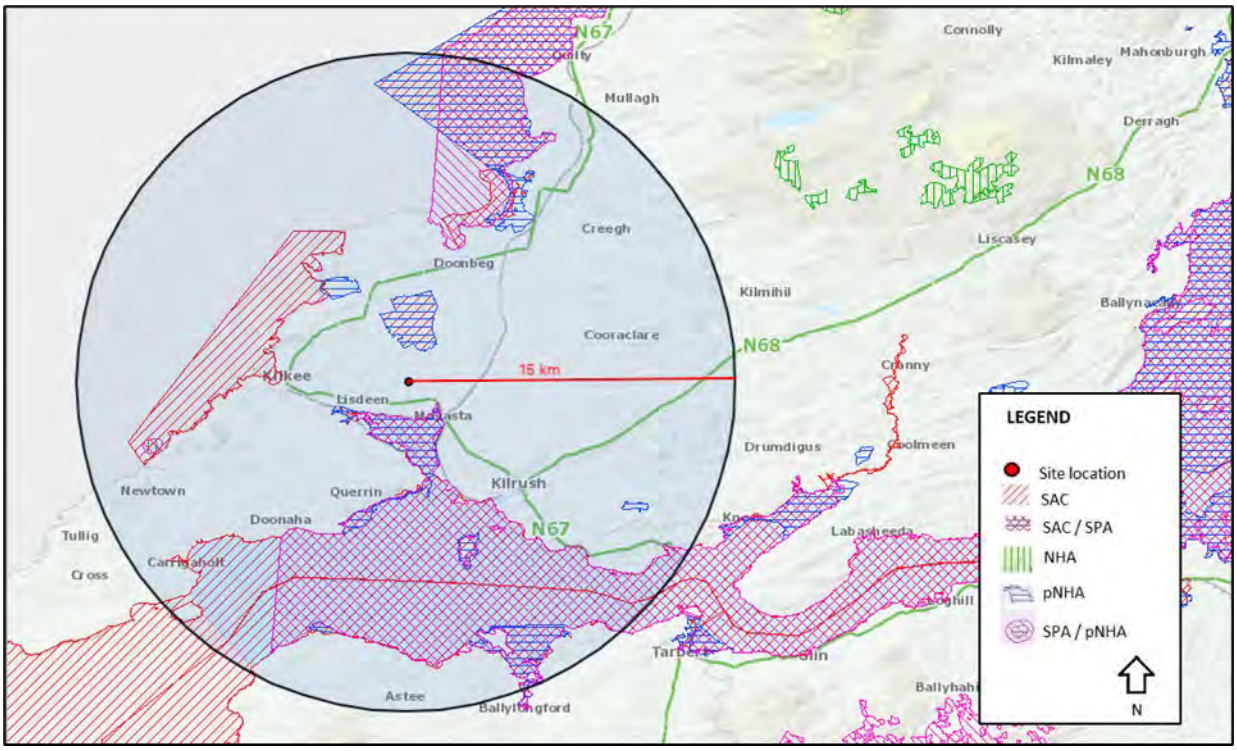
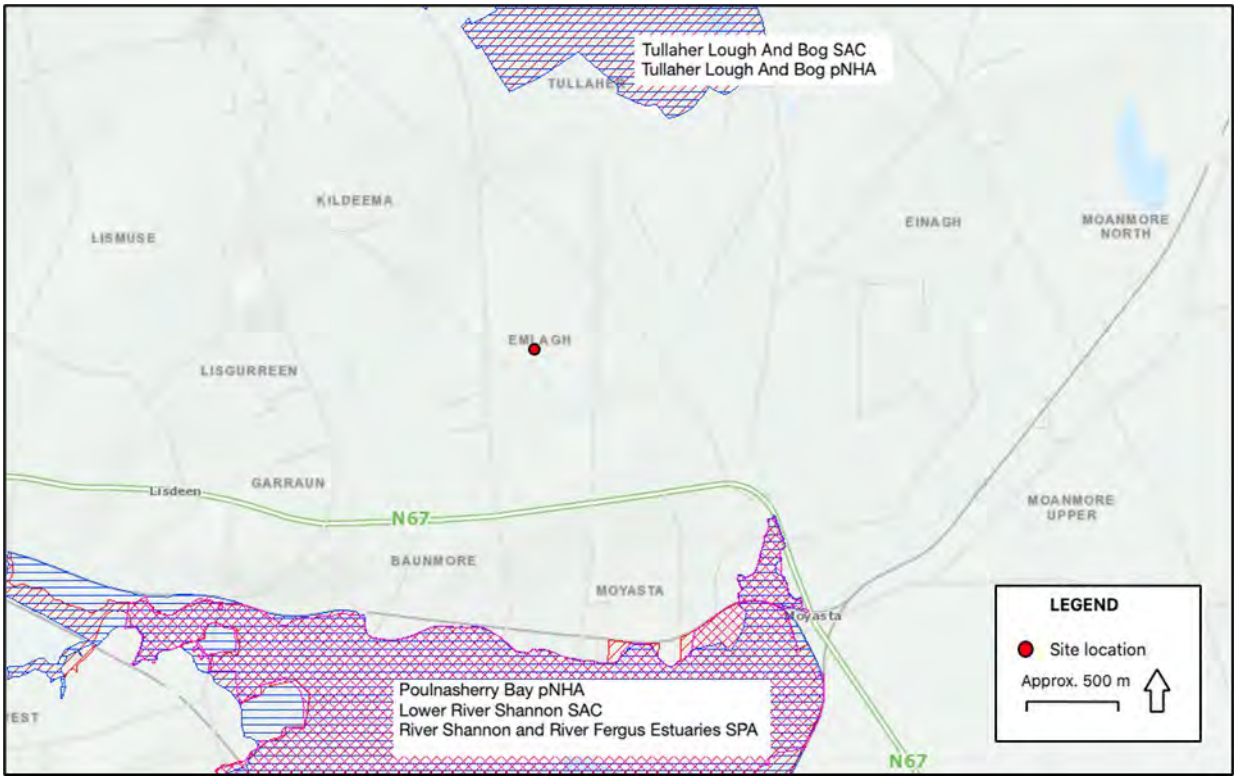
Appendix 1: MAPS

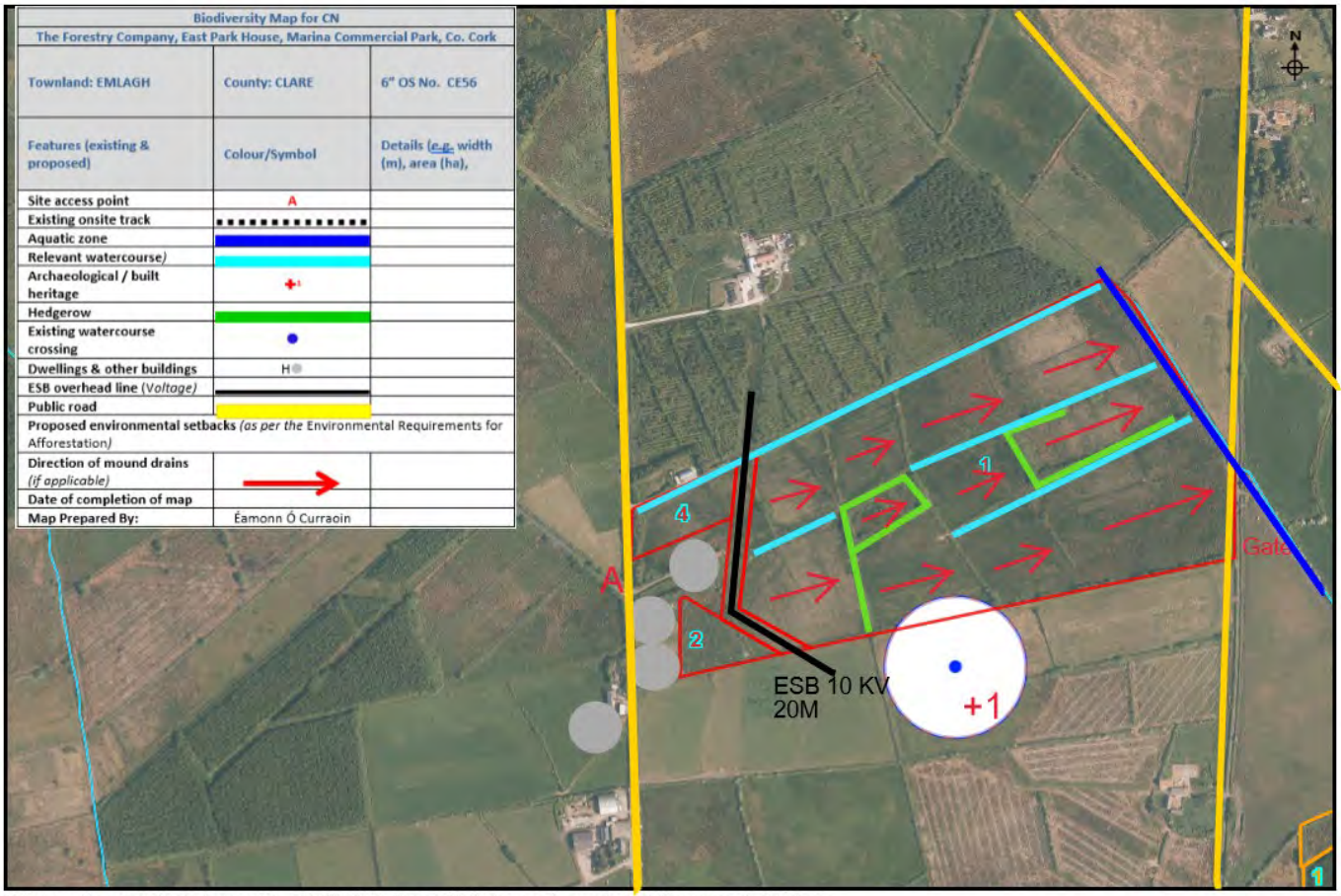
Showing Natura 2000 sites within 15km radius of site
(Map source: http://dahg.maps.arcgis.com/apps/webappviewer)



Showing Natura 2000 sites in close proximity to development site
(Map source - https://www.npws.ie/maps-and-data)

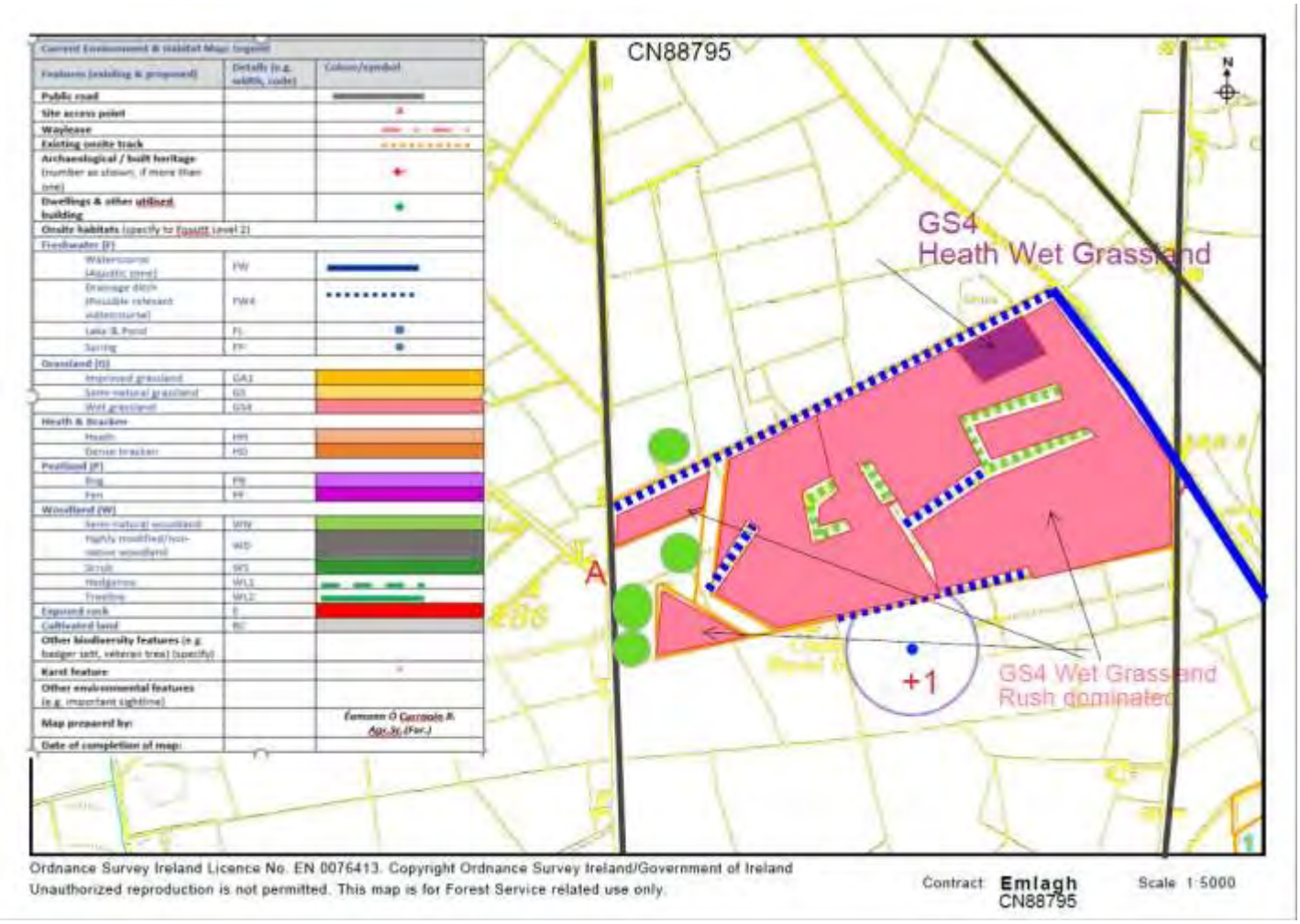

Tullaher Lough And Bog SAC
Tullaher Lough And Bog pNHA
TULLAHER
KILDEEMA
LISMUSE
EINAGH
MOANMORE NORTH
EMLAGH
LISGURREEN
Lisdeen
GARRAUN
N67
BAUNMORE
MOYASTA
Moyasta
MOANMORE UPPER
Poulnasherry Bay pNHA
Lower River Shannon SAC
River Shannon and River Fergus Estuaries SPA
N67
LEGEND
Site location
Approx. 500 m

Biodiversity map



Contract: **Emlagh** Scale 1:5000

Habitat Map


CN88795
GS4
Heath Wet Grassland
GS4 Wet Grassland
Rush dominated
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Ordnance Survey Ireland Licence No. EN 0076413. Copyright Ordnance Survey Ireland/Government of Ireland
Unauthorized reproduction is not permitted. This map is for Forest Service related use only.
Contract: Emlagh
CN88795
Scale 1:5000

Appendix 2: SUPPORTING DOCUMENTS

Appendix – Site Synopsis for European Sites

Site Name: Lower River Shannon SAC
Site Code: 002165

This very large site stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/ Kerry Head, a distance of some 120 km. The site thus encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. Rivers within the sub-catchment of the Feale include the Galey, Smearlagh, Oolagh, Allaughaun, Owveg, Clydagh, Caher, Breanagh and Glenacarney. Rivers within the sub-catchment of the Mulkear include the Killeenagarriff, Annagh, Newport, the Dead River, the Bilboa, Glashacloonaraveela, Gortnageragh and Cahernahallia.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1110] Sandbanks
[1130] Estuaries
[1140] Tidal Mudflats and Sandflats
[1150] Coastal Lagoons*
[1160] Large Shallow Inlets and Bays
[1170] Reefs
[1220] Perennial Vegetation of Stony Banks
[1230] Vegetated Sea Cliffs
[1310] Salicornia Mud
[1330] Atlantic Salt Meadows
[1410] Mediterranean Salt Meadows
[3260] Floating River Vegetation
[6410] Molinia Meadows
[91E0] Alluvial Forests*
[1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
[1095] Sea Lamprey (Petromyzon marinus)
[1096] Brook Lamprey (*Lampetra planeri*)
[1099] River Lamprey (*Lampetra fluviatilis*)
[1106] Atlantic Salmon (*Salmo salar*)
[1349] Bottle-nosed Dolphin (*Tursiops truncatus*)
[1355] Otter (*Lutra lutra*)

The Shannon and Fergus Rivers flow through Carboniferous limestone as far as Foynes, but west of Foynes Namurian shales and flagstones predominate (except at Kerry Head, which is formed from Old Red Sandstone). The eastern sections of the Feale catchment flow through Namurian rocks and the western stretches through Carboniferous limestone. The Mulkear flows through Lower Palaeozoic rocks in the upper reaches before passing through Namurian rocks, followed by Lower

Carboniferous shales and Carboniferous limestone. The Mulkear River itself, immediately north of Pallas Green, passes through an area of Rhyolites, Tuffs and Agglomerates. The Shannon and Fergus Estuaries form the largest estuarine complex in Ireland. They form a unit stretching from the upper tidal limits of the Shannon and Fergus Rivers to the mouth of the Shannon Estuary (considered to be a line across the narrow strait between Kilcredaun Point and Kilconly Point). Within this main unit there are several tributaries with their own 'sub-estuaries' e.g. the Deel River, Mulkear River, and Maigue River. To the west of Foynes, a number of small estuaries form indentations in the predominantly hard coastline, namely Poulnasherry Bay, Ballylongford Bay, Clonderalaw Bay and the Feale or Cashen River estuary. Both the Fergus and inner Shannon Estuaries feature vast expanses of intertidal mudflats, often fringed with saltmarsh vegetation. The smaller estuaries also feature mudflats, but have their own unique characteristics, e.g. Poulnasherry Bay is stony and unusually rich in species and biotopes. Plant species are typically scarce on the mudflats, although there are some eelgrass (*Zostera spp.)* beds and patches of green algae (e.g. *Ulva sp. and Enteromorpha sp*.).

The main macro-invertebrate community which has been noted from the inner Shannon and Fergus estuaries is a Macoma Scrobicularia-Nereis community. In the transition zone between mudflats and saltmarsh, specialised colonisers of mud predominate. For example, swards of Common Cord-grass (*Spartina anglica*) frequently occur in the upper parts of the estuaries. Less common are swards of Glasswort (*Salicornia europaea agg.).* In the innermost parts of the estuaries, the tidal channels or creeks are fringed with species such as Common Reed (*Phragmites australis*) and club-rushes (S*cirpus maritimus, S. tabernaemontani and S. triquetrus*). In addition to the nationally rare Triangular Club-rush (*Scirpus triqueter*), two scarce species are found in some of these creeks (e.g. *Ballinacurra Creek*): Lesser Bulrush (*Typha angustifolia*) and Summer Snowflake (Leucoj*um aestivum*). Saltmarsh vegetation frequently fringes the mudflats. Over twenty areas of estuarine saltmarsh have been identified within the site, the most important of which are around the Fergus estuary and at Ringmoylan Quay.

The dominant type of saltmarsh present is Atlantic salt meadow occurring over mud. Characteristic species occurring include Common Saltmarsh-grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea-milkwort (*Glaux maritima*), Sea Plantain (Plantago maritima), Red Fescue (*Festuca rubra*), Creeping Bent (*Agrostis stolonifera)*, Saltmarsh Rush (*Juncus gerardi*), Long-bracted Sedge (*Carex extensa*), Lesser Sea-spurrey (*Spergularia marina*) and Sea Arrowgrass (*Triglochin maritima*). Areas of Mediterranean salt meadows, characterised by clumps of Sea Rush (*Juncus maritimus*) occur occasionally. Two scarce species are found on saltmarshes in the vicinity of the Fergus estuary: a type of robust saltmarsh-grass (*Puccinellia foucaudii*), sometimes placed within the species Common Saltmarsh-grass (*P. maritima*) and Hard-grass (*Parapholis strigosa*). Saltmarsh vegetation also occurs around a number of lagoons within the site, two of which have been surveyed as part of a National Inventory of Lagoons. Cloonconeen Pool (4-5 ha) is a natural sedimentary lagoon impounded by a low cobble barrier. Seawater enters by percolation through the barrier and by overwash. This lagoon represents a type which may be unique to Ireland since the substrate is composed almost entirely of peat.

The adjacent shore features one of the best examples of a drowned forest in Ireland. Aquatic vegetation in the lagoon includes typical species such as Beaked Tasselweed (*Ruppia maritima*) and green algae (*Cladophora sp*.). The fauna is not diverse, but is typical of a high salinity lagoon and includes six lagoon specialists (*Hydrobia ventrosa, Cerastoderma glaucum, Lekanesphaera hookeri,*

Palaemonetes varians, Sigara stagnalis and Enochrus bicolor). In contrast, Shannon Airport Lagoon (2 ha) is an artificial saline lake with an artificial barrier and sluiced outlet. However, it supports two Red Data Book species of stonewort (*Chara canescens and Chara cf. connivens*). Most of the site west of Kilcredaun Point/Kilconly Point is bounded by high rocky sea cliffs. The cliffs in the outer part of the site are sparsely vegetated with lichens, Red Fescue, Sea Beet (*Beta vulgaris subsp. maritima*), Sea Campion (*Silene vulgaris subsp. maritima*), Thrift and plantains (*Plantago spp*.). A rare endemic type of sea lavender, *Limonium recurvum subsp. pseudotranswallianum*, occurs on cliffs near Loop Head. Cliff-top vegetation usually consists of either grassland or maritime heath. The boulder clay cliffs further up the estuary tend to be more densely vegetated, with swards of Red Fescue and species such as Kidney Vetch (*Anthyllis vulneraria*) and Common Bird's-foot-trefoil (*Lotus corniculatus*). The site supports an excellent example of a large shallow inlet and bay. Littoral sediment communities in the mouth of the Shannon Estuary occur in areas that are exposed to wave action and also in areas extremely sheltered from wave action.

Characteristically, exposed sediment communities are composed of coarse sand and have a sparse fauna. Species richness increases as conditions become more sheltered. All shores in the site have a zone of sand hoppers at the top, and below this each of the shores has different characteristic species giving a range of different shore types. The intertidal reefs in the Shannon Estuary are exposed or moderately exposed to wave action and subject to moderate tidal streams. Known sites are steeply sloping and show a good zonation down the shore. Well-developed lichen zones and littoral reef communities offering a high species richness in the sublittoral fringe and strong populations of the Purple Sea Urchin *Paracentrotus lividus* are found. The communities found are tolerant to sand scour and tidal streams. The infralittoral reefs range from sloping platforms with some vertical steps, to ridged bedrock with gullies of sand between the ridges, to ridged bedrock with boulders or a mixture of cobbles, gravel and sand. Kelp is very common to about 18 m. Below this it becomes rare and the community is characterised by coralline crusts and red foliose algae.

Other coastal habitats that occur within the site include stony beaches and bedrock shores (these support a typical zonation of seaweeds such as Fucus spp., Ascophyllum nodosum and kelps), shingle beaches (with species such as Sea Beet, Sea Mayweed - *Matricaria maritima*, Sea Campion and Curled Dock - *Rumex crispus*), sandbanks which are slightly covered by sea water at all times (e.g. in the area from Kerry Head to Beal Head) and sand dunes (a small area occurs at Beal Point, where Marram – *Ammophila arenaria* is the dominant species). Freshwater rivers have been included in the site, most notably the Feale and Mulkear catchments, the Shannon from Killaloe to Limerick (along with some of its tributaries, including a short stretch of the Kilmastulla River), the Fergus up as far as Ennis, and the Cloon River. These systems are very different in character: the Shannon is broad, generally slow flowing and naturally eutrophic; the Fergus is smaller and alkaline; while the narrow, fast flowing Cloon is acid in nature. The Feale and Mulkear catchments exhibit all the aspects of a river from source to mouth.

Semi-natural habitats, such as wet grassland, wet woodland and marsh occur by the rivers, but improved grassland is the most common habitat type. One grassland type of particular conservation significance, Molinia meadows, occurs in several parts of the site and the examples at Worldsend on the River Shannon are especially noteworthy. Here are found areas of wet meadow dominated by rushes (*Juncus spp*.) and sedges (*Carex spp*.), and supporting a diverse and species-rich vegetation, including such uncommon species as Blue-eyed Grass (*Sisyrinchium bermudiana*) and Pale Sedge (C*. pallescens*). Floating river vegetation characterised by species of water-crowfoot

(*Ranunculus spp*.), pondweeds (*Potamogeton spp.)* and the moss Fontinalius antipyretica are present throughout the major river systems within the site. The rivers contain an interesting br*yoflor*a with *Schistidium alpicola var. alpicola* recorded from in-stream boulders on the Bilboa, new to Co. Limerick. Alluvial woodland occurs on the banks of the Shannon and on islands in the vicinity of the University of Limerick. The woodland is up to 50 m wide on the banks and somewhat wider on the largest island.

The most prominent woodland type is gallery woodland where White Willow (*Salix alba*) dominates the tree layer with occasional Alder (*Alnus glutinosa*). The shrub layer consists of various willow species with Rusty Willow (*Salix cinerea ssp. oleifolia*) and what appear to be hybrids of *S. alba x S. viminalis.* The herbaceous layer consists of tall perennial herbs. A fringe of bulrush (*Typha sp.)* occurs on the river side of the woodland. On slightly higher ground above the wet woodland and on the raised embankment remnants of mixed oak-ashalder woodland occur. These are poorly developed and contain numerous exotic species but locally there are signs that it is invading open grassland. Alder is the principal tree species, with occasional Pedunculate Oak (*Quercus robur*), elm (*Ulmus glabra and U. procera*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus m*onogyna) and the shrubs Guelder-rose (*Viburnum opulus*) and willows. The ground flora is species rich. While woodland is infrequent within the site, however Cahiracon Wood contains a strip of old oak woodland. Sessile Oak (*Q. petraea*) forms the canopy, with an understorey of Hazel and Holly (*Ilex aquifolium*). Great Wood-rush (*Luzula sylvatica*) dominates the ground flora. Less common species present include Great Horsetail (*Equisetum telmeteia*) and Pendulous Sedge (*Carex pendula*).

In the low hills to the south of the Slievefelim Mountains, the Cahernahallia River cuts a valley through the Upper Silurian rocks. For approximately 2 km south of Cappagh Bridge at Knockanavar, the valley sides are wooded. The woodland consists of birch (*Betula spp*.), Hazel, oak, Rowan (*Sorbus aucuparia*), some Ash (*Fraxinus excelsior*) and willow (*Salix spp*.). Most of the valley is not grazed by stock, and as a result the trees are regenerating well. The ground flora features prominent Great wood-rush and Bilberry (*Vaccinium myrtillus*), along with a typical range of woodland herbs. Bracken (*Pteridium aquilinum*) is a feature in areas where there is more light available. The valley sides of the Bilboa and Gortnageragh Rivers, on higher ground north-east of Cappamore, support patches of semi-natural broadleaf woodland dominated by Ash, Hazel, oak and birch. There is a good scrub layer with Hawthorn, willow, Holly and Blackthorn (*Prunus spinosa*) common. The herb layer in these woodlands is often open, with a typically rich mixture of woodland herbs and ferns. Moss species diversity is high. The woodlands are ungrazed. The Hazel is actively coppiced in places.

There is a small area of actively regenerating cut-away raised bog at Ballyrorheen. It is situated approximately 5 km north-west of Cappamore in Co. Limerick. The bog contains some wet areas with good cover of bog mosses (*Sphagnum spp*.). Species of particular interest include Cranberry (*Vaccinium oxycoccos*) and White Sedge (*Carex curta*), along with two regionally rare mosses, including the bog moss *S. fimbriatum.* The site is being invaded by Downy Birch (*Betula pubescens*) scrub woodland. Both commercial forestry and the spread of Rhododendron (*Rhododendron ponticum*) has greatly reduced the overall value of the site. A number of plant species that are listed in the Irish Red Data Book occur within the site, and several of these are protected under the Flora (*Protection*) Order, 1999. These include Triangular Club-rush (*Scirpus triquetrus*), a species which is only found in Ireland only in the Shannon Estuary, where it borders creeks in the inner estuary. Opposite-leaved Pondweed (*Groenlandia densa*) is found in the Shannon where it passes

through Limerick City, while Meadow Barley (Hordeum secalinum) is abundant in saltmarshes at Ringmoylan and Mantlehill. Hairy Violet (Viol*a h*irta) occurs in the Askeaton/Foynes area. Golden Dock (Rumex maritimus) is noted as occurring in the River Fergus estuary.

Finally, Bearded Stonewort (*Chara canescens*), a brackish water specialist, and Convergent Stonewort (*Chara connivens*) are both found in Shannon Airport Lagoon. Overall, the Shannon and Fergus Estuaries support the largest numbers of wintering waterfowl in Ireland. The highest count in 1995-96 was 51,423 while in 1994-95 it was 62,701. Species listed on Annex I of the E.U. Birds Directive which contributed to these totals include: Great Northern Diver (3; 1994/95), Whooper Swan (201; 1995/96), Pale-bellied Brent Goose (246; 1995/96), Golden Plover (11,067; 1994/95) and Bartailed Godwit (476; 1995/96). In the past, three separate flocks of Greenland Whitefronted Goose were regularly found, but none were seen in 1993/94. Other wintering waders and wildfowl present include Greylag Goose (216; 1995/96), Shelduck (1,060; 1995/96), Wigeon (5,976; 1995/96), Teal (2,319; 1995-96), Mallard (528; 1995/96), Pintail (45; 1995/96), Shoveler (84; 1995/96), Tufted Duck (272; 1995/96), Scaup (121; 1995/96), Ringed Plover (240; 1995/96), Grey Plover (750; 1995/96), Lapwing (24,581; 1995/96), Knot (800; 1995/96), Dunlin (20,100; 1995/96), Snipe (719, 1995/96), Black-tailed Godwit (1,062; 1995/96), Curlew (1,504; 1995/96), Redshank (3,228; 1995/96), Greenshank (36; 1995/96) and Turnstone (107; 1995/96). A number of wintering gulls are also present, including Black-headed Gull (2,216; 1995/96), Common Gull (366; 1995/96) and Lesser Black-backed Gull (100; 1994/95).

This is the most important coastal site in Ireland for a number of the waders including Lapwing, Dunlin, Snipe and Redshank. It also provides an important staging ground for species such as Black-tailed Godwit and Greenshank. A number of species listed on Annex I of the E.U. Birds Directive breed within the site. These include Peregine Falcon (2-3 pairs), Sandwich Tern (34 pairs on Rat Island, 1995), Common Tern (15 pairs: 2 on Sturamus Island and 13 on Rat Island, 1995), Chough (14-41 pairs, 1992) and Kingfisher. Other breeding birds of note include Kittiwake (690 pairs at Loop Head, 1987) and Guillemot (4,010 individuals at Loop Head, 1987). There is a resident population of Bottle-nosed Dolphin in the Shannon Estuary. This is the only known resident population of this E.U. Habitats Directive Annex II species in Ireland. The population is estimated (in 2006) to be 140 ± 12 individuals. Otter, a species also listed on Annex II of this Directive, is commonly found on the site. Five species of fish listed on Annex II of the E.U. Habitats Directive are found within the site. These are Sea Lamprey (Petromyzon marinus), Brook Lamprey (*Lampetra planeri*), River Lamprey (*Lampetra fluviatilis*), Twaite Shad (*Allosa fallax fallax*) and Salmon (*Salmo salar*). The three lampreys and Salmon have all been observed spawning in the lower Shannon or its tributaries. The Fergus is important in its lower reaches for spring salmon, while the Mulkear catchment excels as a grilse fishery, though spring fish are caught on the actual Mulkear River. The Feale is important for both types. Twaite Shad is not thought to spawn within the site. There are few other river systems in Ireland which contain all three species of lamprey.

Two additional fish species of note, listed in the Irish Red Data Book, also occur, namely Smelt (*Osmerus eperlanus*) and Pollan (*Coregonus autumnalis pollan*). Only the former has been observed spawning in the Shannon. Freshwater Pearl Mussel (*Margaritifera margaritifera*), a species listed on Annex II of the E.U. Habitats Directive, occurs abundantly in parts of the Cloon River. There is a wide range of land uses within the site. The most common use of the terrestrial parts is grazing by cattle, and some areas have been damaged through over-grazing and poaching. Much of the land adjacent to the rivers and estuaries has been improved or reclaimed and is protected by embankments

(especially along the Fergus estuary). Further, reclamation continues to pose a threat, as do flood relief works (e.g. dredging of rivers). Gravel extraction poses a major threat on the Feale. In the past, cord-grass (*Spartina sp*.) was planted to assist in land reclamation.

This has spread widely, and may oust less vigorous colonisers of mud and may also reduce the area of mudflat available to feeding birds. Domestic and industrial wastes are discharged into the Shannon, but water quality is generally satisfactory, except in the upper estuary where it reflects the sewage load from Limerick City. Analyses for trace metals suggest a relatively clean estuary with no influences of industrial discharges apparent. Further industrial development along the Shannon and water polluting operations are potential threats. Fishing is a main tourist attraction on the Shannon and there are a large number of angler associations, some with a number of beats. Fishing stands and styles have been erected in places. The River Feale is a designated Salmonid Water under the E.U. Freshwater Fish Directive. Other uses of the site include commercial angling, oyster farming, boating (including dolphin-watching trips) and shooting. Some of these may pose threats to the birds and dolphins through disturbance. Specific threats to the dolphins include underwater acoustic disturbance, entanglement in fishing gear and collisions with fast moving craft. This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitats lagoon and alluvial woodland, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species.

A good number of Red Data Book species are also present, perhaps most notably the thriving populations of Triangular Club-rush. A number of species listed on Annex I of the E.U. Birds Directive are also present, either wintering or breeding. Indeed, the Shannon and Fergus Estuaries form the largest estuarine complex in Ireland and support more wintering wildfowl and waders than any other site in the country. Most of the estuarine part of the site has been designated a Special Protection Area (SPA), under the E.U. Birds Directive, primarily to protect the large numbers of migratory birds present in winter.

16.12.2013

Site Name: River Shannon and River Fergus Estuaries SPA
Site Code: 004077

The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland. The site comprises the entire estuarine habitat from Limerick City westwards as far as Doonaha in Co. Clare and Dooneen Point in Co. Kerry. The site has vast expanses of intertidal flats which contain a diverse macroinvertebrate community, e.g. *Macoma-Scrobicularia-Nereis*, which provides a rich food resource for the wintering birds. Salt marsh vegetation frequently fringes the mudflats and this provides important high tide roost areas for the wintering birds. Elsewhere in the site the shoreline comprises stony or shingle beaches.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Cormorant, Whooper Swan, Lightbellied Brent Goose, Shelduck, Wigeon, Teal, Pintail, Shoveler, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank and Black-headed Gull. It 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 Wetland & Waterbirds.

The site is the most important coastal wetland site in the country and regularly supports in excess of 50,000 wintering waterfowl (57,133 - five year mean for the period 1995/96 to 1999/2000), a concentration easily of international importance. The site has internationally important populations of Light-bellied Brent Goose (494), Dunlin (15,131), Black-tailed Godwit (2,035) and Redshank (2,645). A further 17 species have populations of national importance, i.e. Cormorant (245), Whooper Swan (118), Shelduck (1,025), Wigeon (3,761), Teal (2,260), Pintail (62), Shoveler (107), Scaup (102), Ringed Plover (223), Golden Plover (5,664), Grey Plover (558), Lapwing (15,126), Knot (2,015), Bar-tailed Godwit (460), Curlew (2,396), Greenshank (61) and Black-headed Gull (2,681) - figures are five year mean peak counts for the period 1995/96 to 1999/2000. The site is among the most important in the country for several of these species, notably Dunlin (13 % of national total), Lapwing (6% of national total) and Redshank (9% of national total). The site also supports a nationally important breeding population of Cormorant (93 pairs in 2010).

Other species that occur include Mute Swan (103), Mallard (441), Red-breasted Merganser (20), Great Crested Grebe (50), Grey Heron (38), Oystercatcher (551), Turnstone (124) and Common Gull (445) - figures are five year mean peak counts for the period 1995/96 to 1999/2000. Apart from the wintering birds, large numbers of some species also pass through the site whilst on migration in spring and/or autumn. The River Shannon and River Fergus Estuaries SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of four species, i.e. Light-bellied Brent Goose, Dunlin, Black-tailed Godwit and Redshank. In addition, there are 17 species that have wintering populations of national importance. The site also supports a nationally important breeding population of Cormorant. Of particular note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit. Parts of the River Shannon and River Fergus Estuaries SPA are Wildfowl Sanctuaries.

30.5.2015

Qualifying interests and documented threats to the Natura 2000 sites lying in a 15km radius of the proposed development site

Site Name and Site Code	Qualifying Interests (* denotes a priority habitat)	Conservation Objectives	Documented Threats / Pressures Information primarily based on NPWS Site Synopses, NATURA 2000 – standard data forms and other sources
Lower River Shannon SAC 002165	**Habitats** 1110 Sandbanks which are slightly covered by sea water all the time 1130 Estuaries 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 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts 1310 Salicornia and other annuals colonising mud and sand 1330 Atlantic salt meadows (Glauco-Puccinel-lietalia maritimae) 1410 Mediterranean salt meadows (Juncetalia maritimi) 3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation 6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) 91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)* **Species** 1029 Freshwater Pearl Mussel *(Margaritifera margaritifera)* 1099 River Lamprey *(Lampetra fluviatilis)* 1349 Common Bottlenose Dolphin *(Tursiops truncatus)*	http://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf	• Removal of beach materials • Marine and Freshwater Aquaculture • Discharges • Landfill, land reclamation and drying out, general • Sea defence or coast protection works, tidal barrages • Nautical sports • Management of aquatic and bank vegetation for drainage purposes • Hunting • Grazing • Sylviculture, forestry • Air pollution, air-borne pollutants • Paths, tracks, cycling tracks • Discharges • Dredging/ removal of limnic sediments • Invasive non-native species • Urbanised areas, human habitation • Fertilisation • Hand cutting of peat

	1355 Otter *(Lutra lutra)* 1096 Brook Lamprey *(Lampetra planeri)* 1095 Sea Lamprey *(Petromyzon marinus)* 1106 Salmon *(Salmo salar)*		
River Shannon and River Fergus Estuaries SPA 004077	**Birds** A179 Black-headed Gull *(Larus ridibundus)* A141 Grey Plover *(Pluvialis squatarola)* A038 Whooper Swan *(Cygnus cygnus)* A140 Golden Plover *(Pluvialis apricaria)* A048 Shelduck *(Tadorna tadorna)* A157 Bar-tailed Godwit *(Limosa lapponica)* A046 Light-bellied Brent Goose *(Branta bernicla hrota)* A137 Ringed Plover *(Charadrius hiaticula)* A156 Black-tailed Godwit *(Limosa limosa)* A160 Curlew *(Numenius arquata)* A164 Greenshank *(Tringa nebularia)* A050 Wigeon *(Anas penelope)* A162 Redshank *(Tringa totanus)* A142 Lapwing *(Vanellus vanellus)* A017 Cormorant *(Phalacrocorax carbo)* A056 Shoveler *(Anas clypeata)* A052 Teal *(Anas crecca)* A143 Knot *(Calidris canutus)* A062 Scaup *(Aythya marila)* A054 Pintail *(Anas acuta)* A149 Dunlin *(Calidris alpina)* **Habitats** Wetlands	http://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf	• Industrial or commercial areas • Fertilisation • Urbanised areas, human habitation • Marine and Freshwater Aquaculture • Shipping lanes • Discharges • Nautical sports

Appendix 3: ECOLOGICAL SURVEYS & INVESTIGATIONS

Walk over habitat assessment:
The principal habitat present is wet grassland (GS4) dominated by Soft Rush (*Juncus effusus* – c.75+ %) with Creeping Buttercup (*Ranunculus repens*), Meadow Buttercup (*Ranunculus acris*), Meadowsweet (*Filipendula ulmaria),* Silverweed (*Potentilla anserina*), Ribwort Plantain (*Plantago lanceolata*), Dandelion (*Taraxacum officinale* agg.), Common Sorrel (*Rumex acetosa*), Dock (*Rumex* sp.), Horsetail (*Equisitum palustre*), Knapweed (*Centauria nigra),* Thistle (*Cirsium vulgare*), typical grasses (e.g. *Holcus lantus, Anthoxanthum odoratum, Agrostis capillaris, Festuca rubra*), occasional orchid (*Orchis mascula*) and some invading Bramble (*Rubus fruticosus*) and Common Gorse (*Ulex europaeus*). There is a small area of peaty wet grassland (GS4) to the north-east where Purple Moorgrass (*Molinia caerulea*), Carnation Sedge (*Carex panicea*) and Marsh Thistle (*Cirsium palustre*) are evident, along with typical wet grassland species, notably Jointed/Sharp-flowered Rush (*Juncus articulatus/acutiflorus*), Meadowsweet and Cuckooflower (*Cardamine pratensis*). It should be noted that the heathy wet grassland habitat does not comply with any EU Annex I habitat.

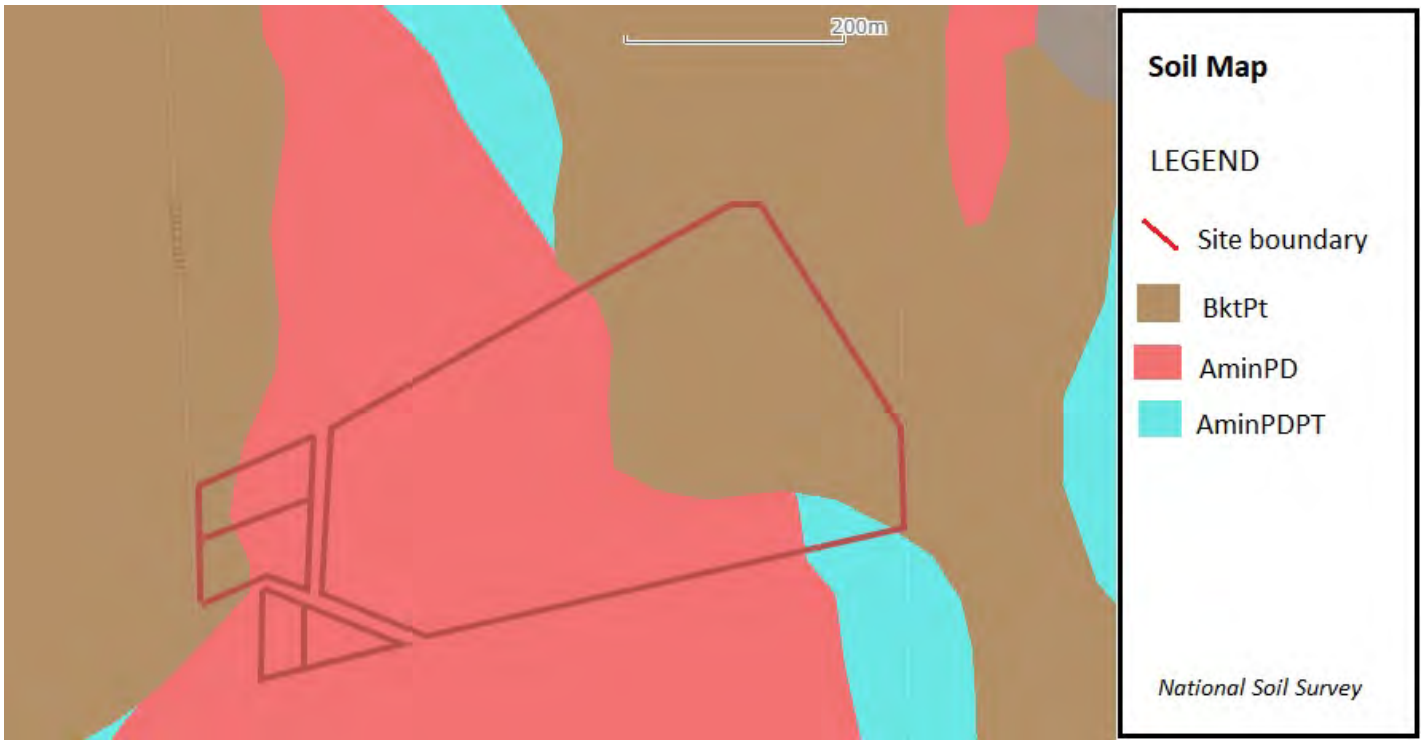
Sparse, low-growing hedgerow (WL1) of mostly Bramble and scattered Willow (*Salix* sp.) and Common Gorse occurs on low banks along field boundaries, with occasional Hawthorn (*Crataegus monogyna*).

Hydrological site assessment
There is one natural watercourse (FW2) present on site flowing along the north-eastern boundary (EPA name: Emlagh-27). This order 1 stream is approximately 0.5m deep (down a 1m bank), slow flowing and with a silt and gravel substrate. It is little vegetated except along its banks where Bramble, Willow, Gorse, Rush and Nettle (*Urtica dioica*) occur. It flows south eastward, entering the Lismuse order 2 river before discharging into Poulnasherry Bay (Lower River Shannon SAC), near Moyasta approximately 2 km downstream.

Drainage channels (FW4) present are approximately 1m deep, 1m wide but with little water flow, being clogged with vegetation and silt. They discharge/filter into the on-site natural watercourse.

Soil and Geological Information

https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx



Following information is from the Geological Survey Ireland
https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx
and ESM tool (https://airomaps.geohive.ie/ESM/)

Geology	71, Fluvio-deltaic & basinal marine (Turbiditic); Shale, sandstone, siltstone & coal
Aquifer	Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones
Aquifer vulnerability	Moderate
Ground water vulnerability	Not at risk
Groundwater Status	Good

Biodiversity Records

Table Showing Biodiversity records in the vicinity of the project site

Species	Date of record	Approximate Distance from site	Grid Reference	Data set
Common Bottlenose Dolphin *(Tursiops truncatus)*	14/06/2014	7 km	Q863621	IWDG Casual Cetacean Sightings
Otter *(Lutra lutra)*	02/05/2017	3.5 km	Q986547	Mammals of Ireland 2016-2025
Dunlin (C*alidris alpina)*	17/12/2005	2 km	Q9358	Clare Biological Records Centre Dataset 2004-2007
Black-headed Gull (*Larus ridibundus)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Grey Plover *(Pluvialis squatarola)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Whooper Swan *(Cygnus cygnus)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Golden Plover *(Pluvialis apricaria)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Shelduck *(Tadorna tadorna)*	17/12/2005	3 km	Q9357	Clare Biological Records Centre Dataset 2004-2007
Bar-tailed Godwit *(Limosa lapponica)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Light-bellied Brent Goose *(Branta bernicla hrota)*	04/04/2006	1.6 km	Q949571	Clare Biological Records Centre Dataset 2004-2007
Ringed Plover *(Charadrius hiaticula)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Black-tailed Godwit *(Limosa limosa)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011

Curlew *(Numenius arquata)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Greenshank *(Tringa nebularia)*	2007 - 2011	5 km	Q95H	Bird Atlas 2007 - 2011
Wigeon *(Anas penelope)*	17/12/2005	2.5 km	Q9557	Clare Biological Records Centre Dataset 2004-2007
Redshank *(Tringa totanus)*	2007 - 2011	3 km	Q95N	Bird Atlas 2007 - 2011
Lapwing *(Vanellus vanellus)*	2007 - 2011	5 km	Q95H	Bird Atlas 2007 - 2011
Cormorant *(Phalacrocorax carbo)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Shoveler *(Anas clypeata)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Teal *(Anas crecca)*	2007 - 2011	2 km	Q96K	Bird Atlas 2007 - 2011
Knot *(Calidris canutus)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Scaup *(Aythya marila)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011
Pintail *(Anas acuta)*	2007 - 2011	Within 10 km square	Q95	Bird Atlas 2007 - 2011

Appendix 4: Relevant guidance documents

Extract from: Environmental Requirements for Afforestation - December 2016

elements of the archaeological heritage, as appropriate;

- there will be a condition requiring the archaeological consultant to submit a full report on the results of the archaeological monitoring (including any discoveries made and any subsequent archaeological work undertaken) to the Forest Service, the NMS and the National Museum of Ireland; and
- failure to ensure that the archaeological monitoring is undertaken during the course of the carrying out of the specified parts of approved development or to submit the required report on this monitoring before or at latest at Form 2 stage, may be deemed to be:
  - a breach of the statutory approval for afforestation; and / or
  - a breach of the specific environmental conditions attached to the approval for grant aid and may: (i) delay the progress of the Form 2 (Application for 1st Grant Instalment); and (ii) be subject to a penalty.

Sanctions may also applied, as set out in the *Terms & Conditions for the Registration of Foresters and Forestry Companies*.

3.4 Contingency measures

Ensure that an adequate contingency plan is prepared. This plan must clearly inform operators how to react and who to contact, should an unexpected event arise that may create a risk to the environment, e.g. a period of intense rainfall, an accidental spillage of chemicals, the discovery of an unidentified archaeological site, monument or object. The plan should be readily available onsite and all operators should be made familiar with its content.

The **SUPPORTING DOCUMENT** contains a template contingency plan, to be completed as relevant.

3.5 Treatment of setbacks

As set out in Stage 1: Design, the following setbacks, comprising (largely) unplanted and undisturbed open spaces of a defined width, are required to protect different environmental features and sensitivities:

- water setbacks
- retained habitat setbacks
- archaeological setbacks
- public road setbacks
- utilised building setbacks
- landscape setbacks

See Table 5 for setback widths and design details. The treatment of these setbacks during Stage 2: Site Works is set out below.

The Registered Forester must ensure that all operators are aware of the importance of any environmental setbacks required onsite, their location and extent, and what is and is not permitted within them (as per Table 6 below). An environmental setback must not be used for any forest operation or for any other purpose which could compromise its protective function or which could

damage the environmental feature or sensitivity being protected.

Under the Forestry Schemes Penalty Schedules, ***failure to adhere to the required environmental setbacks can incur significant penalties.***

3.5.1 Installing environmental setbacks

It is good forest practice to mark out environmental setbacks *before* operations commence, to avoid incursions. The following guidance applies:

- Mark off the setback using temporary markers, e.g. posts or bamboos with hi-vis tape, securely driven into the soil with approximately 1.5 metres remaining visible above ground.
- Marker spacing will vary depending on setback shape, e.g. 10 metre spacing for setbacks which vary in width; 30 metre spacing for long linear setbacks.
- Linear setbacks (e.g. archaeological sight lines) can be demarcated by markers set along the centre line.
- Also use markers to indicate the position of any additional enhancement planting proposed along the forest edge or within the setback itself (see below).

Note that specific requirements apply regarding 'designated' archaeological sites and monuments and 'designated' buildings and structures or parts of structures which form part of the architectural heritage and which are of special interest:

- Unless the conditions attached to the technical approval specify otherwise, erect a permanent fence comprising two strands of plain wire on the outer edge of the archaeological / built heritage exclusion zone. Adhere to the standard Forest Service fencing specifications, including the use of IS 436 stakes (see the *Forestry Standards Manual*)(*). Note, where the outer edge of an archaeological monument / built heritage structure or feature is not evident on-the-ground, the advice of the Forest Service Archaeologist or a consultant archaeologist retained by the Applicant or her / his Registered Forester should be sought. (*This fence must be stock proof, if it represents an external boundary of the plantation.)
- Existing access routes to an archaeological site must be left unplanted and undisturbed, and must be left open for pedestrian access by archaeological officials throughout the rotation. If there is no existing access route, leave an unplanted 4 metre wide route suitable for pedestrian access from the direction of the nearest public road, forest road or track.

3.5.2 Subsequent treatment

Table 6 details what is and is not permitted within the various environmental setbacks.

Table 6 Treatment of environmental setbacks during site works. Note, if setbacks overlap, the more environmentally stringent set of requirements apply.

	Operation						
Setback type	***Forest edge planting***	***Environmental setback planting***	***Demarcation fencing with stakes and wire***	***Machine traffic***	***Cultivation / Drainage***	***Fertiliser application / Vegetation management***	***Temporary onsite storage of fertiliser, fuel, etc. associated with afforestation***
Water setback	Encouraged – see Section 3.5.3.	Encouraged – see Section 3.5.4.	Not required	Exclude	Exclude. New drains must not enter into or traverse the water setback, or discharge directly into the aquatic zone or into an existing drain (with an exception detailed in Section 3.7.1).	Permitted if required to establish setback planting, based on the following requirements: ➢ Fertiliser application limited to the manual application of an appropriate slow-release formulation into the planting pit. ➢ Regarding vegetation management, herbicide use is prohibited. Use non-herbicide methods instead, such as trampling, mulches and mats.	Exclude
Habitat setback	Encouraged – see Section 3.5.3.	Exclude	Not required	Exclude	Exclude	Exclude	Exclude
Archaeological setback	Encouraged – see Section 3.5.3.	Exclude	Required for designated archaeological features – see Section 3.5.1 for details.	Exclude	Exclude	Exclude	Exclude

Setback type	*Forest edge planting*	*Environmental setback planting*	*Demarcation fencing with stakes and wire*	*Machine traffic*	*Cultivation / Drainage*	*Fertiliser application / Vegetation management*	*Temporary onsite storage of fertiliser, fuel, etc. associated with afforestation*
Public road setback	Mandatory for roadside conifer plots – see Section 3.5.3.	Exclude	Not required	Permitted	Exlude	Exclude	Permitted, subject to safeguards under Section 3.7.5.
Utilised building setback	Mandatory for setbacks from dwellings – see Section 3.5.3.	In relation to setbacks from dwellings, setback planting is encouraged within the 30 m to 60 m zone, if agreed to by the neighbouring dweller. See Section 3.5.4.	Not required	Permitted	Exclude	Permitted if required to establish setback planting, based on the following requirements: ➢ Fertiliser application limited to the manual application of an appropriate slow-release formulation into the planting pit. ➢ Regarding vegetation management, herbicide use is prohibited. Use non-herbicide methods instead, such as trampling, mulches and mats.	Permitted, subject to safeguards under Section 3.7.5. However, if within a setback from a dwelling, exclude the preparation and storage of herbicides (and other pesticides, if used).
Landscape setback	Encouraged – see Section 3.5.3.	Encouraged – see Section 3.5.4.	Not required	Permitted	Permitted, for setback planting.	Permitted, for setback planting.	Permitted, subject to safeguards under Section 3.7.5.

3.5.3 Forest edge planting

- Forest edge planting comprises the planting of single, small groups and irregular belts of native species (e.g. birch, rowan, oak and Scots pine, as site conditions allow) along the outer edge of conifer GPC plots, typically those adjoining environmental setbacks.
- This measure enhances the landscape and biodiversity value of the forest edge.
- Forest edge planting is mandatory within conifer plots adjoining:
  - utilised building setbacks created for dwellings; and
  - public road setbacks, where the strip 10 metres to 20 metres from the road must be planted with broadleaf trees, to give a minimum two-thirds coverage within this strip.
- Forest edge planting is encouraged in relation to all other environmental setbacks, as site conditions allow - see Table 6.
- Where applied, forest edge planting must not encroach into the environmental setback itself, in order to maintain the necessary setback width. Forest edge planting forms part of the GPC plot.
- Where applied as single trees, ensure that the tree is adequately protected against grazing, using a standard tree shelter or a deer guard, as necessary.
- Where applied as groups, adopt a robust planting design using trees with compatible growth rates, planted with necessary protection against grazing. Group size may vary from 5-10 trees to 50 trees and over, depending on landscape scale. In deer-prone areas, wider spacing and the use of deer guards may be appropriate - specify details on the Certified Species Map.

3.5.4 Environmental setback planting

- Environmental setback planting comprises the planting of single, small groups and irregular belts of native species (e.g. birch, rowan, oak and Scots pine, as site conditions allow) ***within*** an environmental setback.

Forest edge planting, using deer shelters.

- This measure enhances the environmental role of the setback itself, e.g. planting within a landscape setback will create better visual 'tie-in' between the surrounding landscape and the forest edge.
- Apply environmental setback planting as per Table 6 and as site conditions allow.
- Where applied as single trees, ensure that the tree is adequately protected against grazing, using a standard tree shelter or a deer guard, as necessary.
- Where applied as groups, adopt a robust planting design using trees with compatible growth rates, planted with necessary protection against grazing. Group size may vary from 5-10 trees to 50 trees and over, depending on landscape scale. In deer-prone areas, wider spacing and the use of deer guards may be appropriate - specify details on the Certified Species Map.
- Environmental setback planting should not exceed 20% of the area of the setback.
- Note, setback planting may be counter-productive within setbacks likely to be important for deer management, as it may obstruct sight lines.
- The following applies specifically in relation to planting within water setbacks:
    - Strategic planting within water setbacks may help to deliver direct in-stream ecosystem services such as bank stabilisation, cooling / shading, and food drop into the aquatic ecosystem.
    - Pursue water setback planting only where agreed in advance with Inland Fisheries Ireland and (where relevant) NPWS.
    - Limit to single or small groups (5-10 trees) of native riparian species (birch, willow, and occasional alder and pedunculate oak) at strategic points within the water setback.
    - Such trees should be pit-planted and protected from grazing, as necessary.

3.6 Treatment of future operational areas

Treat future operational areas (as described in Section 2.5.2) as follows, to enhance their landscape and biodiversity value:

- As per good practice, mark out these areas *before* operations commence (see Section 3.5.1).
- Based on the immediate topography, vary their width to avoid artificially straight lines and to create a naturally undulating forest edge.
- Consider forest edge planting (see Section 3.5.3).

Extract from: Environmental Requirements for Afforestation - December 2016

Section 4
Ongoing Management

4.1 Overview

Stage 3: Ongoing Management spans the period from the completion of initial site works (and payment of the 1st grant instalment, if grant-aided) up to Year 15 (i.e. the end of the premium period, if applicable).

During this part of the forest rotation, there are generally no major site inputs required. However, basic environmental measures apply, in addition to any specific conditions attached to the original approval. Other silvicultural requirements also apply during the premium payment period, as set out in the *Forestry Standards Manual* (e.g. the maintenance of stocking levels, fence lines and fire breaks, fertiliser application) all of which must be carried out appropriately to prevent environmental impacts.

Key will be the ongoing monitoring of the site, to ensure compliance with silvicultural and environmental standards, requirements and conditions and also to check that potential threats to the environment do not emerge (particularly in relation to drains and sediment traps) and that various protective measures (principally setbacks) are functioning as intended.

4.2 Site inputs

Site inputs during Stage 3 are generally limited to the first 4 years up to submission of the Form 3 (if grant-aided). At this point, the forest should be fully established(*), with all plots having at least 90% of the original stocking spread evenly throughout the plot, with originally approved species represented proportionately, and with trees free from competing vegetation and free-growing (see the *Forestry Standards Manual*). Such inputs include herbicide application and possible fertiliser application, if nutrient deficiencies arise. Both inputs must adhere to measures set out in Sections 3.7.2 and 3.7.3 of these Requirements. (*Note, establishment may take longer on some sites.)

Regarding fertiliser application, assess exact requirements through a foliage analysis, following the procedures set out in the *Forestry Standards Manual*.

(Over larger areas, aerial fertilisation may be required. No aerial fertilisation can be undertaken unless an Aerial Fertilisation Licence as been obtained from the Forest Service. Refer to the separate *Aerial Fertilisation Requirements* for details.)

Ensure that any necessary filling-in prior to Form 3 submission reflects the diversity of the original planting, in relation to biodiversity and landscape.

4.3 Drains and sediment traps

Check drains and sediment traps regularly up to Year 4 and periodically thereafter, particularly during and after heavy rainfall, in order to assess how effectively they are working.

If sediment traps are filling up, clear out the built-up sediment and dispose of it on level ground several meters away. Where the drainage network and sediment traps are under pressure and signs of failure are evident, additional measures will be required, often in the form of additional sediment

traps. In complex situations, the input of a hydrologist or an engineer may be required.

In most cases, drains will stabilise and 'green-up' with colonising vegetation over time.

4.4 Treatment of setbacks

As set out in Stage 1: Design and Stage 2: Site Works, the following setbacks, comprising (largely) unplanted and undisturbed open spaces of a defined width, are required to protect different environmental features and sensitivities:

- water setbacks
- retained habitat setbacks
- archaeological setbacks
- public road setbacks
- utilised building setbacks
- landscape setbacks

The treatment of these setbacks during Stage 3: Ongoing Management is as follows:

1. The intended protective function of these setbacks must be maintained throughout this stage of the forest's development. This generally entails leaving these areas undisturbed and allowing natural ground vegetation to develop. Management may be required in some cases, e.g. to control woody growth within a setback adjoining a dwelling, to retain an important view or to prevent fire risk.
2. Monitor the development of forest edge planting and environmental setback planting (where undertaken) and maintain trees as appropriate (e.g. vegetation management, replacement of mortalities, adjustment and eventual removal of tree shelters) until the trees are established and free of grazing pressure.

A well-established water setback adjoining a broadleaf plot.

Appendix 5: Mitigation measures implementation and monitoring

Table showing: Mitigation Measures Implementation and Monitoring

Number	Mitigation measure	How mitigation measure will avoid or reduce adverse effects	Mitigation measure implementation and level of success	Monitoring to prevent mitigation failure
1	Exclusion zones for machinery	Exclusion zones for machinery will ensure that machines do not traverse close to watercourses on site during forestry operations. With respect to exclusion zones, measures outlined in Section 3.5 of the Environmental Requirements for Afforestation (December 2016), will be adhered to. (See www.iai.ie/wp-content/uploads/2016/03/EnvReqs-for-Afforestation-Dec16.pdf).	All mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	Contractor will monitor the implementation of the mitigation measures on an on-going basis throughout afforestation phase.
2	Silt and sediment control	Silt traps will be deployed to control movement of silt and sediment, as outlined in Section 4.3 of Environmental Requirements for Afforestation (December 2016) (See www.iai.ie/wp-content/uploads/2016/03/EnvReqs-for-Afforestation-Dec16.pdf). Silt traps will be constructed at end of mound drains at 50 m intervals. Silt traps will be maintained throughout all planting works, ensuring that they are clear of sediment build-up. The silt traps will reduce the risk of sediment runoff reaching waterways within the proposed afforestation area.	All mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	Contractor will monitor the implementation of the mitigation measures on an on-going basis throughout afforestation phase.

3	Drainage and cultivation	All drains will protect aquatic zones (order 1 - Emlagh Stream 27) from any sediment and nutrients contained in water draining off the site as outlined in Section 3.7.1 of Environmental Requirements for Afforestation (December 2016) ((See www.iai.ie/wp-content/uploads/2016/03/EnvReqs-for-Afforestation-Dec16.pdf). Drains will be maintained throughout all planting works, ensuring that they are clear of sediment build-up and are not severely eroded. There will be no vegetation removal within 20 m of a drainage ditch. This ensures the area close to a drain act as a filter for sediment before entering a drain.	All mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	Contractor will monitor the implementation of the mitigation measures on an on-going basis throughout afforestation phase.
4	Afforestation	A setback area of 5m will be applied along the relevant watercourses present in the project area (there are three that run west-east into the Emlagh Stream 27), as specified in Section 4.4 of the Environmental Requirements for Afforestation (December 2016) (See www.iai.ie/wp-content/uploads/2016/03/EnvReqs-for-Afforestation-Dec16.pdf).	All mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	Contractor will monitor the implementation of the mitigation measures on an on-going basis throughout afforestation phase.
5	Setbacks	Apply a 5-metre-wide (minimum) setback along relevant watercourses (as defined in Circular 12/2017) located within or adjoining the site. This setback is to remain undisturbed during establishment and throughout the forest rotation. Apply and maintain as per details set out in Tables 5 and 6 of the Environmental Requirements for Afforestation (DAFM, 2016) (See www.iai.ie/wp-content/uploads/2016/03/EnvReqs-for-Afforestation-Dec16.pdf).	All mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	Contractor will monitor the implementation of the mitigation measures on an on-going basis throughout afforestation phase.

		A setback of 10 m from the aquatic zone, Emlagh stream which runs along the eastern boundary of the site for 240 m. There shall be no mounding or machine work within 10 m of Aquatic Zone except for essential fencing purposes. There shall be no mounding or machine work within 5 m of Relevant Water Course (RWC).		
6	Chemical use	Chemical use will be kept to an absolute minimum, depending on site requirements; chemicals will only be applied in dry weather. Chemicals shall not be applied within 20 m of the aquatic zone or within watercourses setbacks or other sensitive areas.	All mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	Contractor will monitor the implementation of the mitigation measures on an on-going basis throughout afforestation phase.
7	Otter	There will be no cleaning of vegetation from any section of such watercourses within 20 m of the aquatic zone (order 1 - Emlagh Stream 27). There will be no woody weed removal within 20 m of an aquatic zone or 10 m of a relevant watercourse.	All mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	Contractor will monitor the implementation of the mitigation measures on an on-going basis throughout afforestation phase.
8	Birds	No work to be carried out during hours of darkness.	All mitigation measures will be included as a contractual obligation on the contractor and will be implemented in full. High probability of success.	Contractor will monitor the implementation of the mitigation measures on an on-going basis throughout afforestation phase.

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APPENDIX 2

Baseline Ornithology Survey Reports for 2019/20 and 2020/21

FEHILY TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

ANNAGH WIND FARM ORNITHOLOGICAL SURVEYS

BASELINE ORNITHOLOGICAL SURVEYS – ANNAGH WIND FARM: SUMMER 2019 AND WINTER 2019/20

Prepared for: EMPower

EMPower

Date: November 2021

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

T: +353 21 4964 133 | E: info@ftco.ie

CORK | DUBLIN | CARLOW

www.fehilytimoney.ie

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EXECUTIVE SUMMARY

Ornithological surveys for Annagh Wind farm searched for and recorded all bird species, focusing primarily on the wind farm site but also taking in the surrounding region. Surveys extended throughout the year, covering both the breeding and non-breeding seasons.

The methodology for the 2019/2020 vantage point surveys at Annagh Wind farm adhered to Scottish Natural Heritage guidance (SNH, 2017) for assessing the impact of proposed wind farm on the breeding and wintering populations of birds within the site and in the greater area. Two timed watches of three hours duration were carried out from each VP every month from April to September 2019 and October 2019 to April 2020 inclusive, totalling 72 hours (36 hours per season) of observation time at each VP over the survey period. Breeding & winter bird transect surveys, hinterland surveys and wader surveys were also undertaken during this period.

During vantage point surveys a total of 56 species of bird were recorded across the surveyed summer and winter periods of 2019/20. One additional target species, namely Hen Harrier (Amber-listed; Annex 1) was noted during winter transect surveys only.

During hinterland surveys surrounding the proposed site a total of 47 species were noted.

During breeding wader surveys evidence was noted for 2 species: common Snipe and Woodcock. A total of 4 occupied territories, 3 potential territories and 2 confirmed breeding attempts were noted for common Snipe. A single potential territory was noted for woodcock.

During breeding transects a total of 42 species were detected; four of these were Red-listed: Kestrel, Meadow pipit, Snipe and Woodcock. A total of eight Amber-listed species were recorded during breeding transects.

A total of 28 species were detected during wintering bird transects. One Annex 1 species was recorded, namely Hen Harrier. A total of four Red-listed species (Kestrel, Meadow Pipit, Redwing and Snipe) were recorded during winter transects. Two Amber-listed species were recorded.

1. INTRODUCTION

Fehily Timoney & Company (FT) was appointed by EMPower to undertake ornithological surveys at the proposed Annagh wind farm from 2019-2020. This report presents the results of the first year of ornithological surveys and summarises the activity of specific target bird species during survey periods in 2019 and 2020. The study area of Annagh wind farm is near Charleville, Co, Cork.

This avian assessment for surveys completed over the first year in summer 2019 and winter 2019/20 includes the assessment of bird species potentially occurring within the proposed site boundary, and surveys of surrounding habitats of value to birds. Surveys adhered to Scottish Natural Heritage guidance (SNH, 2017). The following surveys were carried out:

- Vantage Point survey (breeding and non-breeding season);
- Hinterland survey;
- Breeding Wader survey;
- Breeding bird transect survey; and
- Winter bird transect survey.

The monthly assessment of bird species during the breeding and winter season within the site was completed using vantage point survey watches. Surveys took place at 2 vantage point (VP) locations from April to September 2019 (inclusive) and October 2019 to March 2020 (inclusive). Each VP was subject to 2 watches per month, each consisting of 3 hours in length (6 hours surveyed per VP per month).

Hinterland surveys were completed in potential favourable bird habitats within a 10 km radius of the proposed wind farm development. This survey method was used to assess species populations surrounding the proposed development site. Breeding bird surveys were completed along transects within the site. This survey technique was also used to assess the presence of breeding waders.

1.1 Study Area

The proposed Annagh wind farm is located c. 7.3 km south west of Charleville, Co. Cork near the Co. Cork/Co. Limerick border. The study area encompasses parts of the townlands of Cooliney, Fiddane, Annagh North, Cullig and Coolcaum. The VP surveys study area was the VP viewsheds and 500m turbine buffers. Breeding bird, breeding wader and wintering bird transects were surveyed within the land ownership boundary. Surrounding habitats and land uses are described by Corine 2018[1] as: Pastures (code 231), land principally occupied by agriculture with significant areas of natural vegetation (code 243), Broad-leaved forests (code 311) and Coniferous forests (code 312). Figure 2-1 displays the site location and vantage points within the study area.

During site surveys, habitats such as wet grassland (GS4), conifer plantation (WD4), hedgerows (WL1), treelines (WL2) and improved agricultural grasslands (GA1) were recorded (Fossitt, 2000). At Annagh, (mixed) broadleaved woodland (WD1), improved agricultural grassland (GA1) and wet grassland (GS4) are the dominant habitat types.

[1] https://gis.epa.ie/EPAMaps/. Accessed 24/11/21.

The protected European sites within 15 km of the proposed wind farm are:

- Blackwater River (Cork/Waterford) SAC (002170)
- Ballyhoura Mountains SAC (002036)
- Kilcolman Bog SPA (004095)

The protected national sites within 15 km of the proposed wind farm are:

- Eagle Lough pNHA (site code 001049)
- Kilcolman Bog pNHA (side code 000092)
- Ballyhoura Mountains pNHA (site code 002036)
- Ballinvonear Pond pNHA (Site code 000012)
- Mountrussel Wood pNHA (Site code 002088)
- Awbeg Valley (Above Doneraile) pNHA (Site code 000075)
- Ballintlea Wood pNHA (Site code 002086)
- Castleoliver wood pNHA (Site code 002090)

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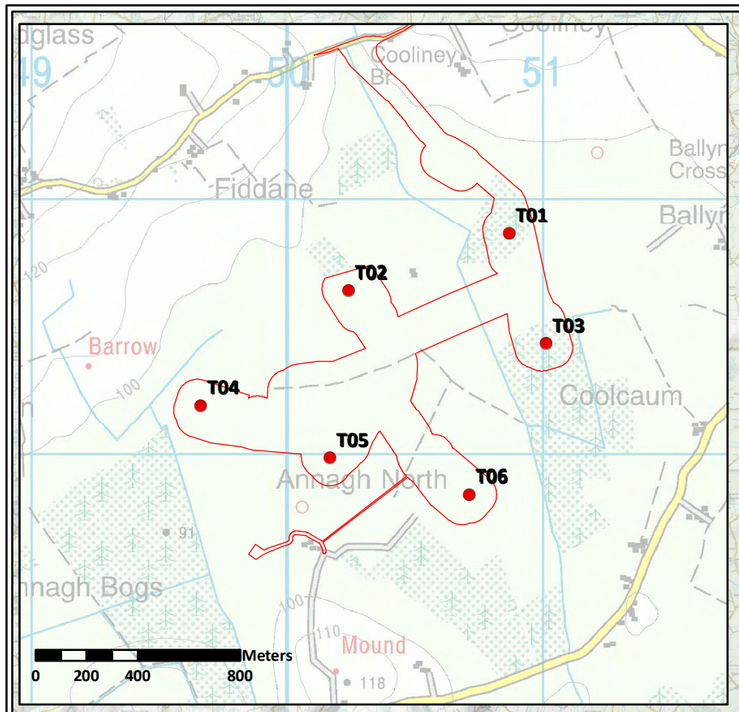

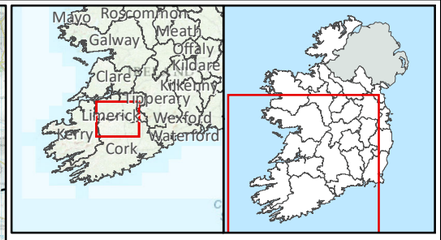

Legend

- County Boundaries
- Proposed Site Boundary
- Proposed Turbine Layout

Tipperary
Cork
Kerry

0 2.5 5 10 Kilometers

TITLE:	Site Location		
PROJECT:	Annagh Wind Farm, Co. Cork		
FIGURE NO:	1.1		
CLIENT:	EMPower		
SCALE:	1:200000	**REVISION:**	0
DATE:	14/10/2021	**PAGE SIZE:**	A3

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2. SURVEY METHODOLOGY

The following surveys were carried out:

- Vantage Point survey (breeding and non-breeding season);
- Hinterland survey;
- Breeding Wader survey;
- Breeding bird transect survey; and
- Winter bird transect survey.

Vantage point surveys carried out at the proposed Wind Farm adhered to Scottish Natural Heritage guidance (SNH, 2017). Hinterland surveys were completed in potentially favourable bird habitats within a c. 10km radius of the proposed Bilboa Wind Farm site, the surveys were undertaken following methodology by Hardey *et al.* (2013) and O' Donoghue, (2012). Breeding bird transects method utilised is based on the existing British Trust for Ornithology (BTO) Breeding Bird Survey (BBS or CBS). Winter bird transect surveys were conducted following a modified wintering bird transect survey method based on Brown and Shepherd (1993) and recommended in published guidance from Scottish Natural Heritage (2017).

2.1 Vantage Point Surveys

Vantage Point (VP) surveys were carried out at the proposed Annagh Wind Farm site from April 2019 to March 2020 (inclusive) during the non-breeding (winter) and breeding seasons, in accordance with the Scottish Natural Heritage Methodology for onshore wind farms (SNH, 2017). These surveys were divided into summer (April – September 2019) and winter (October 2019 – March 2020) seasons. Two fixed VP locations (Annagh VP1 and VP2) overlooking the study area were used during the VP surveys (Table 2-1). Table 2-2 gives the VP locations. Vantage points were chosen to cover a specific viewshed of the proposed development site. Each was chosen specifically to encompass the view of all the proposed turbines. Figure 2-1 displays the site location and vantage points within the study area.

The main purposes of vantage point survey watches are to collect data on *target species* that will enable estimates to be made of:

a. The time spent flying over the defined survey area;
b. The relative use of different parts of the defined survey area; and
c. The proportion of flying time spent within the upper and lower height limits as determined by the rotor diameter and rotor hub height.

The specific vantage points and turbines within their viewsheds can be seen in Table 2-1 below:

Table 2-1: Vantage point viewshed and turbines encompassed

Site	Vantage Point	Turbine number(s) covered in viewshed
Annagh	VP 1	1-6
	VP 2	1-6

Vantage point locations were based on observations from walkover/reconnaissance surveys, viewshed analysis (using GIS) and collated information on known feeding and roosting sites from both desktop review and consultation. The number and location of vantage points was selected in order to achieve visibility of the entire study area and important features for birds in close proximity to the site (e.g., lakes, wetlands).

In line with recommended best practice (SNH, 2017 and Band *et al*. 2007), viewshed analysis was undertaken using ARCMAP 10.4.1, to calculate a theoretical zone of visibility from each vantage point. Visibility is calculated from each vantage point along an invisible layer suspended at the predicted lowermost height passed through by the rotor blade tips, using an observer height of 1.5 m. We note the following from SNH guidance in respect of priority areas for viewshed analysis (emphasis added):

> *"Where the key purpose is to estimate the risk of collision with turbines,* ***it is the visibility of the airspace to be occupied by the turbine rotors (the collision risk volume) that is of prime importance****. Therefore, it is recommended that visibility be calculated using the least visible part of this airspace, i.e. an imaginary layer suspended at the lowermost height passed through by the rotor blade tips (typically about 20-30m above ground level). Predicting visibility at this level is a simple task using GIS, however it should be noted that the baseline should take account of any forestry or other features that will potentially obstruct the view. For example, forestry may be 10-30m high and if viewshed height is taken as 20-30m ground level the visible area could be overestimated if there is forestry within the viewshed. Being able to view all or most of the site to ground level can be helpful in gauging overall bird activity and usage of the site but is not as important as being able to view the collision risk volume"*

Following SNH guidance (2017), watches were conducted to sample diurnal and crepuscular activity of target species and *exceeding* the required effort from SNH.

Data recorded included flight activity of target species (flight height, duration, directionality) in addition to metrics such as flock size (per recorded transit) and time of observation relative. Detailed notes of each observation of a target bird species was recorded including behaviour, gender (where possible), numbers, flight height, associated habitat and the period of time spent within the study area. Successful foraging events were also noted if they arose. Other bird species seen or heard during the VP surveys were also recorded and were considered separately in the analysis as additional species. Flight activity was annotated onto field maps. Total numbers of birds present both on arrival at the vantage point and on departure is noted. Details of each flight-path observation are provided in Section 3. Binoculars are used to scan for target species. Dictaphones are utilised to dictate bird heights whilst tracking flight events.

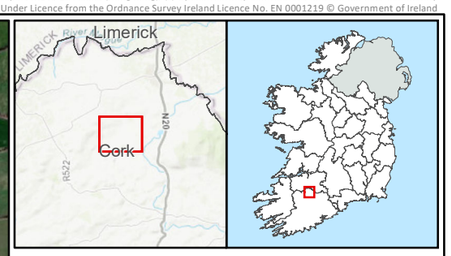
Flight heights are estimated visually as allowed for in SNH (2017) guidance. Flight height estimation using a clinometer or rangefinder is accepted as an *alternative* means of determining flight height however this is often not practicable (equipment may be clumsy and birds may be lost from view whilst trying to focus additional equipment on a target species rapidly moving out of sight); it should be noted that in practice many flocks of swans do not fly close enough to a surveyor for a rangefinder to be used, resulting in most flights heights being estimated in any case. As is often the case an experienced observer will be able to record accurate observations at a higher frequency.

As previously mentioned, VP surveys were carried out at the site from April 2019 to March 2020 inclusive and involved carrying out 2 x 3-hour VPs at each VP every month. As per SNH guidance (2017), 36 hours of vantage point effort was carried out at each vantage point during the breeding period, and 36 hours during wintering period). The proportion of survey time that activity was recorded inside and outside the wind farm site boundary was used as part of the overall analysis and assessment of target species usage of the study area. Vantage point locations can be found in Table 2-2, below. All surveys were conducted during suitable weather conditions.

Table 2-2: Grid References for VP locations at Annagh Wind Farm

Site	Vantage Point	Easting, Northing (ITM)
Annagh WF	VP 1	550115, 616205
	VP 2	550037, 616468

Path: R:\Map Production\2020\P2359\Workspace\Information\P2359_GIS_ViewshedAnalysis_A3.mxd



Legend

- Turbine Layout
- Turbine Layout 500m Buffer
- Vantage Point Locations

2km Viewsheds

- VP1 Viewshed
- VP2 Viewshed

N
W E
S

0 0.25 0.5 1 Kilometers

TITLE:	Viewshed Analysis (based on a target height of 30m and observer height of 1.5m)		
PROJECT:	Annagh Wind Farm		
FIGURE NO:	2.1		
CLIENT:	EMP Group		
SCALE:	1:12800	**REVISION:**	0
DATE:	15/10/2021	**PAGE SIZE:**	A3

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2.2 Hinterland Surveys

The methodology used for wetland sites during the hinterland surveys followed I-WeBS (Irish Wetland Bird Survey) methodology (Lewis *et al*, 2019), whereby each location was surveyed for the duration necessary to identify and obtain a count for all target species present. The same approach was adapted for non-wetland sites. A hinterland survey for raptors was conducted in accordance with Raptors: a field guide to survey and monitoring (Hardey *et al*. 2013) to assess Hen Harrier and other raptor activity over the winter and breeding periods in the greater surroundings. Surveys for Hen Harrier breeding and roosting sites were also carried out within 10km of the proposed Wind Farm, fulfilling and exceeding the requirement set out in SNH Guidance (2017).

The surveys were carried out in suitable woodland and wetland habitats in the area surrounding the proposed wind farm site. This comprised 13 sites within 10 km from the proposed wind farm site. These sites were chosen as they had suitable habitat for the following target species and groups: raptors, waders, waterfowl, swans and barn owl. Surveys were carried out between April and September in the summer of 2019 and October to March in the winter of 2019/20. The following sites were checked regularly across this period: West Plantation (Aughrim), River Blackwater SAC/Annagh Bridge, River Awbeg, River Blackwater SAC/Buttevant Bridge , Eagle Lough pNHA, Glanmore Flats, Kilcolman Bog SPA, Ballinvonear Ponds pNHA, Ballyhoura Mountain pNHA, Castle Lake (Milltown), Small Quarry Lake (Ballyroe), and Large Quarry Lake (Ballinadrideen). Two opportunistic visits were made to flooded fields, also listed below (Table 2-3). Table 2-3 indicates where within the 10 km area around the proposed Wind Farm hinterland surveys were carried out.

Table 2-3: Hinterland survey locations

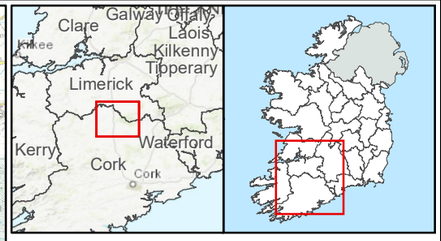
Location	Easting, Northing (ITM)	Distance to site (km)	Dates visited
West Plantation (Aughrim)	543767, 616842,	5.76	02/05/2019 27/05/2019 23/06/2019 01/08/2019 27/08/2019 06/11/2019 28/11/2019 17/12/2019 28/01/2020 25/02/2020
River Blackwater SAC/Annagh Bridge	549814, 615638	1.01	02/05/2019 27/05/2019 23/06/2019 01/08/2019 27/08/2019 06/11/2019 28/11/2019 17/12/2019 28/01/2020

Location	Easting, Northing (ITM)	Distance to site (km)	Dates visited
			25/02/2020 27/04/2020
River Awbeg	552564, 614751	2.76	02/05/2019 27/05/2019 23/06/2019 01/08/2019 27/08/2019 06/11/2019 28/11/2019 17/12/2019 28/01/2020 25/02/2020
River Blackwater SAC/ Buttevant	554265, 609841	7.84	02/05/2019 27/05/2019 23/06/2019 01/08/2019 01/08/2019 27/08/2019 06/11/2019 28/11/2019 17/12/2019 28/01/2020 25/02/2020
Eagle Lough pNHA	556064, 610328	8.60	02/05/2019 27/05/2019 23/06/2019 01/08/2019 27/08/2019 08/11/2019 28/11/2019 17/12/2019 28/01/2020 25/02/2020
Glanmore Flats	554616, 612847	5.55	02/05/2019 27/05/2019 23/06/2019 01/08/2019 27/08/2019 06/11/2019 28/11/2019

Location	Easting, Northing (ITM)	Distance to site (km)	Dates visited
			17/12/2019 28/01/2020 25/02/2020
Kilcolman Bog SPA	558072, 610856	9.49	02/05/2019 27/05/2019 23/06/2019 01/08/2019 27/08/2019 06/11/2019 28/11/2019 17/12/2019 28/01/2020 25/02/2020 27/04/2020
Ballinvonear Ponds pNHA	556797, 613057	7.13	02/05/2019 27/05/2019 23/06/2019 01/08/2019 27/08/2019 06/11/2019 28/11/2019 17/12/2019 28/01/2020 25/02/2020
Ballyhoura Mountain pNHA	557289, 614688	6.60	02/05/2019 27/05/2019 28/11/2019 20/12/2019 28/01/2020 25/02/2020 27/04/2020
Castle Lake (Milltown)	550153, 619611	0.90	02/05/2019 27/05/2019 23/06/2019 01/08/2019 27/08/2019 08/11/2019 28/11/2019 17/12/2019 28/01/2020

Location	Easting, Northing (ITM)	Distance to site (km)	Dates visited
			25/02/2020
Small Quarry Lake (Ballyroe)	552833, 616762	1.89	02/05/2019 27/05/2019 23/06/2019 01/08/2019 27/08/2019 08/11/2019 28/11/2019 20/12/2019 28/01/2020 25/02/2020
Large Quarry Lake (Ballinadrideen)	553853, 617143	2.60	02/05/2019 27/05/2019 23/06/2019 01/08/2019 27/08/2019 08/11/2019 28/11/2019 17/12/2019 28/01/2020 25/02/2020
Flooded Field near Corbett Court	554293, 618683	3.50	17/12/2019
Fields close to Glanmore Flats	554495, 612863	5.60	28/11/2019

Path: R:\Map Production\2020\P2359\Workspace\EIAR\P2359_GIS_Fig8-4_Hinterland_A3.mxd



Legend

- Site Boundary
- Turbine Layout
- Met Mast
- Substation
- Construction Compound
- Underground Cable Route
- Hen Harrier Recce Survey

Hinterland Survey Sites

ID and Name:

1: Ballinvonear Ponds pNHA
2: Ballyhoura Mountains pNHA
3: Ballyhoura Mountains SAC
4: Castle Lake (Milltown)
5: Eagle Lough pNHA
6: Glanmore Flats
7: Kilcolman Bog SPA
8: Large Quarry Lake (Ballinadrideen)
9: River Awbeg
10: River Blackwater SAC/ Buttevant
11: River Blackwater SAC/Annagh Bridge
12: Small Quarry Lake (Ballyroe)
13: Western Plantation (Aughrim)

TITLE:	Hinterland Survey Area		
PROJECT:	Annagh Wind Farm		
FIGURE NO:	2.2		
CLIENT:	EMP Group		
SCALE:	1:90000	**REVISION:**	0
DATE:	12/10/2021	**PAGE SIZE:**	A3

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N W E S

0 0.5 1 2 3 4 Kilometers

2.3 Breeding Waders Surveys

Survey transects to assess the presence of breeding wader populations were completed during the months of April, May, July and August 2019. A number of methods were combined from published literature including Bibby *et al*, (2000), Gilbert *et al*, (1998), O'Brien & Wilson (2011) and SNH 2017 to estimate numbers of target species breeding within this envelope.

Methods utilised were grouped into 2 categories; those for breeding lapwing *Vanellus* and those for other species such as Curlew *Numenius arquata*, Snipe *Gallinago*, Redshank *Tringa totanus*, Woodcock *Scolopax rusticola*, Common Sandpiper *Actitis hypoleucos* and Ringed Plover *Charadrius hiaticula*. For each species, a pre-defined matrix of suitable habitats was created and used to select target habitats for survey.

Table 2-4: Target Species and Associated Suitable Breeding Habitat

Target Species	Suitable Breeding Habitat
Lapwing	Lowland wet grassland, arable farmland, cutover bog with pools and wet grassland
Snipe	Wet pastures, marsh, bogs (intact and cutover) and fens
Redshank	Bog
Curlew	Bog
Common Sandpiper	Streams/rivers in bog
Woodcock	Woodland, bog woodland
Ringed Plover	Cutover bog, milled peat with exposed gravel

Survey methods for Lapwing followed those in Bibby *et al*. 2000 wherein the primary count unit for breeding birds is defined as an incubating female; in addition, displaying birds, birds standing guard near nests or distraction displays were also recorded as indications of occupied territories. Extensive areas of open ground were covered from roads, farm tracks or roadsides (where possible); larger areas of open ground not visible from easily accessible vantage points were walked using transects.

Surveys were carried out during the time periods recommended in Bibby *et al*. 2000 although territorial behaviour noted outside these periods was also utilised in the assessment. For all additional species of wader the employed method was essentially the same and utilised transects walked through suitable habitat within 3 hours of dawn or dusk. Count units (see Table 2-5) were predefined for each target species and included in the method statement provided to surveyors.

All suitable habitats for waders were visited, at four week intervals, during the months of April, May, July and August 2019. Observations from each visit were annotated onto maps (locations of territories or breeding attempts) and a final, summary map produced at the end of the survey season using ARCMAP 10.4.1. Breeding wader summary sheets were also compiled at the end of the breeding season, indicating in each case the minimum number of breeding pairs/occupied territories known to occur.

Table 2-5: Count Units for each Wading Species

Species	Count Unit
Lapwing	Incubating Bird
Common Snipe	Drumming or Chipping Bird
Redshank	Alarming Bird
Woodcock	Displaying Male
Ringed Plover	Presence or Absence/ Fledged Young late in season
Common Sandpiper	Presence or Absence/ Fledged young late in season
Curlew	Territorial Activity

All species encountered (seen or heard) were recorded and their abundance, behaviour, sex/age and breeding status noted. Any species occurring more than 100 m from the observer, or flying over the site and not using it, were recorded as 'additional' species to further inform the baseline survey. Table 2-6 below, details the survey dates and weather conditions.

Table 2-6: Breeding Waders Survey Details

Date	Location	Cloud (Okta)	Precipitation	Visibility	Wind
26/04/2019	Annagh WF	5/8	Dry	Excellent	F2
15/05/2019	Annagh WF	4/8	Dry	Excellent	F4
02/08/2019	Annagh WF	2/8	Showers	Excellent	F2-3
28/08/2019	Annagh WF	2/8	Light Shower	Excellent	F1-2

2.4 Breeding Bird Surveys

For general breeding birds the method utilised was based on the existing British Trust for Ornithology (BTO) Breeding Bird Survey (BBS or CBS; Bibby *et al*, 2000). The study area for this survey comprised a total of two no. c. 1 km transects which were selected and centred on different habitats present within the subject sites (See Figure 2-3 for the location of transects). Birds were counted over two visits, each timed to coincide with the early part of the breeding season (April to mid-May 2019) and later part of the season (mid- May to late June 2019) with visits at least four weeks apart. Surveyors recorded all birds seen or heard as they walked methodically along the transect routes. Birds were noted in four distance categories, measured at right angles to the transect line (within 25 m, between 25 m-100 m and over 100 m from the transect line) and those seen in flight only. Recording birds in distance bands gives a measure of bird detectability and allows relative population densities to be estimated if required (BTO, 2018).

SNH guidance on recommended bird survey methods to inform impact assessment of onshore wind farms states:

> *"Surveys of farmland passerines especially on more intensive arable habitat are generally not required"* (SNH 2017).

The summer breeding bird transect schedule is available in Table 2-7. The results are presented in Table 3-4.

Table 2-7: Breeding bird summer transect Survey Details

Date	Transect	Time	Weather Conditions
15/05/2019	TR1 and TR2	07:30 – 09:25	Cloud: 4/8 oktas; rain: none; wind: F1; visibility: excellent
29/06/2019	TR1 and TR2	10:00 – 12:30	Cloud: 3/8 oktas; rain: none; wind: F2; visibility: excellent

2.5 Wintering Bird Survey

For the general wintering bird survey, the method utilised was the same as for the breeding bird transects, except it was undertaken in the winter season.

The wintering bird transect schedule is available in Table 2-8. The results are presented in Table 3-5.

Table 2-8: Breeding bird winter transect survey details

Date	Transect	Time	Weather Conditions
20/12/2019	TR1 and TR2	07:45 – 10:30	Cloud: N/A oktas, Rain: occ., showers, Wind: F1, Visibility: Excellent
21/01/2020	TR1 and TR2	09:10 – 10:40	Cloud: 7/8 oktas, Rain: Dry, Wind: F1, Visibility: very good

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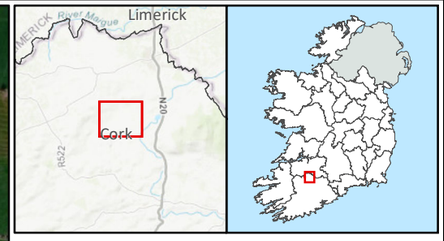

Legend

- Site Boundary
- Turbine Layout
- Bird Survey Transect
- Construction Access
- Turbine Hardstanding Area
- Construction Compound
- Substation
- Internal Access Track

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0 0.5 1 2 Kilometers

TITLE: Breeding/Wintering Bird and Wader Survey Transects			
PROJECT: Annagh Wind Farm, Co. Cork			
FIGURE NO:	2.3		
CLIENT:	EMPower		
SCALE:	1:12500	**REVISION:**	0
DATE:	18/10/2021	**PAGE SIZE:**	A3

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3. RESULTS

3.1 Avian usage of the Study Area – Vantage point

A total of 2 timed watches of 3 hours duration each were carried out at each of the 2 vantage points every month from April 2019 to March 2020, inclusive. This surveying effort totals to 72 hours of observation time at each VP over the survey period (see Appendix 3). Bird activity was recorded from the VPs every month. Table 3.1 shows all the species recorded during surveys. In total there were 49 individual flight lines of 11 target species observed during VP surveys competed over the survey period.

It is noted that a total of 8 additional flight lines for 4 species (1 additional species) were also recorded during winter transect surveys.

In total, 57 species of bird were noted (including additional target species records from transect surveys). Of these species, 6 are of Red-list status under the BoCCI: Grey Wagtail, Kestrel, Meadow Pipit, Redwing, Snipe and Swift. A total of 16 are Amber-listed and the remaining 35 are Green-listed. A total of 2 species are protected under Annex I of the EU Birds Directive: Hen Harrier and Little Egret. Table 3-1 details the conservation status of all 57 species.

3.1.1 Summary Results Summer 2019 (April - September)

Target species observed during this survey period at Annagh include Buzzard, Little Egret, Great Black-backed Gull, Grey Heron, Kestrel, and Lesser Black-backed Gull. Buzzard was recorded on 5 occasions, Grey Heron on 9, Kestrel on 6 and Lesser Black-backed Gull on 2 occasions during summer vantage point surveys in 2019.

3.1.2 Summary Results Winter 2019/20 (October - March)

Target species observed during this survey period included: Black-headed Gull, Buzzard, Cormorant, Common Gull, Grey Heron, Kestrel, Lesser Black-backed Gull, Mute Swan, Sparrowhawk, and Snipe. During VP surveys in winter 2019-20, Black-headed Gull was recorded on 2 occasions, Buzzard 9, Cormorant 2, Common Gull 1, Grey Heron 6, Kestrel 4, Lesser Black-backed Gull 1, Mute Swan 1, Sparrowhawk 1, and Snipe on 1 occasion. The following target species observations were recorded incidentally during winter transect surveys on 21st January 2020: Grey Heron (3 observations), Buzzard (1 observation), Hen Harrier (1 observation) and Snipe (3 observations).

Table 3-1: Bird species recorded during VP surveys and additional target species records from transect surveys

Common name (BTO code)	Scientific name	*BoCCI status	**Annex I status
Blackbird (B.)	*Turdus merula*	Green	No
Blackcap (BC)	*Sylvia atricapilla*	Green	No
Black-headed Gull (BH)	*Chroicocephalus ridibundus*	Amber	No
Blue Tit (BT)	*Cyanistes caeruleus*	Green	No
Bullfinch (BF)	*Pyrrhula pyrrhula*	Green	No

Common name (BTO code)	Scientific name	*BoCCI status	**Annex I status
Buzzard (BZ)	*Buteo buteo*	Green	No
Chaffinch (CH)	*Fringilla coelebs*	Green	No
Chiffchaff (CC)	*Phylloscopus collybita*	Green	No
Coal Tit (CT)	*Periparus ater*	Green	No
Common Gull (CM)	*Larus canus*	Amber	No
Coot (CO)	*Fulica atra*	Amber	No
Cormorant (CA)	*Phalacrocorax carbo*	Amber	No
Cuckoo (CK)	*Cuculus canorus*	Green	No
Dunnock (D.)	*Prunella modularis*	Green	No
Feral Pigeon (FP)	*Columba livia*	Green	No
Fieldfare (FF)	*Turdus pilaris*	Green	No
Goldcrest (GC)	*Regulus regulus*	Amber	No
Goldfinch (GF)	*Carduelis carduelis*	Green	No
Great Black-backed Gull (GB)	*Ardea cinerea*	Green	No
Great Tit (GT)	*Parus major*	Green	No
Grey Heron (H.)	*Ardea cinerea*	Green	No
Grey Wagtail (GL)	*Motacilla cinerea*	Red	No
Hen Harrier	***Circus cyaneus***	**Amber**	**Yes**
Hooded Crow (HC)	*Corvus cornix*	Green	No
House Martin (HM)	*Delichon urbicum*	Amber	No
House Sparrow (HP)	*Passer domesticus*	Amber	No
Jackdaw (JD)	*Corvus monedula*	Green	No
Jay (J.)	*Garrulus glandarius*	Green	No
Kestrel (K.)	*Falco tinnunculus*	Red	No
Lesser Black-backed Gull (LB)	*Larus fuscus*	Amber	No
Lesser Redpoll (LR)	*Carduelis cabaret*	Green	No
Linnet (LI)	*Carduelis cannabina*	Amber	No
Little Egret (ET)	***Egretta garzetta***	**Green**	**Yes**
Long-tailed Tit (LT)	*Aegithalos caudatus*	Green	No
Magpie (MG)	*Pica pica*	Green	No
Meadow Pipit (MP)	*Anthus pratensis*	Red	No
Mistle Thrush (M.)	*Turdus viscivorus*	Green	No
Mute Swan (MS)	*Cygnus olor*	Amber	No
Pheasant (PH)	*Phasianus colchicus*	Green	No

Common name (BTO code)	Scientific name	*BoCCI status	**Annex I status
Pied/White Wagtail (PW)	*Motacilla alba*	Green	No
Raven (RN)	*Corvus corax*	Green	No
Redwing (RE)	*Turdus iliacus*	Red	No
Robin (R.)	*Erithacus rubecula*	Green	No
Rook (RO)	*Corvus frugilegus*	Green	No
Sand Martin (SM)	*Riparia riparia*	Amber	No
Siskin (SK)	*Carduelis spinus*	Green	No
Skylark (S.)	*Alauda arvensis*	Amber	No
Snipe (SN)	*Gallinago gallinago*	Red	No
Song Thrush (ST)	*Turdus philomelos*	Green	No
Sparrowhawk (SH)	*Accipiter nisus*	Green	No
Starling (SG)	*Sturnus vulgaris*	Amber	No
Stonechat (SC)	*Saxicola torquatus*	Green	No
Swallow (SL)	*Hirundo rustica*	Amber	No
Swift (SI)	*Apus apus*	Red	No
Willow Warbler (WW)	*Phylloscopus trochilus*	Amber	No
Woodpigeon (WP)	*Columba palumbus*	Green	No
Wren (WR)	*Troglodytes troglodytes*	Green	No

* refers to the conservation status of the species according to Birds of Conservation Concern in Ireland

**refers to species listed on Annex I of the EU Birds Directive

3.2 Target Species observations

3.2.1 Black-headed Gull

A total of 2 observations of this Amber-listed species were recorded during winter vantage point surveys, both of which were below the rotor-swept height band (25-175m). The first observation was in December 2019 at VP 2 where a large flock was recorded flying in from the south-west and foraging in a field for 145 minutes, outside the 500m buffer zone. The second observation was in February 2020 at VP 1 where 10 birds were recorded foraging in a field for 60 minutes before flying east, outside the 500m buffer zone.

During hinterland surveys, Black-headed Gull was recorded on 3 occasions in the summer season (May, June & July 2019), and once in the winter season, with a maximum count of 4 in June. All hinterland records come from site 12 (Large Quarry Lake – Ballinadrideen).

3.2.2 Buzzard

A total of 14 observations of this Green-listed species were made during VP surveys (5 in summer, 9 in winter). One additional flight line was recorded during winter transect surveys.

Five observations of Buzzard were recorded in Summer 2019. Four of these flight paths were both in and outside the 500m buffer. Two of the observations inside/outside the 500m buffer in summer 2019 were single birds and two of the observations were of two birds. The fifth sighting (single bird) was outside of the buffer zone. All recorded flight paths within the buffer zone were within the rotor-swept height band (25-175m).

A total of nine observations of this Green-listed species were made during winter VP surveys 2019-20. During this period there was one instance of five birds sighted together (15/01/2020, at VP 1 inside/outside the buffer zone). The other eight sightings of Buzzard were of single birds, three of which were within the 500m buffer zone, five of which were inside/outside and one which was outside. Of the birds observed within the buffer zone, two flew within the rotor-swept height band (25-175m). One additional flight line was recorded during winter transect surveys. This incidentally recorded flight line was inside the 500m buffer, below the rotor-swept height band.

across both seasons, most of the observations were of single birds, with occasional sightings of 2 birds and one instance of 5 birds (15/01/2020, at VP 1).

There were no nests of Buzzards recorded on site or in the surrounding area, but given the frequency of recordings, it is likely that the species is breeding nearby.

3.2.3 Common Gull

This Amber-listed gull species was observed on 1 occasion during winter 2019-20 surveys in February 2020 at VP1. A group of 15 birds were recorded foraging as part of a mixed flock in an improved agricultural grassland (GA1) field for 60 minutes outside the 500m buffer zone before flying away low (0-10m) to the east.

3.2.4 Cormorant

A total of two sightings of this Amber-Listed species were recorded during winter 2019-20 VP surveys, at both VP1 and VP2, in January and February 2020. Both were outside the buffer zone. No sightings were recorded within the rotor-swept height band (25-175m).

3.2.5 Grey Heron

This Green-listed species was recorded as a flight-line during VP surveys on ten occasions at VPs 1 and 2, with seven records for summer VP surveys, and three during winter VP surveys.

A total of seven observations of Grey Heron in flight were recorded during summer 2019. Of the flight lines recorded as part of the summer surveys, one was inside the buffer, one was outside, and five were inside/outside. Four were single individuals flying between 0-20m height. One of these sightings was of an adult and a juvenile flying together at 0-20m height on 29/04/2019. Two observations were of single birds flying within the rotor-swept height band (25-175m). The five remaining observations were of single birds flying below the rotor-swept height band. One record of Grey Heron calling but not seen was also made.

Three Grey Heron flight lines were recorded during December 2019 as part of the winter 2019-20 surveys. Each sighting was of birds within the buffer zone flying at heights between 0-20m. A total of three incidental flight lines were also recorded during winter transect surveys. All were inside the 500m buffer, below the rotor-swept height band. A further three observations of Grey Heron were also made where flight activity was not recorded because they were either perched or on the ground during the VP.

3.2.6 Kestrel

This red-listed species was recorded 4 times in winter and 6 in the summer. All sightings involved single birds, with one record inside the 500m buffer zone, 4 out, and 5 in and out. Most of these records involved birds flying in the 0-20m height band, however 4 sightings were noted within the rotor-swept height band (25-175m). Of note were 3 records of birds hunting within the site.

During summer 2019 surveys, there were six sightings in total. Three sightings were recorded in May from VP2. One of the birds was flying low within the buffer zone (below 20m), and two of the birds were flying both inside/outside the buffer zone and rose to a height between 20-40m which is within the rotor-swept height band (25-175m). The bird flying below 20m dived for prey within the site. A further three sightings were recorded from VP1 in May 2019. One was outside the buffer zone flying along the access road. The other two sightings were of birds flying both inside and outside the buffer zone with one individual rising into the rotor-swept height band inside the buffer zone.

During winter surveys a total of four observations of Kestrel were recorded. One involved a female observed from VP1 in November 2019 flying into a tree on site and flying out again heading West, both flight paths were outside the 500m buffer between 0-20m altitude. Two further flight lines were also outside the 500m buffer, below 20m altitude. The remaining sighting was inside/outside the 500m buffer; this Kestrel was being mobbed by corvids and was forced down.

3.2.7 Lesser Black-backed Gull

This Amber-listed gull species was recorded on one occasion during summer 2019 vantage point surveys at VP2, involving a single individual flying over the site. The individual was flying inside/outside the buffer zone.

One record was made during winter 2019-20 surveys of a large flock of birds feeding withing the site in an Improved agricultural grassland field (GA1). This observation was in January 2020 at VP2 where a large mixed flock (c. 60 birds, comprised of Black-headed and Lesser Black-backed Gulls) flew in low (0-20m) from the south-west and foraged in the field where VP2 is located for 145 minutes (outside the 500m buffer zone).

3.2.8 Little Egret

This Annex I species was recorded at VP 1 and 2 on six separate occasions with five records inside the 500m buffer zone and one inside/outside. Of these records, three were from the summer, with the remaining three from winter surveys. A high count of 4 individuals were noted feeding in GS4 on 13/02/20. No birds were recorded flying within the rotor-swept height band (25-175m).

All summer sightings recorded in 2019 were within the 500m buffer zone and were of single individuals flying low (0-20m).

During winter surveys 4 individuals were noted flying in from the east and foraging in GS4 on 13th February 2020 within the buffer zone. Two more sightings of single individuals flying below the rotor-swept height band (25-175m) were recorded; one within, and one inside/outside the 500m buffer. The latter of these birds flew in from the west and foraged in a wet, scrubby area.

3.2.9 Mute Swan

A single observation of this Amber-listed species was recorded during winter 2019-20 VP surveys. The observation was made from VP2 on 26/11/2019, involving a bird flying north to south, inside and outside the 500m buffer zone, spending the entirety of recorded time (23 seconds) within the rotor-swept height band (25-175m).

3.2.10 Sparrowhawk

Sparrowhawk, a green-listed species in Ireland, was recorded once, during winter surveys, at VP 1, inside the 500m buffer zone, and below the rotor-swept height band (25-175m).

3.2.11 Snipe

Snipe was not recorded during VP surveys but was observed flying within the 500m buffer during winter transect surveys in January 2020. All three flights observed were below the rotor-swept height band. All were short flights (5-8 seconds) within the 500m buffer, in the 0-10m height band.

3.2.12 Hen Harrier

This species was not recorded during VP surveys but was observed flying within the 500m buffer over wet grassland during winter transect surveys in January 2020 The flight was below the rotor-swept height band. The surveyor noted the bird was a ringtail.

3.3 Hinterland Survey

Hinterland surveys to establish breeding occupancy and census wetland sites within a 10 km radius of the site were carried out over a 14 day period over 12-months across 2019 and 2020. The survey schedule and locations of the Hinterland watches are shown in Table 2-3 of Section 2.2. A total of 47 bird species were identified during Hinterland surveys within this 12-month period.

A total of 3 Annex I species were recorded during hinterland surveys: Little Egret, Kingfisher, and Whooper Swan. A total of 10 Red-listed species were observed: Curlew, Grey Wagtail, Kestrel, Lapwing, Meadow Pipit, Redwing, Shoveler, Snipe, swift and Yellowhammer. A further 19 Amber-listed species were observed.

Species recorded during Hinterland surveys included three raptor species, two gull species, five wader species, seven duck species, one goose species and two swan species.

For site-specific Hinterland survey results see Appendix 5 of this report. Species of conservation concern that were recorded will be discussed in more detail in this section. Species have been selected for detailed discussion on the basis of conservation status, vulnerability to wind farm developments and if species sightings have been confirmed on or near the proposed Wind Farm site, which will indicate potential links between species recorded at the proposed site and the surrounding environment.

3.3.1 Black-headed Gull

This Amber-listed Gull species was seen on four occasions during Hinterland surveys. All observations were at Large Quarry Lake (Ballinadrideen), which is 2.6 km from the proposed Annagh Wind Farm. Sightings were noted in May, June, July and October 2019 and between two and four individuals were observed on each occasion.

3.3.2 Cormorant

Amber-listed Cormorant was noted on four occasions during Hinterland surveys and all observations were from the winter 2019/2020 season. Two observations were made at Large Quarry Lake (Ballinadrideen) (2.6 km distance to proposed Wind Farm), where one Cormorant was seen in December 2019 and three birds were observed on the 25th of February 2020. Further observations were made in January 2020 with one sighting at River Blackwater SAC/ Buttevant (7.84 km distance to proposed Wind Farm), and one from the River Awbeg (2.76 km distance to proposed Wind Farm), where one Cormorant was noted on each occasion.

3.3.3 Curlew

This Red-listed wader species was seen on three occasions during Hinterland surveys. It was seen twice on the 17th of December 2019. Once at Glanmore Flats (5.55 km distance to proposed Wind Farm), where three Curlew were noted and once at Kilcolman Bog SPA (9.49 km distance to proposed Wind Farm) where 12 Curlew were observed. Additionally it was noted on the 28th of January 2020 at the Large Quarry Lake (Ballinadrideen) (2.6 km distance to proposed Wind Farm) where a flock of 40 Curlew was observed.

3.3.4 Grey Heron

Green-listed Heron was noted on 25 occasions during Hinterland surveys. The site with most Heron sightings was Large Quarry Lake (Ballinadrideen) (2.6 km distance to proposed Wind Farm). Heron were observed here in August, November and December 2019 as well as in January and February 2020. On five of these occasions one Heron was observed while on the 17th of December 2019 four Grey Herons were noted. Grey Heron were also observed five times at the River Blackwater SAC/Annagh Bridge (1.01 km distance to proposed Wind Farm), four times at the Kilcolman Bog SPA (9.49 km distance to proposed Wind Farm), three times at the River Blackwater SAC/ Buttevant (7.84 km distance to proposed Wind Farm), twice at the Small Quarry Lake (Ballyroe) (2.6 km distance to proposed Wind Farm), and once at 2 Flooded fields east of Corbett Court restaurant (co-ordinates 554293, 618683). These observations were made throughout the year during hinterland surveys in April, May, June, July, August, October and December 2019 and in January and February 2020.

3.3.5 Kestrel

Red-listed Kestrel was noted on two occasions during Hinterland surveys and one individual was seen each time. The first observation was from the 27th of August 2019 at Eagle Lough pNHA (8.6 km distance to proposed Wind Farm) and the second observation was from the 20th of December 2019 at Ballyhoura Mountain pNHA (6.6 km distance to proposed Wind Farm).

3.3.6 Lapwing

Red-listed Lapwing was noted on four occasions during Hinterland surveys. Lapwing was seen twice at the Large Quarry Lake (Ballinadrideen) (2.6 km distance to proposed Wind Farm), once on the 28th of January 2020 and once on the 25th of February where 16 and 21 Lapwing were observed respectively. The third occasion Lapwing was seen was on the 17th of December 2019 at Glanmore Flats (5.55 km distance to proposed Wind Farm) where 18 Lapwing were noted. Finally, six Lapwing were observed at the Kilcolman Bog SPA (9.49 km distance to proposed Wind Farm) on the 28th of November 2019.

3.3.7 Lesser Black-backed Gull

Amber-listed Lesser Black-backed Gull was noted on three occasions during Hinterland surveys with each observation being from the summer 2019 season. This gull species was observed at Large Quarry Lake (Ballinadrideen) (2.6 km distance to proposed Wind Farm) in May, June and July 2019 and between two and four individuals were observed on each occasion.

3.3.8 Little Egret

Little Egret, an Annex 1 species, was noted on five occasions during Hinterland surveys. Two observations were made at Eagle Lough pNHA (8.6 km distance to proposed Wind Farm), where one bird was observed on the 1st of August 2019 and four Little Egret were seen on the 8th of October 2019. One observation of four Little Egret was made on the 2nd of May 2019 at the River Blackwater SAC/Annagh Bridge (1.01 km distance to proposed Wind Farm). A further observation was made of one Little Egret at the Kilcolman Bog SPA (9.49 km distance to proposed Wind Farm) on the 23rd of June 2019. The final observation was on the 17th of December 2019 at 2 Flooded fields east of Corbett Court restaurant (co-ordinates 554293, 618683).

3.3.9 Mute Swan

This Amber-listed Swan species was noted on 22 occasions at eight different sites during Hinterland surveys. It was seen seven times at Castle Lake (Milltown) (0.9 km distance to proposed Wind Farm) where between two and five Mute Swan were seen in May, June, August, November and December 2019 and January 2020. Mute Swan were seen on four occasions at Kilcolman Bog SPA (9.49 km distance to proposed Wind Farm), where two Swans were seen on the 2nd of May 2019, one Swan was seen on the 27th of May 2019 and seven Swans were seen on the 17th of December 2019, an additional Mute Swan record was from the 28th of November 2019. At the River Blackwater SAC/ Buttevant (7.84 km distance to proposed Wind Farm), seven Mute Swans were seen on the 17th of December 2019 and three Swans were seen on the 28th of January 2019. At the River Awbeg (2.76 km distance to proposed Wind Farm), Mute Swan were seen in May and in December 2019 where between one and two Swans were seen on each occasion.

Mute Swan were also observed at West Plantation (Aughrim) (5.76 km distance to proposed Wind Farm), at Eagle Lough pNHA (8.6 km distance to proposed Wind Farm), at Glanmore Flats (5.55 km distance to proposed Wind Farm) and at the River Blackwater SAC/Annagh Bridge (1.01 km distance to proposed Wind Farm) where on each occasion between one and two birds was observed. These observations were from May and December 2019 and from February 2020.

3.3.10 Sparrowhawk

This Green-listed raptor species was seen twice during Hinterland surveys. One observation of a single hawk was made at Kilcolman Bog SPA (9.49 km distance to proposed Wind Farm) on the 23rd of June 2019 and a further sighting was recorded at the same site on the 1st of August 2019.

3.3.11 Snipe

Red-listed Snipe was noted five times during Hinterland surveys with all observations being from the winter 2019/2020 season and from four different Hinterland sites. Snipe was seen twice at the Large Quarry Lake (Ballinadrideen) (2.6 km distance to proposed Wind Farm), where three Snipe were noted on the 17th of December 2019 and one Snipe was noted on the 28th of January 2020. On the same day in January total of five Snipe were observed at Ballyhoura Mountain pNHA (6.6 km distance to proposed Wind Farm) and two Snipe were seen at the River Blackwater SAC/Annagh Bridge (1.01 km distance to proposed Wind Farm). On the 25th of February 2020 one Snipe was noted at Glanmore Flats (5.55 km distance to proposed Wind Farm).

3.3.12 Whooper Swan

Annex 1 species Whooper Swan was seen on eight occasions during Hinterland surveys, all of which were throughout the winter season 2019/2020. Of these, two observations were at the River Blackwater SAC/Annagh Bridge (1.01 km distance to proposed Wind Farm), the largest flock of 50 was observed on the 28th of January 2020 and a smaller number of 18 Whooper Swans was observed on the 17th of December 2019. A further large flock of 40 Whooper Swans was noted at Glanmore Flats (5.55 km distance to proposed Wind Farm) on the 28th of November 2019. At the Large Quarry Lake (Ballinadrideen) (2.6 km distance to proposed Wind Farm), ten Whooper Swans were seen on the 28th of January 2020, on the same day five more Swans were seen at Glanmore Flats (5.55 km distance to proposed Wind Farm). A total of eight Whooper Swans was noted on the 6th of November at Kilcolman Bog SPA (9.49 km distance to proposed Wind Farm) and a further record of Whooper Swan was taken at this site on the 28th of November 2019. Finally, seven Swans were seen on the 17th of December at the River Awbeg (2.76 km distance to proposed Wind Farm).

Table 3-2: Bird species recorded during hinterland surveys

Common Name	Scientific Name	Conservation Status	
		BoCCI*	Annex I**
Blackcap	*Sylvia atricapilla*	Green	No
Black-headed Gull	*Chroicocephalus ridibundus*	Amber	No
Buzzard	*Buteo buteo*	Green	No
Chaffinch	*Fringilla coelebs*	Green	No
Chiffchaff	*Phylloscopus collybita*	Green	No

Common Name	Scientific Name	Conservation Status	
		BoCCI*	Annex I**
Collared Dove	*Streptopelia decaocto*	Green	No
Coot	*Fulica atra*	Green	No
Cormorant	*Phalacrocorax carbo*	Amber	No
Curlew	*Numenius arquata*	Red	No
Garganey	*Anas querquedula*	Amber	No
Greenfinch	*Carduelis chloris*	Amber	No
Grey Heron	*Ardea cinerea*	Green	No
Grey Wagtail	*Motacilla cinerea*	Red	No
Greylag Goose	*Anser anser*	Amber	No
Hooded Crow	*Corvus cornix*	Green	No
House Martin	*Delichon urbicum*	Amber	No
Jackdaw	*Corvus monedula*	Green	No
Kestrel	*Falco tinnunculus*	Red	No
Kingfisher	***Alcedo atthis***	**Amber**	**Yes**
Lapwing	*Vanellus vanellus*	Red	No
Lesser Black-backed Gull	*Larus fuscus*	Amber	No
Little Egret	***Egretta garzetta***	**Green**	**Yes**
Little Grebe	*Tachybaptus ruficollis*	Green	No
Mallard	*Anas platyrhynchos*	Amber	No
Meadow Pipit	*Anthus pratensis*	Red	No
Moorhen	*Gallinula chloropus*	Green	No
Mute Swan	*Cygnus olor*	Amber	No
Pheasant	*Phasianus colchicus*	Green	No
Pied/White Wagtail	*Motacilla alba*	Green	No
Raven	*Corvus corax*	Green	No
Redwing	*Turdus iliacus*	Red	No
Rook	*Corvus frugilegus*	Green	No
Sand Martin	*Riparia riparia*	Amber	No
Shoveler	*Anas clypeata*	Red	No
Skylark	*Alauda arvensis*	Amber	No
Snipe	*Gallinago gallinago*	Red	No
Song Thrush	*Turdus philomelos*	Green	No
Sparrowhawk	*Accipiter nisus*	Green	No

Common Name	Scientific Name	Conservation Status	
		BoCCI*	Annex I**
Starling	*Sturnus vulgaris*	Amber	No
Stonechat	*Saxicola torquatus*	Green	No
Swallow	*Hirundo rustica*	Amber	No
Swift	*Apus apus*	Red	No
Teal	*Anas crecca*	Amber	No
Tufted Duck	*Aythya fuligula*	Amber	No
Whooper Swan	***Cygnus cygnus***	**Amber**	**Yes**
Wigeon	*Anas penelope*	Amber	No
Yellowhammer	*Emberiza citrinella*	Red	No

* refers to the conservation status of the species according to Birds of Conservation Concern in Ireland
**refers to species listed on Annex I of the EU Birds Directive

3.4 Breeding Waders Survey

Transect 1 (TR1) is located near the proposed road between T05 and T04, and the construction access track between T05 and substation. Transect 2 (TR2) is located north of T1 and below T01, T02 and T03, cutting across the proposed access track from T05 to T02 (see figure 2-3 for a detailed transect map). A confirmed breeding attempt by Snipe was established in the first of 4 visits in April 2019, along TR1. A total of 3 occupied territories were noted in May 2019 (all along TR1), as well as a confirmed attempt (TR1) and a potential Woodcock territory (TR1) based on a feather found on site. A return visit in August 2019 yielded another occupied territory (TR1) as well as an additional potential territory. The closest suitable habitat for breeding Woodcock is a conifer plantation at the eastern end of TR1, close to where the feather was found.

Table 3-3: Bird species recorded during breeding wader surveys

Date	Transect	Common Name	Behaviour	Breeding Status	Grid
26/04/2019	2	Snipe	Flushed	Potential	550406, 617426
26/04/2019	1	Snipe	Flushed	Potential	548934, 617056
26/04/2019	1	Snipe	Drumming	Confirmed attempt	549684, 617036
15/05/2019	1	Snipe	Flushed	Occupied Territory	550356, 616863
15/05/2019	1	Snipe	Flushed	Occupied Territory	550236, 616947
15/05/2019	1	Snipe	Flushed	Occupied Territory	549980, 617041
15/05/2019	1	Snipe	N/A	Confirmed attempt	549637, 617007
15/05/2019	1	Woodcock	N/A	Potential	550439, 616786
02/08/2019	1	Snipe	Calling	Occupied Territory	N/A
28/08/2019	1	Snipe	Flushed	Potential	N/A

3.5 General Breeding Bird Survey

The results of the summer breeding bird transect survey at Annagh are shown in Table 3-4. A total of 42 species were recorded along the transects. A total of 4 Red-listed species were recorded: Kestrel, Meadow Pipit, Snipe and Woodcock. Thirteen Meadow Pipit were recorded in transect one (b), and twelve in transect two (a), in the first visit in May 2019. In June, 10 were recorded in the first transect, and 3 in the second transect. A Woodcock feather was discovered along transect 1 in May (same record noted above in 3.4).

A total of eight Amber-listed species were recorded: Goldcrest, Greenfinch, ouse sparrow, Linnet, Skylark, Starling, Swallow and Willow Warbler.

Table 3-4: Results of breeding bird transects surveys of Annagh (TR1, TR2 and TR3) during summer 2019

Common Name	Scientific Name	Early		Late			Early		Late			
		T1					T2					
		0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO
Blackbird	*Turdus merula*	4	0	0	3	2	0	1	0	0	5	0	0
Blackcap	*Sylvia atricapilla*	0	1	0	0	3	0	2	3	0	3	0	0
Blue Tit	*Cyanistes caeruleus*	0	5	0	1	0	0	3	2	0	0	0	0
Bullfinch	*Pyrrhula pyrrhula*	0	2	0	0	4	0	2	0	0	0	0	0
Buzzard	*Buteo buteo*	0	0	0	0	0	2	0	0	0	0	0	1
Chaffinch	*Fringilla coelebs*	4	0	0	3	0	0	8	0	0	7	0	0
Chiffchaff	*Phylloscopus collybita*	0	6	0	0	1	0	0	0	0	0	0	0
Coal Tit	*Periparus ater*	0	0	0	0	0	0	0	0	0	2	0	0
Cuckoo	*Cuculus canorus*	0	0	0	0	1	0	0	2	0	0	0	0
Dunnock	*Prunella modularis*	0	0	0	2	0	0	2	1	0	3	0	0
Goldcrest	*Regulus regulus*	0	0	0	0	0	0	2	0	0	0	0	0
Goldfinch	*Carduelis carduelis*	2	0	0	0	0	0	2	0	0	0	0	0
Grasshopper Warbler	*Locustella naevia*	0	1	0	0	1	0	1	1	0	0	2	0
Great Tit	*Parus major*	7	2	0	2	0	0	3	1	0	4	0	0
Greenfinch	*Carduelis chloris*	0	1	0	0	1	0	0	2	0	0	0	0
Grey Heron	*Ardea cinerea*	0	0	0	0	2	0	0	0	2+	0	0	0

Common Name	Scientific Name	Early		Late				Early		Late			
		T1						T2					
		0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO
Hooded Crow	*Corvus cornix*	0	0	8	0	0	0	0	0	5	0	0	3
House Sparrow	*Passer domesticus*	0	0	0	0	0	1	0	0	0	0	0	0
Jackdaw	*Corvus monedula*	0	0	0	0	0	1	0	0	1	0	0	3
Kestrel	*Falco tinnunculus*	0	0	0	0	0	0	0	0	0	0	0	1
Lesser Redpoll	*Carduelis cabaret*	0	0	0	0	0	0	0	0	0	0	0	4
Linnet	*Carduelis cannabina*	0	2	0	0	0	5	0	1	0	0	2	0
Magpie	*Pica pica*	0	0	0	0	0	0	0	0	0	0	1	0
Meadow Pipit	*Anthus pratensis*	13	0	0	6	0	4	0	4	8	1	2	0
Mistle Thrush	*Turdus viscivorus*	0	0	0	0	0	0	0	2	0	0	0	0
Pheasant	*Phasianus colchicus*	3	0	0	0	0	1	0	2	0	0	1	0
Raven	*Corvus corax*	0	0	1	0	0	0	0	0	0	0	0	0
Reed Bunting	*Emberiza schoeniclus*	2	0	0	0	0	0	0	0	0	0	0	0
Robin	*Erithacus rubecula*	0	0	0	0	0	0	2	3	0	4	0	0
Rook	*Corvus frugilegus*	0	0	0	0	0	17	0	0	10	0	0	0
Sedge Warbler	*Acrocephalus schoenobaenus*	0	2	0	0	0	0	1	0	0	0	1	0
Siskin	*Carduelis spinus*	0	0	0	0	0	1	0	0	0	0	0	0
Skylark	*Alauda arvensis*	4	3	0	3	0	0	0	2	0	0	2	0

Common Name	Scientific Name	Early		Late				Early			Late		
		T1						T2					
		0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO
Snipe	*Gallinago gallinago*	4	0	0	2	0	0	0	0	0	2	0	0
Song Thrush	*Turdus philomelos*	3	0	0	3	0	0	0	0	0	1	0	0
Starling	*Sturnus vulgaris*	6	0	11	0	0	0	0	0	0	0	0	0
Stonechat	*Saxicola torquatus*	4	0	0	5	7	0	3	0	0	3	0	0
Swallow	*Hirundo rustica*	0	0	0	0	0	1	0	0	10	0	0	12
Willow Warbler	*Phylloscopus trochilus*	3	0	0	1	0	0	8	0	0	0	0	0
Woodcock	*Scolopax rusticola*	0	0	0	0	0	0	0	0	0	0	0	0
Woodpigeon	*Columba palumbus*	0	0	5	0	0	6	0	0	3	0	0	0
Wren	*Troglodytes troglodytes*	4	0	0	4	0	0	5	1	0	3	0	0
Total Number of Species:											**42**		

3.6 Wintering Bird Survey

The results of the wintering bird transect survey at Annagh are shown below, in table 3-5.

A total of 28 species were recorded along the transects. Just one Annex I species was recorded during surveys, namely Hen Harrier. This female/immature was observed south of T04, flying low in a westerly direction over wet grassland GS4.

A total of 4 Red-listed species (Kestrel, Meadow Pipit, Redwing and Snipe) were recorded. An additional 2 Amber-listed species were recorded: Hen Harrier and Starling.

Table 3-5: Results of wintering bird transects surveys at Annagh (TR1, TR2 and TR3) during winter 2019/20

Common Name	Scientific Name	Early		Late				Early			Late		
		T1						T2					
		0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO
Blackbird	*Turdus merula*	4	0	0	2	0	0	6	0	0	4	0	0
Blue Tit	*Cyanistes caeruleus*	1	0	0	1	0	0	7	0	0	2	0	0
Bullfinch	*Pyrrhula pyrrhula*	0	0	0	0	0	0	2	0	0	2	0	0
Buzzard	*Buteo buteo*	0	0	1	2	0	0	0	0	1	0	0	0
Chaffinch	*Fringilla coelebs*	2	2	0	1	0	0	1	0	0	2	0	0
Coal Tit	*Periparus ater*	0	2	0	0	0	0	0	4	0	0	0	0
Goldfinch	*Carduelis carduelis*	0	5	0	1	0	0	0	0	0	0	0	0
Great Tit	*Parus major*	3	0	0	0	1	0	4	0	0	0	0	1
Grey Heron	*Ardea cinerea*	0	0	0	1	0	0	0	0	1	4	1	0
Hen Harrier	*Circus cyaneus*	0	0	0	1	0	0	0	0	0	0	0	0
Hooded Crow	*Corvus cornix*	0	0	1	0	1	4	0	0	0	1	1	2
Jack Snipe	*Lymnocryptes minimus*	0	0	0	0	0	0	0	0	0	0	0	0
Jackdaw	*Corvus monedula*	2	0	3	0	0	0	0	0	0	0	0	0
Jay	*Garrulus glandarius*	0	0	0	1	0	0	0	0	0	0	0	0
Kestrel	*Falco tinnunculus*	0	0	0	0	0	0	1	0	0	0	0	0
Long-tailed Tit	*Aegithalos caudatus*	0	0	0	0	0	0	0	2	0	0	1	0

Common Name	Scientific Name	Early		Late				Early			Late		
		T1						T2					
		0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO	0-25m	25-100m	>100/FO
Magpie	*Pica pica*	0	0	0	0	0	1	0	0	1	0	0	0
Meadow Pipit	*Anthus pratensis*	0	0	6	0	0	0	0	0	0	7	0	0
Mistle Thrush	*Turdus viscivorus*	0	0	0	0	2	0	0	0	0	0	0	0
Redwing	*Turdus iliacus*	0	0	15	0	0	0	0	0	60	5	0	0
Robin	*Erithacus rubecula*	3	0	0	0	0	0	4	0	0	2	0	0
Rook	*Corvus frugilegus*	1	0	0	1	0	6	0	0	0	0	0	20
Snipe	*Gallinago gallinago*	0	2	0	0	0	0	2	0	0	1	4	0
Song Thrush	*Turdus philomelos*	0	0	0	0	0	0	6	0	0	0	0	0
Starling	*Sturnus vulgaris*	0	35	0	0	0	0	0	0	0	0	0	0
Stonechat	*Saxicola torquatus*	0	0	0	1	0	0	0	0	0	0	0	0
Woodpigeon	*Columba palumbus*	0	0	3	0	0	3	3	0	10	1	0	1
Wren	*Troglodytes troglodytes*	3	0	0	0	0	0	5	0	0	2	0	0
Total number of species:											**28**		

4. DISCUSSION

In conclusion, FT carried out one full year of ornithological surveys at the proposed Annagh Wind Farm between April 2019 and March 2020, inclusive. The following surveys were undertaken: vantage point surveys, breeding & winter bird transect surveys, hinterland surveys, and breeding wader surveys.

In total there were 58 individual flight lines of 12 target species observed during the survey period (including additional flight lines for recorded during transect surveys).

In total 57, species of bird were noted. Of these species, 6 are of Red-list status under the BoCCI: Grey Wagtail, Kestrel, Meadow Pipit, Redwing , Snipe and swift. A total of 16 are Amber-listed and the remaining 35 are Green-listed. A total of 2 species are protected under Annex I of the EU Birds Directive: Hen Harrier and Little Egret. Table 3-1 details the conservation status of all 57 species.

Annex I-listed Little Egret was observed on a total of 5 occasions. All flight-lines of this species were below 20m, highlighting the fact that birds were primarily feeding or commuting within site, in suitable GS4 habitat. There was one record of annex-1 listed Hen Harrier, with a ringtail observed flying within the 500m buffer over wet grassland during winter transect surveys in January 2020. The flight was below the rotor-swept height band.

A total of 47 bird species were identified during Hinterland surveys surrounding the proposed site. A total of 3 Annex I species were recorded: Little Egret, Kingfisher, and Whooper Swan. A total of 10 Red-listed species were observed: Curlew, Grey Wagtail, Kestrel, Lapwing, Meadow Pipit, Redwing, Shoveler, Snipe, Swift and Yellowhammer. A further 18 Amber-listed species were observed during hinterland surveys.

The most important sites for wetland bird species of interest were the Large Quarry Lake (Ballinadrideen) at 2.6 km from the proposed development and Kilcolman Bog SPA at 9.49 km from the proposed development. At the Large Quarry Lake (Ballinadrideen) the following species of conservation concern, and species which are known to be vulnerable to wind farm developments, were noted: Annex 1 species Whooper Swan, Red-listed Lapwing, Curlew and Snipe and Amber-listed Lesser Black-backed Gull, Black-headed Gull, Cormorant, Mallard, Teal, Wigeon, Sand Martin, House Martin and Swalllow, as well as Green-listed Grey Heron. At Kilcolman Bog SPA the following species of conservation concern were noted: Annex 1 species Whooper Swan, Red-listed Curlew, Amber-listed Garganey, Greylag Goose, Mallard, Teal, Wigeon, Tufted Duck and Mute Swan, as well as Green-listed Grey Heron, Sparrowhawk, Buzzard, Coot, Little Grebe and Moorhen.

Other Hinterland sites which support a variety of species of conservation interest are: River Blackwater SAC/Annagh Bridge (1.01 km distance to proposed Wind Farm), River Awbeg (2.76 km distance to proposed Wind Farm), Ballyhoura Mountains pNHA (6.6 km distance to proposed Wind Farm), River Blackwater SAC/ Buttevant (7.84 km distance to proposed Wind Farm) and Eagle Lough pNHA (8.6 km distance to proposed Wind Farm).

A confirmed breeding attempt by common Snipe was established in the first of 4 visits in April 2019. A total of 3 occupied territories were noted in May, as well as a confirmed attempt and a potential woodcock territory based on a feather found on site. A return visit in August 2019 yielded another occupied territory as well as an additional potential territory.

A comprehensive ornithological assessment is included in the EIAR (Chapter 8: Biodiversity). This comprises a detailed impact assessment of the potential impact of the proposed Wind Farm on birds. Collision risk modelling (CRM) has been carried out for target species and the CRM report is contained within Appendix 8.7 of the EIAR.

5. REFERENCES

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APPENDIX 1

VP Summer 2019
Survey Details

VP Summer 2019 - Survey Details

Site	VP	Date	Start Time	End Time	Cloud (Oktas)	Visibility	Rain	Wind
Annagh	1	29/04/2019	08:45	15:15	8	Excellent - Good	Light at times	F0
Annagh	2	01/05/2019	09:45	16:15	6 to 7	Excellent	Light	F1-0 W
Annagh	1	22/05/2019	08:10	14:40	3 to 7	Excellent	Dry	F0-1
Annagh	2	24/05/2019	08:05	14:35	8	Good - OK	N/A - Light @ 12	F1-2 E
Annagh	1	24/06/2019	14:05	17:05	5	Excellent	Dry	F1 SE
Annagh	1	25/06/2019	09:05	12:05	8	Fair - Good	Dry	F2 NW
Annagh	2	24/06/2019	11:00	14:00	7	Excellent	Dry	F1-2 SE
Annagh	2	25/06/2019	06:00	09:00	8	Poor-Fair	Dry	F2-3 NW
Annagh	1	02/08/2019	09:30	12:30	0 to 2	Excellent	Light Showers	F2-3 SE - E
Annagh	1	03/08/2019	08:05	11:05	6	Excellent	Light Showers	F2-3 SE
Annagh	2	02/08/2019	12:35	15:35	1	Excellent	Dry	F2-3 E
Annagh	2	03/08/2019	11:10	14:10	6	Excellent	Dry	F2-3 SE
Annagh	1	27/08/2019	11:00	14:00	8	Excellent	Rain at 12	F2-3 SW
Annagh	1	28/08/2019	07:00	10:00	0 to 8	Excellent	Dry	F1-2 SW
Annagh	2	27/08/2019	14:05	17:05	8	Excellent	Occasional fronts	F2-3 SW
Annagh	2	28/08/2019	10:10	13:10	2	Excellent	Dry	F1-2 SW
Annagh	1	02/09/2019	14:00	17:00	8	Excellent	Occasional light showers	F4 SW
Annagh	1	03/09/2019	09:35	12:35	8	Good - Fair	Drizzle	F1-2 S
Annagh	2	02/09/2019	17:10	20:10	8	Excellent	Occasional showers	F4-5 SW
Annagh	2	03/09/2019	06:30	09:30	8	Excellent	Very light drizzle	F1-2 S

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APPENDIX 2

VP Winter 2019/2020
Survey Details

VP Winter 2019/2020 - Survey Details

Site	VP	Date	Start	End	Cloud (Oktas)	Visibility	Rain	Wind
Annagh	1	06/11/2019	12:50	15:50	8	Good	Occ. Drizzle	F1-2 SSW
Annagh	1	08/11/2019	09:20	12:20	0	Excellent	Dry	F1 SW
Annagh	2	06/11/2019	09:45	12:45	8	Moderate - Good	Persistent until 11:45	F1-2 SSW
Annagh	2	08/11/2019	12:25	15:25	0	Excellent	Dry	F1 SW
Annagh	2	26/11/2019	09:30	15:30	8	Good	Dry - Light Drizzle	F3-4
Annagh	1	27/11/2019	09:35	15:35	7	Good	Dry	F3
Annagh	1	16/12/2019	08:40	11:40	2	Very Good	Dry	F1
Annagh	1	16/12/2019	11:40	14:40	1	Very Good	Dry	F1
Annagh	2	08/01/2020	09:30	15:30	4 to 7	Good	Dry	F1
Annagh	1	15/01/2020	10:30	16:30	1 to 6	Excellent	Occ. Light Showers	F1-2
Annagh	2	18/02/2020	09:30	16:00	6	Good	Occ. Light Showers	F3-4
Annagh	1	13/02/2020	09:30	16:00	2	Good	Dry	F2
Annagh	2	09/03/2020	09:05	15:05	8	Good	Persistent	F1-2 SE
Annagh	1	22/03/2020	10:15	13:20	5	Excellent	Dry	F1-2 SE
Annagh	1	23/03/2020	09:00	12:00	8	Good	Frequent squalls	F5 SW
Annagh	2	22/03/2020	13:30	16:30	4	Excellent	Dry	F1-2 SE
Annagh	2	23/03/2020	12:10	15:15	8	Good	Freq. heavy squalls	F4 SW

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APPENDIX 3

Bird Survey Observations 2019-2020

Summer Survey 2019 Bird Flightline data

Site	VP	Date	Observation	Species	Species Quantity	Start Time	Duration	Flightline Map	Flightline No.
Annagh	1	29/04/2019	2	Buzzard	2	09:42	120	8B	2
Annagh	2	01/05/2019	2	Buzzard	1	11:44	240	8B	4
Annagh	2	24/05/2019	8	Buzzard	1	14:02	25	8B	24
Annagh	1	22/05/2019	4	Buzzard	2	11:27	560	8B	13
Annagh	1	22/05/2019	5	Buzzard	1	12:02	240	8B	14
Annagh	3	03/09/2019	-	Buzzard	1	-	-	-	-
Annagh	1	29/04/2019	1	Grey Heron	2	09:22	15	8C	1
Annagh	2	01/05/2019	1	Grey Heron	1	09:50	20	8C	3
Annagh	2	01/05/2019	7	Grey Heron	1	16:15	20	8C	9
Annagh	2	24/05/2019	4	Grey Heron	1	08:51	40	8C	20
Annagh	2	24/05/2019	7	Grey Heron	1	12:40	35	8C	23
Annagh	1	22/05/2019	2	Grey Heron	1	10:47	20	8C	11
Annagh	1	22/05/2019	7	Grey Heron	1	13:59	30	8C	16
Annagh	2	28/08/2019	-	Grey Heron	1	-	-	-	-
Annagh	2	02/09/2019	-	Grey Heron	1	-	-	-	-
Annagh	3	03/09/2019	-	Grey Heron	2	-	-	-	-
Annagh	2	01/05/2019	3	Kestrel	1	13:47	25	8D	5
Annagh	2	01/05/2019	4	Kestrel	1	15:45	15	8D	6
Annagh	2	01/05/2019	6	Kestrel	1	16:03	30	8D	8
Annagh	1	22/05/2019	1	Kestrel	1	10:38	30	8D	10

Site	VP	Date	Observation	Species	Species Quantity	Start Time	Duration	Flightline Map	Flightline No.
Annagh	1	22/05/2019	3	Kestrel	1	11:20	40	8D	12
Annagh	1	22/05/2019	6	Kestrel	1	13:28	5	8D	15
Annagh	2	24/05/2019	5	Lesser Black-backed Gull	1	09:50	35	8E	21
Annagh	2	01/05/2019	5	Little Egret	1	16:00	30	8F	7
Annagh	2	24/05/2019	1	Little Egret	1	08:28	20	8F	18
Annagh	2	22/05/2019	1	Little Egret	1	14:09	20	8F	17

Winter Survey 2019/20 Bird Flightline data

VP	Date	Observation	Species	Species Quantity	Start Time	Duration	Flightline Map	Flightline No.
2	08/01/2020	6	Black-headed Gull	30	12:15	8700	8H	22
1	13/02/2020	5	Black-headed Gull	10	15:16	3600	8H	49
2	08/01/2020	1	Buzzard	1	09:50	19	8G	29
2	08/01/2020	2	Buzzard	1	09:55	350	8G	30
2	08/01/2020	3	Buzzard	1	10:04	600	8G	31
1	15/01/2020	1	Buzzard	1	11:30	150	8G	37
1	15/01/2020	2	Buzzard	1	11:35	125	8G	38
1	15/01/2020	3	Buzzard	5	11:57	545	8G	39
1	15/01/2020	4	Buzzard	1	12:11	39	8G	40
1	15/01/2020	8	Buzzard	1	14:19	9	8G	44
1	13/02/2020	1	Buzzard	1	09:48	128	8G	45
TR1	21/01/2020	3	Buzzard	1	9:21	10	8G	187
1	13/02/2020	4	Common Gull	15	15:16	3600	8I	48
2	08/01/2020	4	Cormorant	1	11:36	9	8J	32
1	13/02/2020	3	Cormorant	1	13:14	70	8J	47
2	09/03/2020	-	Cormorant	2	-	-	-	-
1	08/11/2019	-	Grey Heron	1	-	-	-	-
2	08/01/2020	5	Grey Heron	1	11:49	10	8L	33
2	08/01/2020	7	Grey Heron	1	13:14	120	8L	35
2	08/01/2020	8	Grey Heron	1	13:49	20	8L	36
2	22/03/2020	-	Grey Heron	1	-	-	-	-
TR1	21/01/2020	1	Grey Heron	1	9:39	10	8L	186

VP	Date	Observation	Species	Species Quantity	Start Time	Duration	Flightline Map	Flightline No.
TR1	21/01/2020	4	Grey Heron	1	10:40	5	8L	189
TR1	21/01/2020	7	Grey Heron	1	10:10	7	8L	192
TR1	21/01/2020	3	Hen Harrier	1	9:15	6	8K	188
1	27/11/2019	1	Kestrel	1	13:24	35	8M	25
1	16/12/2019	1	Kestrel	1	10:01	4	8M	28
1	15/01/2020	5	Kestrel	1	12:26	45	8M	41
2	18/02/2020	1	Kestrel	1	12:19	47	8M	50
2	08/01/2020	6	Lesser Black-backed Gull	30	12:15	8700	8N	34
1	27/11/2019	2	Little Egret	1	13:45	216	8O	26
1	15/01/2020	7	Little Egret	1	14:01	18	8O	43
1	13/02/2020	2	Little Egret	4	10:22	240	8O	46
2	26/11/2019	1	Mute Swan	2	13:10	23	8P	27
TR1	21/01/2020	5	Snipe	3	10:39	8	8Q	190
TR1	21/01/2020	6	Snipe	1	10:15	5	8Q	191
TR1	21/01/2020	8	Snipe	1	10:12	7	8Q	193
2	08/11/2019	-	Snipe	2	-	-	-	-
2	06/11/2019	-	Snipe	1	-	-	-	-
1	22/03/2020	-	Snipe	1	-	-	-	-
1	23/03/2020	-	Snipe	2	-	-	-	-
1	15/01/2020	6	Sparrowhawk	1	13:39	4	8R	42

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APPENDIX 4

Target species Flight Lines

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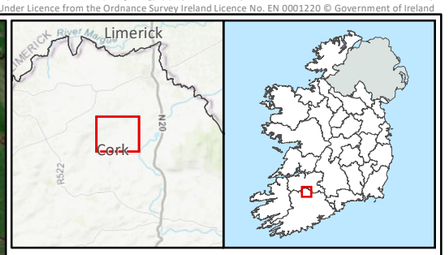

Legend

- Site Boundary
- Turbine Layout 500m Buffer
- Turbine Layout

Flightlines

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- 22, 08/01/2020, 12:15
- 49, 13/02/2020, 15:16

N W E S

Kilometers
0.5 0.25 0 0.5

TITLE:	Winter 2019 - 2020 Flightlines Black-headed Gull		
PROJECT:	Annagh Wind Farm, Co. Cork		
FIGURE NO:	8H		
CLIENT:	EMPower		
SCALE:	1:12500	**REVISION:**	0
DATE:	13/10/2021	**PAGE SIZE:**	A3

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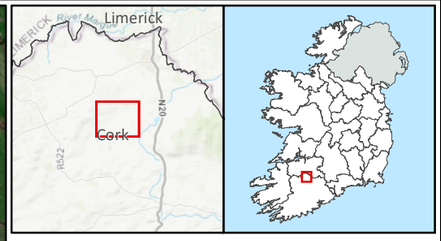

Legend

- Site Boundary
- Turbine Layout 500m Buffer
- Turbine Layout

Flightlines

ID, Date, Time:

- 29, 08/01/2020, 09:50
- 30, 08/01/2020, 09:55
- 31, 08/01/2020, 10:04
- 37, 15/01/2020, 11:30
- 38, 15/01/2020, 11:35
- 39, 15/01/2020, 11:57
- 40, 15/01/2020, 12:11
- 44, 15/01/2020, 14:19
- 45, 13/02/2020, 09:48
- 187, 21/01/2020, 09:21

Kilometers
0.5 0.25 0 0.5

TITLE:	Winter 2019 - 2020 Flightlines Buzzard		
PROJECT:	Annagh Wind Farm, Co. Cork		
FIGURE NO:	8G		
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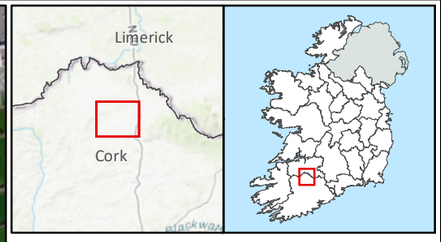

Legend

- Site Boundary
- Turbine Layout 500m Buffer
- Turbine Layout

Flightlines

ID, Date, Time:

- 2, 29/04/2019, 09:42
- 4, 01/05/2019, 11:44
- 13, 22/05/2019, 11:27
- 14, 22/05/2019, 12:02
- 24, 24/05/2019, 14:02

N W E S

0.5 0.25 0 0.5 Kilometers

TITLE:	Summer 2019 Flightlines Buzzard		
PROJECT:	Annagh Wind Farm, Co. Cork		
FIGURE NO:	8B		
CLIENT:	EMPower		
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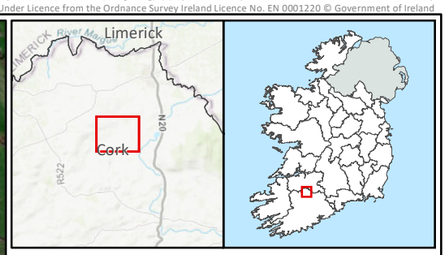

Legend

- Site Boundary
- Turbine Layout 500m Buffer
- Turbine Layout

Flightlines

ID, Date, Time:

- 48, 13/02/2020, 15:16

TITLE:	Winter 2019 - 2020 Flightlines Common Gull		
PROJECT:	Annagh Wind Farm, Co. Cork		
FIGURE NO:	8I		
CLIENT:	EMPower		
SCALE:	1:12500	**REVISION:**	0
DATE:	13/10/2021	**PAGE SIZE:**	A3

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N W E S

0.5 0.25 0 0.5 Kilometers

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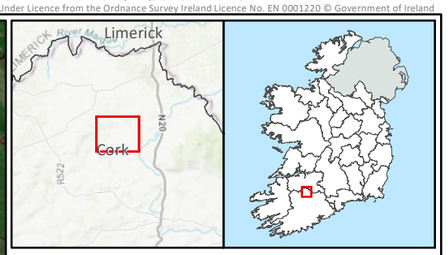

Legend

- Site Boundary
- Turbine Layout 500m Buffer
- Turbine Layout

Flightlines

ID, Date, Time:

- 32, 08/01/2020, 11:36
- 47, 13/02/2020, 13:14

N
W E
S

0.5 0.25 0 0.5 Kilometers

TITLE:	Winter 2019 - 2020 Flightlines Cormorant		
PROJECT:	Annagh Wind Farm, Co. Cork		
FIGURE NO:	8J		
CLIENT:	EMPower		
SCALE:	1:12500	**REVISION:**	0
DATE:	13/10/2021	**PAGE SIZE:**	A3

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