Planning and Environmental Consultants

Appropriate Assessment Screening Report and Natura Impact Statement

Lemanaghan Wind Farm, Co. Offaly

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Term	Definition
Qualifying Interests	The specific habitats or species for which Special Areas of Conservation (SACs) are designated under the EU Habitats Directive
Biological Q-Rating	A scientific method used to assess water quality in rivers and streams, in Ireland; developed by the EPA
Natural Heritage Area	Areas considered important for the habitats present or areas which hold species whose habitats require protection
Potential Collision Height	The rotor-swept area of the proposed turbines
Proposed Natural Heritage Area	a site designated under non-statutory protection for its significant wildlife and habitats, representing the initial stage of becoming a fully designated Natural Heritage Area
Special Areas of Conservation	Designated for habitats (e.g., active raised bogs, reefs) and non-bird species listed under the EU Habitats Directive.
Special Conservation Interests	Specific species or habitats for which a site is designated as a Special Protection Area (SPA), primarily focusing on rare, vulnerable, or migratory birds, as well as wetlands
Special Protection Areas	Designated specifically for the protection of wild birds and their habitats under the Birds Directive.

GLOSSARY OF ACRONYMS

Acronym	Definition
AASR	Appropriate Assessment Screening Report
BTO	British Trust for Ornithology
DAU	Development Applications Unit
DEM	Digital Elevation Model
DTM	Digital Terrain Model
ECoW	Ecological Clerk of Works
EDNA	Environmental DNA
EQSs	Environmental Quality Standards
GWBs	Groundwater Bodies
IFI	Inland Fisheries Ireland
IPC	Integrated Pollution Control
ITM	Irish Transverse Mercator
JTF	Just Transition Fund
MS	Microsoft
MTN	Midlands Trail Network
MV	Medium Voltage
NIS	Natura Impact Statement
NHA	Natural Heritage Area
NPWS	National Parks and Wildlife Service
OPR	Office of the Planning Regulator

OTE	Over the Edge Drainage
PCH	Potential Collision Height
pNHA	Proposed Natural Heritage Area
QI	Qualifying Interest
RED	Renewable Energy Directive
SAC	Special Area of Conservation
SCADA	Supervisory Control and Data Acquisition
SCI	Special Conservation Interest
SNH	Scottish Natural Heritage
SPA	Special Protection Area

1. INTRODUCTION

1.1 Background

MKO has been appointed by Lemanaghan Wind Farm DAC (the Applicant) to prepare an Appropriate Assessment screening and, if required, a Natura Impact Statement to allow the competent authority (An Coimisiún Pleanála) to conduct an Appropriate Assessment under Part XAB of the Planning and Development Acts 2000 (as amended) of a proposed wind energy development and all associated infrastructure located at Lemanaghan, Co. Offaly and adjacent townlands. Please see Section 2 below for further detail on the Proposed Project.

An Appropriate Assessment Screening Report (AASR) has been prepared and is provided in Section 4. Screening for Appropriate Assessment is required under Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive). A screening for appropriate assessment of a draft land-use plan or application for consent for a proposed development shall be carried out by the competent authority to assess, in view of best scientific knowledge, if that land-use plan or proposed development, individually or in combination with another plan or project is likely to have a significant effect on the European Site. The competent authority shall determine that an appropriate assessment of a draft land-use plan or a proposed development, as the case may be, is required if it cannot be excluded, on the basis of objective information, that the draft land-use plan or proposed development, individually or in combination with other plans or projects, will have a significant effect on a European Site. The Proposed Project is not directly connected with, or necessary for, the management of any European Site. Consequently, the Proposed Project has been subject to the Appropriate Assessment Screening process.

This Natura Impact Statement (NIS) has been prepared in accordance with the European Commission's Assessment of Plans and Projects Significantly affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC (EC, 2021) and Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (EC, 2018) as well as the Department of the Environment's Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (DoEHLG, 2010) and the Appropriate Assessment Screening for Development Management. Office of the Planning Regulator, Dublin 7, Ireland OPR (2021). A Natura impact statement means a statement, for the purposes of Article 6 of the Habitats Directive, of the implications of a proposed development, on its own or in combination with other plans or projects, for one or more than one European site, in view of the conservation objectives of the site or sites. Without prejudice to the generality of subsection (1), a Natura Impact Report or a Natura Impact Statement, as the case may be, shall include a report of a scientific examination of evidence and data, carried out by competent persons to identify and classify any implications for one or more than one European site in view of the conservation objectives of the site or sites.

In addition to the guidelines referenced above, the following relevant guidance and legislation was adhered to in preparation of this report:

1. *Council of the European Commission (1992) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the EU Habitats Directive) Official Journal of the European Communities. Series L 20, pp. 7-49.*
2. *Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (Codified version) (the Birds Directive)*
3. *European Communities (2000) Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission,*
4. *EC (2013) Interpretation Manual of European Union Habitats. Version EUR 28. European Commission.*
5. *CIEEM (2022) Institute of Ecology and Environmental Management Guidelines for Ecological Impact Assessment.*

6. *EC (2020) Guidance document on wind energy developments and EU nature legislation*

1.2 References to Proposed Project

The proposed project will be known as the Lemanaghan Wind Farm and for the purposes of this report:

- Where the 'Proposed Project' is referred to this encompasses the entirety of the project for the purposes of this assessment. The Proposed Project is described in Section 2 of this report.
- Where the 'Proposed Wind Farm' is referred to, this refers to turbines and associated foundations and hard-standing areas, meteorological mast, internal roads, amenity track, temporary construction compounds, underground cabling, peat and spoil management, borrow pits, site drainage, biodiversity mitigation and enhancement, turbine delivery route and associated junction accommodation works, and all ancillary works and apparatus. The Proposed Wind Farm is described in Section 2.3.1 of this report.
- Where the 'Proposed Grid Connection' is referred to, this refers to the onsite 220kV substation wind farm control building, associated temporary construction compound, 2 no. gantry structures, 2 no. crane pad, 2 no. tower pad, 4 no. steel masts, telecommunications tower, temporary access track, and overhead line (OHL) connecting to the existing Shannonbridge-Maynooth 220kV OHL, and all ancillary works and apparatus. The Proposed Grid Connection is described in Section 2.3.2 of this report.
- Where the 'Proposed Project site' or 'site' is referred to, this relates to the primary study area for this assessment, as delineated by the NIS Site Boundary in green as shown on Figure 2-1 and encompasses an area of approximately 1,258 hectares.
- Where the 'proposed TDR accommodation area' is referred to, this relates to the area of the Proposed Project site at Kennedy's Cross where turbine delivery route works are proposed.

1.3 Statement of Authority

This report has been prepared by Sorcha Shanley (B.A., M.Sc.) and has been reviewed by Rachel Walsh (B.Sc. Env., MCIEEM). The baseline ecological surveys were coordinated and led by Rachel Walsh (B.Sc. Env. MCIEEM).

Sorcha is a Project Ecologist at MKO and holds a BA (Hons) in Zoology and an M.Sc. in Marine Biology. Sorcha has over 4 years' experience working in ecological consultancy with experience in undertaking habitat and species surveys and working on Ecological Impact Assessment and Appropriate Assessment for a wide range of projects.

Rachel is a Senior Ecologist at MKO and holds a B.SC. in Environmental Science. Rachel has over 5 years' experience in ecological consultancy and holds full membership with the Chartered Institute of Ecology and Environmental Management (MCIEEM). Rachel has worked on a wide range of ecological impact assessments for projects such as renewable energy infrastructure projects, wastewater infrastructure projects, extractive industry and residential projects.

The ornithological survey methodology and results were prepared by Kathryn Sheridan (MSc.), Project Ornithologist Donnacha Woods (MSc.), Senior Ornithologist and reviewed by Padraig Cregg (MSc), Principal Ornithologist of MKO, all of whom are suitably qualified ornithologists with experience in completing avifaunal assessments and competent experts for the purposes of the preparation of this NIS. The scope of ornithological works and survey methodology was devised by Padraig Cregg and is fully compliant with recent NatureScot (formerly Scottish Natural Heritage (SNH)) guidance (SNH, 2017).

Kathryn Sheridan is a Project Ornithologist with MKO with over 6 years of experience in ornithological field surveys. Kathryn holds a BA (Hons) Zoology, and a MSc (Hons) in Wildlife Conservation and Management where she focused her studies on breeding hen harrier. Prior to joining MKO in November 2020, Kathryn has worked as a research assistant with UCD, in private consultancy as a sub-consultant with Scott Cawley, and has also worked with BirdWatch Ireland and the NPWS Curlew Conservation Programme. Kathryn's key strengths and expertise are bird identification, GIS, data collation and report writing. In her role as a project ornithologist, Kathryn has worked on wind farm projects, residential developments, county council projects and conservation projects including the preparation of EIAR chapters and seasonal reports.

Donnacha Woods was a Senior Ornithologist with MKO with over 10 years of experience in both private consultancy and public conservation work. He holds a BSc (Hons) in Zoology, and a MSc (Hons) in Biodiversity and Conservation where he focused his studies on feather morphology and its implications on bird flight. Donnacha's key strengths and expertise are bird surveying and identification, survey design, data analysis and report writing. Prior to joining MKO in August 2020, Donnacha has worked in private consultancy as an ecologist with Mott MacDonald and Enviroguide and has also worked with BirdWatch Ireland and equivalent conservation organisations in France and Canada. While at MKO, Donnacha was involved in a range of wind energy projects, in addition to projects in housing, education, afforestation, fishing and other sectors. In his role as a project manager, Donnacha worked with and co-ordinated a team within MKO's Ornithological department, as well as sub-contractor ornithologists, in the collection and analysis of data for the production of EIAR Bird chapters, Natura Impact Statements and other reports as required. Donnacha is also experienced in impact assessment and in the writing of EIAR Bird Chapters for large-scale wind energy projects.

Padraig is a Principal Ornithologist with MKO and has over 12 years of experience working in environmental consultancies. The natural world has been a lifelong passion for Padraig. He has pursued this passion from boyhood through his academic study and career with MKO. In his role, he acts as technical advisor for the ornithology team, helping to take projects through their entire lifecycle, from site selection through survey design, constraints studies, impact assessment and lodgement of the planning application. He is responsible for training the ornithology team and keeping his colleagues updated on all emerging guidance, legislation, policies, initiatives, industry best practices, emerging trends, and market opportunities.

1.4 Methodology, Structure and Format of this AASR and NIS

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

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

Stage 2 Appropriate Assessment - A Stage Two AA is a focused and detailed examination, analysis and evaluation carried out by the competent authority of the implications of the plan or project, alone and in-combination with other plans and projects, on the integrity of a European site in view of that site's

conservation objectives. Case law has established that such an Appropriate Assessment, to be lawfully conducted, in summary:

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

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

(iii) may only include a determination that the proposed development will not adversely affect the integrity of any relevant European Site where the competent authority decides (on the basis of complete, precise and definitive findings and conclusions) that no reasonable scientific doubt remains as to the absence of the identified potential effects. If adverse impacts can be satisfactorily avoided or successfully mitigated at this stage, so that no reasonable doubt remains as to the absence of the identified potential effects, then the process is complete. If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must proceed to stage three (assessment of alternative) and, if necessary, stage four (IROPI[1]).

This report is structured as follows:

- Section 2: provides a description of all relevant elements of the Proposed Project;
- Section 3: describes the characteristics of the receiving environment;
- Section 4: describe the Stage 1 Screening undertaken to identify any European Sites upon which there is a potential for a likely significant effect to occur either individually or in combination with other plans and projects as a result of the Proposed Project;
- Section 5: provide a detailed consideration of the Screened in European Sites and identifies the relevant qualifying features and how they may be affected in light of their conservation objectives;
- Section 6: provide an assessment of the potential for adverse effects on the identified European Sites as a result of the Proposed Project and in the absence of mitigation.
    - This section also prescribes mitigation to robustly block any identified pathways for impact for effect.
- Section 7: provide an assessment of residual effects taking into consideration the proposed mitigation.
- Section 8: outline the potential in combination effects of the Proposed Project on European Sites, when considered in combination with other plans and projects were assessed;
- Section 9: details the concluding statements.

[1] *IROPI - 'imperative reasons of overriding public interest', the test found in Article 6(4) of the Habitats Directive.*

1.4.1 Scoping and Consultation

MKO undertook a scoping exercise during preparation of this report. Table 1-1 provides a list of the organisations with relevance to European Sites and Appropriate Assessment consulted during the scoping process, and notes where scoping responses were received.

Table 1-1 Scoping Responses

Consultee	Date of Response 2021	Date of Response 2024
An Taisce	No response received	No response received
Bat Conservation Ireland	No response received	No response received
BirdWatch Ireland	No response received	No response received
Butterfly Conservation Ireland	No response received	No response received
Department of Housing, Local Government and Heritage (includes National Parks & Wildlife Service)	No response received	Response received 24th October 2024 in relation to archaeological assessment only. Following the scoping response, a request for a meeting with DAU/NPWS was issued on the 9th of October 2025. A meeting with the DAU/NPWS was held on the 25th of November 2025 and is detailed in Section 1.4.1.1.1 below.
Inland Fisheries Ireland	Response received 16th June 2021 outlining recommended measures for the protection of aquatic resources and associated riparian habitat.	No response received
Irish Peatland Conservation Council	No response received	No response received
Irish Wildlife Trust	No response received	No response received
Offaly County Council	Response received 25th May 2021	Response received 22nd November 2024. No response relevant to Appropriate Assessment.

1.4.1.1 Pre-Planning Meetings

1.4.1.1.1 *Development Applications Unit (DAU)/National Parks and Wildlife Service (NPWS)*

In addition to the above consultation, members of the Proposed Project team and the Applicant met with a representative from the NPWS to provide an overview of the Proposed Project and to discuss aspects relevant to biodiversity. The meeting was held via Microsoft (MS) Teams on the 25th of November 2025.

The Proposed Project team gave an overview of the Proposed Project in the form of a PowerPoint presentation which set out the following information:

- Overview of the Proposed Project site layout
- An overview of ecological surveys undertaken to date, how these informed the design of the wind farm, and the baseline data established for the Proposed Project site

- A summary of the potential impacts arising from the Proposed Project
- Proposed ecological enhancement and mitigation measures to be implemented as part of the design and operation of the Proposed Project.

Following this presentation, there was a discussion held between the project team and the NPWS representative. Matters relevant to Appropriate Assessment that were raised included:

- The requirement for a robust approach to bird collision risk assessment and the provision of appropriate mitigation, where necessary
- The importance of giving detailed consideration to cumulative effects, particularly in relation to bird collision risk, when assessed alongside other permitted or proposed projects

The matters raised during the consultation have been considered and addressed where relevant within this report. The collision risk assessment is provided in Appendix 9 and discussed in Section 6 of this report. The cumulative impact assessment is provided in Section 8 below.

1.4.1.1.2 *An Coimisiún Pleanála*

Following the transposition of some of the provisions of RED III into national law through the European Union (Planning and Development) (Renewable Energy) Regulations 2025 (S.I. No. 274 of 2025) in August 2025, a third and final pre-application meeting was held with ACP via Microsoft (MS) Teams on the 10th of December 2025.

The Proposed Project team gave a PowerPoint presentation which set out the following information:

- Overview of the Proposed Project site layout
- An overview of ecological surveys undertaken to date, how these informed the design of the wind farm, and the baseline data established for the Proposed Project site
- A summary of the potential impacts arising from the Proposed Project
- Proposed ecological enhancement and mitigation measures to be implemented as part of the design and operation of the Proposed Project.

Following this presentation, there was further discussion held between the project team and ACP representatives. Matters relevant to Appropriate Assessment that were raised included:

- The need for coordination and consistency between the EIAR and the NIS
- The interaction between the Proposed Project, the substitute consent application and the IPC licence, including confirmation that peatland rehabilitation works are subject to EPA oversight and will proceed independently of the Proposed Project
- The importance of assessment of cumulative effects, particularly in relation to other wind farm developments

The matters raised during the consultation have been considered and addressed where relevant within this report. The cumulative impact assessment is provided in Section 8 below.

1.4.2 Desk Study

The desk study undertaken for this assessment included a thorough review of available data pertaining to the Proposed Project site and surrounding area, as well as information pertaining to the European Sites identified in Section 4 below. Sources of information included the following:

- Existing information on the Proposed Project site provided by Bord na Móna (BnM), in particular ecological data including habitat data and bird survey data provided by the Ecology team.

- BnM Draft Cutaway Bog Decommissioning and Rehabilitation Plan for Lemanaghan Bog (included in Appendix 3 of the NIS)
- Aerial imagery of the Proposed Project site.
- Review of NPWS Site Synopses, Conservation Objectives for the European Sites
- Review of EU Habitats Directive (Article 17) Reports.
- Review of online web-mappers: National Parks and Wildlife Service (NPWS), Environmental Protection Agency (EPA), EPA (Envision) and Water Framework Directive (WFD).
- Review of OS maps and aerial photographs of the Proposed Project site.
- Review of relevant available Plans, including the Offaly County Development Plan 2021-2027 and National Biodiversity Action Plan 2023-2030.
- MKO field assessments and surveys carried out between 2020 and 2025, summarised in Section 3.
- Integrated Pollution Control Licence (IPC) Licence Boora Bog Group (Ref. P0500-01) Environmental Protection Agency.
- Aquatic Report (2024) for the Proposed Project prepared by Triturus Environmental Ltd (Appendix 4 of the NIS).

1.4.3 Ecological Surveys

Comprehensive and multidisciplinary surveys of the Proposed Project site were undertaken on various dates between 2020 and 2025. Table 1-2 lists all surveys completed and the dates on which they were carried out. The following sections fully describe the ecological surveys that have been undertaken to inform this assessment and provide details of the methodologies, dates of survey and guidance followed.

Table 1-2 Summary of surveys that inform the NIS

Survey	Dates
Multidisciplinary walkover survey	21st April 2021 30th July 2021 3rd August 2022 25th July 2023 10th August 2023 14th September 2023 29th July 2025
Otter surveys	17th August 2021 18th August 2021 18th August 2024 19th August 2024 10th September 2024
Aquatic surveys	17th August 2021

Survey	Dates
	18th August 2021 18th August 2024 19th August 2024
Bird surveys	Various dates during both summer and winter seasons between October 2020– March 2024

1.4.3.1 Multidisciplinary Walkover Surveys

Multidisciplinary walkover surveys of the Proposed Project site were undertaken between 2021 and 2025. The habitat surveys were carried out within the recognised optimum period for vegetation surveys/habitat mapping, i.e. April to September (Smith *et al.*, 2011).

The multidisciplinary walkover surveys comprehensively covered the Proposed Project site and were carried out in accordance with TII *Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna* on National Road Schemes (TII, 2008). Peatland surveys were carried out in accordance with methods outlined in Smith *et al.* (2020). Habitats were classified according to the guidelines set out in *'A Guide to Habitats in Ireland'* (Fossitt, 2000). The walkover surveys were designed to detect the presence, or likely presence, of a range of habitats and species with potential to be associated with European Sites. 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.

Other targeted survey methodologies relevant to habitats and species with potential to be associated with European Sites were undertaken at the Proposed Project site are described in the following subsections.

1.4.3.2 Otter Surveys

Otter is a Qualifying Interest (QI) species for River Shannon Callows SAC and therefore, following a review of the previously completed ecological surveys and the results of the multidisciplinary walkover survey, areas identified as providing potential habitat for otter were subject to targeted survey. The otter survey of watercourses were conducted on the 19th of August 2024 and 10th of September 2024. Additional otter surveys were undertaken by Triturus Environmental Ltd. during aquatic surveying of the watercourses both within and downstream of the targeted otter study area on 17th of August 2021, 18th of August 2021, 18th of August 2024, and 19th of August 2024. The drainage ditch at the proposed TDR accommodation area at Kennedys Cross was not subject to targeted otter surveys given the small scale and nature of the works proposed at this location, which includes reinstatement of an existing grassed route.

The otter survey was conducted as per TII (2008) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes). This involved a search for all otter signs e.g. spraints, scat, prints, slides, trails, couches and holts 150m upstream and downstream of the Proposed Project. In addition to the width of the rivers/watercourses, a 10m riparian buffer (both banks) was considered to comprise part of the otter habitat (NPWS, 2009). The dedicated otter survey also followed the guidance as set out in TII (2006) *'Guidelines for the Treatment of Otters Prior to the Construction of National Roads Schemes'* and CIEEM best practice competencies for species surveys (CIEEM, 2013).

1.4.3.3 Aquatic Surveys

Dedicated aquatic surveys of the watercourses draining the Proposed Project site were conducted by Triturus Environmental Ltd. on the 17th and 18th of August 2021 and the 18th and 19th of August 2024. The surveys assessed watercourses and ponds within and downstream of the Proposed Project site to evaluate fisheries potential, biological water quality, and the presence of aquatic species and habitats of conservation interest, including those with potential to be associated with European Sites. A total of 13 sites were surveyed. The survey site locations are shown in Figure 2-1 of the Aquatic Report (Appendix 4). The surveys covered all watercourses draining the Proposed Project site and the survey effort was considered sufficient to provide comprehensive information on the nature of the watercourses within and draining the Proposed Project site.

The surveys included electro-fishing, fisheries habitat appraisal, biological water quality (Q-sampling), macrophyte and aquatic bryophyte surveys, white-clawed crayfish surveys and otter surveys. In addition, environmental DNA (eDNA) sampling was undertaken at selected riverine and pond locations to assist in the detection of potential cryptically low populations of protected and rare aquatic species.

The surveys covered all watercourses draining the Proposed Project site and the survey effort was considered sufficient to provide comprehensive information on the nature of the watercourses within and draining the Proposed Project site. The drainage ditch at the proposed TDR accommodation area at Kennedys Cross was not subject to targeted aquatic surveys given the small scale and nature of the works proposed at this location, which includes reinstatement of an existing grassed route. A full description of the survey methodologies is provided in the Aquatic Report in Appendix 4.

1.4.3.4 Bird Surveys

Bird surveys were undertaken by MKO at the Proposed Project site between October 2020 and March 2025 consisting of four breeding seasons (April – September) and five non-breeding seasons (October – March). The survey methodologies and effort relevant to European Sites and Special Conservation Interest (SCI) bird species are described below.

Vantage Point Surveys

Vantage point surveys were undertaken in accordance with NatureScot guidance (SNH, 2017) to monitor flight activity within the Proposed Project site and within a 500m radius of the potential turbine positions. Surveys were conducted from six fixed point vantage points with comprehensive coverage of the Proposed Project site. The vantage point locations were selected by undertaking a viewshed analysis (described below) and confirmed by a reconnaissance visit and initial field surveys to ensure that the proposed turbine layout was entirely covered.

Viewshed Analysis

The viewshed analysis aims to identify the most suitable locations to site vantage points such that the airspace of the proposed turbine rotor swept area is in view using the fewest possible number of vantage points. Viewsheds were calculated using visibility analysis over raster Digital Elevation Model (DEM) (Version 1.8) in QGIS (Version 3.28) using a notional layer suspended at 70m, which is representative of the minimum swept height of the proposed turbines. While the relevance of being able to view as much of the site to ground level is acknowledged, the NatureScot guidance (2017) emphasises the importance of visibility of the 'collision risk volume' when the data is to be used to estimate the risk of collision with turbines by birds.

The vantage point location was tested for visibility coverage of the proposed turbines and to a 500m radius of the outermost turbines in line with NatureScot guidance (SNH, 2017). The viewshed analysis

was undertaken by creating a viewshed point 1.75m in height (to represent the height of the observer) on a map using a 25m resolution digital terrain model (DTM). The relative height of any surrounding vegetation and its effects on visibility was recorded during a site visit and is also accounted for in the analysis. Using QGIS (Version 3.28), a viewshed of 360° was produced calculating an area 70m from ground level up to a 2km radius. The resulting viewshed image was then cropped to 180° to give the viewshed. A 500m buffer was applied to the outer most turbines of the Proposed Wind Farm.

Data Recording and Digitisation

Survey methodology followed NatureScot guidance (SNH, 2017). The surveyor collected data on bird observations and flight activity from the scanning arc of 180° to a 2km radius at the fixed vantage point locations for two 3 hour watches separated by a minimum 30 minute break (i.e. 6 hours total) per month. Surveys were conducted from October 2020 to March 2025 inclusive, and were scheduled to provide a minimum of 36 hours per winter or breeding season and spread over the full daylight period, including dawn and dusk watches, to coincide with the highest periods of bird activity (Table 1-3).

Table 1-3 Vantage point survey effort

Survey Season and Number of Vantage Points (VPs)	Effort per Vantage Point (VP)
Winter Season 2020/2021 (6 VPs)	21-24 hours per VP[2]
Breeding Season 2021 (6 VPs)	36 hours per VP
Winter Season 2021/2022 (6 VPs)	36 hours per VP
Breeding Season 2022 (6 VPs)	36 hours per VP
Winter Season 2022/2023 (6 VPs)	36 hours per VP
Breeding Season 2023 (6 VPs)	36 hours per VP
Winter Season 2023/2024 (6 VPs)	36 hours per VP
Breeding Season 2024 (6 VPs)	36 hours per VP
Winter Season 2024/2025 (6 VPs)	36 hours per VP

Flight activity of target species was mapped and recorded as per defined flight bands, which were chosen in relation to the dimensions of potential turbine models for the site. Bands were split into 0-15m, 15-25m, 25-200m and >200m. All flight activity within height bands 25-200m and >200m is considered to be within the Potential Collision Height (PCH) as the turbine swept area of the proposed turbine dimension overlaps with these height bands (lowest swept height 70m, maximum tip height 220m). In addition, the presence of any non-target species was recorded to inform the evaluation of supporting habitat. Each flight observation was assigned a unique identifier when mapped in the field and subsequently digitised using GIS software.

Winter Walkover Surveys

Winter walkover surveys were undertaken to record the presence of bird species within the Proposed Project site to a 500m radius, including areas between vantage point locations. The methodology was adapted from the breeding walkover methodology outlined in Bibby *et al.* (2000) and adapted Brown

[2] *A total of 36 hours were not completed at VPs in 2020/2021, however this is not of concern as the minimum requirement of two years' of bird surveys (SNH, 2017) was greatly exceeded throughout the overall survey period.*

and Shepherd surveys', combined with Common Bird Census methods (British Trust for Ornithology, 2021). Transect routes were walked across different habitat complexes within the survey area where access allowed. All target species were recorded and mapped. In addition, the presence of any non-target species was recorded to inform the evaluation of supporting habitat.

Winter walkover surveys were conducted in daylight hours over four visits between October and March (i.e. four visits in winter 2020/2021, four visits in winter 2021/2022, four visits in winter 2022/2023, four visits in winter 2023/2024 and four visits in winter 2024/2025).

Breeding Walkover Surveys

Breeding walkover surveys were undertaken to determine the presence of bird species of high conservation concern and identify areas of possible, probable or confirmed breeding for bird species observed within the Proposed Project site and a 500m radius. The methodology was based on Brown and Shepherd (1993) and Calladine *et al.* (2009), combined with Common Bird Census methods (British Trust for Ornithology, 2021) for dense habitat. Transect routes were walked across different habitat complexes within the survey area where access allowed. Using binoculars, the surveyor regularly scanned the surroundings of each transect for target species. All target species were mapped and breeding status was assigned following British Trust for Ornithology (BTO) breeding status codes[3]. In addition, the presence of any non-target species was recorded to inform the evaluation of supporting habitat.

Breeding walkover surveys were carried out at dawn over four visits during the core breeding season months April to July (2021, 2022, 2023 & 2024), with the Proposed Project site being visited three consecutive days per month on each occasion. Following all survey visits, the field maps were analysed to determine the number and location of breeding territories. All non-breeding individuals and species encountered were also recorded.

Waterbird Distribution and Abundance Surveys

Significant wetlands and waterbodies within 8km of the Proposed Project site were surveyed for waterbirds during the 2020/2021, 2021/2022, 2022/2023, 2023/2024 and 2024/2025 winter and passage seasons (August to May inclusive) to provide information on their distribution and abundance in relation to the Proposed Project site. Waterbirds include swans, geese and ducks; cormorant, shag, divers and grebes; auks and seabirds; gulls, terns and skuas; herons, egrets and crane; rails and crakes; waders; and kingfisher. The area surveyed exceeds the 500m for foraging waterbirds and 1km for roosting waterbirds requirements of Naturescot guidance (SNH, 2017) and follows the recommendations of SNH (2016) guidance (*Assessing connectivity with Special Protection Areas (SPAs)*) to account for the core foraging ranges of whooper swan (<5km) and Greenland white-fronted goose (5-8km) which are Annex I waterbirds listed as SCI species of SPAs within 15km of the Proposed Project site.

Survey methodology follows Gilbert *et al.* (1998) and the Irish Wetland Bird Survey (BirdWatch Ireland, 2021). Surveys were undertaken during daylight hours from suitable vantage points at wetlands and waterbodies. All target waterbird species were recorded and mapped.

1.4.3.5 Invasive Species Surveys

During the multidisciplinary walkover surveys, a search for non-native invasive species was also undertaken. The survey focused on the identification of invasive species listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (As Amended) (S.I. 477 of 2015).

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

2. DESCRIPTION OF PROPOSED PROJECT

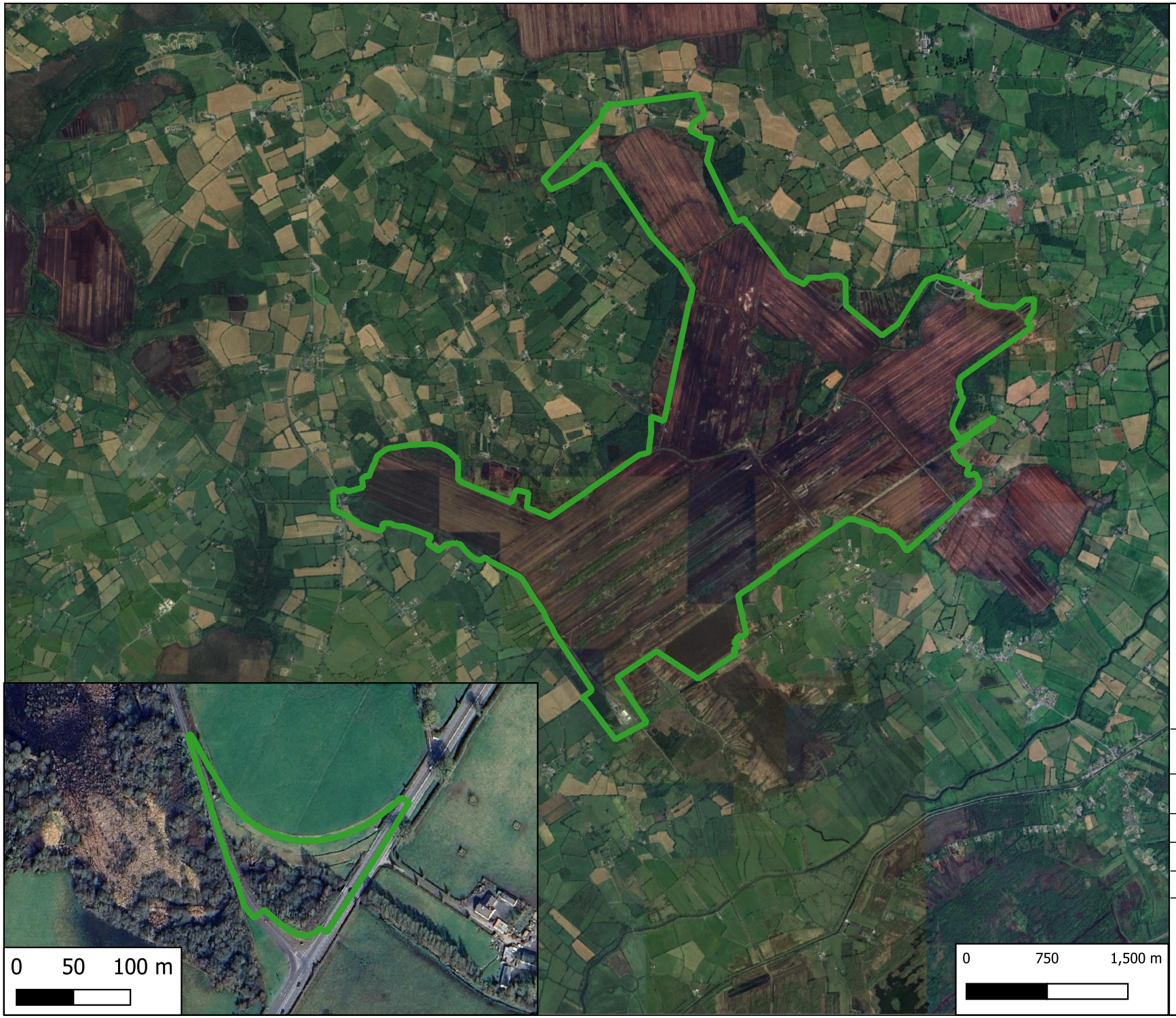
2.1 Site Location

The Proposed Project is located approximately 3 kilometres (km) northeast of Ferbane and approximately 2.5 km southwest of the village of Ballycumber in Co. Offaly. The approximate centre of the site is X616027, Y728163 in Irish Transverse Mercator (ITM) coordinates. Please note, as part of the Proposed Wind Farm, turbine accommodation works will be required at Kennedys Cross located in the townland of Ballindown, Co. Offaly (junction of the N52 and N62 National Secondary Roads).

The Proposed Wind Farm is located in a peatland setting, comprising a mixture of bare cutaway peat, re-vegetated bare peat, degraded raised bog, scrub, low immature woodland and remnants of high bog. Current land use within the Proposed Wind Farm comprises natural recolonisation of cutaway and degraded bog and a small area of-active turbary.

The nearest Natura 2000 site to the Proposed Wind Farm, i.e., Special Area of Conservation (SAC) or Special Protection Area (SPA), is the Ferbane Bog SAC which is located approximately 1.3km southwest of the Proposed Wind Farm. Elevations within the Proposed Project site range from ~51mOD (metres above Ordnance Datum) in the southwest of the site to ~48m in the northeast of the site. The site is approximately 5.4km in length at its longest point and 4.9km in width at its widest point; the site encompasses an area of approximately 1,258ha.

The Proposed Grid Connection includes for 0.8km of new OHL from the proposed onsite 220kV substation, in the townland of Cooldorragh, Co. Offaly, and will require to break into the existing Shannonbridge-Maynooth 220kV OHL to facilitate the Proposed Project connection to the national electricity grid. Current land use along the Proposed Grid Connection comprises peatland and pastures. Land-use in the wider landscape of the site comprises of BnM landholdings, forestry, agricultural land, cutover and cutaway peatland, one-off rural housing and small village settlements.



Map Legend

NIS Site Boundary

Drawing Title	Proposed Project Site
Project Title	Lemanaghan Wind Farm, Co Offaly
Drawn By: SS	Checked By: RW
Project No.: 200804	Drawing No.: Figure 2-1
Scale: 1:47,600	Date: 2026-03-09

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

2.2 Characteristics of the Proposed Project

The Proposed Project will consist of the provision of the following:

(i) *15 no. wind turbines with the following dimensions:*
   a. *A total tip height of 220m;*
   b. *Rotor diameter of 150m;*
   c. *Hub height of 145m.*

(ii) *Permanent turbine foundations, hard-standing and assembly areas;*

(iii) *Underground electrical and communications cabling connecting the 15 no. wind turbines to the proposed 220kV onsite electrical substation;*

(iv) *A new permanent 220kV electrical substation compound (c. 9611m²) in the townland of Cooldorragh consisting of 1 no. Gas Insulated Substation (GIS) building, 1 no. Independent Power Producer (IPP) control building, 2 no. gantry structures, all associated electrical and communications plant and equipment, welfare facilities, 2 no. foul water holding tank, 2 no. bored wells, access roads, security fencing and gates, lightning masts, signage, landscaping, drainage infrastructure and all other ancillary works;*

(v) *A permanent telecommunications tower with a height of 36m and associated foundation and hard-standing area;*

(vi) *The permanent installation of c. 800m of 220kV overhead line, 4 no. new steel masts, temporary tower build areas, temporary tower crane pads and associated hard-standing areas to facilitate the new 'loop-in/loop-out' connection into the existing 220kV Shannonbridge to Maynooth line;*

(vii) *The new permanent overhead line grid connection will require the decommissioning / removal of 1 no. existing steel mast and c. 75m of existing 220 kV line;*

(viii) *A meteorological mast with a height of 145 metres and associated foundation and hard-standing area;*

(ix) *The permanent upgrade of c.1.14km of existing internal site roads/tracks and the provision of c.17.1 km of new permanent internal site access roads, passing bays and a layby area;*

(x) *The permanent upgrade of c.1.8km of existing tracks and the provision of c.3.9km of new permanent tracks for the purposes of amenity, seating areas, and amenity signage;*

(xi) *The provision of temporary access track off the L7001 local road during the construction phase;*

(xii) *Removal of an existing agricultural shed to accommodate the new temporary access track off the L7001 local road;*

(xiii) *2 no. new gated site entrances off the L7002 local road;*

(xiv) *Upgrade of 3 no. existing site entrances off the N62 national road, R436 regional road and L7001 local road;*

(xv) *A temporary access track from the N52 national road to the N62 national road at Kennedy's Cross in the townland of Ballindown to facilitate the delivery of turbine components and other abnormal loads;*

(xvi) *5 no. temporary construction compounds with temporary offices, containers and staff facilities;*

(xvii) *3 no. permanent amenity car parks each including 15 no. spaces for private vehicles, 3 no. spaces for accessible parking, parking for buses and bicycle rack facilities;*

(xviii) *4 no. temporary borrow pits;*

(xix) *5 no. temporary security cabins;*

(xx) *2 no. clear span watercourse crossings;*

(xxi) *Peat and Spoil Management;*

(xxii) *Site Drainage;*

(xxiii) *Removal of c.1.02ha of immature woodland and c.0.64 hectares of scrub;*

(xxiv) *Biodiversity management and enhancement measures;*

(xxv) *Operational stage site signage; and*

(xxvi) *All ancillary apparatus and site development works above and below ground, including hard and soft landscaping and drainage infrastructure.*

This application seeks a 10-year planning permission and 35-year operational life from the date of commissioning of the wind energy development.

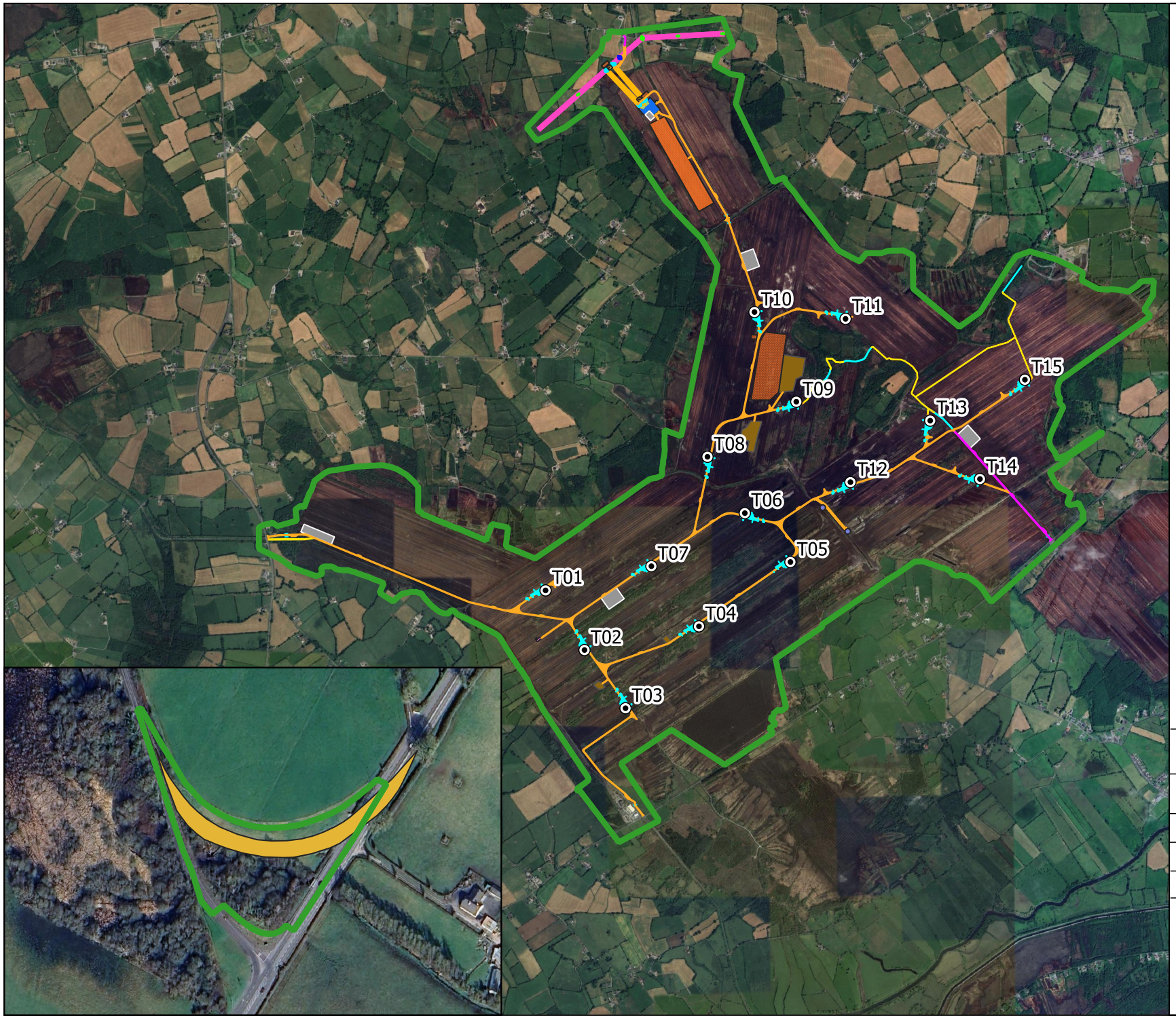
The application meets the threshold for wind energy set out in the Seventh Schedule of the Planning and Development Acts 2000 to 2023, on foot of a notice issued by ACP on March 3rd 2026 and is therefore being submitted directly to ACP as a Strategic Infrastructure Development (SID) in accordance with Section 37E of the Planning and Development Act 2000, as amended. Please note, the planning application will encompass all elements of the Proposed Project, including the grid connection 220kV infrastructure and associated works.

Site layout drawings are included in Appendix 1. All elements of the Proposed Project have been assessed as part of this NIS.

2.2.1 Development Layout

The layout of the Proposed Project has been designed to minimise the potential environmental effects, while at the same time maximising the energy yield from the wind resource passing over the Proposed Project site. Constraint studies have been carried out to ensure that turbines and all ancillary infrastructure are located in the most appropriate areas of the site.

The overall layout of the Proposed Project is shown on Figure 2-2. Site layout drawings and included in Appendix 1.



Map Legend

- NIS Site Boundary
- Proposed Turbines
- Proposed Turbine Foundations
- Proposed Hardstand
- Proposed New Roads
- Proposed Temporary Access Track
- Proposed New Amenity Track
- Proposed Upgrades to Existing Roads
- Proposed Upgrades to Existing Roads for the Purposes of Amenity
- Proposed Lay By for Delivery Vehichles
- Proposed Gates
- Proposed Onsite 220 kV Substation
- Proposed Telecommunications Tower
- Proposed Met Mast
- Proposed Temporary Construction Compounds
- Proposed Amenity Carparks
- Proposed Borrow Pit
- Proposed Peat Deposition Areas
- Pump Station
- Proposed Pump Station Access Road
- Proposed New Pylon
- Existing Pylons
- Existing Pylon To Be Removed
- Proposed Crane Pads
- Proposed Tower Hardstand
- Proposed Gantry Structures
- Shannonbridge-Maynooth 220kV Overhead Line
- Proposed Grid Connection
- Proposed TDR SPA Works

N

Drawing Title

Proposed Project Layout

Project Title

Lemanaghan Wind Farm, Co Offaly

Drawn By	Checked By
SS	RW
Project No.	Drawing No.
200804	Figure 2-2
Scale	Date
1:37,300	2026-03-06

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

2.3 Proposed Project Components

The Proposed Wind Farm consists of 15 no. wind turbines and associated infrastructure including hardstands, 1 no. meteorological mast, 5 no. temporary construction compounds, 4 no. borrow pits, 3 no. permanent amenity carparks, approximately 17.1m of new road, the upgrade of approximately 1.14km of existing road, the construction of approximately 3.9km of dedicated new amenity track, the upgrade of approximately 1.8km of existing road for the purposes of amenity, felling of immature woodland (1.02ha), proposed biodiversity enhancement measures, and all associated development and drainage works. The Proposed Grid Connection comprises of a 220kV electricity substation, control buildings, approximately 0.8km of overhead line, 4 no. new steel masts, 2 no. gantry structures, telecommunications tower and a temporary access track.

2.3.1 Proposed Wind Farm

2.3.1.1 Wind Turbines

2.3.1.1.1 *Turbine Locations*

The proposed wind turbine layout has been optimised using wind farm design software (a combination of WAsP [wind resource assessment software]) and WindPro [Computational Fluid Dynamics and WindFarmer]) to maximise the energy yield from the Proposed Project site, while maintaining sufficient distances between the proposed turbines to ensure turbulence and wake effects do not compromise turbine performance and maintain the minimum setbacks from neighbouring properties as set out in the '*Wind Energy Development Guidelines for Planning Authorities'* (DoEHLG, 2006) (hereafter referred to as the 'DoEHLG 2006 Guidelines') and the Draft Wind Energy Development Guidelines (December 2019) (hereafter referred to as the 'Draft DoHPLG 2019 Guidelines). The Irish Transverse Mercator (ITM) Grid Reference coordinates of the proposed turbine locations are listed in Table 2-1 below.

The final Top of Foundation Level of the turbine foundations will be determined by the actual ground conditions at each proposed turbine location and may differ slightly from those levels listed in Table 2-1.

Table 2-1 Proposed Wind Turbine Locations and Elevations

Turbine	ITM X	ITM Y	Top of Foundation Levels (mOD)
1	614199	727374	51.5
2	614482	726940	51.9
3	614780	726517	50.6
4	615314	727112	52.7
5	615979	727580	48.1
6	615647	727936	50.0
7	614968	727550	51.3
8	615376	728346	50.6
9	616022	728746	52.3
10	615717	729399	53.7
11	616380	729350	55.7
12	616415	728161	48.5
13	616995	728609	51.8
14	617357	728184	48.9
15	617684	728907	52.2

2.3.1.1.2 Site Investigation

As part of the design process for the Proposed Project, site investigations were undertaken across the Proposed Project site, to provide detail and clarity on the nature and extent of subsoils and bedrock as a means of characterising the Proposed Project site. This provided information on the most suitable location for turbines and associated infrastructure.

The objectives of the site investigations included mapping the subsoil lithology for all proposed turbines and other key locations (i.e., internal access roads) and assessing the underlying bedrock. The first round of geotechnical ground investigations, consisting of trial pitting, was undertaken between the 6th and 9th of April 2021, under the supervision of Fehily Timoney & Company Ltd. (FTC) and Tobar Archaeological Services (Tobar). The second round of geotechnical ground investigations, consisting of trial pitting, was undertaken during the 23rd, 24th, 25th and 28th of March 2022, under the supervision of FTC and Tobar. Finally, the third and final round of geotechnical ground investigations, consisting of trial pitting, was completed over the time period 24th to 27th October 2023, under the supervision FTC and Irish Archaeological Consultancy Ltd (IAC). Please see Section 1.8.2 of Chapter 1 of the EIAR for detailed biographies of all involved persons in the above identified work.

In summary, a total of 62 no. trial pits, supervised by FTC, and Tobar/IAC, were carried out at all proposed turbine locations and at other key locations (i.e., internal access roads and met mast location) to investigate the underlying mineral soil lithology and subsoil/bedrock interface.

The complete geotechnical ground investigation campaign was carried out in accordance with IS EN 1997-2 and BS5930:2015+A1:2020 Code of Practice for Ground Investigations with precedence given to IS EN 1997-2 where applicable.

2.3.1.1.3 Turbine Type

The proposed wind turbines to be installed for the Proposed Wind Farm have the following dimensions:

- Turbine Tip Height – 220 metres
- Hub Height – 145 metres
- Blade Rotor Diameter – 150 metres

Turbines from the main turbine manufacturers share common appearance and other major characteristics, with minor cosmetic differences differentiating one from another. The wind turbines that will be installed on the Proposed Wind Farm will be conventional three-blade turbines, that will be geared to ensure the rotors of all turbines always rotate in the same direction.

The turbines will be multi-ply coated to protect against corrosion. It is proposed that the turbines would be of a light grey colour to blend into the sky background to minimise visual impact as recommended in the DoEHLG 2006 Guidelines and '*The Influence of Colour on the Aesthetics of Wind Turbine Generators*' (ETSU, 1999).

2.3.1.1.4 Turbine Foundations

Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground level. The size of the foundation will be dictated by the turbine manufacturer, and the final turbine selection will be the subject of a competitive tender process. Different turbine manufacturers use differently shaped turbine foundations, ranging from circular to hexagonal and square, depending on the requirements of the final turbine supplier. Adopting a precautionary approach, however, a foundation area large enough to accommodate modern turbine models has been assessed in this NIS. The turbine foundation transmits any load on the wind turbine into the ground. The maximum horizontal and vertical extent of the turbine foundations will be 28m and 4m respectively, which has been assessed in this NIS and is shown in Appendix 1.

After the foundation level of each turbine has been formed using piled foundations, bored foundations or a gravity foundation on competent stratum (i.e., bedrock or subsoil of sufficient load bearing capacity), the "anchor cage" (which anchors the first section of the turbine tower to the foundation) is levelled and reinforcing steel is then built up around and through the anchor cage. The outside of the foundation is shuttered with demountable formwork to allow the pouring of concrete and is backfilled accordingly with appropriate granular fill to the finished surface level.

2.3.1.1.5 Hardstanding Areas

Hardstanding areas consisting of levelled and compacted hardcore are required around each turbine base to facilitate access, turbine assembly and turbine erection. The hard standing areas are used to accommodate cranes used in the assembly and erection of the turbine. The hardstands also allow for the offloading and storage of turbine components, and provide a safe, level working area around each turbine position. The hardstanding areas are extended to cover the turbine foundations once the turbine foundation is in place. All hardstand areas will be designed taking account of the loadings provided by the turbine manufacturer and will consist of a compacted stone structure.

The hardstanding areas shown represents a design based on manufacturer's requirements and seeks to accommodate a number of different turbine types and models.

The proposed hard standing areas for each individual turbine are shown as part of the detailed layout drawings included in Appendix 1.

2.3.1.1.6 Assembly Area

Levelled assembly areas will be located on either side of the hard-standing areas. These assembly areas are required for offloading turbine blades, tower sections and hub from trucks until such time as they are ready to be lifted into position by cranes and to assist the main crane during turbine assembly. The extent of the area required for the assembly areas is shown the detailed drawing in Appendix 1.

2.3.1.2 Site Roads

To provide internal access to the Proposed Project site to connect the wind turbines, proposed onsite 220kV substation, and associated infrastructure, approximately 20.8km of new internal roads and new dedicated amenity track will need to be constructed and 2.9km of existing road will be upgraded (1.14 for internal roads and 1.8km for the purposes of amenity). Fehily Timoney & Company Ltd. (FTC) was appointed to assess the existing ground conditions and specify the type of road required to access all locations on site. The road construction preliminary design has taken into account the following key factors as stated in the Peat and Spoil Management Plan in Appendix 5.

1. *Buildability considerations*
2. *Maximising use of existing infrastructure*
3. *Minimising excavation arisings*
4. *Serviceability requirements for construction and wind turbine delivery and maintenance vehicles*
5. *Requirement to minimise disruption to peat hydrology*

Whilst the above key factors are used to determine the road design, the actual construction technique employed for a particular length of road will be determined on the prevailing ground conditions encountered along that length of road. It is proposed to construct 18 no. passing bays along the proposed access road network. The proposed new roads will be approximately 6m in width and the three road construction techniques that will be used are as follows:

- Construction of New Floating Roads over peat (majority);
- Construction of New Excavated Roads through peat, and;

- Upgrades to existing roads.

Upgrade of Existing Access Roads or Tracks

As noted above, approximately 2.9km of existing roads and access tracks will be upgraded as part of the Proposed Project construction phase. The general construction methodology for upgrading of existing sections of access roads or tracks, is presented in FTC's *Peat & Spoil Management Plan* in Appendix 5.

Construction of New Floating Roads

As noted above, approximately 20.8km of new roads will be constructed in order to facilitate the Proposed Project; approximately 12.1km being new floating roads within the Proposed Wind Farm. The general construction methodology for the construction of new floating access roads or tracks, is presented in FTC's *Peat & Spoil Management Plan* in Appendix 5.

Construction of New Excavated Roads

As noted above, approximately 20.8 of new roads will be constructed in order to facilitate the Proposed Project; approximately 9.3km being new excavated roads. The general construction methodology for the construction of new floating access roads or tracks, is presented in FTC's *Peat & Spoil Management Plan* in Appendix 5.

2.3.1.3 Underground Electrical & Communications Cabling

Each turbine will be connected to the onsite 220kV electricity substation via underground 20kV or 33kV (kilovolt) electricity cabling. Fibre-optic cables will also connect each wind turbine and the proposed met mast to the proposed onsite 220kV substation. The electricity and fibre-optic cabling connecting to the proposed onsite 220kV substation compound will be run in cable ducts adjacent to the proposed internal roads and buried directly alongside the internal roads at depths of approximately 1.2m below ground level to the top of the duct. The routes the cables will follow the access roads to each proposed turbine location. Please note, at 2 no. locations the cable will be floated alongside the proposed new road to minimise impacts on cultural heritage. The cables will follow the access roads to each proposed turbine location and will cross the L7002 local road at 1 no. location (X615527, Y730068 (ITM)). The proposed underground 20kv or 33kV cable routes are illustrated on the site layout drawings included as Appendix 1; the exact number and configuration of cable may vary within the cabling trench; i.e., 1 no. cable trench, 2 no. cable trench, or 3 no. cable trench which will be placed within the ground adjacent to proposed internal roads to facilitate the connection of the proposed turbines to the proposed onsite 220kV substation. The exact configuration of the underground cabling will be set by the requirements of the electrical designers at detailed design stage.

Clay plugs (water flow barrier) will be installed at regular intervals of not greater than 50m along the length of the trenches where required to prevent the trenches becoming conduits for runoff water.

2.3.1.4 Anemometry Mast

One permanent anemometry mast (met mast) is proposed as part of the Proposed Project. The anemometry mast will be equipped with wind monitoring equipment at various heights. The mast will be a free-standing 145m structure constructed with a reinforced concrete gravity foundation measuring 12m by 12m and a hard-standing area measuring 15m by 40m.

2.3.1.5 Temporary Construction Compounds

There are 5 no. temporary construction compounds proposed as part of the Proposed Project, which will be located within the Proposed Project site in the townlands of Corbane, Lisdermot, Cor Mor and Cor Beg, Straduff, Tumbeagh, Cappanalosset, Cooldorragh, and Lemanaghan.

The proposed 5 no. temporary construction compounds will consist of: bunded refuelling and containment area for the storage of lubricants, oils, and site generators, etc., full retention oil interceptor, storage area (including waste and recycling areas), temporary site offices, staff facilities, and car-parking areas for staff and visitors.

The 5 no. temporary construction compounds will be removed from the Proposed Project site as part of the post-construction reinstatement works of the Proposed Project. The concrete foundations of these compounds will be left in situ. The concrete foundations at Temporary Construction Compound 1, Temporary Construction Compound 3 and Temporary Construction Compound 4 will be utilised for amenity car parks during the operational phase. The concrete foundations associated with Temporary Construction Compound 2 and Temporary Construction Compound 5, and the areas associated with Temporary Construction Compound 1, Temporary Construction Compound 3 and Temporary Construction Compound 4 that will not be used for amenity car parks, will be reinstated with previously excavated peat, and either be reseeded or left to revegetate naturally.

2.3.1.6 Temporary Security Cabins and Proposed Gates

During the construction phase, 4 no. temporary security cabins will be installed within the Proposed Project site for the duration of the construction phase located at the 4 no. construction phase entrance points. During the construction phase, each temporary security cabin will have a gate installed which will be manned by security stationed within each temporary security compound. The gates will remain on the site during the operational phase to facilitate access during the operational phase of the Proposed Project. Each gate will have a locking mechanism and will be used in the operational phase for amenity purposes and for maintenance and monitoring activities.

At the end of the construction phase, the temporary security cabins will be removed from the site, however the concrete foundation of these cabins will be left in situ as this is the most environmentally prudent option. These concrete foundations will be reinstated with previously excavated peat, and either be reseeded or left to revegetate naturally.

The security cabins will be prefabricated structures measuring approximately 7.2m by 2.5m and 2.85m in height. The temporary cabins will be removed as part of the post-construction reinstatement works of the wind farm development.

2.3.1.7 Biodiversity Enhancement

A Biodiversity Management and Enhancement Plan (BMEP) accompanies the Proposed Project. Please note that irrespective of the consenting or construction of the Proposed Project, the measures outlined in the Draft Cutaway Bog Decommissioning and Rehabilitation Plan (Draft Rehabilitation Plan) (Appendix 3) will be implemented by BnM in agreement with the EPA, per the BnM's IPC Licence Obligations (P0500-01). The Draft Rehabilitation Plan included provides a description of Lemanaghan Bog and its ecology and has been taken account in describing the baseline environment in this report. It also provides a framework and outline of the works that will be undertaken to achieve the aims of successful rehabilitation (the criteria for which are defined in the plan) and a timescale for when the various elements of the Draft Rehabilitation Plan will be implemented. Irrespective any further development on the site, the measures outlined in the Draft Rehabilitation Plan (Appendix 3) will be implemented by BnM in agreement with the EPA, per BnM's IPC Licence Obligations.

As part of the proposed enhancement for the site, an area of approximately 10ha is to be flooded to a depth of 1.5m (rewetting by drain blocking) for use by whooper swan. In addition to the 10ha to be flooded for whooper swan, it is proposed that a 10ha lake shoreline habitat is also developed for use by lapwing. The area will be managed by regular mowing to keep the land open for breeding waders. Other measures include marsh fritillary habitat management (including Devil's-bit Scabious planting), native woodland and hedgerow planting for connectivity, wetland creation and scrub/woodland management.

2.3.1.8 Vegetation Removal & Replanting

As part of the Proposed Project, no commercial forestry felling will occur. However, the felling of 1.02ha of immature woodland (WS2) will be required within and around development footprint to allow for the construction of the site entrances, access roads, underground cabling, and other ancillary infrastructure.

A total of 1.02 ha of WS2 felling will occur as part of the Proposed Project. The 1.02ha of WS2 being felled to accommodate the Proposed Project will be replanted within the site as part of the proposed biodiversity enhancement measures (outlined in the Biodiversity Management and Enhancement Plan).

2.3.1.9 Amenity Track and Carparks

The Proposed Project will upgrade approximately 1.14km of existing track within the site and provide approximately 17.1km of new roads to be used for maintenance and monitoring activity as well as for amenity purposes such as walkways and cycleways when the Proposed Wind Farm becomes operational.

An additional 3.9km of a new dedicated amenity link, along with the further upgrade of approximately 1.8km of existing track, for the purposes of amenity, is also proposed as part of the Proposed Project to provide a greater variety of walking loops. The amenity pathways will be surfaced with a granular material.

Three new public car parks will provide for recreational use during the operational stage. The bases of Temporary Construction Compounds 1, 3 and 4 will be repurposed as the operational car parks, while the remaining compounds will be reinstated and allowed to revegetate.

If planning permission is granted for the Proposed Wind Farm, the associated amenity pathways will connect into the permitted Offaly West portion of the Midlands Trail Network (MTN). The MTN is a long-term plan to create a network of walking and cycling trails that connects rural areas to open spaces. The MTN will:

- Deliver a network of connected walking and cycling trails across the Midlands.
- Provide trails which will interconnect with the existing and emerging arterial Greenway network, including the repurposing of former narrow-gauge rail track beds, culverts and underpasses.
- Include related infrastructure to enhance the experience, e.g., repurpose industrial bridges formerly used to transport peat to factories for Just Transition Fund (JTF) place-making and art installations, signage and interpretation to create a sense of connectivity across the towns, villages, bogs and waterways of the JTF region.

The MTN will consist of a serviced network of inclusive off-road trails that enables local people and visitors to explore the Midlands region by bike, e-bike and on foot. The network will connect rural settlements to open spaces, traversing peatlands, waterways and other habitats and linking to heritage sites and visitor attractions. The planning application for the Offaly West portion of the MTN was granted by Offaly County Council on 7th August 2025 (PL Ref: 25/60014).

2.3.1.10 Watercourse/Culvert Crossings

The site is extensively drained by a network of manmade land drains and is traversed by the Lemanaghan Stream (EPA Code 25_3841). To facilitate the construction of Proposed Wind Farm roads, it is required to cross the Lemanaghan Stream at two locations: Watercourse Crossing No. 1 at ITM 615354, 728152 (new crossing) and Watercourse Crossing No. 2 at ITM 616121, 728023 (existing crossing to be removed and replaced). Both crossings will comprise a clear-span watercourse crossing or bottomless box culvert. The construction methodology has been designed to eliminate the requirement for in-stream works. Crossings will be constructed to OPW Section 50 guidance and in consultation with Inland Fisheries Ireland (IFI).

All new culverts and culvert upgrades at field-drain crossings will be suitably sized for expected peak flows, and some culverts may be installed to manage drainage waters from works areas, particularly where waters must be taken from one side of a roadway to the other. Culvert size will be influenced by the depth of the track or road sub-base and all culverts will be oversized to allow mammals to pass. Culverts will be inspected regularly to ensure they are not blocked by debris, vegetation or other material that may impede conveyance.

2.3.1.11 Peat & Spoil Management

The estimated volumes of material requiring management are approximately 207,527m^3 of peat and 230,922 m^3 of spoil, giving a total of about 438,449 m^3 (including bulking and contingency). These materials will be stored or placed within four borrow pits (608,600 m^3 for peat and spoil), two peat deposition areas (175,000 m^3 for peat only), landscaping (30,000 m^3, approximately 2,000 m^3 at each of the 15 no. turbines), and side-casting along access roads (10,710 m^3), providing a total on-site capacity of 824,310 m^3.

2.3.1.12 Borrow Pits

It is intended to obtain significant volumes of crushed stone that will be required for the construction of the Proposed Project from 4 no. proposed onsite borrow pits. The proposed borrow pits will be located in the townlands of Derrica More, Straduff, Kilnagoolny, and Tumbeagh within Co. Offaly and within the Proposed Project site.

The anticipated maximum volume to be extracted from the proposed borrow pits for the construction of the Proposed Project is 15,587 m^3 of peat and 159,522 m^3 of spoil. The figures presented are the anticipated maximum volumes; however, the actual volumes to be removed from the proposed borrow pits will be confirmed at the time of construction and following detailed pre-construction site investigation works

As part of the construction phase, the proposed borrow pits will be infilled with excavated peat after all required material for construction has been excavated. By the end of the construction phase the proposed borrow pits will be reinstated and either reseeded or left to revegetate naturally.

2.3.2 Proposed Grid Connection

The Proposed Project will connect to the national grid via a new onsite 220 kV substation in the townland of Cooldorragh, Co. Offaly via an OHL connection to the existing Shannonbridge–Maynooth 220kV line. The substation (footprint 11,057 m^2) will be built to ESB/EirGrid specifications and enclosed by a 2.6 m palisade fence. It includes a control building (approximately 19 m × 12 m) with welfare facilities supplied by a groundwater well (for non-potable uses) and a sealed 10,000 litre wastewater holding tank with alarm and off-site tanker removal. The proposed onsite 220kV substation will remain in situ after the Proposed Wind Farm has been decommissioned as it will form part of the national grid.

The Proposed Grid Connection will consist of approximately 0.8km of overhead line (comprising 0.4km of OHL from the proposed steel masts for the double loop-in/loop-out from the proposed onsite 220kV substation to the existing OHL), 4 no. new steel masts, 2 no. new gantry structures, and the removal of 1 no. existing steel mast. Proposed new steel masts will be approximately 28.5 m high with a base footprint of 20 m² each. The existing line will be deviated between Towers 60 and 61 to the 2 no. new steel masts located under the existing OHL, and connected to the proposed onsite 220kV via the 2 no. new steel masts located just north of the proposed onsite 220kV substation and the 2 no. new gantry structures located within the proposed onsite 220kV substation footprint. Final configurations will be determined by ESB/EirGrid.

A rural/local electricity supply will be required as a back-up power supply to the proposed onsite 220kV substation for light, heat and power purposes. There is a local medium-voltage (MV) supply adjacent to the development location which could be utilised; this is the Shannonbridge – Lumcloon MV supply. The rural/local supply will be designed and constructed by ESB Networks.

A 36 m telecommunications tower with a 13 m × 13 m hard-standing adjacent to the proposed onsite 220kV substation will provide operational communications and data relay.

2.3.3 EPA IPC Licence Activities

Current activities onsite include site management and environmental monitoring as required under Integrated Pollution Control (IPC) Licence P0500-01[4] from the Environmental Protection Agency (EPA). Industrial scale peat extraction was permanently ceased by BnM in Lemanaghan Bog in June 2020. From June 2020 until the end of 2024, all remaining stockpiled peat was systematically removed from the Lemanaghan Bog. BnM's statutory duties to discharge the conditions of its Integrated Pollution Control Licence (IPC) Licence (Ref. P0500-01; hereafter "IPC Licence"), from the Environmental Protection Agency (EPA) for the Boora Bog Group, which encompasses Lemanaghan Bog also remain on-going. These ongoing duties, such as environmental monitoring, do not facilitate the continuation of peat extraction, but rather ensure compliance with BnM's extant IPC Licence.

The IPC Licence is subject to 14. No. conditions pertaining to the ongoing monitoring and maintenance to ensure any emissions from site activities will comply with and not contravene, any of the requirements of Section 83(3) of the Environmental Protection Agency Act, 1992. Conditions 1-4 of the licence outlined the Scope, Management, Interpretation and Notification procedures required by the BnM, respectively. Conditions 11 to 14 detail the Monitoring (equipment use), Recording and Reporting, Emergency Response and Financial Provisions duties of BnM. Conditions 5 to 10 pertain to environmental monitoring and management.

Irrespective of the consenting or construction of the Proposed Project, BnM's statutory duties to discharge the conditions of its IPC Licence will remain ongoing.

2.3.3.1 Peatland Rehabilitation Plan

It is also a requirement of '*Condition 10 Cutaway Bog Rehabilitation'* of the IPC Licence that following the decommissioning of use of all or part of their bogs, BnM prepares (to the satisfaction of the EPA) and implements a Cutaway Bog Rehabilitation Plan. BnM have produced a Draft Rehabilitation Plan for Lemanaghan Bog, and it is the intention of BnM to rehabilitate the bog in a phased approach under IPC Licence. The Draft Rehabilitation Plan is included as Appendix 3.

Rehabilitation work will commence immediately following the decommissioning of the Proposed Project. The Draft Rehabilitation Plan included provides a description of the Proposed Wind Farm and its ecology. It also provides a framework and outline of the works that will be undertaken to achieve the

[4] *Integrated Pollution Control License PO-500-01 issued by the EPA for the Boora Bog Group. Available at: https://epawebapp.epa.ie/terminalfour/ippc/ippc-view.jsp?regno=P0500-01*

aims of successful rehabilitation (the criteria for which are defined in the plan) and a timescale for when the various elements of the Draft Rehabilitation Plan will be implemented.

Irrespective of the consenting or construction of the Proposed Project, the measures outlined in the Draft Rehabilitation Plan (Appendix 3) will be implemented by BnM in agreement with the EPA, per BnM's IPC Licence Obligations.

2.3.3.2 Site Drainage

The drainage design for the Proposed Project has been prepared to protect groundwater and surface waters within and surrounding the site, with the intention of having no negative impact on water quality or downstream catchments. There will be no direct discharges to natural watercourses; all discharges from proposed works areas will be dispersed as overland flows over vegetated ground at appropriate distances from streams and inevitably flow into BnM settlement ponds that are part of and monitored under an EPA IPC license (P0500-01). In addition, buffer zones around natural drainage features have informed the layout of the Proposed Project.

Existing Drainage Features

The site comprises a network of man-made field drains, typically 0.5–1.5m deep, which feed into larger main drains and outfalls at the bog margins. Pumped drainage operates on the site, with surface water routed through settlement ponds under the IPC licence (Section 2.3.3 above) prior to discharge. Natural drainage routes will not be altered.

Drainage Design Principles

The design follows the principles of: keeping clean water clean by intercepting it upgradient where possible and diverting it around works; collecting potentially silt-laden runoff downgradient for attenuation and settlement prior to diffuse discharge; maintaining existing hydrology and hydrogeology; and implementing daily inspection where works will be temporarily ceased if required.

Drainage Design

- **Interceptor drains**: installed upgradient of works to divert clean runoff around excavations and work areas and removed after construction except where locally required.
- **Collector drains (swales)**: located downgradient of main works to convey potentially silt-laden water to settlement facilities and retained during operation to collect runoff from roads and hardstands.
- **Over-the-edge drainage**: employed in low-risk sections where topography allows, discharging over vegetated ground with downstream controls.
- **Check dams**: placed at intervals to control flow velocity, minimise erosion and promote settlement, and left in place post-construction where appropriate.
- **Silt bags**: used to filter pumped water from excavations and as an additional control downstream of stilling ponds. Sitl bags will be removed by permitted waste contractors.
- **Culverts**: sized for expected peak flows and installed with sufficient gradient. The culverts will be oversized to allow mammal passage.
- **Silt fences**: installed where works occur close to streams to intercept and settle suspended solids.
- **Peat-ditch silt traps**: used within field drains to slow flows and promote settlement and largely left in situ after construction.
- **Temporary stilling/settlement ponds**: located at the ends of collector drains to attenuate and settle runoff from works areas. They will be monitored and cleaned out when sediment reaches defined capacity and removed at the end of construction, with operational drainage routed to existing settlement ponds.

Cable Trench Drainage

Cable trenches will be constructed in short, controlled sections with immediate ducting and backfill thereby minimising the amount of ground disturbed at any one time and minimising the potential for drainage runoff to pick up silt or suspended solids. Excavated material will be stored upgradient and sealed to limit runoff, with temporary silt fences on steeper slopes where required.

Site and Drainage Management

Preparative Site Drainage Management

All materials and equipment necessary to implement the drainage measures detailed above, will be brought onsite in phases as they are required during the construction phase. A sufficient number of straw bales, clean drainage stone, terram, stakes, etc., will be kept on site at all times to implement the drainage design measures as necessary. The drainage measures detailed in the above will be installed prior to, or at the same time as the works they are intended to drain.

Pre-emptive Site Drainage Management

The works programme for the groundworks part of the construction phase of the Proposed Project will also take account of weather forecasts, and predicted rainfall in particular, working under a schedule of works operation system (SOWOR) system as proposed in the planning application; further detail is provided in the Surface Water Management Plan (SWMP) (Appendix 6). Large excavations, large movements of overburden or large-scale overburden or soil stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

Reactive Site Drainage Management

The final drainage design prepared for the Proposed Project prior to commencement of construction will provide for reactive management of drainage measures. The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat silt-laden water from the works areas, will be monitored continuously by the Ecological Clerk of Works (ECoW) or supervising hydrologist on-site. The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the Proposed Project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional check dams; interceptor drains or swales as deemed necessary on-site. The drainage design may have to be modified on the ground as necessary, and the modifications will draw on the various features outlined above in whatever combinations are deemed to be most appropriate to situation on the ground as a particular time.

In the event that works are giving rise to siltation of watercourses, the ECoW or supervising hydrologist will stop all works in the immediate area around where the siltation is evident. The source of the siltation will be identified and additional drainage measures such as those outlined above will be installed in advance of works recommencing.

Drainage Maintenance

An inspection and maintenance regime will operate during construction and operation, with frequent checks (especially after rainfall) of drains, check dams, swales, silt traps and stilling ponds during construction, reducing thereafter to routine operational inspections.

2.3.4 Operation

The Proposed Wind Farm is expected to have a lifespan of approximately 35 years. As part of the Proposed Wind Farm planning application, permission is being sought for the full operational life of the

Proposed Project. During the operational period, on a day-to-day basis the wind turbines will operate automatically, responding by means of meteorological equipment and control systems to changes in wind speed and direction.

The wind turbines will be connected together, and data relayed from the wind turbines to a central control unit at the on-site substation which will facilitate off-site remote monitoring of the wind farm. Each turbine will be monitored off-site by the appointed Operations and Maintenance contractor (typically the wind turbine manufacturer) and a wind farm operations management company. The monitoring of turbine output, performance, wind speeds, and responses to any key alarms will be monitored off-site by both parties 24 hours per day. Regular on-site visual inspections will also be carried out by the wind farm operations management company.

Maintenance

Each turbine will be subject to a routine maintenance programme involving several checks and changing of consumables, including oil changes. In addition, there may be a requirement for unscheduled maintenance, which could vary between resetting alarms to major component changes requiring a crane. Typically, maintenance traffic will consist of four-wheel-drive vehicles or vans. The site roads will also require periodic maintenance.

The proposed onsite 220kV substation and site tracks will also require periodic maintenance. The proposed onsite 220kV substation would be operational 24 hours per day, 7 days per week throughout the year. Substations can be operated remotely and manually. Supervisory operational and monitoring activities will be carried out remotely using a Supervisory Control and Data Acquisition (SCADA) system, with the aid of computers connected via a telephone modem link.

The Construction and Environmental Management Plan (CEMP), sets out a programme of monitoring required for the operational phase of the Proposed Project. The CEMP will be consulted for detailed information on the monitoring requirements during the operational phase. However, a brief summary of the key information is provided below:

- Monthly sampling and laboratory analysis will be undertaken for the first 6 months of the operational phase of the Proposed Wind Farm.
- The drainage system will be monitored in the operational phase until such a time that all areas that have been reinstated become re-vegetated and the natural drainage regime has been restored.
- Post-construction bird monitoring which includes breeding bird surveys, winter roost surveys and corpse searching on the site determine the level of fatalities for the site as a result of collisions with the installed turbines. These surveys will be completed in accordance with guidelines issued by the Scottish Natural Heritage (SNH, 2009).
    - Vantage point surveys will be undertaken to monitor flight activity within a 500m radius of the turbine positions monthly during operational years 1, 2, 3, 5, 10 and 15 of the lifetime of the Proposed Wind Farm.
- Post-construction bat monitoring will be undertaken for at least 3 years post construction of the renewable energy development. The monitoring will also include corpse searching in the areas surrounding the turbines to gather data on any actual collisions.
- Monitoring of habitat enhancement will be carried out annually until the proposed habitats have been sufficiently established and have given consistent results for 3 consecutive years after the establishment phase.
- Monitoring for shadow flicker at properties where any exceedance of the shadow flicker limit has been predicted as outlined in Chapter 5 of the EIAR.
- Post turbine commissioning noise monitoring.

2.3.5 Decommissioning

The wind turbines proposed as part of the Proposed Wind Farm are expected to have a lifespan of approximately 35 years. Following the end of their useful life, the equipment may be replaced with a new technology, subject to planning permission being obtained, or the Proposed Wind Farm may be decommissioned fully.

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

The underground electrical cabling connecting the proposed turbines to the proposed onsite 220kV substation will be removed from the cable ducts and any direct buried cables will be cut and left in situ. The cabling will be pulled from the cable ducts using a mechanical winch which will extract the cable and re-roll it on to a cable drum. This will be undertaken at the original cable jointing pits which will be excavated using a mechanical excavator and will be fully re-instated once the cables are removed. The cable ducting will be left in situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance. The cable materials will be transferred to a suitable recycling or recovery facility.

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

Site roadways will be in use as amenity and recreational pathways, and therefore will not be removed during decommissioning, and as part of the permitted Offaly West Midlands Trail Network (MTN) (PL Ref: 25/60014).

The Proposed Grid Connection, which includes the proposed onsite 220kV substation, will remain in place as it will be under the ownership and control of the ESB Networks and/or EirGrid and will form a permanent part of the national electricity grid.

A Decommissioning Plan has been prepared (included in Appendix 2) the detail of which will be agreed with the Local Authority prior to any decommissioning. The Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will agree with the Planning Authority at that time. The potential for effects during the decommissioning phase of the Proposed Project has been fully assessed in the NIS.

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

> *"best practice not to limit options too far in advance of actual decommissioning but to maintain informed flexibility until close to the end-of-life of the wind farm".*

3. CHARACTERISTICS OF THE RECEIVING ENVIRONMENT

3.1 Description of the Existing Environment

3.1.1 Description of Habitats and Flora

Habitat information from previous surveys undertaken by BnM, including habitat mapping using the BnM habitat classification scheme and cross-referenced with Fossitt (2000), was reviewed as part of the desk study for the Proposed Project. The habitat mapping and descriptions presented in this section are informed by multidisciplinary and detailed vegetation surveys of the Proposed Project site undertaken by MKO in 2023, 2024 and 2025.

The Proposed Project site comprises primarily cutover raised bog. Industrial peat production formally ceased at Lemanaghan Bog in June 2020, although some areas have been out of industrail peat production for many years prior to this and thus vegetation, dominated primarily by birch scrub, common cottongrass and marsh arrowgrass, has regenerated over much of these areas. Small areas/remnant of uncut raised bog occur at various locations at its edges of the Proposed Project site with some small areas of active turbary present within the site.

The main habitat types on the site include bare peat communities, cutover bog habitats with a vegetative composition that is similar to degraded dry and wet heath type communities (dominated by Ling heather), woodlands and scrub (dominated by birch), poor fen and small areas of grasslands (occurring alongside railway tracks). These habitats occur in intimate mosaics throughout the Proposed Project site. Areas of open water occur where industrial peat extraction has ceased and the water levels in these areas are no longer managed through the onsite pumping and drainage infrastructure. The largest area of open water and reed swamp occurs within the southern central part of the site close to existing onsite pump stations, which is a linear standing water feature.

3.1.1.1.1 Cutover Bog (PB4)

The vast majority of the Proposed Project site, with the exception of small remnant sections of raised bog around the peripheries of the site and areas of agricultural grassland under the existing Shannonbridge-Maynooth 220kV OHL, comprise of cutover or open cutaway peat. Large areas of the Proposed Project site ceased active industrial peat extraction in June 2020. These areas are dominated by bare peat with little growth of vegetation, see Plate 3-1 below. Where peat extraction has ceased for a number of years prior to 2020, these areas have begun to revegetate, predominantly by poor fen and birch dominated scrub/woodland. The following subsections provide a description of the secondary habitats that have begun to form on the cutover bog following cessation of milled peat extraction.

The majority of the infrastructure proposed as part of the Proposed Project are located within cutover bog habitat, including turbines, internal access roads, met mast, temporary construction compounds, borrow pits and peat deposition areas.

Plate 3-1 Open cutaway bog with sparse vegetation

Bog Woodland/Scrub (WN7/WS1)

The habitats within the Proposed Project site have developed as birch dominated scrub and woodland in the areas where the peat extraction has ceased for the longest periods (i.e. several years prior to full cessation of peat extraction in 2020), along unmaintained drainage channels and where the cutaway is relatively dry. A mosaic of these habitats dominates large sections of the western and central area of the site, and provide areas of separation, cover and shelter throughout the site. In general, the woodlands and scrub are relatively recently colonized and have a poorly developed layer structure and ground flora. Typically, they are dominated by birch (*Betula pubescens*) with some willows (*Salix spp.*). Occasional Sitka spruce (*Picea sitchensis*) and Lodgepole pines (*Pinus contorta*) had started to establish as a result of natural seed dispersal. The ground flora is commonly dominated by brambles (*Rubus fruticosus agg.*). In more established areas, ivy (*Hedera hibernica*) dominates the understory with bracken (*Pteridium aquilinum*) and other fern species also a regular component of the ground flora. In some areas where the woodlands and scrub are colonizing the cutover bog, the ground flora is often dominated by ling (*Calluna vulgaris*) heather and in places purple moor grass (*Molinia caerulea*). Both birch scrub and birch dominated woodland occur throughout much of the site where peat extraction has ceased. The Annex I habitat Bog Woodland (91DO) was not recorded during the habitat surveys; the woodlands were predominantly very dry and none of the woodland areas had developed on *Sphagnum* rich substrates. Plate 3-2 below shows a typical area of birch dominated bog woodland within the Proposed Project site with small trees and low structural diversity.

Plate 3-2 Typical Bog Woodland found throughout the Proposed Project site.

Poor Fen (PF2)

Many sections of the Proposed Project site supported cutaway bog that was dominated by common cottongrass and was wet underfoot (though with little open water except after prolonged wet weather) or dry. Species frequently recorded included purple moor grass, soft rush (*Juncus effuses*), marsh arrowgrass (*Triglochin palustris*) and hummocks of the moss *Polytrichum commune.* This habitat was quite variable but was widespread within the Proposed Project site. It formed mosaics with heath and woodland habitats and was classified as Poor Fen.

There are also small areas with Poor Fen (PF2) vegetation associated with open water pools within the Proposed Project site. These areas are dominated by common cottongrass, although also containing species such as marsh arrowgrass, reedmace (*Typha latifolia*), horsetail (*Equisetum arvense*), water mint (*Mentha aquatica*), soft rush (*Juncus effusus*) and bulbous rush (*Juncus bulbosus*).

Cutover Bog (PB4) (also supporting secondary heath type communities)

Secondary heath habitats were dominated by tall ling heather (*Calluna vulgaris*), some cross-leaved heath (*Erica tetralix*), purple moor grass (*Molinia caerulea*) and common cottongrass (*Eriophorum angustifolium*) on dry peats with no Sphagnum present. It is likely that the dry heath areas would, if left undisturbed, colonize to form bog woodland (Dry Birch Woodland – Non-Annex I). The wetter heath communities supported higher abundance of purple moor grasses and common cottongrass. This habitat type covers a broad range of conditions from bare peat and dry but vegetated to much wetter areas that grade into poor fen. In more vegetated areas, dominated by cotton grasses, orchid species were present including heath spotted orchid (*Dactylorhiza maculata*), twayblade (*Listera ovata*) and marsh helleborine (*Epipactis palustris*). This was mostly associated with areas of revegetated bare peat occurring within the western portion boundary of the Proposed Project site. The species composition, hydrological and geomorphological characteristics of the heath type habitat was assessed with reference

to best practice guidance[2,5,6] and professional judgement, and was found not to conform to the EU Habitats Directive Annex I listed habitat European Dry Heaths [4030].

The cutover bog habitats on the site do not correspond to either Active Raised Bog (7110) or Degraded Raised Bog still capable of Natural Regeneration (7120). The NPWS Article 17 Reporting for 2019 states:

> *In an Irish context, ARB (which is currently defined as occurring only on the high bog) encompasses active peat --forming ecotopes (central and sub--central) as defined by Kelly (1993) and Kelly & Schouten (2002), and actively peat --forming flushes.*

The 2025 Article 17 Report (NPWS 2025) recognises the publication of the classification and appraisal system for cutover raised bog habitats (Smith et al. 2020). Regarding this system it is stated,

> *This is the first time that ARB has been recognised as occurring on cutover in the Irish context. In general, however, regenerating ombrotrophic vegetation on cutover characterised by a high Sphagnum cover (i.e. greater than 40- 50% cover), lacks the diversity of Sphagnum species, microtopographical features and good quality indicators associated with ARB. These cutover areas have the capacity to develop into embryonic ARB but longer time periods (>30 years) are likely to be required for high quality ARB to develop.*

With regard to the definition of Degraded Raised Bog (DRB), the 2025 Article 17 Report states,

> *Currently cutover areas are not considered to support DRB. However, the potential of cutovers to support peat-forming vegetation is recognised. Potential peat-forming habitat (PPFH) on cutover is defined using similar methods to that for DRB on the high bog. PPFH is not included under the definition of DRB as it is believed that these areas will require periods longer than 30 years to develop into ARB.*

These Annex I habitats do not occur on the cutover habitats in the Proposed Project site. They do not conform to Annex I Heath habitat as defined by the Irish Wildlife Manual (Perrin *et.al.* 2014). As stated by Smith *et al.* (2020):

> *Cutover bog habitats should only rarely be considered examples of dry siliceous heath (HH1) or wet heath (HH3). These habitats are defined by peat depths of less than 0.5 m (Fossitt, 2000), which seldom occur on cutover bog. Only where a habitat is underlain by shallow peat and good indicators of heath are present, such as Carex binervis, Galium saxatile and Juncus squarrosus, should heath habitats be considered for cutover bog.*

In light of the above, given the habitat history, peat depth in this area and the plant species present, the area does not correspond with Annex I habitat.

3.1.1.1.2 Grasslands (GA1, GS2 and GS1)

The grasslands within the Proposed Project site primarily occur along old trackways and railway lines, and within agricultural fields in the centre and northern part of the Proposed Project site. Many of the verge areas are classified as Dry Meadows and Grassy Verges (GS2) with rank grasses including false oat grass (*Arrhenatherum elatius*), Yorkshire fog (*Holcus lanatus*), cocks foot (*Dactylis glomerata*) and encroaching scrub with nettle (*Urtica dioica*), bramble and rosebay (*Epilobium angustifolium*).

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[5] *Perrin, P.M., Barron, S.J., Roche, J.R. & O'Hanrahan, B. (2014). Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 2.0. Irish Wildlife Manuals, No. 79. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland*

[6] *Smith, G.F. & Crowley, W. (2020) The habitats of cutover raised bog. Irish Wildlife Manuals, No. 128. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.*

Other areas are less rank and support more calcareous grasslands with species such as knapweed (*Centaurea nigra*), sweet vernal grass (*Anthoxanthum odoratum*), lady's bedstraw (*Galium verum*), dandelion (*Taraxacum officinalis agg.*), common bird's foot trefoil (*Lotus corniculatus*), common centaury (*Centaurium erythraea*), occasional yellow rattle (*Rhinanthus minor*) and orchids such as common spotted orchid (*Dactylorhiza fuchsii subsp. fuchsia*).

Areas of improved species-poor pasture within the agricultural fields in the central and northern areas of the Proposed Project site were categorised as Improved Agricultural Grassland (GA1). Other areas grassland habitats comprised of a mix of species typical of both calcareous and peatland habitats. This diversity in species recorded has resulted from the importing of stone for the construction of railway tracks throughout the peatland or from the exposure of underlying calcareous subsoil resulting from historical industrial peat extraction.

Plate 3-3 Example of rank grassland habitat within of the Proposed Project site

3.1.1.1.3 Open waterbodies

A number of standing water areas were present within the Proposed Project site. These were classified as Other Artificial Lakes and Ponds (FL8) and are not permanent waterbodies (Plate 3-4).

Plate 3-4 Standing water on bare peat within the Proposed Project site

3.1.1.1.4 Drainage Channels (FW4)

The Proposed Project site is extensively drained with deep channels that run through the site. The majority of the drains within the site are devoid of vegetation and have a poor structure. In the areas where the drains are surrounded by dense woodland and scrub, the vegetation within them is sparse and the substrate comprises of bare silt. In the areas where there is less cover of trees, many of the drains support dense macrophytes including reedmace, horsetails (*Equisetum spp.*). In other areas, the drains are large and hold deep water with floating vegetation such as pondweeds (*Potamogeton spp.*) and water mint.

3.1.1.1.5 Lowland Depositing Streams (FW2)

The Proposed Project site is drained by a number of watercourses that surround the Proposed Project site. The Proposed Project site spans three surface water catchments within the Shannon River Basin District: the Lower Shannon (Hydrometric Areas 25A and 25B) and the Upper Shannon (Hydrometric Area 26G). All surface waters from the site ultimately discharge to the River Shannon.

The majority of the site lies within the Lower Shannon (25A) catchment, specifically the Brosna sub-catchment. This area is drained by several streams including the Lemanaghan Stream, Fortified House Castlearmstrong Stream, and Kilcolgan Beg Stream, all of which flow to the Brosna River. The Brosna River discharges into the River Shannon approximately 14.5 km southwest of the site.

Smaller portions of the Proposed Project site are located in the Upper Shannon (26G) and Lower Shannon (25B) catchments, respectively. These areas are drained by the Ballynahown Stream (into the Boor River, which joins the River Shannon c. 11 km downstream) and the Holy Well of Clongawny Stream (into the Blackwater River, reaching the Shannon c. 13.5 km southwest of the site).

The Lemanaghan Stream has been highly modified where it runs through the Proposed Project site. The current configuration of Lemanaghan Stream represents a peat drainage channel that had been heavily modified, i.e., extensively straightened and deepened historically during peat extraction activities. The channel has a deep U-shaped profile with 4m high banks. The flow profile was of very slow-moving deep glide and pool. The bed comprised of extensive soft peat. The channel supported no macrophytes given deep peat-stained water (Plate 3-5).

Plate 3-5 The Lemanaghan Stream within the Proposed Project site

3.1.1.1.6 Remnant Uncut Raised Bog (PB1)

There are some remnant uncut raised bog habitats at the Proposed Project site. The areas of raised bog recorded within the site are typically small in area, have been historically drained, are relatively dry and in some areas extracted at the facebank. The vegetation comprises predominantly of tall ling heather with some purple moor grass and cottongrasses (Plate 3-6). Some wetter areas were also found to contain cross-leaved heath (*Erica tetralix*) and bog asphodel (*Narthecium ossifragum*). In general, the bog remnants did not contain significant areas of *Sphagnum* mosses. This is likely due to the historic draining of these small, fragmented remnant areas of raised bog during historical industrial peat extraction.

Plate 3-6 Example of intact raised bog recorded within the Proposed Project site.

3.1.1.1.7 Buildings and Artificial Surfaces

There are some areas of Buildings and Artificial Surfaces (BL3) within the Proposed Project site. The majority of the artificial surfaces are associated with access roads, a works offices and storage buildings within the south-western part of the site. Other small areas of hardcore occur within the Proposed Project site that are used for informal parking in close proximity to access roads.

3.1.1.1.8 Habitats within the Footprint of the Proposed Grid Connection

The Proposed Grid Connection infrastructure, encompassing 2 no. new pylons and the OHL connection to the existing Shannonbridge-Maynooth 220kV OHL, is located within agricultural grassland fields situated to the north of the site. These areas were classified as Improved Agricultural Grassland (GA1), based on species composition and land use.

The grassland is dominated by common agricultural grass species, including Yorkshire fog (Holcus lanatus), perennial ryegrass (*Lolium perenne*), and red fescue (*Festuca rubra*). Other grass species observed include creeping bent (Agrostis stolonifera), sweet vernal grass (*Anthoxanthum odoratum*), rough meadowgrass (*Poa trivialis*), and marsh foxtail (*Alopecurus geniculatus*). Forbs and ruderal species such as white clover (*Trifolium repens*), broadleaved dock (*Rumex obtusifolius*), and willowherb (*Epilobium* spp.) were also present.

Linear landscape features are present along field boundaries including sections of Hedgerows (WL1) and Treelines (WL2). The hedgerows are dominated by hawthorn and bramble and managed in line with agricultural land use. Treelines occur in the north of the Proposed Project site along residential boundaries and provide localised linear habitat and connectivity within the wider agricultural landscape. No hedgerow or treeline removal is proposed as part of the Proposed Project.

The proposed onsite 220kV substation will be located on an area of cutover bog, classified as bare Cutover Bog (PB4). The substrate at this location is dry and firm, with no remaining acrotelm and no *Sphagnum* cover recorded. Vegetation is sparse and indicative of early stage recolonisation following cessation of peat extraction.

Species recorded within this area include ling heather (*Calluna vulgaris*), cross-leaved heath (*Erica tetralix*), purple moor grass (*Molinia caerulea*), and occasional birch (*Betula pubescens*) saplings. Sheep's sorrel (*Rumex acetosella*) was also present. These species reflect the early development of dry heath or poor fen-type vegetation, although the area remains ecologically degraded and lacks the structure and function of active peatland habitat. The habitat within the proposed onsite 220kV substation footprint is therefore classified as bare, cutover bog in early natural recolonisation, with low ecological value in its current state.

3.1.1.1.9 Habitats within the Footprint of the Proposed Amenity Tracks

Proposed Wind Farm roads will predominantly be available for amenity use once the Wind Farm is operational. As part of the Proposed Wind Farm, 4km of additional dedicated amenity track are proposed to provide connectivity between the internal Wind Farm roads and local/regional roads around the site.

The eastern most proposed section of amenity track follows an existing track along a mixture of Broadleaved Woodland (WD2), Immature Woodland (WS2) and Scrub (WS1). Species include downy birch (*Betula pubescens),* goat willow (*Salix caprea),* rowan (*Sorbus aucuparia),* ash (*Fraxinus excelsior)* and sycamore (*Acer pseudoplatanus).* The trail turns south-eastwards through bracken (*Pteridium aquilinum)* and scrub and then traverses the open Cutover Bog (PB4) (Plate 3-7).

The section of proposed amenity track between proposed turbines T13, T11 and T09, traverses across open Cutover Bog (PB4) habitat. It also crosses through Dry Meadows and Grassy Verges (GS2), Scrub (WS1) and Immature Woodland (WS2) (Plate 3-8). There will be some loss of woodland edge habitat within the east of the site to facilitate the amenity tracks, as well as dry meadows and grassy verge and scrub habitat in the middle of the site. However, the majority of the amenity track in this area is restricted to existing road being upgraded for the purposes of amenity and bare cutover peat.

Plate 3-7 Existing tracks at the location of the proposed amenity track within the Proposed Project site

Plate 3-8 Proposed amenity track location through grassy meadow and along scrub habitats within central area of the site

3.1.1.1.10 Habitats along the Proposed Turbine Delivery Route

For the purposes of this assessment, all proposed turbine infrastructure will be imported to Galway Port. The proposed TDR for the Proposed Project has been the subject of a route assessment to determine if any accommodation works are required. A temporary access road for the facilitation of abnormal load

deliveries will be required at Kennedy's Cross, located in the townland of Ballindown, Co. Offaly (junction of the N52 and N62 National Secondary Roads). These works will comprise the re-establishment of a temporary junction bypass road to facilitate the delivery of turbine components and other abnormal loads. The proposed temporary access road will measure approximately 160 m in length and have a 6-metre running width. Following the completion of the construction phase of the Proposed Project gates be removed and the boundary will be reinstated to its original state. The temporary access road will be closed, covered with a layer of topsoil and reseeded. It would only be used again in the event that an oversized delivery was required for wind turbine maintenance purposes; appropriate planning would be secured prior to the commencement of these works should they be required.

The track to be used for re-establishment of the temporary access road comprises an existing grassed over track categorised as Recolonising Bare Ground (ED3) transitioning to a grassland and is dominated by Yorkshire fog (*Holcus lanatus)* and dock (*Rumex spp.).*

The habitat adjacent to the track comprises Scrub (WS1) dominated by willows (*Salix* spp.*),* with some alder (*Alnus glutinosa),* hawthorn (*Crataegus monogyna),* bramble (*Rubus fruticosus agg.)* and birch (*Betula pubescens).* A Drainage Ditch (FW4) is adjacent to the existing track and is culverted beneath the N62 and N52 national roads. This channel had a low flow and was densely overgrown. There will be no requirement for loss of trees to re-use the existing track to accommodate the abnormal load delivery.

Plate 3-9 Habitat in the footprint of accommodation works area at Kennedy's Cross, Birr

3.1.1.1.11 Invasive species and Protected Flora Species

No invasive species, listed on the Third Schedule of the S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011, were recorded within the Proposed Project site. The only non-native invasive species recorded on site include butterfly bush (*Buddleja davidii*) and

bearberry (*Cotoneaster dammeri*). Although invasive species, these are not listed on the Third Schedule.

No botanical species protected under the Flora (Protection) Order (1999, as amended 2022) were recorded during the survey.

3.1.2 Description of Fauna

3.1.2.1 Otter

No otter resting or breeding sites were recorded within the Proposed Project site during dedicated otter surveys undertaken by MKO. No otter resting or breeding sites were recorded during the aquatic surveys of the watercourses downstream of the Proposed Project site undertaken by Triturus Environmental Ltd.

Surveys undertaken by Triturus Environmental Ltd. in 2021 and updated in 2024 found no direct evidence of otters (*Lutra lutra*) such as holts, couches, spraint, or tracks at any of the aquatic or pond sites surveyed within or adjacent to the Proposed Project site. Despite this, otter is known to occur within the wider area, with contemporary records available for several nearby watercourses including the Boor River, Blackwater River, River Shannon, and the Grand Canal.

3.1.2.2 Birds

Bird survey results were reviewed for species relevant to the assessment of potential impacts on SPAs within the potential Zone of Influence of the Proposed Project site (included in Table 4-1). Only bird species listed as SCIs of these SPAs are described below. These species are:

- Golden Plover
- Whooper Swan
- Lapwing
- Black-headed Gull
- Common Tern
- Black-tailed Godwit
- Shoveler
- Coot
- Tufted Duck
- Wigeon
- Teal
- Pintail
- Cormorant
- Mallard
- Little Grebe

Detailed maps and data are provided in Chapter 7: Birds of the EIAR that was prepared in support of the planning application and are included in Appendix 7 of this NIS.

The target species listed below were only recorded during waterbird distribution and abundance surveys, greater than 1.5km, and up to 8km, from the Proposed Project site. There were no observations of these species within or near the Proposed Project site over the 4.5 years of surveying.

- Common Tern (closet record = 7.7km distant from Proposed Project site).
- Black-tailed Godwit (closet record = 6.0km distant from Proposed Project site).
- Shoveler (closet record = 3.6km distant from Proposed Project site).
- Coot (closet record = 5.8km distant from Proposed Project site).
- Teal (closet record = 1.8km distant from Proposed Project site).

- Tufted Duck (closet record = 5.8km distant from Proposed Project site).

The following species were recorded during ornithological surveys, however, the distances between the Proposed Project site and the respective SPAs are significantly greater than the foraging ranges of these species.

- Wigeon – SCI of Middle Shannon Callows SPA situated approx. 8.9km from Proposed Project site – core foraging range of wigeon is 2.5 – 2.8km (Johnston *et al.*, 2013).
- Mallard – SCI of Lough Ree SPA situated approx. 11.4km from Proposed Project site – core foraging range of mallard is 0.5 – 1.3km (Johnston *et al.*, 2013).
- Little Grebe – SCI of Lough Ree SPA situated approx. 11.4km from Proposed Project site.
- Pintail – SCI of River Little Brosna Callows SPA situated approx. 5.4km from the Proposed Project site (20.6km from the Proposed Wind Farm) – core foraging range of pintail is 1.3km (Johnston *et al.*, 2013).
- Cormorant – SCI of 18.2km from the Proposed Project site (33.6km from the Proposed Wind Farm) – core foraging range of cormorant is 5.2km (Thaxter *et al.*, 2012)

The following species are SCI species of SPAs included in Table 4-1 and were not recorded during any ornithological surveys:

- Greenland White-Fronted Goose
- Corncrake
- Common Scoter
- Goldeneye

The sections below set out records for golden plover, whooper swan, black-headed gull and lapwing under the relevant survey headings.

3.1.2.2.1 *Golden Plover*

Golden plover were observed in the winter and passage[7] seasons. Raw survey data and maps are provided in Appendix 7. The relevant SPAs are designated for the wintering population of golden plover only, and the Conservation Objectives relate solely to maintaining the favourable conservation condition of the wintering population. Therefore, only wintering survey results are included.

Vantage Point Surveys

Golden plover were observed on 57 occasions during vantage point surveys comprising 41 flight observations and 16 non-flight observations. Golden plover were observed on average once every 19 hours of vantage point survey over the months when present (i.e. September – April). Observations were recorded across the months of September – April and ranged from an individual up to 275 birds with the majority of observations comprising birds travelling and calling. There were four observations of birds landing on bog within the Proposed Project site, comprising a flock of 29 birds in October 2021, two birds in December 2021, 80 birds in October 2023 and 46 birds in March 2024, in different locations. Birds were observed travelling at potential collision height on 30 occasions. Of the total 57 observations, 28 were within 500m of the proposed turbine layout and 52 within the Proposed Project site.

[7] *Passage season refers to the period when birds are on migration or movement between breeding and wintering areas, typically in the months of August, September, March and April.*

Winter Walkover Surveys

Golden plover was observed on 9 occasions during winter walkover surveys (on average, one observation per 21.5 hours of survey). Observations ranged from individuals up to 18 birds, with the majority of observations comprising birds flying or circling. There were 2 observations of birds roosting within the Proposed Project site, both within 500m of the proposed turbine layout, and comprising flocks of 4 and 8 birds. Of the total 9 observations, 6 were within 500m of the proposed turbine layout and 6 within the Proposed Project site.

Waterbird Distribution and Abundance Surveys

Golden plover were observed on 85 occasions during the waterbird distribution and abundance surveys (on average 1 observation per 6.5 hours of survey). Observations comprised birds circling, travelling and roosting. Flock sizes ranged from an individual up to 4,000 birds. All observations were greater than 5km distant from the Proposed Project site.

Incidental Observations

Golden plover were observed on 5 occasions as incidental observations. Observations comprised birds circling and travelling and ranged from an individual up to 80 birds. Of the 5 observations, 3 were within/partially within the Proposed Project site and a 500m radius of proposed turbine locations.

3.1.2.2.2 *Whooper Swan*

Whooper swan were observed in the winter season. Raw survey data and maps are provided in Appendix 7. The relevant SPAs are designated for the wintering population of whooper swan only, and the Conservation Objectives relate solely to maintaining the favourable conservation condition of the wintering population. Therefore, only wintering survey results are included.

Vantage Point Surveys

Whooper swan were observed on 142 occasions during vantage point surveys. Whooper swan were observed on average once every 7.5 hours of vantage point survey over the months when present (i.e. September – April). Observations ranged from an individual up to 71 birds, with the majority of observations comprising birds calling or travelling. Whooper swan were regularly observed roosting on flooded sections of bog within the Proposed Project site across the five winter seasons surveyed (2020/21 to 2024/25). The site was used for overnight roosting. These roosting areas were located approximately 10m, 230m, 120m, 220m and 490m from the nearest proposed turbine locations, respectively. Birds were observed travelling at Potential Collision Height on 36 occasions. Of the 142 total observations, 130 were within 500m of the proposed turbine layout.

Winter Walkover Surveys

Whooper swan was observed on 23 occasions during winter walkover surveys (on average, 1 observation per 8.5 hours of survey). Observations comprised birds travelling and roosting, and ranged from an individual up to 80 birds. Roosting across two areas within the Proposed Project site across the five winter seasons surveyed. Of the 23 total observations, 20 were within 500m of the proposed turbine layout.

Waterbird Distribution and Abundance Surveys

Whooper swan were observed on 139 occasions during the waterbird distribution and abundance surveys (on average, 1 observation per 4 hours of survey). Observations comprised up to 120 birds

recorded foraging, travelling or roosting outside the Proposed Project site, between 6.2km and 9.7km from the nearest proposed turbine location.

Incidental Observations

Whooper swan were observed on 23 occasions as incidental observations. Observations comprised up to 60 birds travelling, foraging and roosting. A flock of 60 birds were recorded roosting near the River Brosna, approximately 2km from the Proposed Project site, in January 2024.

Roosting Summary

Roosting was recorded across a total of five areas within the Proposed Project site across the five winter seasons surveyed. The majority of observations related to one area, with regular interchange of birds observed between this area and a second regularly used nearby area. The maximum flock sizes recorded at each of the roosting areas across the five winter seasons surveys are provided below:

- **Winter 2020/21** – Roosting recorded at four areas Proposed Project site with max counts of 39, 42, 28 and 2 respectively
- **Winter 2021/22** – Roosting recorded at two areas Proposed Project site with max counts of 15 and 23 respectively
- **Winter 2022/23** – Roosting recorded at four areas Proposed Project site with max counts of 71, 20, 57 and 5 respectively
- **Winter 2023/24** – Roosting recorded at two areas Proposed Project site with max counts of 11 and 5 respectively
- **Winter 2024/25** – Roosting recorded at three areas Proposed Project site with max counts of 10, 6 and 2 respectively

3.1.2.2.3 *Black-headed Gull*

Black-headed gull were observed in the breeding and winter season. Raw survey data and maps are provided in Appendix 7. The relevant SPAs are designated for the wintering population of black-headed gull only, and the Conservation Objectives relate solely to maintaining the favourable conservation condition of the wintering population. Therefore, only wintering survey results are included.

Vantage Point Surveys

Black-headed gull were observed on 16 occasions during vantage point surveys. Black-headed gull were observed on average once every 122 hours of the vantage point survey. The majority of observations comprised individual birds travelling, with a maximum flock of 3 birds recorded. The majority of observations were in the breeding season months of May, June and July, with only 3 observations outside this period (single observations from January, February and March). Birds were observed travelling at potential collision height on 10 occasions. Of the total 16 observations, nine were within the Proposed Project site, with seven also being within 500m of the proposed turbine layout.

Waterbird Distribution and Abundance Surveys

Black-headed gull were observed on 156 occasions during the waterbird distribution and abundance surveys (on average, 1 observation per 3.5 hours of survey). Observations ranged from individuals up to 200 birds and comprised birds foraging, travelling or roosting. All observations were outside of the Proposed Project site, ranging from between 4.3km and 9.8km from the nearest proposed turbine.

Incidental Observations

Black-headed gull were observed on nine occasions as incidental observations. Observations were of up to 12 birds travelling, foraging and circling. All observations were outside of the Proposed Project site, ranging from between 0.8km and 5km from the nearest proposed turbine.

3.1.2.2.4 *Lapwing*

Lapwing were observed in the breeding and winter seasons. Raw survey data and maps are provided in Appendix 7. The relevant SPAs are designated for the wintering population of lapwing only, and the Conservation Objectives relate solely to maintaining the favourable conservation condition of the wintering population. Therefore, only wintering survey results are included.

Vantage Point Surveys

Lapwing were observed on 89 occasions during vantage point surveys. Lapwing were observed on average once every 22 hours of vantage point survey. Observations were of up to 2 birds and the majority were of birds circling or travelling. In 2021, there was 1 observation of behaviour indicating probable breeding (mobbing). In 2023, there were 8 observations of behaviour indicating probable breeding (mobbing and displaying) and 1 observation confirming breeding (chicks observed). In 2024, there were 2 observations of behaviour indicating probable breeding (mobbing and displaying). There were 3 observations of birds landing or roosting on the bog. Birds were observed travelling at potential collision height on 34 occasions. Lapwing were observed on 78 occasions within 500m of the proposed turbine layout.

Winter Walkover Surveys

Lapwing was observed on 4 occasions during winter walkover surveys (on average, 1 observation per 48 hours of survey). The observations were of up to 4 birds travelling or roosting. There were 3 observations within 500m of the proposed turbine layout.

Waterbird Distribution and Abundance Surveys

Lapwing were observed on 261 occasions during the waterbird distribution and abundance surveys (on average, 1 observation every 2 hours of survey). Observations were of up to 1,400 birds and were of birds foraging, travelling, displaying or roosting. All observations were outside of the Proposed Project site, ranging from between 4.6km and 10.2km from the nearest proposed turbine.

Incidental Observations

Lapwing were observed on 55 occasions as incidental observations. The majority of observations comprised individual birds travelling. Observations were recorded across most months, but were predominantly concentrated within the breeding season. There were several observations of breeding activity. A juvenile bird was observed with an adult in suitable nesting habitat in June 2023, confirming breeding within this area. There were several observations of display and mobbing behaviour in breeding season 2024, indicating probable breeding in this area.

Observations were of up to 130 birds calling, travelling, displaying and roosting up to 4.9km from the nearest proposed turbine.

3.1.3 Baseline Hydrology and Hydrogeology

The following sections have been summarised from the hydrological and hydrogeological assessment carried out for Chapter 9 'Water' of the accompanying EIAR where pertinent in the assessment of potential effects on European Sites.

3.1.3.1 Local and Regional Hydrology

The Proposed Project site is located in a total of 3 no. surface water catchments. The vast majority of the Proposed Project site is located in the Lower Shannon surface water catchment within Hydrometric Area 25A of the Shannon Irish River Basin District (Shannon IRBD). Meanwhile, a small area in the northwest of the Proposed Project site is located within the Lower Shannon surface water catchment within Hydrometric Area 25B of the Shannon IRBD. Furthermore, a small section towards the north of the Proposed Project site is located in the Upper Shannon surface water catchment within Hydrometric Area 26G of the Shannon IRBD (www.epa.ie). Therefore, all surface waters draining the Proposed Project site will eventually discharge to the River Shannon. The River Shannon flows to the southwest approximately 10km northwest of the Proposed Project site before veering to the southeast at Shannonbridge, approximately 15km west of the Proposed Project site. The River Shannon then flows to the southwest, north of Banagher, approximately 17km southwest of the Proposed Project site before eventually discharging into Lough Derg.

Within the Upper Shannon regional surface water catchment (26G), the Proposed Project site is located in the Shannon Lower sub-catchment (Shannon[Lower]_SC_010) and the Boor_010 WFD river sub-basin. This area of the Proposed Project site is drained by the Boor River. Within this WFD river sub-basin the EPA named the Ballynahown Stream (EPA Code: 26B17) flows to the northwest from the vicinity of the Proposed Project site. The Ballynahown Stream discharges into the Boor River (EPA Code: 26B07) approximately 6.5km northwest of the Proposed Project site. The Boor River the continues to the west for 4.5km before it discharges into the River Shannon (EPA Code: 26S02).

Within the Lower Shannon (25B) regional surface water catchment, the Proposed Project site is located in the Shannon Lower sub-catchment (Shannon[Lower]_SC_030) and the Blackwater(Shannonbridge)_010 WFD river sub-basin. The closest EPA mapped watercourse is the EPA named Holy Well of Clongawny Stream (EPA Code: 25H29) which flows to the northwest approximately 950m west of the Proposed Project site and discharges into the Blackwater River (EPA Code: 25B27) approximately 3.3km northwest of the Proposed Project site. The Blackwater River then continues to the southwest before discharging into the Lower River Shannon (EPA Code: 25S01) approximately 13.5km southwest of the Proposed Project site and southeast of the village of Shannonbridge.

As stated above, the majority of the Proposed Project site is located within the Lower Shannon (25A) regional surface water catchment. On a more local scale within this catchment, the Proposed Project site is situated in the River Brosna sub-catchment (Brosna_SC_060) and 3 no. WFD river sub-basins. The easternmost section of this area of the Proposed Project site is located in the Brosna_100 WFD river sub-basin. In this area the EPA named Fortified House Castlearmstrong Stream (EPA Code: 26F69) flows southwards immediately to the east of the Proposed Project site. This stream discharge into the Brosna River (EPA Code: 25B09) approximately1.3km to the east. Meanwhile, the majority of the Proposed Project site is located in the Lemanaghan Stream_010 WFD river sub-basin with the Lemanaghan Stream (EPA Code: 25L04) flowing southwards through the centre of the Proposed Project site. This stream discharges into the Brosna River approximately 1.2km south of the Proposed Project site. Within this WFD river sub-basin the EPA map another stream to flow to the southwest along the northern boundary of Derrynagun Bog. This stream, referred to by the EPA as the Lemanaghan (EPA Code: 25L72) discharges into the Lemanaghan Stream to the south of the Proposed Project site. In addition, the west of the Proposed Project site is located in the Brosna_110 WFD river sub-basin. Here the EPA named Kilcolgan Beg Stream (EPA Code: 25Q21) flows to the south from the Proposed Project site, passing to the west of Curraghalassa Bog discharging into the Brosna River.

Downstream of the Proposed Project site the Brosna River then continues to flow to the west before it discharges into the Lower River Shannon approximately14.5km to the southwest. The River Shannon itself then continues to flow to the southwest before discharging into Lough Derg near Portumna.

The majority of the Proposed Project infrastructure is located within Lemanaghan Stream_010 river sub-basin (i.e., 11 no. proposed turbines, 2 no. borrow pits and 2 no. temporary construction compounds), with 3 no. proposed turbines, 1 no. met mast, 2 no. borrow pits and 1 no. temporary construction compound located in the Brosna_110 river sub-basin, 1 no. temporary construction compound is located in the Boor_020 river sub-basin, 1 no. temporary construction compound is located within the Blackwater(Shannonbridge)_010 and 1 no. proposed turbine is located in the Brosna_100 river sub-basin.

3.1.3.2 Hydrogeology

The Proposed Project site is underlain by a total of 4 no. GWBs. The vast majority of the Proposed Project site is underlain by the Clara GWB (IE_SH_G_240). A small area in the north of the Proposed Project site is underlain by the Inny GWB (IE_SH_G_110) whilst some of the south of the Proposed Project site is underlain by the Ferbane GWB (IE_SH_G_089). The Boor Gravels GWB (IE_SH_G_258) is also mapped to underlie some elements of the Proposed Grid Connection in the north of the Proposed Project site.

While diffuse recharge occurs across most of the GWBs above, in the vicinity of the vast majority of the Proposed Project site groundwater recharge is restricted by peat and its underlying low permeability lacustrine clay and shell marl. Groundwater movement through the underlying subsoil glacial deposits will be relatively slow unless higher permeability sands and gravels are present. Recharge is likely to be limited to the perimeter of the site where the peat is thin or absent (the presence of peat will prevent rapid recharge to underlying regional groundwater systems).

Based on topography and regional surface water drainage flows, groundwater flow direction across much of the Proposed Project site is likely to be southwards the Brosna River. Meanwhile in the north and northwest, groundwater will flow towards the Boor and Blackwater rivers. Groundwater gradients in the area of the Proposed Project site will be low, reflecting surface topography.

3.1.4 Proposed Project Site Drainage

Due to the historic industrial peat extraction activities at the Proposed Project site, the site has been artificially drained in order to lower the peat water table. Drainage ditches were first inserted into the upper surface of the bog in 1950 prior to the commencement of peat extraction in 1960.

Currently surface water (or runoff water) is drained from the site via a network of field drains typically spaced at 15 to 20m intervals, piped drains, main drains, headland drains, and settlement ponds. Much of the site is drained by gravity however there are 2 no. pumps located in the centre of the site. Following peat extraction activities, drainage by gravity in this area of the site was no longer feasible as the water level in the surrounding streams were higher than the water level within the site. The field drains discharge to main drains which flow via gravity towards the perimeter of the site where they discharge to larger headland drains. These headland drains eventually discharge to large silt (settlement) ponds. The settlement ponds are used to trap sediment and prevent elevated levels of suspended sediment arising in effluent from the drained peatland. Treated surface water is then discharged at outfall points where the effluent flows into off-site drainage channels which in turn discharge into the local stream and river network.

Drainage of the Proposed Project site is currently operating under licence from the EPA (P0500-01). The drainage system has been operating in accordance with this existing Integrated Pollution Control (IPC) licence, with all drainage water from the bogs being discharged via an appropriately designed settlement pond treatment arrangement.

A flow diagram for the existing drainage system is shown in Plate 3-10 below.

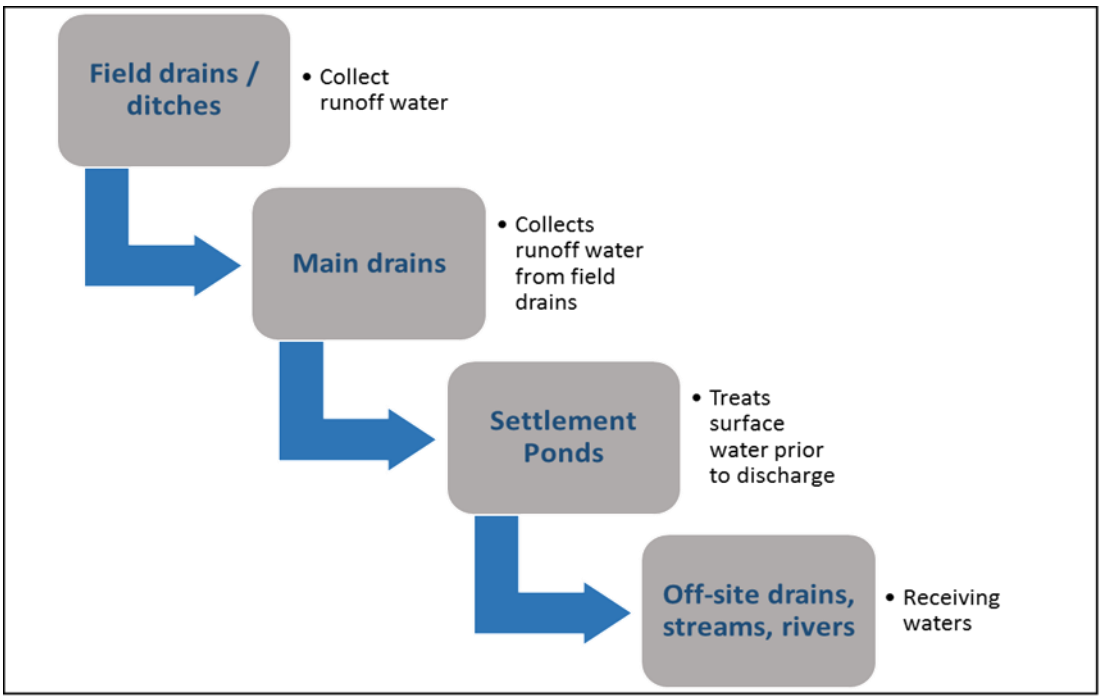


Plate 3-10 Process Flow Diagram for the Existing Drainage System

Drainage from the Proposed Project site discharges through 8 no. gravity surface water outfalls (SW19, SW19A, SW19B, SW22, SW22A, SW22B, SW22C and SW22D):

- In the east of the Proposed Project site, within the Brosna_100 WFD river sub-basin, there are a total of 4 no. discharge points (SW22, SW22A, SW22B and SW22C) to the EPA named Fortified House Castlearmstong Stream;
- Within the Boor_020 WFD river sub-basin, there is 1 no. outfall (SW22D) to the EPA named Ballynahown Stream (referred to locally as the Brooks Stream);
- Within the Lemanaghan Stream_010 WFD river sub-basin, there are a total of 2 no. outfalls (SW19 and SW19A) to the EPA named Lemanaghan Stream; and,
- To the west, within the Brosna_110 WFD river sub-basin, there is 1 no. outfall (SW19B) to the EPA named Kilcolgan Beg Stream, a tributary of the Brosna River.

Note that despite a section of the Proposed Project site being mapped in the catchment of the Blackwater River, there are no surface water discharge points (outfalls) within this sub-catchment. Drainage in this area of the Proposed Project site is directed, via field and main drains, into the Brosna sub-catchment and discharges to the tributaries of the Brosna River.

3.1.5 EPA Biological Q-Rating

The Biological Q-Rating is a water quality rating system based on both the habitat and the invertebrate community assessment and is divided into status categories ranging from 0-1 (Poor) to 4-5 (Good/High). The most recent Biological Q-rating data for EPA monitoring points on the Brosna, Blackwater and Boor rivers are shown in Table 3-1 below.

Within the Shannon Lower_SC_010 sub-catchment, the Boor River achieved a Q3-4 rating upstream (Station Code: RS26B071100) and downstream (Station Code: RS26B071200) of the Proposed Project site in 2023.

Within the Shannon Lower_SC_030 sub-catchment, the Blackwater River achieved a Q3 rating downstream of the Proposed Project site at a bridge northeast of Derryharry (Station Code: RS25B270110) and at Blackwater Bridge (Station Code: RS25B270200).

Within the Brosna_SC_060 sub-catchment, upstream of the Proposed Project site at Ballycumber, Co. Offaly the Brosna River achieved 'Good' status in 2021 (RS25B090700). The Brosna River achieved 'Moderate' status in 2023 at Pollagh, Co. Offaly upstream of its confluence with the Lemanaghan Stream. Further downstream the Brosna River was assigned a Q4 rating in 2023 near Kilcolgan and Ferbane (RS25B090800 and RS25B090950). Further downstream at Bellmount downstream of Ferbane, the Brosna River has been assigned a Q-rating of Q3-4 in 2023 (RS25B091000).

Table 3-1 Most recent (2020) Q-ratings

River	Station ID	Location	EPA Q-Rating (Year)	Q-Value Status
Shannon Lower_SC_010 sub-catchment				
Boor River	RS26B071100	Bridge NW of Kilbillaghan	2024	Q3-4 (Moderate)
Boor River	RS26B071200	Bridge NW of Ballynahownwood	2023	Q3-4 (Moderate)
River Shannon	RS26S021800	Clonmacnoise: at Jetty	2024	Q3 (Poor)
Shannon Lower_SC_030 sub-catchment				
Blackwater River	RS25B270110	Bridge ENE of Derryharry	2023	Q3 (Poor)
Blackwater River	RS25B270200	Blackwater Bridge	2023	Q3 (Poor)
Brosna_SC_060 sub-catchment				
Brosna River	RS25B090700	Ballycumber Bridge (upstream of site)	2021	Q4 (Good)
Brosna River	RS25B090760	0.5km NW of Pollagh	2023	Q3-4 (Moderate)
Brosna River	RS25B090800	Bridge near Kilcolgan	2023	Q4 (Good)
Brosna River	RS25B090950	Ferbane Bridge	2023	Q4 (Good)
Brosna River	RS25B091000	Bellmount downstream of Ferbane	2023	Q3-4 (Moderate)

4. APPROPRIATE ASSESSMENT SCREENING

4.1 Identification of Relevant European Sites

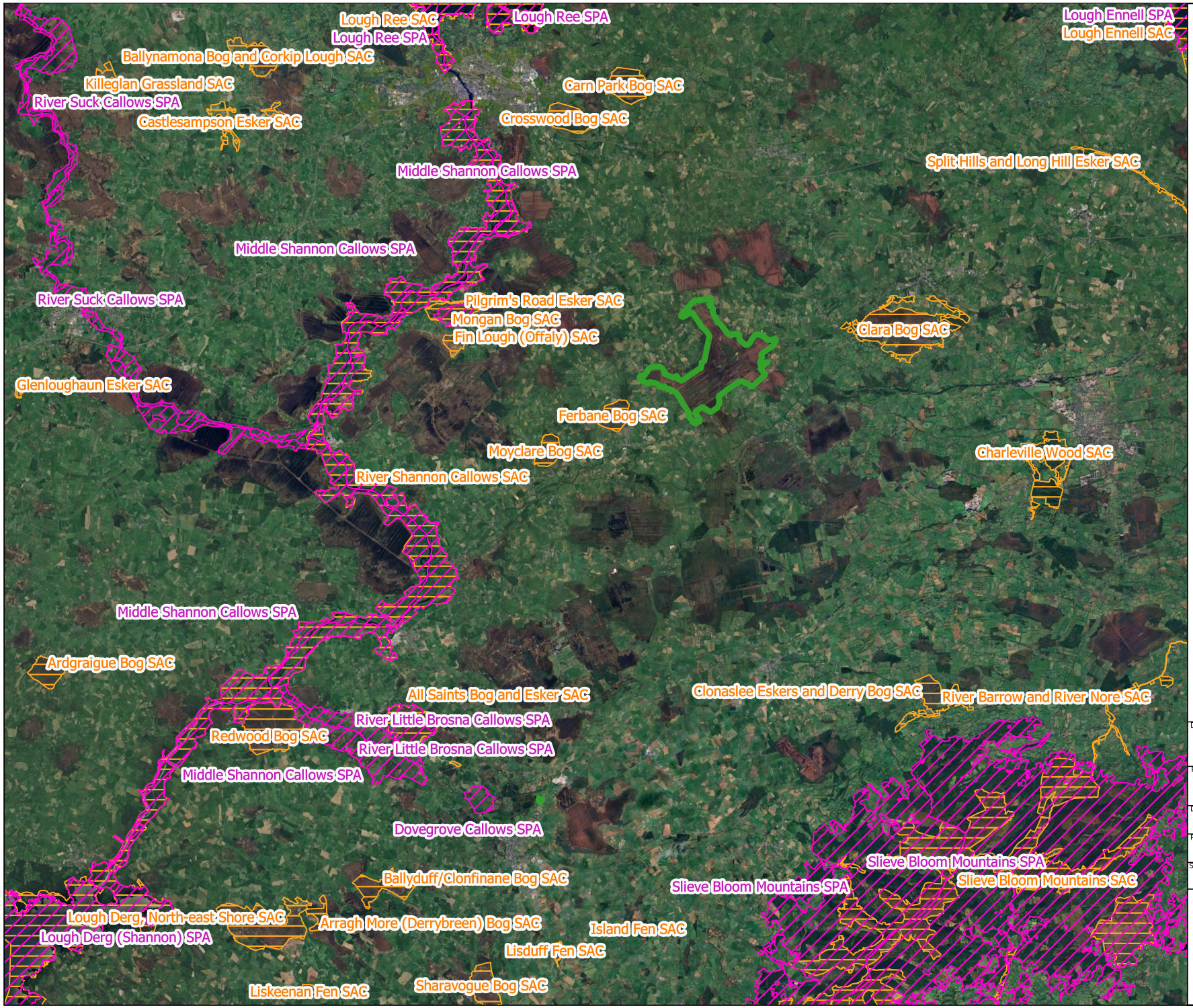
The following methodology was used to establish any European Sites upon which there is a potential for a likely significant effect to occur either individually or in combination with other plans and projects as a result of the Proposed Project:

- Initially the most up to date GIS spatial datasets for European designated sites and water catchments were downloaded from the NPWS website (www.npws.ie)[8] and the EPA website (www.epa.ie). The datasets were utilised to identify Designated Sites which could feasibly be affected by the Proposed Project.
- All European Sites that could potentially be affected were identified using a source-pathway - receptor model and are shown on Figure 4-1. Information on these European Sites according to the site-specific conservation objectives is provided in Table 4-1.
- The catchment mapping was used to establish or discount potential hydrological connectivity between the site of the Proposed Project and any European Sites. The hydrological catchments are also shown in Figure 4-1.
- In relation to Special Protection Areas, in the absence of any specific European or Irish guidance in relation to such sites, the Scottish Natural Heritage (SNH) Guidance, '*Assessing Connectivity with Special Protection Areas* (SPA)' (2016) was consulted. This document provides guidance in relation to the identification of connectivity between Proposed Project and Special Protection Areas. The guidance takes into consideration the distances species may travel beyond the boundary of their SPAs and provides information on dispersal and foraging ranges of bird species which are frequently encountered when considering plans and projects.
- Table 4-1 provides details of all relevant European Sites as identified in the preceding steps and assesses the potential for likely significant effects on each.
- The assessment considers any likely direct or indirect impacts of the Proposed Project, both alone and in combination with other plans and projects, on European Sites by virtue of criteria including the following: size and scale, land-take, distance from the European Site or key features of the site, resource requirements, emissions, excavation requirements, transportation requirements and duration of construction, operation and decommissioning were considered in this assessment.
- The site synopses and conservation objectives of these European Sites, as per the NPWS website (www.npws.ie), were consulted and reviewed at the time of preparing this report.
- Where potential pathways for Likely Significant Effect are identified, the European Site is included within the Likely Zone of Influence and further assessment is required within the NIS.
- The potential for the Proposed Project to result in cumulative impacts on any European Sites in combination with other plans and projects was considered in the assessment (the list of plans and projects is included in Appendix 8).

[8] *The following SAC and SPA GIS boundary datasets are the most recently available at the time of writing: SAC_ITM_2026_01 and SPA_ITM_2026_01*

4.1.1 European Designated Sites Within the Zone of Influence

An assessment of the potential for the Proposed Project to result in Likely Significant Effects on European Sites is provided in Table 4-1. European Sites in the vicinity of the Proposed Project site are shown on Figure 4-1 below. Distances presented in Table 4-1 are measured from the Proposed Project site boundary at its nearest point. The Proposed Project site includes a geographically separate area associated with the proposed TDR accommodation works. As this area is located separately from the remainder of the Proposed Project site, the distance from the proposed TDR accommodation area to each European site is also provided in Table 4-1 to provide spatial context where proximity to the proposed TDR works differs from that of the remainder of the Proposed Project site. In some cases, the distances will be the same where the nearest point of the Proposed Project site occurs at the proposed TDR accommodation area.



Map Legend

- NIS Site Boundary
- WFD Sub-catchments
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)

N

Drawing Title: Nationally Designated Sites

Project Title: Lemanaghan Wind Farm, Co Offaly

Drawn By	Checked By
SS	RW
Project No.	**Drawing No.**
200804	Figure 4-1
Scale	**Date**
1:243,000	2026-03-09

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

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

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
Special Areas of Conservation (SAC)			
Ferbane Bog SAC [000575] **Distance:** 1.2km from the Proposed Project site at its nearest point 17.9km from the proposed TDR accommodation area	› [7110] Active raised bogs › [7120] Degraded raised bogs still capable of natural regeneration › [7150] Depressions on peat substrates of the Rhynchosporion	Detailed conservation objectives for this site, (Version 1, November 2015[9]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >1km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connection between the Proposed Project and this SAC via surface or groundwater. The potential for indirect effects arising from air quality impacts was also considered. The Proposed Project does not include any significant operational combustion sources and will not give rise to ongoing atmospheric emissions. During the construction phase, there is potential for temporary and localised dust generation associated with site preparation, excavation works and construction traffic. However, published guidance indicates that dust deposition effects on sensitive habitats are typically confined to areas within approximately 50–100m of works and rarely extend beyond 200m of the source[10][11]. In the absence of a significant emission source and given the separation distance between the Proposed Project and the SAC, there is no pathway by which construction dust, exhaust emissions or any associated atmospheric deposition could affect the QI habitats of Ferbane Bog SAC.

[9] *NPWS (2015) Conservation Objectives: Ferbane Bog SAC 000575. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.*
[10] *Institute of Air Quality Management (IAQM) (2024). Guidance on the Assessment of Dust from Demolition and Construction.*
[11] *Transport Infrastructure Ireland (TII) (2011). Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes.*

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
			On the basis of the absence of any hydrological connectivity, the absence of a significant atmospheric emission source, the localised and temporary nature of construction-related emissions, and the separation distance of over 1km between the Proposed Project and the SAC, no pathway for indirect effects has been identified. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**
Clara Bog SAC [000572] **Distance:** 3.1km from the Proposed Project site at its nearest point 26.6km from the proposed TDR accommodation area	› [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) › [7110] Active raised bogs › [7120] Degraded raised bogs still capable of natural regeneration › [7150] Depressions on peat substrates of the Rhynchosporion › [91D0] Bog woodland	Detailed conservation objectives for this site, (Version 1, August 2016[12]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >3km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connection between the Proposed Project and this SAC via surface or groundwater. On this basis and given the distance between the Proposed Project site and this European Site, no potential for indirect effects was identified. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**

[12] *NPWS (2016) Conservation Objectives: Clara Bog SAC 000572. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.*

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
Ridge Road, SW of Rapemills SAC [000919] **Distance:** 4km from the Proposed Project site at its nearest point 4km from the proposed TDR accommodation area	› [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)	Detailed conservation objectives for this site, (Version 1, June 2018[13]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and 4km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. No connectivity or pathway for significant effects on the site was identified and the habitat for which the site is designated is terrestrial in nature. On this basis and given the distance between the Proposed Project site and this European Site, no potential for indirect effects was identified. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**
Moyclare Bog SAC [000581] **Distance:** 4.8km from the Proposed Project site at its nearest point 15.9km from the proposed TDR accommodation area	› [7110] Active raised bogs › [7120] Degraded raised bogs still capable of natural regeneration › [7150] Depressions on peat substrates of the Rhynchosporion	Detailed conservation objectives for this site, (Version 1, November 2015[14]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >4km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connection between the Proposed Project and this SAC via surface or groundwater. On this basis and given the distance between the Proposed Project site and this European Site, no potential for indirect effects was identified.

[13] *NPWS (2018) Conservation Objectives: Ridge Road, SW of Rapemills SAC 000919. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.*
[14] *NPWS (2015) Conservation Objectives: Moyclare Bog SAC 000581. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.*

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
			There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.
All Saints Bog and Esker SAC [000566] **Distance:** 5.8km from the Proposed Project site at its nearest point 5.8km from the Turbine Delivery Route accommodation area	› [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) › [7110] Active raised bogs › [7120] Degraded raised bogs still capable of natural regeneration › [7150] Depressions on peat substrates of the Rhynchosporion › [91D0] Bog woodland	Detailed conservation objectives for this site, (Version 1, March 2016[15]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >5km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connection between the Proposed Project and this SAC via surface or groundwater. On this basis and given the distance between the Proposed Project site and this European Site, no potential for indirect effects was identified. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**
Lisduff Fen SAC [002147] **Distance:** 6.7km from the Proposed Project site at its nearest point	› [1013] Geyer's Whorl Snail (*Vertigo geyeri*) › [7220] Petrifying springs with tufa formation (Cratoneurion) › [7230] Alkaline fens	Detailed conservation objectives for this site, (Version 1, January 2019[16]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >5km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connection between the Proposed Project and this SAC via surface or groundwater. On this basis and given the distance between the

[15] *NPWS (2016) Conservation Objectives: All Saints Bog and Esker SAC 000566. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.*
[16] *NPWS (2019) Conservation Objectives: Lisduff Fen SAC 002147. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht*

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
6.7km from the proposed TDR accommodation area			Proposed Project site and this European Site, no potential for indirect effects was identified. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**
Ballyduff/Clonfinane Bog SAC [000641] **Distance:** 7.1km from the Proposed Project site at its nearest point 7.1km from the proposed TDR accommodation area	› [7110] Active raised bogs › [7120] Degraded raised bogs still capable of natural regeneration › [7150] Depressions on peat substrates of the Rhynchosporion › [91D0] Bog woodland	Detailed conservation objectives for this site, (Version 1, November 2015[17]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >7km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connection between the Proposed Project and this SAC via surface or groundwater. On this basis and given the distance between the Proposed Project site and this European Site, no potential for indirect effects was identified. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**
Island Fen SAC [002236]	› [5130] *Juniperus communis* formations on heaths or calcareous grasslands › [7230] Alkaline fens	Detailed conservation objectives for this site, (Version 1, October 2018[18]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >7km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological

17NPWS (2015) Conservation Objectives: Ballyduff/Clonfinane Bog SAC 000641. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

18NPWS (2018) Conservation Objectives: Island Fen SAC 002236. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
Distance: 7.5km from the Proposed Project site at its nearest point 7.5km from the proposed TDR accommodation area			connection between the Proposed Project and this SAC via surface or groundwater. On this basis and given the distance between the Proposed Project site and this European Site, no potential for indirect effects was identified. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**
Pilgrim's Road Esker SAC [001776] **Distance:** 7.7km from the Proposed Project site at its nearest point 23.6km from the proposed TDR accommodation area	› [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia)	Detailed conservation objectives for this site, (Version 1, July 2018[19]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >7km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. No connectivity or pathway for significant effects on the site was identified and the habitats for which the site is designated are terrestrial in nature. On this basis and given the distance between the Proposed Project site and this European Site, no potential for indirect effects was identified. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**
Sharavogue Bog SAC [000585]	› [7110] Active raised bogs › [7120] Degraded raised bogs still capable of natural regeneration	Detailed conservation objectives for this site, (Version 1, November 2015[20]), were	No pathway for direct effects was identified as this European Site lies entirely outside of and 8km from the Proposed Project site.

[19] *NPWS (2018) Conservation Objectives: Pilgrim's Road Esker SAC 001776. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.*
20NPWS (2015) Conservation Objectives: Sharavogue Bog SAC 000585. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
Distance: 8km from the Proposed Project site at its nearest point 8km from the proposed TDR accommodation area	› [7150] Depressions on peat substrates of the Rhynchosporion	reviewed as part of the assessment and are available at www.npws.ie	The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connection between the Proposed Project and this SAC via surface or groundwater. On this basis and given the distance between the Proposed Project site and this European Site, no potential for indirect effects was identified. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**
Mongan Bog SAC [000580] **Distance:** 8.4km from the Proposed Project site at its nearest point 22.9km from the proposed TDR accommodation area	› [7110] Active raised bogs › [7120] Degraded raised bogs still capable of natural regeneration › [7150] Depressions on peat substrates of the Rhynchosporion	Detailed conservation objectives for this site, (Version 1, April 2016[21]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >8km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connection between the Proposed Project and this SAC via surface or groundwater. On this basis and given the distance between the Proposed Project site and this European Site, no potential for indirect effects was identified. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**

[21] *NPWS (2016) Conservation Objectives: Mongan Bog SAC 000580. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.*

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
River Shannon Callows SAC [000216] **Distance:** 8.3km from the Proposed Project site at its nearest point 9.5km from the proposed TDR accommodation area	› [1355] Otter (*Lutra lutra*) › [6410] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) › [6510] Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) › [7230] Alkaline fens › [8240] Limestone pavements › [91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	Detailed conservation objectives for this site, (Version 1, January 2022[22]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >8km from the Proposed Project site. There is hydrological connectivity between the Proposed Project site and this SAC (approximately 9.9km downstream) via drainage ditches and watercourses within the Proposed Project site which ultimately discharge to the Brosna River and the River Shannon, both of which are designated as part of the SAC. A potential pathway for indirect effects on the aquatic QIs of this SAC was identified. There is potential for deterioration in surface and ground water quality due to run off of pollutants, including silts and hydrocarbons, to watercourses within and downstream of the site. Therefore, a potential pathway for indirect effects on the aquatic QIs of the SAC where they occur downstream of the Proposed Project site was identified. A potential pathway for indirect effects on otter as a result of disturbance was also identified. While no evidence of otter was recorded during any surveys of the Proposed Project site, there is likely to be a regularly occurring population utilising the watercourses within and downstream of the Proposed Project site. Otters can utilise extensive territories, (approximately 7.5 ± 1.5km for females and 13.2 ± 5.3km for males (Ó'Neill, 2008)). On a precautionary basis, it is considered that otters potentially using watercourses within or downstream of the Proposed Project site may be associated with River

[22] *NPWS (2022) Conservation Objectives: River Shannon Callows SAC 000216. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.*

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
			Shannon Callows SAC. Therefore, a potential pathway for disturbance has been identified. **A complete source pathway receptor chain was identified and in the absence of mitigation, there is potential for significant effects on this European Site. Therefore, the European Site is located within the Likely Zone of Influence and is considered further in this assessment.**
Fin Lough (Offaly) SAC [000576] **Distance:** 8.4km from the Proposed Project site at its nearest point 21.5km from the proposed TDR accommodation area	› [1013] Geyer's Whorl Snail (*Vertigo geyeri*) › [7230] Alkaline fens	Detailed conservation objectives for this site, (Version 1, February 2019[23]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >8km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connection between the Proposed Project and this SAC via surface or groundwater. On this basis and given the distance between the Proposed Project site and this European Site, no potential for indirect effects was identified. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**
Crosswood Bog SAC [002337]	› [7110] Active raised bogs › [7120] Degraded raised bogs still capable of natural regeneration	Detailed conservation objectives for this site, (Version 1, February 2016[24]), were reviewed as part of	No pathway for direct effects was identified as this European Site lies entirely outside of and >9km from the Proposed Project site.

[23] *NPWS (2019) Conservation Objectives: Fin Lough (Offaly) SAC 000576. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.*
[24] *NPWS (2016) Conservation Objectives: Crosswood Bog SAC 002337. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.*

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
Distance: 9.6km from the Proposed Project site at its nearest point 31.8km from the proposed TDR accommodation area		the assessment and are available at www.npws.ie	The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connection between the Proposed Project and this SAC via surface or groundwater. On this basis and given the distance between the Proposed Project site and this European Site, no potential for indirect effects was identified. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**
Carn Park Bog SAC [002336] **Distance:** 9.8km from the Proposed Project site at its nearest point 33.5km from the proposed TDR accommodation area	› [7110] Active raised bogs › [7120] Degraded raised bogs still capable of natural regeneration	Detailed conservation objectives for this site, (Version 1, November 2015[25]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >9km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connection between the Proposed Project and this SAC via surface or groundwater. On this basis and given the distance between the Proposed Project site and this European Site, no potential for indirect effects was identified. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**

[25] *NPWS (2015) Conservation Objectives: Carn Park Bog SAC 002336. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.*

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
Charleville Wood SAC [000571] **Distance:** 12.6km from the Proposed Project site at its nearest point 26.9km from the proposed TDR accommodation area	› [1016] Desmoulin's Whorl Snail (*Vertigo moulinsiana*) › [91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	Detailed conservation objectives for this site, (Version 1, November 2021[26]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >12km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connection between the Proposed Project and this SAC via surface or groundwater, and the SAC is located in a different surface water sub-catchment. On this basis and given the distance between the Proposed Project site and this European Site, no potential for indirect effects was identified. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**
Lough Ree SAC [000440] **Distance:** 14.9km from the Proposed Project site at its nearest point	› [1355] Otter (*Lutra lutra)* › [3150] Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation › [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) › [7120] Degraded raised bogs still capable of natural regeneration	Detailed conservation objectives for this site, (Version 1, August 2016[27]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >14km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connection between the Proposed Project and this SAC via surface or groundwater. On this basis and given the distance between the Proposed Project site and this European Site, no potential for indirect effects was identified.

[26] *NPWS (2021) Conservation Objectives: Charleville Wood SAC 000571. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.*
27 NPWS (2016) Conservation Objectives: Lough Ree SAC 000440. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
35km from the proposed TDR accommodation area	› [7230] Alkaline fens › [8240] Limestone pavements › [91A0] Old sessile oak woods with *Ilex* [and *Blechnum* in the British Isles › [91D0] Bog woodland		**There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**
Lough Derg, North-east Shore SAC [002241] **Distance:** 17.9km from the Proposed Project site at its closest point 17.9km from the proposed TDR accommodation area	› [5130] *Juniperus cummunis* formations on heaths or calcareous grasslands › [7210] Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae › [7230] Alkaline fens › [8240] Limestone pavements › [91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) › [91J0] *Taxus baccata* woods of the British Isles	Detailed conservation objectives for this site, (Version 1, April 2019[28]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >17km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is hydrological connectivity between the Proposed Project site and this SAC via watercourses within and adjacent to the Proposed Project site which discharge to the River Shannon which eventually discharges to Lough Derg. This European Site is located >17km from the Proposed Project site and a significant distance downstream of the Proposed Project (approximately 63.9km). Given the significant distance between the Proposed Project site and the SAC, and the attenuation properties of the intervening watercourses, no potential for significant indirect effects on the European Site was identified. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**

[28] *NPWS (2019) Conservation Objectives: Lough Derg, North-east Shore SAC 002241. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.*

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
Special Protection Area (SPA)			
Dovegrove Callows SPA [004137] **Distance:** 2km from the Proposed Project site at its nearest point 2km from the proposed TDR accommodation area	› [A395] Greenland White-fronted Goose (*Anser albifrons flavirostris*)	Detailed conservation objectives for this site, (Version 1, January 2025[29]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and 2km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connectivity between the Proposed Project site and this European Site. Therefore, no potential for indirect effect on supporting wetland habitat for SCI bird species due to deterioration in water quality exists. There were no observations of Greenland white-fronted geese within 500m of the Proposed Project site during ornithological surveys undertaken between October 2020 and March 2025. The Proposed Wind Farm lies outside the core foraging distance of the SCI species Greenland white-fronted goose (core range of 5-8km) as per Scottish Natural Heritage (SNH) Guidelines (SNH, 2016). This SPA lies within the core foraging distance of the Turbine Delivery Route accommodation area, however the works at this location are small in scale and the area does not provide suitable habitat to support Greenland white-fronted geese. Given this, and the distance between the Proposed Wind Farm and the SPA, no potential for significant indirect disturbance effects on Greenland white-fronted goose activities was identified.

29 NPWS (2025) Conservation Objectives: Dovegrove Callows SPA 004137. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
			There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.
River Little Brosna Callows SPA [004086] **Distance:** 5.4km from the Proposed Project site at its nearest point 5.4km from the proposed TDR accommodation area	› [A038] Whooper Swan (*Cygnus cygnus)* › [A050] Wigeon (*Anas penelope)* › [A052] Teal (*Anas crecca)* › [A054] Pintail (*Anas acuta)* › [A056] Shoveler (*Anas clypeata)* › [A140] Golden Plover (*Pluvialis apricaria)* › [A142] Lapwing (*Vanellus Vanellus)* › [A156] Black-tailed Godwit (*Limosa limosa)* › [A179] Black-headed Gull (*Chroicocephalus ridibundus)* › [A395] Greenland White-fronted Goose (*Anser albifrons flavirostris)* › [A999] Wetlands	Detailed conservation objectives for this site, (Version 1, January 2025[30]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >5km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connectivity between the Proposed Project site and this European Site. Therefore, no potential for indirect effect on supporting wetland habitat for SCI bird species due to deterioration in water quality exists. The potential for effects on SCI bird species was also considered. The Proposed Wind Farm is located a considerable distance from the SPA (over 20km), and no pathway for connectivity between the Proposed Project site and populations with potential to be associated with this SPA has been identified. While the SPA is located 5.4km from the proposed TDR accommodation area, the works at this location are small in scale and the area does not provide suitable supporting habitat for these SCI species. On this basis, no potential for significant indirect effects due to disturbance or ex situ habitat loss has been identified.

30 NPWS (2025) Conservation Objectives: River Little Brosna Callows SPA 004086. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
			There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.
All Saints Bog SPA [004103] **Distance:** 5.9km from the Proposed Project site at its nearest point 5.9km from the proposed accommodation area	› [A395] Greenland White-fronted Goose (*Anser albifrons flavirostris*)	Detailed conservation objectives for this site, (Version 1, April 2025[31]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >5km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connectivity between the Proposed Project site and this European Site. Therefore, no potential for indirect effect on supporting wetland habitat for SCI bird species due to deterioration in water quality exists. There were no observations of Greenland white-fronted geese within 500m of the Proposed Project site during ornithological surveys undertaken between October 2020 and March 2025. The Proposed Project site lies outside the core foraging distance of the SCI species Greenland white-fronted goose (core range of 5-8km) as per Scottish Natural Heritage (SNH) Guidelines (SNH, 2016). Given the distance between the Proposed Project site and the SPA, no potential for significant indirect disturbance effects on Greenland white-fronted goose activities was identified. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**

31 NPWS (2025) Conservation Objectives: All Saints Bog SPA 004103. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
Middle Shannon Callows SPA [004096] **Distance:** 8.3km from the Proposed Project site at its nearest point 9.5km from the proposed TDR accommodation area	› [A038] Whooper Swan (*Cygnus cygnus*) › [A050] Wigeon (*Anas Penelope*) › [A122] Corncrake (*Crex crex*) › [A140] Golden Plover (*Pluvialis apricaria*) › [A142] Lapwing (*Vanellus vanellus*) › [A156] Black-tailed Godwit (*Limosa limosa*) › [A179] Black-headed Gull (*Chroicocephalus ridibundus*) › [A999] Wetlands	Detailed conservation objectives for this site, (Version 1, November 2022[32]), were reviewed as part of the assessment and are available at www.npws.ie	A potential pathway for direct effects was identified as result of collision risk and displacement/barrier effects to SCI bird species due to the Proposed Wind Farm. A potential pathway for indirect effects on SCI bird species due to deterioration of water quality was also identified. There is hydrological connectivity between the Proposed Project site and this SPA (approximately 9.9km) via watercourses within the Proposed Project site which discharge to the Brosna River and the River Shannon, both of which are designated as part of the SPA. There is potential for deterioration in surface water quality due to run-off of pollutants, including silts and hydrocarbons, to watercourses within and downstream of the site. This has potential to result in degradation of SCI supporting wetland habitat and negatively affect availability of food resources for SCI species. A potential pathway for indirect effects on SCI species where they occur outside the SPA, as a result of disturbance and loss of ex situ habitat, has also been identified. While much of the Proposed Project site comprises cutover bog and regenerating habitats of limited ecological value, SCI bird species with potential to be connected with SCI populations associated with the Middle Shannon Callows SPA have been recorded using areas within the Proposed Project site. The construction of the Proposed Project will result in a permanent loss of habitat within the footprint of turbines, tracks and associated infrastructure. Although the overall footprint is small relative to the

[32] *NPWS (2022) Conservation Objectives: Middle Shannon Callows SPA 004096. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.*

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
			extent of available habitat within the site and wider landscape, this has the potential to represent a loss of ex situ habitat for SCI species. On a precautionary basis, a potential pathway for effect due to habitat loss has therefore been identified. **A complete source pathway receptor chain was identified and in the absence of mitigation, there is potential for likely significant effects on this European Site. Therefore, the European Site is located within the Likely Zone of Influence and further assessment is required.**
Mongan Bog SPA [004017] **Distance:** 8.5km from the Proposed Project site at its nearest point 22.9km from the proposed TDR accommodation area	› [A395] Greenland White-fronted Goose (*Anser albifrons flavirostris*)	Detailed conservation objectives for this site, (Version 1, April 2025[33]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >8km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connectivity between the Proposed Project site and this European Site. Therefore, no potential for indirect effect on supporting wetland habitat for SCI bird species due to deterioration in water quality exists. There were no observations of Greenland white-fronted geese within 500m of the Proposed Project site during ornithological surveys undertaken between October 2020 and March 2025. The Proposed Project site lies outside the core foraging distance of the SCI species Greenland white-fronted goose (core range of 5-8km) as per Scottish Natural Heritage (SNH) Guidelines (SNH, 2016). Given the distance between the Proposed Project site and the SPA, no potential for

33 NPWS (2025) Conservation Objectives: Mongan Bog SPA 004017. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage..

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
			significant indirect disturbance effects on Greenland white-fronted goose activities was identified. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**
Lough Ree SPA [004064] **Distance:** 14.9km from the Proposed Project site at its nearest point 34.9km from the proposed TDR accommodation area	› [A004] Little Grebe (*Tachybaptus ruficollis*) › [A038] Whooper Swan (*Cygnus cygnus*) › [A050] Wigeon (*Anas Penelope*) › [A052] Teal (*Anas crecca*) › [A053] Mallard (*Anas platyrhynch*os) › [A056] Shoveler (*Anas clypeata*) › [A061] Tufted Duck (*Aythya fuligula*) › [A065] Common Scoter (*Melanitta nigra*) › [A067] Goldeneye (*Bucephala clangula*) › [A125] Coot (*Fulica atra*) › [A140] Golden Plover (*Pluvialis apricaria*) › [A142] Lapwing (*Vanellus vanellus*) › [A193] Common Tern (*Sterna hirundo*) › [A999] Wetlands	Detailed conservation objectives for this site, (Version 1, April 2025[34]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >14km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connectivity between the Proposed Project site and the SPA, which are located within separate hydrological catchments. Therefore, no potential for indirect effect on supporting wetland habitat for SCI bird species due to deterioration in water quality exists. During ornithological surveys undertaken between October 2020 and March 2025, the following SCI species were recorded within the Proposed Project site and/or within 500m of the Proposed Project site: little grebe, whooper swan, wigeon, mallard, golden plover and lapwing. The distance between the SPA and the Proposed Project site is greater than the core foraging range of little grebe, whooper swan (<5km), wigeon (2.5 - 2.8km) and mallard (0.5-1.3km) (SNH, 2016; Johnston *et al.,* 2013), and no regular or patterned flight activity of these species was recorded during surveys such as would suggest connectivity between the Proposed Project site and the SPA. Furthermore, in

[34] *NPWS (2025) Conservation Objectives: Lough Ree SPA 004064. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.*

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
			relation to whooper swan, regularly used closely located roost sites were identified within the Proposed Project site. Flock sizes recorded in the vicinity of the Proposed Project site were broadly in line with numbers observed at the roost sites, and therefore the birds recorded in the vicinity of the Proposed Project site are considered to be associated with these roost sites, and not the SPA. Therefore, based on published core foraging ranges and recorded flight activity, there is no evidence to suggest connectivity between the SPA and the Proposed Project site for whooper swan. There is no widely recognised foraging range for wintering golden plover or lapwing, and these species were recorded using the Proposed Project site. However, the Proposed Project site is not considered to represent an important foraging or roosting resource for the SCI populations of Lough Ree SPA, given its distance from the designated site (15.2 km). If any connectivity potentially exists between birds using the Proposed Project site and an SPA population, it is likely to be with the Middle Shannon Callows SPA, which lies closer to the Proposed Project site and supports significant populations of these species. Therefore, it is considered that there is no potential for significant indirect impacts due to ex situ habitat loss or disturbance effects on any SCI species as a result of the Proposed Project. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
River Suck Callows SPA [004097] **Distance:** 15.6km from the Proposed Project site at its nearest point 20km from the proposed TDR accommodation area	› [A038] Whooper Swan (*Cygnus cygnus*) › [A050] Wigeon (*Anas Penelope*) › [A140] Golden Plover (*Pluvialis apricaria*) › [A142] Lapwing (*Vanellus vanellus*) › [A395] Greenland White-fronted Goose (*Anser albifrons flavirostris*) › [A999] Wetlands	Detailed conservation objectives for this site, (Version 1, November 2022[35]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >15km from the Proposed Project site. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is no hydrological connectivity between the Proposed Project site and the SPA, which are in separate hydrological catchments. Therefore, no potential for indirect effect on supporting wetland habitat for SCI bird species due to deterioration in water quality exists. During ornithological surveys undertaken between October 2020 and March 2025, the following SCI species were recorded within the Proposed Project site and/or within 500m of the Proposed Project site: whooper swan, wigeon, golden plover and lapwing. The distance between the SPA and the Proposed Project site is greater than the core foraging range of whooper swan (<5km) and wigeon (2.5 - 2.8km) (SNH, 2016; Johnston *et al.*, 2013), and no regular or patterned flight activity of these species was recorded during surveys such as would suggest connectivity between the Proposed Project site and the SPA. Furthermore, in relation to whooper swan, regularly used closely located roost sites were identified within the Proposed Project site. Flock sizes recorded in the vicinity of the Proposed Project site were broadly in line with numbers observed at the roost sites, and therefore the birds recorded in the vicinity of the Proposed Project site are considered to be associated with these roost sites, and not the SPA. Therefore, based on published core foraging ranges and recorded

[35] *NPWS (2022) Conservation Objectives: River Suck Callows SPA 004097. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.*

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
			flight activity, there is no evidence to suggest connectivity between the SPA and the Proposed Project site for whooper swan. There is no widely recognised foraging range for wintering golden plover or lapwing, and these species were recorded using the Proposed Project site. However, the site is not considered to represent an important foraging or roosting resource for the SCI populations of River Suck Callows SPA, given its distance from the designated site (15.7km). If any connectivity potentially exists between birds using the Proposed Project site and an SPA population, it is likely to be with the Middle Shannon Callows SPA, which lies closer to the site and supports significant populations of these species. Therefore, it is considered that there is no potential for significant indirect impacts due to ex situ habitat loss or disturbance effects on any SCI species as a result of the Proposed Project. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**
Lough Derg (Shannon) SPA [004058] **Distance:** 18.2km from the Proposed	› [A017] Cormorant (*Phalacrocorax carbo*) › [A061] Tufted Duck (*Aythya fuligula*) › [A067] Goldeneye (*Bucephala clangula*) › [A193] Common Tern (*Sterna hirundo*)	Detailed conservation objectives for this site, (Version 1, August 2024[36]), were reviewed as part of the assessment and are available at www.npws.ie	No pathway for direct effects was identified as this European Site lies entirely outside of and >18km from the Proposed Project site boundary. The potential for the Proposed Project to result in indirect effects on this European Site was considered. There is hydrological connectivity

[36] *NPWS (2024) Conservation Objectives: Lough Derg (Shannon) SPA 004058. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage*

European Sites and distance from Proposed Project site	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Identification of Source-Pathway-Receptor Chain
Project site at its nearest point 18.2km from the proposed TDR accommodation area	› [A999] Wetlands		between the Proposed Project site and this SPA via watercourses within and adjacent to the Proposed Project site which discharge to the River Shannon which eventually discharges to Lough Derg. This European Site is located >18km from the Proposed Project site and a significant distance downstream of the Proposed Project (approximately 63.9km). Given the significant distance between the site and the SPA, and the attenuation properties of the intervening watercourses, no potential for significant indirect effects on the European Site was identified. The SCI species of this SPA were not recorded during ornithological surveys undertaken between October 2020 and March 2025. On this basis and given the considerable distance between the site and the SPA, and the lack of significant suitable habitat, there is no potential for significant indirect effects due to disturbance or ex situ habitat loss on any SCI species. **There is no potential for significant effect on this European Site, it is not located within the Likely Zone of Influence, and no further assessment is required.**

4.2 Stage 1 Appropriate Assessment Screening Conclusion

It cannot be excluded beyond reasonable scientific doubt, in view of best scientific knowledge, on the basis of objective information and in light of the conservation objectives of the relevant European sites, that the Proposed Project, individually or in combination with other plans and projects, will have a significant effect on the following European Sites. Measures intended to avoid or reduce the harmful effects of the Proposed Project on European sites (i.e., "mitigation measures") or best practice measures have not been taken into account in the screening stage appraisal.

- River Shannon Callows SAC [000216]
- Middle Shannon Callows SPA [004096]

As a result, an Appropriate Assessment is required, and a Natura Impact Statement shall be prepared in respect of the Proposed Project. It has also been concluded that it can be excluded on the basis of objective information that the Proposed Project, individually or in combination with any other plan or project will not have a significant effect on any other European Site. Accordingly, it is respectfully submitted that an Appropriate Assessment is required for the above European Sites, however it is noted that An Coimisiún Pleanála, as the competent authority, will make its determination in this regard. An NIS has been prepared in respect of the effects of the Proposed Project individually and in combination with any other plans or projects on the aforementioned European Sites (Section 5).

5. STAGE 2- NATURA IMPACT STATEMENT (NIS)

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

- River Shannon Callows SAC
- Middle Shannon Callows SPA

The following sections consider each European Site individually to:

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

5.1 Identification of Relevant Qualifying Features and Desk Study

5.1.1 River Shannon Callows SAC [000216]

The potential for impacts on this SAC were identified in Section 4.1 above. The SAC is located 8.3km overland from the Proposed Project site and is hydrologically connected to the Proposed Project site via the Brosna River and River Shannon over a hydrological distance of approximately 9.9km. The identified pathway for effect is via impacts on water quality as a result of construction activities. Such impacts include pollution as result of sedimentation, cementitious materials and hydrocarbons. Such pollution events have the potential to result in eutrophication of watercourses, resulting in increased plant/algal growth and deoxygenation of waters, alteration of pH, and toxicity effects as a result of hydrocarbons and cementitious materials resulting in fish kills, or clogging of fish gills due to siltation of watercourses.

A potential pathway for effects on otter as a result of disturbance was also identified. While no evidence of otter was recorded during any surveys of the Proposed Project site, there is likely to be a regularly occurring population using the watercourses within and downstream of the Proposed Project site. Otters can utilise extensive territories, (approximately 7.5 ± 1.5km for females and 13.2 ± 5.3km for males (Ó'Neill, 2008)). On a precautionary basis, it is considered that otters potentially using watercourses within or downstream of the Proposed Project site may be associated with River Shannon Callows SAC.

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

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

Table 5-1 Assessment of Individual QIs with the Potential to be Affected by the Proposed Project

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2022[37]),	Rationale	Potential for Adverse Effects Yes/No
[1355] Otter (*Lutra lutra*)	To restore the favourable conservation condition of Otter in River Shannon Callows SAC	This is an aquatic-dependent QI of the River Shannon Callows SAC. A hydrological connection has been established between the Proposed Project site and the SAC via downstream watercourses. Therefore, a complete source-pathway-receptor chain exists, and the potential for adverse effects on otter as a result of deterioration in water quality, potentially resulting in habitat degradation and reduction in prey biomass, cannot be ruled out. On a precautionary basis, it is also considered that otters potentially using watercourses within or downstream of the Proposed Project site may be functionally linked to the SAC and could be subject to indirect disturbance impacts. As such, this QI is assessed further.	Yes
[6410] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	To restore the favourable conservation condition of Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) in River Shannon Callows SAC	This is a terrestrial habitat, and no hydrological or other functional connectivity exists between the Proposed Project site and areas where this habitat occurs within the River Shannon Callows SAC. As such, a complete source-pathway-receptor chain is not present, and there is no potential for adverse effects. No further assessment is required.	No
[6510] Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*)	To restore the favourable conservation condition of Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) in River Shannon Callows SAC	This is a terrestrial habitat, and no hydrological or other functional connectivity exists between the Proposed Project site and areas where this habitat occurs within the River Shannon Callows SAC. As such, a complete source-pathway-receptor chain is not present, and there is no potential for adverse effects. No further assessment is required.	No

[37] *NPWS (2022) Conservation Objectives: River Shannon Callows SAC 000216. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.*

[7230] Alkaline fens	To restore the favourable conservation condition of Alkaline Fens in River Shannon Callows SAC	This is a groundwater-dependent wetland habitat and is sensitive to changes in hydrology and water quality. While the mapped areas of this habitat lie within a different groundwater body than the Proposed Project site, the NPWS conservation objectives indicate that not all areas of alkaline fen within the SAC have been fully mapped. Given this and the presence of a hydrological connection via surface water between the Proposed Project site and the SAC, on a highly precautionary basis a complete source-pathway-receptor chain exists. Therefore, the potential for adverse effects on alkaline fen cannot be ruled out, and this QI is assessed further.	Yes
[8240] Limestone pavements	To restore the favourable conservation condition of Limestone Pavements in River Shannon Callows SAC	This is a terrestrial habitat, and no hydrological or other functional connectivity exists between the Proposed Project site and areas where this habitat occurs within the River Shannon Callows SAC. As such, a complete source-pathway-receptor chain is not present, and there is no potential for adverse effects. No further assessment is required.	No
[91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	To maintain the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) in River Shannon Callows SAC	This is a riparian habitat associated with riverine systems and may be sensitive to changes in water quality or hydrology. A direct hydrological connection via surface water has been established between the Proposed Project site and the River Shannon Callows SAC. Mapped areas of this QI occur on river islands downstream of the site. Therefore, a complete source-pathway-receptor chain exists, and the potential for adverse effects on alluvial forests as a result of deterioration in water quality cannot be ruled out. As such, this QI is assessed further.	Yes

5.1.1.2 Site Specific Pressures and Threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to impact on the European Site were reviewed and considered in relation to the Proposed Project. These are provided in Table 5-2. None of the threats or pressures identified in the data form relate to the Proposed Project.

Table 5-2 River Shannon Callows SAC site-specific threats, pressures and activities

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
High	A03.03	Abandonment/lack of mowing	Inside
High	A04.03	Abandonment of pastoral systems, lack of grazing	Inside
High	A07	Use of biocides, hormones and chemicals	Inside
High	J02.04.01	Flooding	Inside
Low	A04.02.05	Non-intensive mixed animal grazing	Inside
Low	A10.01	Removal of hedges and copses or scrub	Inside
Low	B06	Grazing in forests/woodland	Inside
Low	C01.03.02	Mechanical removal of peat	Inside
Low	D01.01	Paths, tracks, cycling tracks	Inside
Low	F03.01	Hunting	Both
Low	G01	Outdoor sports and leisure activities, recreational activities	Inside
Low	G05.01	Trampling, overuse	Inside
Low	J02.01	Landfill, land reclamation and drying out, general	Inside
Low	J02.05	Modification of hydrographic functioning, general	Inside
Medium	A04.01	Intensive grazing	Inside
Medium	A08	Fertilisation	Inside
Medium	B02.02	Forestry clearance	Inside
Medium	J02.05.02	Modifying structures of inland water courses	Inside
Medium	J02.11	Siltation rate changes, dumping, depositing of dredged deposits	Inside
Medium	K03.04	Predation	Both

5.1.1.3 QI Specific Information

5.1.1.3.1 *Otter*

Description from SSCO document

According to the site-specific conservation objectives document for the SAC the current range for this species within the SAC is estimated at 93.6%. The extent of terrestrial habitat is calculated as 282.1ha. The extent of freshwater habitat is calculated as 146.7km. According to the site-specific conservation objectives otters need lying up areas throughout their territory where they are secure from disturbance.

Targets and Attributes

Table 5-3 Targets and Attributes

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target in the Absence of Mitigation
Distribution	No significant decline	Yes – In the absence of mitigation, deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could indirectly affect prey availability downstream, which has the potential to undermine this target. There is also potential for disturbance to otters using downstream watercourses connected to the SAC.
Extent of terrestrial habitat	No significant decline. Area mapped and calculated as 282.1ha	No – The Proposed Project will not result in any loss of terrestrial habitat for otter. No works will occur within the SAC, and no suitable terrestrial otter habitat or resting/breeding sites were recorded within the Proposed Project site.
Extent of freshwater (river) habitat	No significant decline. Length mapped and calculated as 146.7km	No - The Proposed Project will not result in any loss of freshwater habitat for otter. No works will occur within the SAC, and no instream works are proposed.
Couching sites and holts	No significant decline	No – There will be no decline in otter couching sites or holts. There will be no works within the SAC. No couches or holts were identified within the Proposed Project site, and the site does not provide significant suitable resting or breeding habitat for otter.
Fish biomass available	No significant decline	Yes – In the absence of mitigation, deterioration in water quality as a result of silt-laden run-off and other pollutants could reduce prey biomass and therefore has potential to undermine this target.
Barriers to connectivity	No significant decline	No - The Proposed Project will not introduce any new barriers to otter movement. Watercourse crossings within the site will comprise clear-span or bottomless structures, ensuring hydrological and ecological continuity, and all culverts will allow mammal passage.

5.1.1.3.2 *Alkaline fens [7230]*

Description from SSCO document

According to the site-specific conservation objectives document for the SAC, alkaline fen in River Shannon Callows SAC occurs south of Portumna Bridge and south-east of the town of Portumna in an area of low-lying terrestrial land west of the river. The fen area corresponds largely to a former small bay at the northern end of Lough Derg that was cut off from the lake when the embankment was originally constructed as part of the Shannon Hydroelectric Scheme in the late 1920s. The area of alkaline fen in the SAC has been mapped as c.15ha. It is important to note that further un-surveyed areas of the habitat may be present within the SAC.

Targets and Attributes

Table 5-4 Targets and Attributes

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target in the Absence of Mitigation
Habitat area	Area stable or increasing, subject to natural processes.	Yes – There will be no direct impact on area as there will be no loss of the habitat due to the Proposed Project. However, in the absence of mitigation deterioration in water quality as a result of silt-laden run-off and other pollutants could indirectly affect fen habitat extent, which has the potential to undermine this target.
Habitat distribution	No decline, subject to natural processes.	Yes – There will be no direct impact on distribution as there will be no loss of the habitat due to the Proposed Project. However, in the absence of mitigation deterioration in water quality as a result of silt-laden run-off and other pollutants could indirectly affect fen habitat extent, which has the potential to undermine this target.
Ecosystem function: soil nutrients	Maintain soil pH and nutrient status within natural ranges	Yes – In the absence of mitigation, nutrient or pH alterations arising from pollutant-laden runoff could affect soil chemistry and undermine this target.
Ecosystem function: peat formation	Maintain active peat formation, where appropriate	No – The Proposed Project will not impact peat formation.
Ecosystem function: hydrology - groundwater levels	Maintain, or where necessary restore, appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat	No – The Proposed Project will not alter groundwater levels or groundwater supply pathways supporting alkaline fen habitat.
Ecosystem function: hydrology - surface water flow	Maintain, or where necessary restore, as close as possible to natural or semi-natural, drainage conditions	No – The Proposed Project will not alter surface-water flow regimes supporting alkaline fen habitat.
Ecosystem function: water quality	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	Yes – In the absence of mitigation, pollutant or sediment-laden runoff could deteriorate downstream water quality and undermine this target.

Vegetation composition: community diversity	Maintain variety of vegetation communities, subject to natural processes	Yes – In the absence of mitigation, deterioration in water quality as a result of silt-laden run-off and other pollutants could alter community diversity and undermine this target.
Vegetation composition: typical brown mosses	Maintain adequate cover of typical brown moss species	Yes – In the absence of mitigation deterioration in water quality as a result of silt-laden run-off and other pollutants could impact brown moss species cover and undermine this target.
Vegetation composition: typical vascular plants	Maintain adequate cover of typical vascular plant species	Yes – In the absence of mitigation deterioration in water quality as a result of silt-laden run-off and other pollutants could impact vascular plant cover and undermine this target.
Vegetation composition: native negative indicator species	Cover of native negative indicator species at insignificant levels	Yes – In the absence of mitigation deterioration in water quality as a result of silt-laden run-off and other pollutants could result in an increase in negative indicator species and undermine this target.
Vegetation composition: non-native species	Cover of non-native species less than 1%	No – The Proposed Project will not facilitate the introduction or spread of non-native species.
Vegetation composition: native trees and shrubs	Cover of scattered native trees and shrubs less than 10%	No – The Proposed Project will not result in changes to native tree or shrub cover.
Vegetation composition: algal cover	Cover of algae less than 2%	Yes – In the absence of mitigation deterioration in water quality as a result of silt-laden run-off and other pollutants could alter algal cover and undermine this target.
Vegetation structure: vegetation height	At least 50% of the live leaves/flowering shoots are more than either 5cm or 15cm above ground surface depending on community type	No – The Proposed Project will not result in changes to vegetation height.
Physical structure: disturbed bare ground	Cover of disturbed bare ground not more than 10%	No – The Proposed Project will not result in physical disturbance resulting in changes to bare ground.
Physical structure: tufa formations	Disturbed proportion of vegetation cover where tufa is present is less than 1%	No – The Proposed Project will not result in changes to tufa formations.
Indicators of local distinctiveness	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes	Yes – In the absence of mitigation deterioration in water quality as a result of silt-laden run-off and other pollutants could impact the present of such species and undermine this target.
Transitional areas between fen and adjacent habitats	Maintain adequate transitional areas to support/protect the alkaline fen ecosystem and the services it provides	No – The Proposed Project will not result in changes to transitional areas.

5.1.1.3.3 *Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnionincanae, Salicionalbae) [91E0]*

Description from SSCO document

Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) is present in River Shannon Callows SAC. Alluvial woodland has been identified at numerous locations along the Shannon from the islands below the ESB weir at Meelick to Madden's Island upstream. A small area of Alluvial woodland (1.1ha) has been mapped on two river islands at Madden's Island (Martin and Brophy, 2017). However, with the exception of Madden's Island, the habitat has not been mapped in detail and thus the current total habitat area within the SAC is unknown. The habitat is found on riverbanks and alluvial islands which are prone to periodic flooding. It is important to note that further areas of the habitat may be present elsewhere within the SAC and other documented areas of wet woodland, e.g. around Bishop's Island, Banagher and Clonburren, may also correspond to this priority Annex I woodland type.

Targets and Attributes

Table 5-5 Targets and Attributes

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target in the Absence of Mitigation
Habitat area	Area stable or increasing, subject to natural processes.	Yes – There will be no direct impact on area as there will be no loss of the habitat due to the Proposed Project. However, in the absence of mitigation, deterioration in water quality as a result of silt-laden run-off and other pollutants could indirectly affect downstream habitat condition and undermine this target.
Habitat distribution	No decline, subject to natural processes.	Yes – There will be no direct impact on area as there will be no loss of the habitat due to the Proposed Project. However, in the absence of mitigation, deterioration in water quality as a result of silt-laden run-off and other pollutants could indirectly affect downstream habitat condition and undermine this target.
Woodland size	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	No – The Proposed Project will not result in any change to woodland size within the SAC.
Woodland structure: cover and height	Total canopy cover at least 30%; median canopy height at least 7m; native shrub layer cover 10-75%; native herb/dwarf shrub layer cover at least 20% and height at least 20cm; bryophyte cover at least 4%	No – The Proposed Project will not affect canopy structure or height within the SAC.
Woodland structure: community diversity and extent	Maintain diversity and extent of community types	Yes – In the absence of mitigation, deterioration in water quality from silt-laden or pollutant-laden run-off could alter community composition and undermine this target.

Woodland structure: natural regeneration	Seedlings, saplings and pole age-classes of target species for 91E0 woodlands and other native tree species occur in adequate proportions to ensure survival of woodland canopy	Yes – In the absence of mitigation, deteriorated water quality could affect substrate and nutrient conditions required for seedling establishment and undermine this target.
Hydrological regime: flooding depth/height of water table	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	No – The Proposed Project will not alter hydrological regimes supporting alluvial woodland.
Woodland structure: dead wood	At least 19 stems/ha of dead wood of at least 20cm diameter	No – The Proposed Project will not affect deadwood availability within the SAC.
Woodland structure: veteran trees	No decline	No – The Proposed Project will not affect veteran trees within the SAC.
Woodland structure: indicators of local distinctiveness.	No decline in distribution and, in the case of red listed and other rare or localised species, population size	Yes – In the absence of mitigation, deterioration in water quality from silt-laden or pollutant-laden run-off could affect sensitive or rare species and undermine this target.
Woodland structure: indicators of overgrazing	All five indicators of overgrazing absent	No – The Proposed Project will not influence grazing levels within the SAC.
Vegetation composition: native tree cover	No decline. Native trees cover at least 90% of canopy; target species cover at least 50% of canopy	No – The Proposed Project will not alter native tree canopy cover within the SAC.
Vegetation composition: typical species	At least 1 target species for 91E0 woodlands present; at least 6 positive indicator species for 91E0 woodlands present	Yes – In the absence of mitigation, deterioration in water quality could alter species composition and undermine this target.
Vegetation composition: negative indicator species	Negative indicator species cover not greater than 10%; regeneration of negative indicator species absent	Yes – In the absence of mitigation, nutrient or pollutant inputs could favour negative indicator species and undermine this target.
Vegetation composition: problematic native species	Cover of common nettle (*Urtica dioica*) less than 75%	No – The Proposed Project will not increase cover of common nettle within the SAC.

5.1.2 Middle Shannon Callows SPA [004096]

The potential for impacts on this SPA was identified in Section 4.1 above. The SPA is located 8.3km overland from the Proposed Project site and is hydrologically connected to the Proposed Project site via the Brosna River and River Shannon over a hydrological distance of approximately 9.9km. A potential pathway for effect via deterioration of water quality of SCI supporting habitats as a result of construction activities associated with the Proposed Project was identified. Such impacts include pollution as result of sedimentation, cementitious materials and hydrocarbons. Such pollution events have the potential to result in deterioration of water quality thus affecting potential foraging and roosting habitat for SCI species.

A potential pathway for direct effects on SCI bird species as a result of collision risk and displacement/barrier effects was identified. In addition, a potential pathway for indirect effect on SCI bird species via disturbance and ex situ habitat loss as a result of the Proposed Project was identified.

In addition to the SCI species for which Middle Shannon Callows SPA is designated, consideration has also been given to whether other Annex I or regularly occurring migratory bird species occur within the SPA that could be relevant to the assessment of potential effects on the site. No additional species were identified that would introduce further potential pathways for effects beyond those already assessed for the SCI species.

Table 5-6 below lists the qualifying features of this European Site and determines, in the light of their Conservation Objectives, whether there is any complete source-pathway-receptor chain, by which adverse effects may occur.

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

Table 5-6 Assessment of Individual SCIs with the Potential to be Affected by the Proposed Project

Qualifying feature	Conservation Objective (NPWS, Version 1, November 2022[38]),	Rationale	Potential for Adverse Effects Yes/No
[A038] Whooper Swan (*Cygnus cygnus*)	To maintain the favourable conservation condition of whooper	The Proposed Project site is located approximately 8.3km from Middle Shannon Callows SPA, which exceeds the core foraging range of whooper swan (<5km) (SNH, 2016). No regular or	Yes

[38] *NPWS (2022) Conservation Objectives: Middle Shannon Callows SPA 004096. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage*

Qualifying feature	Conservation Objective (NPWS, Version 1, November 2022[38]),	Rationale	Potential for Adverse Effects Yes/No
	swan in Middle Shannon Callows SPA	patterned whooper swan flight activity was recorded during surveys that would indicate connectivity between the Proposed Project site and the SPA. Whooper swan were regularly recorded roosting within the Proposed Project site across the five winter seasons surveyed, with five roost locations identified within the site. The majority of roosting activity was concentrated at two locations, with the remaining areas used only infrequently. Interchange of birds between the two principal roost locations within the site was also recorded. Flock sizes recorded within and in the area surrounding the Proposed Project site were broadly consistent with those recorded at these roost locations, indicating that birds recorded using the Proposed Project site are associated with roost locations within the site rather than with the SPA. Therefore, based on published core foraging ranges and recorded whooper swan activity during ornithological surveys, there is no evidence to suggest connectivity between the Middle Shannon Callows SPA population and the Proposed Project site. Therefore, there is no potential for adverse effects arising from ex situ habitat loss, disturbance, displacement and barrier effects or collision risk for this species. A direct hydrological connection (approximately 9.9km) has been established between the Proposed Project site and this SPA. Potential changes in water quality could affect the condition of supporting habitats and food resources for this species and result in indirect effects. Therefore, a complete source-pathway-receptor chain exists, and the potential for adverse effects as a result of deterioration in water quality cannot be ruled out. As such, this SCI is assessed further.	
[A050] Wigeon (*Anas penelope*)	To restore the favourable conservation condition of wigeon in Middle Shannon Callows SPA species	The Proposed Project site lies beyond the core foraging range of this species (2.5-2.8km; Johnston *et al.*, 2013). The species was not recorded in significant numbers during ornithological surveys between October 2020 and March 2025. Therefore, there is no potential for adverse effects arising from ex situ habitat loss, disturbance, displacement and barrier effects or collision risk for this species	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, November 2022[38]),	Rationale	Potential for Adverse Effects Yes/No
		A direct hydrological connection has been established between the Proposed Project site and this SPA. Potential changes in water quality could affect the condition of supporting habitats and food resources for this species and result in indirect effects. Therefore, a complete source-pathway-receptor chain exists, and the potential for adverse effects as a result of deterioration in water quality cannot be ruled out. As such, this SCI is assessed further.	
[A122] Corncrake (*Crex crex*)	The status of corncrake as a Species of Conservation Interest for the Middle Shannon Callows SPA is currently under review. The outcome of this review will determine whether a site-specific conservation objective is set for this species	There were no observations of corncrake within 500m of the Proposed Project site during ornithological surveys undertaken between October 2020 and March 2025. This is a ground-nesting species that relies on tall, undisturbed grassland habitat during the breeding season. Suitable habitat for this species is not present within the Proposed Project site, and the site lies beyond its core foraging range (<1km; Green et al., 1997, Parisi et al., 2024). Therefore, there is no potential for adverse effects arising from ex situ habitat loss, disturbance, displacement and barrier effects or collision risk for this species. Whilst a direct hydrological connection has been established between the Proposed Project site and the SPA, corncrake is not dependent on aquatic food resources or wetland habitats, and potential changes in water quality are not expected to affect the terrestrial habitats used by this species. Therefore, there is no complete source-pathway-receptor chain, and no further assessment is required.	No
[A140] Golden Plover (*Pluvialis apricaria*)	To maintain the favourable conservation condition of golden plover in Middle Shannon Callows SPA	Golden plover were recorded landing in and utilising the habitats within the Proposed Project site. There is no widely recognised foraging range for wintering golden plover. As such, there is potential connectivity between the Proposed Project site and the SPA population. On a precautionary basis, it is considered that golden plover potentially using the Proposed Project site may be associated with Middle River Shannon SPA. Therefore, the potential for adverse effects on this SCI species in the form of direct impacts due to collision risk and displacement and barrier effects, as well as indirect impacts due to ex situ habitat loss and disturbance, cannot be excluded.	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, November 2022[38]),	Rationale	Potential for Adverse Effects Yes/No
		A direct hydrological connection has been established between the Proposed Project site and this SPA. Potential changes in water quality could affect the condition of supporting habitats and food resources for this species and result in indirect effects. Therefore, a complete source-pathway-receptor chain exists, and the potential for adverse effects as a result of deterioration in water quality cannot be ruled out. As such, this SCI is assessed further.	
[A142] Lapwing (*Vanellus vanellus*)	To restore the favourable conservation condition of lapwing in Middle Shannon Callows SPA	Lapwing were recorded within the Proposed Project site during ornithological surveys. There is no widely recognised foraging range for wintering lapwing. As such, there is potential connectivity between the Proposed Project site and the SPA population. On a precautionary basis, it is considered that lapwing potentially using the Proposed Project site may be associated with Middle River Shannon SPA. Therefore, the potential for adverse effects on this SCI species in the form of direct impacts due to collision risk and displacement and barrier effects, as well as indirect impacts due to ex situ habitat loss and disturbance, cannot be excluded. A direct hydrological connection has been established between the Proposed Project site and this SPA. Potential changes in water quality could affect the condition of supporting habitats and food resources for this species and result in indirect effects. Therefore, a complete source-pathway-receptor chain exists, and the potential for adverse effects as a result of deterioration in water quality cannot be ruled out. As such, this SCI is assessed further.	Yes
[A156] Black-tailed Godwit (*Limosa limosa*)	To restore the favourable conservation condition of Black-tailed godwit in Middle Shannon Callows SPA	There were no observations of black-tailed godwit within 500m of the Proposed Project site during ornithological surveys undertaken between October 2020 and March 2025. There is no significant suitable habitat for this species within the Proposed Project site. As such, the potential for habitat loss, disturbance and displacement, and collision risk is highly limited. Therefore, there is no potential for adverse effects arising from ex situ habitat loss, disturbance, displacement and barrier effects or collision risk for this species. A direct hydrological connection has been established between the Proposed Project site and this SPA. Potential changes in water quality could affect the condition of supporting habitats	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, November 2022[38]),	Rationale	Potential for Adverse Effects Yes/No
		and food resources for this species and result in indirect effects. Therefore, a complete source-pathway-receptor chain exists, and the potential for adverse effects as a result of deterioration in water quality cannot be ruled out. As such, this SCI is assessed further.	
[A179] Black-headed Gull (*Chroicocephalus ridibundus*)	To restore the favourable conservation condition of black-headed gull in Middle Shannon Callows SPA	Although the Proposed Project site lies within the core foraging range of black-headed gull (11.4 km; Thaxter *et al.*, 2012), the site lacks significant optimal habitat for roosting, nesting, or regular foraging. No population of ecological significance was recorded utilising the Proposed Project site during the extensive suite of surveys conducted. There were three observations of black-headed gull within the Proposed Project site over the five winter seasons surveyed, comprising between 1-2 birds travelling overhead, with no observations of birds utilising habitats within the Proposed Project site. As such, the potential for adverse effects on the SCI population is highly limited. Therefore, there is no potential for adverse effects arising from ex situ habitat loss, disturbance, displacement and barrier effects or collision risk for this species. A direct hydrological connection has been established between the Proposed Project site and this SPA. Potential changes in water quality could affect the condition of supporting habitats and food resources for this species and result in indirect effects. Therefore, a complete source-pathway-receptor chain exists, and the potential for adverse effects as a result of deterioration in water quality cannot be ruled out. As such, this SCI is assessed further.	Yes
[A999] Wetlands	To maintain the favourable conservation condition of wetlands in Middle Shannon Callows SPA	A direct hydrological connection has been established between the Proposed Project site and this SPA. Potential changes in water quality could affect the condition of wetlands. Therefore, a complete source-pathway-receptor chain exists, and the potential for adverse effects as a result of deterioration in water quality cannot be ruled out. As such, this SCI is assessed further.	Yes

5.1.2.2 Site Specific Pressures and Threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to impact on the European Site were reviewed and considered in relation to the Proposed Project. These are provided in Table 5-7. None of the threats or pressures identified in the data form relate to the Proposed Project.

Table 5-7 Middle Shannon Callows SPA site-specific threats, pressures and activities

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
Low	A04.03	Abandonment of pastoral systems, lack of grazing	Inside
High	A04	Grazing	Inside
High	E01	Urbanised areas, human habitation	Outside
Low	D01.01	Paths, tracks, cycling tracks	Inside
High	D01.05	Bridge, viaduct	Inside
High	G01.01	Nautical sports	Inside
Medium	A08	Fertilisation	Outside
Low	A08	Fertilisation	Inside
Medium	G01.02	Walking, horse-riding and non-motorised vehicles	Inside
Low	F03.01	Hunting	Inside
Medium	F02.03	Leisure fishing	Inside

5.1.2.3 SCI Specific Information

5.1.2.3.1 *Whooper Swan*

Description from SSCO document

According to the site-specific conservation objectives document for this SPA, the national population of whooper swan overwintering in Ireland has increased in the long term, with a 40% population increase from 1991 to 2015. During the baseline assessments to inform SPA designation, 305 whooper swans were estimated to be using this SPA (4 year mean of peak counts from a combination of aerial and ground-based surveys for baseline period 1995/96 to 1999/2000; note no data for the winter of 1997/98 was available). A population of 728 whooper swans was estimated to be using the Middle Shannon Callows SPA in recent years (3 year mean of peak counts from aerial- and ground-based surveys during winters 2018/19 to 2020/21). This represents an estimated population increase of 139% since the baseline period.

According to the site synopsis document the SPA supports an internationally important wintering population of whooper swan. The SPA is designated for the wintering population of whooper swan.

Targets and Attributes

Table 5-8 Targets and Attributes

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target in the Absence of Mitigation
Winter population trend	Long term winter population trend is stable or increasing	No – The Proposed Project site lies beyond the 5 km core foraging range of whooper swan (SNH, 2016) and ornithological survey findings do not indicate any connectivity with Middle Shannon Callows SPA. Therefore, the Proposed Project will not affect SCI winter population trend.
Winter spatial distribution	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target	No – The Proposed Project site lies beyond the 5 km core foraging range of whooper swan (SNH, 2016) and ornithological survey findings do not indicate any connectivity with Middle Shannon Callows SPA. Therefore, the Proposed Project will not affect SCI winter spatial distribution.
Disturbance at wintering site	The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution	No – The Proposed Project site lies beyond the 5 km core foraging range of whooper swan (SNH, 2016) and ornithological survey findings do not indicate any connectivity with Middle Shannon Callows SPA. Therefore, the Proposed Project will not result in disturbance of SCI whooper swan.
Barriers to connectivity and site use	The number, location, shape and area of barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA	No – The Proposed Project site lies beyond the 5 km core foraging range of whooper swan (SNH, 2016) and ornithological survey findings do not indicate any connectivity with Middle Shannon Callows SPA. Therefore, the Proposed Project will not create barriers to connectivity for SCI whooper swan.
Forage spatial distribution, extent and abundance	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target	Yes – In the absence of mitigation, deterioration in water quality could affect supporting foraging habitats and food resources of SCI population whooper swan.
Roost spatial distribution and extent	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target	No – The Proposed Project site lies beyond the 5 km core foraging range of whooper swan (SNH, 2016) and ornithological survey findings do not indicate any connectivity with Middle Shannon Callows SPA. Therefore, the Proposed Project will not affect SCI population roosts.
Supporting habitat: area and quality	Sufficient area of utilisable habitat available in ecologically important sites outside the SPA	Yes – In the absence of mitigation, deterioration in water quality has the potential to undermine the quality of supporting wetland habitat for SCI population whooper swan.

5.1.2.3.2 *Wigeon*

Description from SSCO document

According to the site-specific conservation objectives document for this SPA, the national population of over-wintering wigeon in Ireland has declined by 18% from 1994/95 to 2019/20, as monitored via the Irish Wetland Bird Survey (Kennedy *et al.*, 2022). During the baseline assessments to inform SPA designation, 3,059 wigeon were estimated to be using this SPA (4 year mean of peak counts from a combination of aerial and ground-based surveys for baseline period 1995/96 to 1999/2000; note no data for the winter of 1997/98 was available). The most recent available data to assess the population trend is from two aerial surveys completed during the winters of 2018/19 and 2020/21. A population of 2,759 wigeon was estimated to be using the Middle Shannon Callows SPA during this period (2 year mean of peak counts). This represents an estimated population decline of 10% since the baseline period.

According to the site synopsis document the SPA supports a nationally important wintering population of wigeon. The SPA is designated for the wintering population of wigeon.

Targets and Attributes

Table 5-9 Targets and Attributes

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target in the Absence of Mitigation
Winter population trend	Long term winter population trend is stable or increasing	No – The Proposed Project site lies beyond the core foraging range of wigeon (2.5-2.8km; Johnston *et al.*, 2013) and wigeon was not recorded in significant numbers during ornithological surveys. Therefore, the Proposed Project it will not affect SCI winter population trend.
Winter spatial distribution	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target	No – The Proposed Project site lies beyond the core foraging range of wigeon (2.5-2.8km; Johnston *et al.*, 2013) and wigeon was not recorded in significant numbers during ornithological surveys. Therefore, the Proposed Project will not affect SCI winter spatial distribution.
Disturbance at wintering site	The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution	No – The Proposed Project site lies beyond the core foraging range of wigeon (2.5-2.8km; Johnston *et al.*, 2013) and wigeon was not recorded in significant numbers during ornithological surveys. Therefore, the Proposed Project will not result in disturbance of SCI wigeon.
Barriers to connectivity and site use	The number, location, shape and area of barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA	No – The Proposed Project site lies beyond the core foraging range of wigeon (2.5-2.8km; Johnston *et al.*, 2013) and wigeon was not recorded in significant numbers during ornithological surveys. Therefore, the Proposed Project will not create barriers to connectivity for SCI whooper swan.

Forage spatial distribution, extent and abundance	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target	Yes –In the absence of mitigation, deterioration in water quality could affect supporting foraging habitats and food resources of SCI population wigeon.
Roost spatial distribution and extent	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target	No – The Proposed Project site lies beyond the core foraging range of wigeon (2.5-2.8km; Johnston *et al.*, 2013) and wigeon was not recorded in significant numbers during ornithological surveys. Therefore, the Proposed Project will not affect SCI population roosts.
Supporting habitat: area and quality	Sufficient area of utilisable habitat available in ecologically important sites outside the SPA	Yes – In the absence of mitigation, deterioration in water quality has the potential to undermine the quality of supporting wetland habitat for SCI population wigeon.

5.1.2.3.3 *Golden Plover*

Description from SSCO document

According to the site-specific conservation objectives document for this SPA, the national population of over-wintering golden plover in Ireland has declined by 54% from 1994/95 to 2019/20, as monitored via the Irish Wetland Bird Survey (Kennedy *et al.*, 2022). During the baseline assessments to inform SPA designation, 4,133 golden plover were estimated to be using this SPA (4 year mean of peak counts from a combination of aerial and ground-based surveys for baseline period 1995/96 to 1999/2000; note no data for the winter of 1997/98 was available). The most recent available data to assess the population trend is from two aerial surveys completed during the winters of 2018/19 and 2020/21. A population of 5,130 golden plover was estimated to be using the Middle Shannon Callows SPA during this period (2 year mean of peak counts). This represents an estimated population increase of 24% since the baseline period.

According to the site synopsis document the SPA supports a nationally important wintering population of golden plover. The SPA is designated for the wintering population of golden plover.

Targets and Attributes

Table 5-10 Targets and Attributes

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target in the Absence of Mitigation
Winter population trend	Long term winter population trend is stable or increasing	Yes – In the absence of mitigation deterioration of water quality as a result of silt-laden run-off or other pollutants could affect supporting habitats and food resources for SCI golden plover. Impacts associated with ex situ habitat loss, disturbance, displacement and barrier effects, and collision risk also have the potential to undermine this target.
Winter spatial distribution	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target	Yes – In the absence of mitigation deterioration of water quality as a result of silt-laden run-off or other pollutants could affect supporting habitats and food resources for SCI golden plover. Impacts associated with ex situ habitat loss,

		disturbance, displacement and barrier effects, and collision risk also have the potential to undermine this target.
Disturbance at wintering site	The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution	Yes – Disturbance could affect use of suitable habitats within the Proposed Project site.
Barriers to connectivity and site use	The number, location, shape and area of barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA	Yes – The Proposed Project has the potential to impact access to the SPA by SCI golden plover by creating a barrier to connectivity.
Forage spatial distribution, extent and abundance	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target	Yes – In the absence of mitigation deterioration of water quality as a result of silt-laden run-off or other pollutants could affect supporting foraging habitats and food resources for SCI golden plover.
Roost spatial distribution and extent	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target	Yes – In the absence of mitigation deterioration of water quality as a result of silt-laden run-off or other pollutants could affect supporting roosting habitats.
Supporting habitat: area and quality	Sufficient area of utilisable habitat available in ecologically important sites outside the SPA	Yes – In the absence of mitigation deterioration of water quality as a result of silt-laden run-off or other pollutants could affect supporting ex situ habitats for SCI golden plover.

5.1.2.3.4 *Lapwing*

Description from SSCO document

According to the site-specific conservation objectives document for this SPA, the national population of over-wintering lapwing in Ireland has declined by 64% from 1994/95 to 2019/20, as monitored via the Irish Wetland Bird Survey (Kennedy et al., 2022). During the baseline assessments to inform SPA designation, 13,240 were estimated to be using this SPA (4 year mean of peak counts from aerial surveys for baseline period 1995/96 to 1999/2000; note no data for the winter of 1997/98 was available). The most recent available data to assess the population trend is from two aerial surveys completed during the winters of 2018/19 and 2020/21. A population of 2,159 was estimated to be using the Middle Shannon Callows SPA during this period (2 year mean of peak counts). This represents an estimated population decline of 84% since the baseline period.

According to the site synopsis document the SPA supports a nationally important wintering population of lapwing. The SPA is designated for the wintering population of lapwing.

Targets and Attributes

Table 5-11 Targets and Attributes

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target in the Absence of Mitigation
Winter population trend	Long term winter population trend is stable or increasing	Yes – In the absence of mitigation deterioration of water quality as a result of silt-laden run-off or other pollutants could affect supporting habitats and food resources for SCI lapwing. Impacts associated with ex situ habitat loss, disturbance, displacement and barrier effects, and collision risk also have the potential to undermine this target.
Winter spatial distribution	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target	Yes – In the absence of mitigation deterioration of water quality as a result of silt-laden run-off or other pollutants could affect supporting habitats and food resources for SCI lapwing. Impacts associated with ex situ habitat loss, disturbance, displacement and barrier effects, and collision risk also have the potential to undermine this target.
Disturbance at wintering site	The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution	Yes – Disturbance could affect SCI lapwing use of suitable habitats within the Proposed Project site.
Barriers to connectivity and site use	The number, location, shape and area of barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA	Yes – The Proposed Project has the potential to impact access to the SPA by SCI lapwing by creating a barrier to connectivity.
Forage spatial distribution, extent and abundance	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target	Yes – In the absence of mitigation deterioration of water quality as a result of silt-laden run-off or other pollutants could affect supporting foraging habitats and food resources for SCI lapwing.
Roost spatial distribution and extent	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target	Yes – In the absence of mitigation deterioration of water quality as a result of silt-laden run-off or other pollutants could affect supporting roosting habitats.
Supporting habitat: area and quality	Sufficient area of utilisable habitat available in ecologically important sites outside the SPA	Yes – In the absence of mitigation deterioration of water quality as a result of silt-laden run-off or other pollutants could affect supporting ex situ habitats for SCI lapwing.

5.1.2.3.5 *Black-tailed Godwit*

Description from SSCO document

According to the site-specific conservation objectives document for this SPA, the national population of over-wintering black-tailed godwit in Ireland has increased by 92% from 1994/95 to 2019/20, as monitored via the Irish Wetland Bird Survey (Kennedy *et al.,* 2022). During the baseline assessments to inform SPA designation, 485 black-tailed godwit were estimated to be using this SPA (4 year mean of peak counts from a combination of aerial and ground-based surveys for the baseline period 1995/96 to 1999/2000; note no data for the winter of 1997/98 was available). The most recent available data to assess the population trend is from two aerial surveys completed during the winters of 2018/19 and 2020/21. A population of 300 black-tailed godwit was estimated to be using the Middle Shannon Callows SPA during this period (2 year mean of peak counts). This represents an estimated population decline of 38% since the baseline period.

The SPA is designated for the wintering population of black-tailed godwit.

Targets and Attributes

Table 5-12 Targets and Attributes

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target in the Absence of Mitigation
Winter population trend	Long term winter population trend is stable or increasing	No – The Proposed Project site does not provide significant suitable habitat and there were no observations of this species within the Proposed Project site or within 500m of the site. Therefore, the Proposed Project will not affect SCI winter population trend.
Winter spatial distribution	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target	No – The Proposed Project site does not provide significant suitable habitat and there were no observations of this species within the Proposed Project site or within 500m of the site. Therefore, the Proposed Project will not affect this SCI winter spatial distribution.
Disturbance at wintering site	The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution	No – The Proposed Project site does not provide significant suitable habitat and there were no observations of this species within the Proposed Project site or within 500m of the site. Therefore, the Proposed Project will not result in will not result in adverse impacts due to disturbance of SCI black-tailed godwit.
Barriers to connectivity and site use	The number, location, shape and area of barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA	No – The Proposed Project site does not provide significant suitable habitat and there were no observations of this species within the Proposed Project site or within 500m of the site. Therefore, the Proposed Project will not create barriers to connectivity for SCI black-tailed godwit.
Forage spatial distribution, extent and abundance	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target	Yes – In the absence of mitigation, deterioration in water quality could affect supporting foraging habitats and food resources of SCI population black-tailed godwit.

Roost spatial distribution and extent	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target	No – The Proposed Project site does not provide significant suitable habitat and there were no observations of this species within the Proposed Project site or within 500m of the site. Therefore, the Proposed Project will not affect SCI population roosts.
Supporting habitat: area and quality	Sufficient area of utilisable habitat available in ecologically important sites outside the SPA	Yes – In the absence of mitigation, deterioration in water quality has the potential to undermine the quality of supporting wetland habitat for SCI population black-tailed godwit.

5.1.2.3.6 *Black-headed Gull*

Description from SSCO document

According to the site-specific conservation objectives document for this SPA, the national waterbird monitoring scheme (Irish Wetland Bird Survey) does not comprehensively monitor this population and therefore robust national population estimates and trends cannot be generated. During the baseline assessments to inform SPA designation, 1,209 individuals were estimated to be using this SPA (4 year mean of peak counts from a combination of aerial and ground-based surveys for the baseline period 1995/96 to 1999/2000; note no data for the winter of 1997/98 was available). The most recent available data to assess the population trend comes from aerial surveys completed during the winters of 2018/19 and 2020/21. A population of 1,055 individuals was estimated to be using the Middle Shannon Callows SPA during this period (2 year mean of peak counts). This represents an estimated population decline of 13% since the baseline period.

According to the site synopsis document the SPA supports a nationally important wintering population of black-headed gull. The SPA is designated for the wintering population of black-headed gull.

Targets and Attributes

Table 5-13 Targets and Attributes

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target in the Absence of Mitigation
Winter population trend	Long term winter population trend is stable or increasing	No – The Proposed Project site does not provide significant suitable habitat for this species and very low numbers of birds were recorded occasionally flying over the Proposed Project site, with no use of on-site habitats observed. Therefore, the Proposed Project will not affect the SCI winter population trend.
Winter spatial distribution	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target	No – The Proposed Project site does not provide significant suitable habitat for this species, and very low numbers of birds were recorded occasionally flying over the Proposed Project site, with no use of on-site habitats observed. Therefore, the Proposed Project will not affect SCI winter spatial distribution.
Disturbance at wintering site	The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact	No – The Proposed Project site does not provide significant suitable habitat for this species, and very low numbers of birds were recorded

	the achievement of targets for population trend and spatial distribution	occasionally flying over the Proposed Project site, with no use of on-site habitats observed. Therefore, the Proposed Project will not result in adverse impacts due to disturbance of SCI black-headed gull.
Barriers to connectivity and site use	The number, location, shape and area of barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA	No – The Proposed Project site does not provide significant suitable habitat for this species, and very low numbers of birds were recorded occasionally flying over the Proposed Project site, with no use of on-site habitats observed. Therefore, the Proposed Project will not create barriers to connectivity for SCI black-headed gull.
Forage spatial distribution, extent and abundance	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target	Yes – In the absence of mitigation, deterioration in water quality could affect supporting foraging habitats and food resources of SCI population black-headed gull.
Roost spatial distribution and extent	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target	No – The Proposed Project site does not provide significant suitable habitat for this species, and very low numbers of birds were recorded occasionally flying over the Proposed Project site, with no use of on-site habitats observed. Therefore, the Proposed Project will not affect SCI population roosts.
Supporting habitat: area and quality	Sufficient area of utilisable habitat available in ecologically important sites outside the SPA	Yes – In the absence of mitigation, deterioration in water quality has the potential to undermine the quality of supporting habitat for SCI population black-headed gull.

5.1.2.3.7 *Wetlands [A999]*

Description from SSCO document

According to the site-specific conservation objectives document for this SPA, the EU 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. Any significant loss to the wetland habitat within the SPA would likely significantly negatively impact the regularly occurring migratory waterbirds that utilise this wetland habitat. Such loss of wetland habitat would likely reduce the diversity and abundance of waterbird species that the wetland can support. In addition, any significant impact on the quality, functioning and accessibility of the wetland habitat within the SPA would likely significantly negatively impact the regularly occurring migratory waterbirds that utilise this wetland habitat.

Targets and Attributes

Table 5-14 Targets and Attributes

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target in the Absence of Mitigation
Wetland habitat area	No significant loss to wetland habitat within the SPA, other than that occurring from natural patterns of variation	Yes – There will be no direct impact on area as there will be no loss of the habitat due to the Proposed Project. However, deterioration in water quality as a result of silt-laden run-off or

		other pollutants could indirectly affect wetland habitats within the SPA, potentially undermining this target.
Wetland habitat quality and functioning	No significant impact on the quality or functioning of the wetland habitat within the SPA, other than that occurring from natural patterns of variation	Yes – deterioration in water quality as a result of silt-laden run-off or other pollutants could affect the ecological quality and functioning of wetland habitats within the SPA.

6. ASSESSMENT OF POTENTIAL EFFECTS & ASSOCIATED MITIGATION

This section of this NIS presents the data and information on the Proposed Project and provides an analysis comprising the scientific examinations of the Proposed Project and its implications for the European sites referred to above in view of their conservation objectives, and provides an analysis of whether the Proposed Project, in light of best scientific information, individually or in combination with other plans or projects, would adversely affect the integrity of a European Site. Potential adverse effects are assessed in view of best scientific knowledge, based on objective information in relation to the Proposed Project including the proposed avoidance, reduction, and preventive measures.

The following sections provide a review of the potential impact pathways for each of the European Sites for which potential pathways for effect have been identified (Section 4.1 and 5.1). Mitigation measures for the avoidance of impact are then provided, followed by an assessment of potential effects, post implementation of the mitigation measures.

6.1 Potential for Direct Effects on the European Sites

The Proposed Project site is located completely outside of any European Site. However, a potential for direct effects on the following SCI species as a result of collision risk with wind turbines, displacement and barrier effect during operation of the Proposed Project was identified:

Middle Shannon Callows SPA:

- A142 Lapwing *Vanellus Vanellus* (wintering)
- A140 Golden Plover *Pluvialis apricaria* (wintering)

Potential collision risk effects are limited to wintering populations of golden plover and lapwing, which have been recorded using the Proposed Project site and may be associated with the SPA population. On a precautionary basis, a pathway for direct impacts on these species due to collision with moving wind turbine rotor blades.

A potential pathway for direct effects via displacement and barrier effects during the operational stage was also identified. Displacement and barrier effects are limited to wintering populations of golden plover and lapwing, which have been recorded using the Proposed Project site and may be associated with the SPA population. On a precautionary basis, a pathway for displacement of these species from the site and barrier impacts affecting access to the site.

6.1.1 Collision Risk

A potential pathway for direct effects in the form of collision risk for wintering populations of golden plover and lapwing associated with the operational phase of the wind farm and turbine layout is considered below on a precautionary basis. Collision risk may arise where flight trajectories intersect with the rotor sweep of turbines or where birds utilise the site during movements between feeding and roosting areas. Collision risk modelling is included in Appendix 9 of this report and the assessments in this section are informed by these findings.

The modelling used in this collision risk calculation follows the Band Model (Band *et al.,* 2007) and included consideration of the most recent NatureScot guidance (2024). The Band Model determines the number of birds transits through the air space swept by the rotor blades of the wind turbines then calculates the collision risk for the birds. The product of the transits multiplied by the collision risk

provides a collision rate. An avoidance factor is applied to this to account for birds actively avoiding turbines, providing a final "real world" annual collision rate for each species. Flight activity information was collected during vantage point surveys of the Proposed Project site.

In determining the appropriate reference population for the collision risk assessment, consideration has been given to whether birds recorded within the Proposed Project site represent a discrete SPA population or form part of a larger wintering population distributed across suitable habitat in the wider surroundings. This has taken account of the mobility and behaviour of wintering golden plover and lapwing, the availability of suitable habitat in the surrounding landscape, and the connectivity between Middle Shannon Callows SPA and the Proposed Project site.

The Proposed Project is located approximately 8.3km from Middle Shannon Callows SPA. Wintering golden plover and lapwing are mobile species that utilise extensive areas of grassland and peatland habitats during the wintering season. Suitable habitat is widespread in the surrounding area and there is no barrier to movement between the SPA and the wider landscape.

Waterbird Distribution and Abundance Surveys demonstrate that both species occur widely beyond the Proposed Project site. Golden plover were recorded on 85 occasions during these surveys, with flock sizes ranging from single birds up to 4,000 individuals, and all records occurring greater than 5km from the Proposed Project site. Lapwing were recorded on 261 occasions, with flock sizes of up to 1,400 birds, at distances of between 4.6km and 10.2km from the nearest proposed turbine. These results indicate that any wintering golden plover and lapwing using the Proposed Project site form part of a broader wintering population present across the wider area, rather than representing a discrete population associated with the SPA.

On this basis, birds recorded within the Proposed Project site are considered to form part of the wider county wintering population, which includes the SPA population. Predicted collision mortality has therefore been assessed against the county wintering population, recognising that only a proportion of the birds recorded within the Proposed Project site would be associated with Middle Shannon Callows SPA.

6.1.1.1 Golden Plover

The species was recorded flying within PCH during vantage point surveys. A "Random" collision risk analysis has been undertaken (full details in Appendix 9). The model used for the analysis assumes that waterbird species are active for 25% of dark hours, in addition to daylight hours.

A key factor in calculating the predicted rate of collisions for a given species is the application of an avoidance rate. The avoidance rate accounts for the ability of a bird to take evasive action to avoid a collision with a turbine. Where species-specific avoidance rates are available these rates are usually very high, e.g. all swan species have been shown to avoid colliding with operating turbines 99.8% of the time. Until recently a species-specific avoidance rate has not been available for golden plover. A review of golden plover collision avoidance from four UK wind farms has been undertaken and is outlined in Appendix 9. The output of this new research was a golden plover avoidance rate of 99.6 to 99.8%. Following a precautionary approach, the lower of these avoidance rates (i.e. 99.6%) was used in the collision risk analysis.

The collision risk has been calculated at a rate of 10.665 collisions per year. Annual mortality of adult golden plover has been calculated at 27% per annum (Sandercock, 2003). If 10.665 collisions were to occur per year, it would mean that the losses at the Proposed Project site would increase the annual mortality of the county population by 0.80%. The predicted collision risk is therefore of negligible magnitude as per Percival (2003) criteria. Therefore, no adverse effects are predicted and no mitigation is required.

6.1.1.2 Lapwing

The species was recorded flying within PCH during vantage point surveys. A "Random" collision risk analysis has been undertaken (full details in Appendix 9). The model used for the analysis assumes that waterbird species are active for 25% of dark hours, in addition to daylight hours.

The collision risk has been calculated at a rate of 2.007 collisions per year. Annual mortality of adult lapwing has been calculated at 29.5% per annum (Peach *et al*, 1994). If 2.007 collisions were to occur per year, it would mean that the losses at the Proposed Project site would increase the annual mortality of the county population by 0.26% (full details in Appendix 9). The predicted collision risk is therefore of negligible magnitude as per Percival (2003) criteria. No adverse effects are predicted and no mitigation is required.

6.1.2 Displacement and Barrier Effect

A potential pathway for direct effects in the form of displacement and barrier impacts wintering populations of golden plover and lapwing associated with Middle Shannon Callows SPA is considered below on a precautionary basis.

6.1.2.1 Golden Plover

Hötker *et al.* (2006) state that golden plover will approach wind turbines to an average distance of 175m in non-breeding season. Of the 161 no. observations of golden plover throughout the survey period, 24 no. observations were within 175m of the proposed turbine layout. The majority of these related to birds in flight, and with two observations relating to birds utilising habitats. Of the total 7 no. observations of golden plover utilising habitats across the Proposed Project site, usage was not recorded on more than one occasion in any area. Golden plover are therefore not reliant on any specific area of the Proposed Project site and utilise habitats on an opportunistic basis. As such, in the event of displacement, there are extensive areas of similar habitat in the wider area. Similar quality habitat is widely available, with good quality habitat abundantly present in the River Shannon catchment. Additionally, the rehabilitation schemes within some of these peatland habitats (on deep peat) are likely to increase the quality of these habitats in the wider surroundings for the species and, relatedly, their potential carrying capacity. The low rate of occurrence limits the potential for disturbance displacement associated with the turbines and/or foot traffic on the amenity tracks. These factors likely render displacement effects inconsequential.

Over the lifetime of the Proposed Wind Farm, with the succession to scrub mosaic on shallower peat, the site will likely become increasingly less suitable for open habitat species like golden plover.

Survey results indicate that the Proposed Project site does not lie on a migratory/regular commuting route for this species, therefore barrier effect is not anticipated. Adverse effect due to displacement and barrier effects are not anticipated and no mitigation is required.

6.1.2.2 Lapwing

There were three records of lapwing utilising habitats within the Proposed Project site over the five winter seasons surveyed. This species was not observed to regularly utilise any areas of the Proposed Project site during winter months but was primarily recorded travelling over the Proposed Project site. There are extensive areas of suitable habitat in the wider area, as identified during the Waterbird Distribution and Abundance Surveys (Appendix 7), including Lough Boora Parklands and Tumduff, outside any potential displacement buffer. Similar quality habitat is widely available, with good quality habitat abundantly present in the River Shannon catchment.

Over the lifetime of the Proposed Wind Farm, with the succession to scrub mosaic on shallower peat, the site will likely become increasingly less suitable for open habitat species like lapwing.

Survey results indicate that the Proposed Project site does not lie on a migratory corridor for lapwing, and no regular or patterned flight was identified over the site. Adverse effects to displacement and barrier effects are not predicted and no mitigation is required.

6.2 Potential for Indirect Effects on the European Sites

There is hydrological connectivity between the Proposed Project and the River Shannon Callows SAC and the Middle Shannon Callows SPA via drainage ditches and watercourses within the Proposed Project site which ultimately discharge to the River Shannon.

Therefore, there is potential for adverse effects on the integrity of these downstream European Sites as a result of the Proposed Project due to deterioration in water quality arising from run-off of and infiltration of pollutants during the construction, operational and decommissioning phases of the development. Potential indirect effects on River Shannon Callows SAC arising from deterioration of water quality are confined to aquatic QIs that may occur downstream of the Application Site, where hydrological connectivity exists. These are:

- 1355] Otter (*Lutra lutra*)
- [7230] Alkaline fens
- [91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)

Potential indirect effects on Middle Shannon Callows SPA arising from deterioration of water quality are limited to SCI species and supporting wetland habitat occurring downstream of the Proposed Project site, where hydrological connectivity is present. These are

- [A038] Whooper Swan (*Cygnus cygnus*)
- [A050] Wigeon (*Anas Penelope*)
- [A140] Golden Plover (*Pluvialis apricaria*)
- [A142] Lapwing (*Vanellus vanellus*)
- [A156] Black-tailed Godwit (*Limosa limosa*)
- [A179] Black-headed Gull (*Chroicocephalus ridibundus*)
- [A999] Wetlands

In addition to water quality, a potential pathway for indirect effects via ex situ habitat loss during the construction stage was identified. These potential effects are limited to wintering populations of golden plover and lapwing, which have been recorded using habitats within the Proposed Project site and may be associated with the SPA population. No habitat loss impacts during the operational or decommissioning phase were identified as no new land-take will occur during these phases.

A potential pathway for indirect effects via disturbance during the construction stage was also identified. For River Shannon Callows SAC, this relates only to otter, on the precautionary basis that otters potentially using watercourses within or downstream of the Proposed Project site may be associated with the SAC population. For Middle Shannon Callows SPA, potential disturbance effects are limited to wintering populations of golden plover and lapwing, which have been recorded using the Proposed Project site and may be associated with the SPA population. On a precautionary basis, a pathway for disturbance of these species from machinery, personnel, noise and general activity has been identified.

6.2.1 Deterioration of Water Quality

The pathways that would allow potential impacts to occur due to deterioration of water quality were considered in the design of the Proposed Project. The footprint of the Proposed Project has been specifically designed to avoid significant impacts on watercourses. The key mitigation measure during the construction phase is the avoidance of sensitive aquatic areas by application of suitable buffer zones (i.e. 50m to main watercourses). All of the key development components within the Proposed Project site are located significantly away from the delineated 50m watercourse buffer zones with the exception of 2 no. watercourse crossing locations on the Lemanaghan Stream. The location of new watercourse crossings has been chosen to facilitate the use of bottomless box culverts, thereby ensuring that no instream works are necessary and minimising potential for impact on the receiving environment.

A detailed Surface Water Management Plan (Appendix 6) has been prepared for the Proposed Project. This plan provides details of how surface water quality will be protected during the construction of the Proposed Project.

The environmental management framework to be adhered to during the construction phase of the Proposed Project includes comprehensive detail regarding site set up, pollution prevention and hydrocarbon management and incorporates mitigating measures to ensure that there are no adverse effects on the integrity of any European Sites in light of their conservation objectives during the construction, operational or decommissioning phases of the Proposed Project. Measures for the protection of water quality during the project design as well as construction, operational and decommissioning phases of the Proposed Project are set out in the following subsections.

6.2.1.1 Construction Phase

Construction phase activities, including construction of Proposed Wind Farm infrastructure and Proposed Grid Connection infrastructure will involve extensive earthworks and the excavation of approximately 438,449 m^3 of peat and mineral subsoil. These activities will create multiple potential sources of sediment-laden water, including drainage and seepage from excavations, exposed stockpiled materials and erosion of newly constructed drainage channels. Mobilisation of suspended solids has the potential to increase turbidity in downstream watercourses, which could adversely affect water quality and aquatic species.

Use of construction machinery, particularly during refuelling, presents a risk of accidental hydrocarbon spills. Both significant spill events and the accumulation of small leaks during routine plant operation can lead to contamination of surface water. Hydrocarbons are toxic, persistent and capable of depleting dissolved oxygen through microbial activity, creating a risk to aquatic organisms and associated habitats, and therefore represent a potentially significant pollution source during the construction phase.

Concrete and cement-based products, due to their highly alkaline and corrosive nature, pose a further risk to surface water quality. These materials can generate fine, high-pH silt capable of damaging fish by burning skin or blocking gills and can cause exceedance of the pH limits set out in S.I. No. 293 of 1988 for salmonid waters. Peat ecosystems, which depend on low-pH hydrochemistry, are particularly sensitive to alkaline inputs. Uncontrolled release of wet concrete, cement washout water or cement-contaminated runoff to the drainage system could therefore significantly impact surface water quality.

Temporary wastewater treatment systems required during the construction phase also present a potential pollution risk. If site conditions are unsuitable for effective percolation or if treatment performance is inadequate, effluent could enter surface water features, resulting in nutrient or microbial contamination with potential impacts on fish and aquatic habitats.

Due to the depth of peat at several turbine locations, piled foundations may be required. Piling activities can influence surface-water pathways by altering drainage patterns locally, increasing the potential for mobilisation and transport of sediment and construction-related contaminants toward

surface water features. Disturbance associated with pile installation may also create temporary preferential pathways within the peat mass, facilitating surface-derived runoff reaching drainage networks more rapidly, which could increase the risk of sedimentation or transport of pollutants to downstream watercourses if not appropriately controlled.

6.2.1.1.1 Proposed Mitigation Measures for Sediment Control

Proposed Mitigation by Avoidance:

The key mitigation measure during the construction phase is the avoidance of sensitive hydrological features where possible, by application of suitable buffer zones (i.e. 50m to main watercourses, and 10m to main drains). All of the key Proposed Project areas are located significantly away from the delineated 50m watercourse buffer zones with the exception of the upgrading of the existing watercourse crossing, new drain crossing and upgrades to existing site access tracks. Additional control measures, which are outlined further on in this section, will be undertaken at these locations.

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

- Avoid physical damage (river/stream banks and river/stream beds) to watercourses and associated release of sediment;
- Avoid excavations within close proximity to surface watercourses;
- Avoid the entry of suspended sediment from earthworks into watercourses; and,
- Avoid the entry of suspended sediment from the construction phase drainage system into watercourses, achieved in part by ending drain discharge outside the buffer zone and allowing percolation across the vegetation of the buffer zone.

In addition, and as outlined above, the Proposed Project drainage system will link into the existing bog drainage system, and discharge from the bog via existing large settlement ponds, which are some distance from the Proposed Project footprint. As such, there is significant distance for wind farm related surface water to travel before it actually reaches the edge of the bogs and joins any receiving waters outside of the overall bog boundaries.

Proposed Mitigation by Design:

There is an extensive network of drains already existing at the Proposed Project site. The existing drainage infrastructure is operating in accordance with IPC licence requirements, with environmental monitoring and silt control measures being implemented. The existing drainage system at the Proposed Project site will be maintained and expanded locally as required for use within the Proposed Project drainage system. The key elements are the upgrading and improvements to water treatment elements, such as in-line controls and treatment systems, including wind farm related silt traps and settlement ponds.

The elements of interaction with existing drains will be as follows:

- Interceptor drains will convey clean runoff water around works areas to the existing downstream drainage system (field drains and main drains). Where required, interceptor drains will be installed in advance of any construction works commencing. This will ensure that clean water is kept clean by diverting surface water flow around excavations, construction areas and temporary storage areas. Where possible (depending on orientation), existing field drains can be used as interceptors drains;
- Collector drains will be used to intercept and collect runoff from construction areas (from turbine base/hardstand areas, construction compounds, and the substation). During the construction phase temporary settlement ponds will be used to attenuate and treat runoff from the construction areas (from turbine base/hardstand areas, construction compounds,

and the substation) and treated water will then discharge into existing field drains and main drains. Temporary settlement ponds will be removed at the end of the construction phase (end of high risk period), and wind farm runoff will discharge into existing field drains and main drains;

- During the construction phase, temporary silt traps (silt fences) will be used as an additional water protection measure around the existing bog drainage network, particularly where works are proposed within 50m of a natural watercourse. The silt fences will be placed in the existing drains downstream of construction works, and the associated construction area run-off water will be diverted into proposed interceptor drains, or culverted under/across the works area;
- During the construction phase, dewatering silt bags will also be used as required. They can be used downgradient of turbine bases, where temporary pumping is required. Discharge from dewatering silt bags will flow into settlement ponds and treated water from settlement ponds will outfall to existing field drains and main drains;
- Within the Proposed Project site layout there are section of proposed floating road between turbine infrastructure. In these sections, and depending on intermediate topography, a collector drain (dirty water system as described above) may be used during construction stage, or over the edge (OTE) drainage will occur. OTE drainage allows runoff from access tracks to flow into local field drains and be managed via the existing site drainage system. OTE drainage will only occur where topography allows, and it is only proposed in areas of low risk and remote from outfall locations (at least 150m from bog outfall locations. Silt traps and check dams will be installed in field drains downstream of OTE drainage areas, and these will provide attenuation and treatment of dirty water; and,
- Culverts will be required where site roads and proposed hardstands cross the main bog drainage networks. These will be installed with a minimum gradient to reduce the entrainment of suspended solids. All culverts will be inspected regularly and maintained where appropriate. Culverts will remain in-situ during the operational phase of the Proposed Project.

Water Treatment Train

If the discharge water from construction areas fails to be of a high quality, then a filtration treatment system (such as a 'siltbuster' or similar equivalent treatment train (sequence of water treatment processes)) will be used to filter and treat all surface discharge water collected in the dirty water drainage system. This will apply throughout the construction phase.

Silt Fences:

Silt fences will be emplaced within drains down-gradient of all construction areas. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to the existing drainage network of sand and gravel-sized sediment, released from excavation of mineral sub-soils of glacial and glacio-fluvial origin and entrained in surface water runoff. Regular inspection and maintenance of these structures during construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase.

Silt Bags:

Silt bags will be used where small to medium volumes of water need to be pumped from excavations (e.g. the proposed underpass locations). As water is pumped through the bag, most of the sediment is retained by the geotextile fabric allowing filtered water to pass through.

Pre-emptive Site Drainage Management:

The works programme for the construction stage of the development will also take account of weather forecasts and predicted rainfall in particular. Large excavations and movements of peat/subsoil or peat

stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

The following forecasting systems are available and will be used on a daily/weekly basis, as required, to allow site staff to direct proposed and planned construction activities:

- General Forecasts: Available on a national, regional and county level from the Met Éireann website (www.met.ie/forecasts). These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates;
- MeteoAlarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale;
- 3-hour Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events;
- Rainfall Radar Images: Images covering the entire country are freely available from the Met Éireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3-hour record is given and is updated every 15 minutes. Radar images are not predictive; and,
- Consultancy Service: Met Éireann provide a 24-hour telephone consultancy service. The forecaster will provide interpretation of weather data and give the best available forecast for the area of interest.

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

Earthworks should be suspended if forecasting suggests any of the following is likely to occur:

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

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

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

Management of Runoff from Peat and Subsoil Storage Areas:

It is proposed that excavated peat and spoil will be used for landscaping close to its original extraction point. During the initial placement of peat and spoil, silt fences, straw bales and biodegradable geogrids will be used to control surface water runoff from the storage areas as required. Interceptor and collector drains will be used at storage areas. 'Siltbuster' treatment trains will be employed if previous treatment is not to a high quality.

Timing of Site Construction Works:

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

Proposed Drainage and Water Quality Monitoring

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

Any excess build-up of silt levels at dams, the settlement ponds, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed.

During the construction phase field testing (visual, supplemented with pH, electrical conductivity, temperature, dissolved oxygen and turbidity monitoring), sampling and laboratory analysis of a range of parameters[39] with relevant regulatory limits and EQSs will be undertaken for each primary watercourse, and specifically following heavy rainfall events (i.e. weekly, monthly and event-based). The data will be processed and analysed and works will cease if elevated turbidity concentrations are recorded. In this event, all upstream silt traps and drainage routes will be inspected to identify the cause of the elevated turbidity levels. Works will not recommence until any issues have been resolved and the turbidity concentrations have returned to background concentrations.

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

6.2.1.1.2 *Proposed Mitigation Measures for the Control of Hydrocarbons*

- All plant will be inspected and certified to ensure they are leak free and in good working order prior to use on site;
- On-site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer or truck will be re-filled off site and will be towed/driven around the site to where machinery are located. The 4x4 jeep/fuel truck will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- Fuels stored on site will be minimised. Any storage areas will be bunded appropriately for the fuel storage volume during the construction phase;
- The electrical control building will be bunded appropriately to the volume of oils likely to be stored and to prevent leakage of any associated chemicals and to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;
- The plant used will be regularly inspected for leaks and fitness for purpose;
- An emergency plan for the construction phase to deal with accidental spillages will be contained within the Construction Environmental Management Plan (CEMP). Spill kits will be available to deal with accidental spillages.

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

[39] *example suite: pH (field measured), Electrical Conductivity (field measured), temperature (field measured), Dissolved Oxygen (field measured), Turbidity (NTU) (sonde measured), Flow (m/s), Total Suspended Solids (mg/l), Ammonia, Nitrite (NO_2) (mg/l), Ortho-Phosphate (P) (mg/l), Nitrate (NO_3) (mg/l), Phosphorus (unfiltered) (mg/l), Chloride (mg/l), and BOD (mg/l).*

6.2.1.1.3 Proposed Mitigation Measures for the Control of Cement-based Products

- No batching of wet-cement products will occur on site. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place;
- Where possible pre-cast elements for culverts and concrete works will be used;
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;
- Where concrete is delivered on site, only the chute will be cleaned, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water is to be isolated in temporary lined wash-out pits located near proposed site compounds. These temporary lined wash-out pits will be removed from the site at the end of the construction phase;
- Any washing out of concrete pumping plant will also be into the temporary lined wash-out pits;
- Will use weather forecasting to plan dry days for pouring concrete; and,
- Will ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event.

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

6.2.1.1.4 Proposed Mitigation Measures for Wastewater Control

- There are a total of 5 no. proposed construction compounds associated with the Proposed Project;
- During the construction phase, a self-contained port-a-loo with an integrated waste holding tank will be used at each of the site compounds, maintained by the providing contractor, and removed from site on completion of the construction works;
- Water supply for the site office and other sanitation will be brought to site and removed after use from the site to be discharged at a suitable off-site treatment location; and,
- No water or wastewater will be sourced on the site, nor discharged to the site.

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

6.2.1.1.5 Proposed Mitigation Associated with Piled Foundations

Proposed mitigation measures relative to piling works will comprise:

- Where driven piles are used, they will have a cross section without re-entrant angles;
- Strict QA/QC procedures for piling works will be followed;
- Piles will be kept vertical during piling works;
- Good workmanship will be employed during all piling works; and,
- Where required use bentonite seal to prevent upward/downward movement of surface water/groundwater.

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

6.2.1.2 Operational Phase

The Proposed Project will result in an overall increase in the area of non-permeable hard-surfaces which has potential to result in increased surface water run-off from the Proposed Project site, which in turn has potential to cause erosion of watercourses and impact water quality.

As the part of the Proposed Project drainage design, it is proposed that runoff from the proposed infrastructure will be collected locally in new proposed silt traps, settlement ponds and vegetated buffer areas prior to release into the existing drainage network. The new proposed drainage measures will then create significant additional attenuation to what is already present. The operational phase drainage system will be installed and constructed in conjunction with the existing bog drainage network and will include the following:

- Interceptor drains will be installed up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it can be re-distributed into downstream field drains;
- Collectors drains will be used to gather runoff from access roads and turbine hardstanding areas of the site, likely to have entrained suspended sediment, and channel it to new local settlement ponds for sediment settling;
- On sections of access road transverse drains ('grips') will be constructed where appropriate in the surface layer of the road to divert any runoff off the road into swales/roadside drains;
- Check dams will be used along sections of access road drains to intercept silts at source. Check dams will be constructed from a 4/40mm non-friable crushed rock;
- Settlement ponds, emplaced downstream of access road sections and at proposed turbine locations, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to existing drains;
- Settlement ponds will be designed in consideration of the greenfield runoff rate, existing bog settlement ponds will also buffer discharges from Lemanaghan Bog; and,
- Finally, all surface water runoff from the Proposed Project will have to pass through the settlement ponds at the existing bog outfall locations.

There is also potential for the release of sediment and run-off of pollutants due to accidental spillage or release of hydrocarbons from site vehicles during any routine maintenance works during the operational phase of the Proposed Project. However, it is not envisaged that any significant refuelling works will be undertaken on site during the operational phase. Proposed mitigation measured (by design) for the control of hydrocarbons include the following:

- Onsite re-fuelling of normal operational vehicles will not be carried out during the operational phase of the development. These vehicles will be refuelled offsite;
- Fuels stored on site will be minimised and any hydrocarbons stored on-site will be bunded. The bund capacity will be sufficient to contain 110% of the storage tank's maximum capacity;
- The substation will be bunded appropriately to the volume of oils likely to be stored, and to prevent leakage of any associated chemicals and to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;
- Oil in the turbine transformers will be fully bunded within the enclosed turbine and as such, there is no potential pathway to the water environment i.e. the pathway has been blocked;
- Any plant used during the operational phase will be regularly inspected for leaks and fitness for purpose; and,
- Spill kits will be available to deal with accidental spillages.

Mitigation measures to avoid the release of suspended solids in surface waters will be implemented as per the construction phase mitigation measures outlined in Section 6.2.1.1.

The potential for effects due to the release of wastewater will be managed by the installation of a sealed underground holding tank for effluent (wastewater) from the substation building. The tank shall be routinely emptied by a licensed contractor. A level sensor will be installed in the tank which shall be linked to the on-site SCADA system. If the level of the tank contents rise to a predetermined 'high 'level a warning shall appear on the overall SCADA system for the site and automatic notification shall be sent to the facility manager. A formal service agreement will be entered into with a suitably permitted waste contractor, in relation to the servicing and de-sludging of the wastewater holding tank on site. There will be no discharge of wastewater to ground at the site, and no potential to impact surface water quality.

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

6.2.1.3 Decommissioning Phase

The potential impacts associated with decommissioning of the Proposed Project will be similar to those associated with construction but of a reduced magnitude, due to the reduced scale of the proposed decommissioning works in comparison to construction phase works. A decommissioning plan will be agreed with Offaly County Council prior to decommissioning of the Proposed Wind Farm (Appendix 2).

During decommissioning, it may be possible to reverse or at least reduce some of the potential impacts caused during construction by rehabilitating construction areas such as turbine bases, hard standing areas and peat deposition areas.

This will be done by covering with peatland vegetation/scraw or poorly humified peat to encourage vegetation growth and reduce run-off and sedimentation. Other impacts such as possible soil compaction and contamination by fuel leaks will remain but will be of reduced magnitude. However, as noted in the Scottish Natural Heritage report (SNH) Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms (SNH, 2013) reinstatement proposals for a wind farm are made approximately 30 years in advance, so within the lifespan of the wind farm, technological advances and preferred approaches to reinstatement are likely to change. According to the SNH guidance, it is, therefore:

> *"best practice not to limit options too far in advance of actual decommissioning but to maintain informed flexibility until close to the end-of-life of the wind farm".*

Some of the impacts will be avoided by leaving elements of the Proposed Project in place where appropriate (e.g. turbine foundations). Elements of the Proposed Grid Connection (i.e., the onsite substation, 4 no. steel masts, and 2 no. gantry structures) will be retained by EirGrid. The turbine bases will be rehabilitated by covering with local topsoil/peat in order to regenerate vegetation which will reduce runoff and sedimentation effects. Internal roads will remain as amenity tracks. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures outlined in Section 6.2.1.

No adverse effects due to hydrological impacts are envisaged during the decommissioning stage of the Proposed Project.

6.2.2 Ex Situ Habitat Loss

A potential pathway for indirect effects in the form of ex situ habitat loss on wintering populations of golden plover and lapwing that may be associated with the Middle River Shannon SPA is considered below on a precautionary basis. This impact pathway is associated with construction phase only as no additional land-take will occur during the operational or decommissioning phases.

6.2.2.1 Golden Plover

Golden plover were observed within, or partially within, the Proposed Project site on 62 occasions over the five wintering seasons. The majority of these observations related to birds in flight over the Proposed Project site. Birds were observed landing and/or roosting within the Proposed Project site on a total of seven occasions over four and a half years of surveying, with flocks recorded ranging from 2 to 80 birds. The Proposed Project site is not considered an important foraging or roosting habitat for golden plover and the potential for construction works to result in ecologically significant habitat loss for golden plover is limited. Furthermore, the results of waterbird distribution and abundance surveys in the wider area demonstrate that the Proposed Project site is not a preferred habitat for golden plover, with activity concentrated on peatlands over 5km south of the Proposed Project site including Boora Bog environs and Tumduff Wetlands (see Appendix 7).

The land lost to the permanent infrastructure footprint of the Proposed Project is small relative to the total area within the Proposed Project site (i.e., approx. 3%). Given the abundance of similar suitable habitats (peatlands and improved agricultural grasslands) in the wider area as those found within the Proposed Project site, and that extensive areas of suitable foraging and roosting habitat will remain post construction, no adverse impacts are predicted and no mitigation is required.

6.2.2.2 Lapwing

Lapwing were observed within, or partially within, the Proposed Project site on 19 occasions across the five winter seasons surveyed. The majority of these observations related to birds in flight over the Proposed Project site. Birds were observed landing or on the ground within the Proposed Project site on a total of three occasions over the five winter seasons surveyed, with flocks recorded ranging from one to four birds. The Proposed Project site is therefore not an important foraging or roosting habitat for wintering lapwing and the potential for construction works to result in ecologically significant habitat loss for wintering lapwing is limited. Furthermore, the results of waterbird distribution and abundance surveys in the wider area demonstrate that the Proposed Project site is not a preferred habitat for lapwing, with activity concentrated on peatlands over 5km south of the Proposed Project site (i.e. Boora Bogs, Tumduff Wetlands and Turraun Wetlands).

The land lost to the permanent infrastructure footprint of the Proposed Project is small relative to the total area within the Proposed Project site (i.e., approx. 3%). Given the abundance of similar suitable habitats (peatlands and improved agricultural grasslands) in the wider area as those found within the Proposed Project site, and that extensive areas of suitable foraging and roosting habitat will remain post construction, no adverse impacts are predicted and no mitigation is required.

6.2.3 Disturbance

A potential pathway for indirect effects in the form of disturbance of otter populations associated with the River Shannon Callows SAC and wintering populations of golden plover and lapwing populations associated with Middle Shannon Callows SPA is considered below on a precautionary basis.

6.2.3.1 Otter

Although a small number of streams and rivers drain the site, the majority of these are located towards the peripheries of the site and the vast majority of watercourses within the site are artificial drainage channels with low suitability for otter, although they may be used on occasion for commuting or foraging. During the walkover surveys and dedicated otter surveys undertaken (refer to Section 3.1.2.1 above), no otter resting or breeding sites were identified within or adjacent to the Proposed Project site and the small, modified watercourses and drains within the site were not found to support significant suitable habitat for this species.

Otter are predominantly crepuscular in nature (prefer dim light and tend to be active during dawn/dusk) and are unlikely to be adversely impacted by the proposed works. Construction activity will be confined to daytime hours, thus minimizing potential disturbance related impacts to the species. The NPWS Threat Response Plan for Otter acknowledges that "*Little evidence has come to light in recent studies to suggest that disturbance by recreation is a significant pressure*." It also identifies that otter are known to travel significant distances from streams and lakes in search of new territory and feeding areas.

Channin (2003) provides a literary review with regard to anthropogenic disturbance and refers to several reports which have found that disturbance is not detrimental to otters (Jefferies, 1987; Durbin, 1993; Green & Green, 1997). The report also describes successful breeding in towns, under ferry terminals and under the jetties of one of Europe's largest oil and gas terminals at Sullom Voe in North Scotland.

Irish Wildlife Manual No 23 (National Otter Survey of Ireland 2004/2005) found no significant relationship between disturbance and otter occurrence. In addition, no significant difference in otter presence was found between sites with and without recreational activity. It also states, "*the lowest percentage occurrence was found at the sites with the lowest recorded disturbance*." Irish Wildlife Manual No 76 (National Otter Survey of Ireland 2010/2012) notes that the occurrence of otter was unaffected by perceived levels of disturbance at the survey sites. It also notes that there is little published evidence demonstrating any consistent relationship between otter occurrence and human disturbance ((Mason & Macdonald 1986, Delibes *et al.* 1991; Bailey & Rochford, 2006). No adverse effects on the otter population associated with the River Shannon Callows SAC during the construction phase of the Proposed Project are anticipated.

Based on the above review of scientific literature, and the absence of significant suitable habitat for otter within the Proposed Project site, the potential for adverse effects on the integrity of the otter population associated with the River Shannon Callows SAC as a result of the of the Proposed Project can be excluded.

6.2.3.1.1 *Mitigation Measures*

While no adverse effects on otter are anticipated, taking a highly precautionary approach, prior to the commencement of construction works associated with the installation of watercourse crossings, a pre-commencement otter survey will be undertaken to ensure that no otter holts/breeding sites have been established since the original surveys were undertaken (TII, 2008). This will be undertaken by a suitably qualified ecologist in accordance with standard best practice guidance.

Should any otter holt be identified within 150m of the proposed works during the pre-construction surveys, it will be subject to exclusion procedures as outlined in the TII guidelines (2006) in consultation with the NPWS.

6.2.3.2 Golden Plover

There were 7 records of golden plover utilising habitats within the Proposed Project site over the four and a half years of surveying. All these records related to different areas of the Proposed Project site, with no repeat usage of any area recorded. The Proposed Project site is therefore not an important foraging or roosting habitat for golden plover and the potential for construction works to result in ecologically significant disturbance effects on golden plover is limited.

Significant areas of suitable roosting and foraging habitat for the species occur in the wider landscape and will be retained. In the event of disturbance, there are extensive areas of similar habitats in the wider area. Similar quality habitat is widely available, with good quality habitat abundantly present in the River Shannon catchment. Additionally, the rehabilitation schemes within some of these peatland habitats (on deep peat) are likely to increase the quality of these habitats in the wider surroundings for the species and, relatedly, their potential carrying capacity. These factors likely render such an effect inconsequential. Adverse effects are therefore not predicted and no mitigation is required.

6.2.3.3 Lapwing

There were only 3 records of lapwing utilising habitats within the Proposed Project site over the five winter seasons surveyed. This is a very low rate of occurrence. The Proposed Project site is therefore not an important foraging or roosting habitat for wintering lapwing and the potential for construction works to result in ecologically significant disturbance impacts on wintering populations of lapwing is limited.

Significant areas of suitable roosting and foraging habitat for the species occur in the wider landscape and will be retained. In the event of disturbance, there are extensive areas of similar or alternative habitat in the wider area. Similar quality habitat is widely available, with good quality habitat abundantly present in the River Shannon catchment. These factors likely render such an effect inconsequential. Adverse effects are not predicted and no mitigation measures are required.

7. ASSESSMENT OF RESIDUAL ADVERSE EFFECTS

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

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

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

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

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

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

8. ASSESSMENT OF CUMULATIVE EFFECTS

A search and review in relation to plans and projects that may have the potential to result in cumulative impacts on European Sites was conducted. This assessment focuses on the potential for cumulative in-combination effects on the European Sites where potential for adverse effects was identified in Section 4 of this report. This included a review of online Planning Registers, Development Plans and other available information and served to identify past and future plans and projects, their activities and their predicted environmental effects.

8.1 Plans

The following development plans have been reviewed and taken into consideration as part of this assessment:

- Offaly County Development Plan 2021-2027
- 4th National Biodiversity Action Plan 2023-2030

The review focused on policies and objectives that relate to European sites. Policies and objectives relating to the conservation of peatlands and sustainable land use were also reviewed, particularly where the policies relate to the preservation of surface water quality. An overview of the search results with regard to plans is provided in Table 8-1. No potential for cumulative effects when considered in-combination with the Proposed Project has been identified, and the Proposed Project is in compliance with the relevant objectives of the Plans.

In addition, the Appropriate Assessment carried out for the Offaly County Development Plan 2021-2027 has been reviewed. The relevant Natura Impact Report (NIR) is found on the Offaly County Council website at the following link:

https://www.offaly.ie/app/uploads/Council/Council_Services_A-Z/Planning_Building/Consolidated-AA-NIR.pdf

The Appropriate Assessment carried out for the Development Plan has concluded that there is no potential for Residual Adverse Effect as a result of implementation of the Plan. Therefore, there is no potential for cumulative effect as a result of the Proposed Project in-combination with the Plan.

Table 8-1 Assessment of Plans

Plans	Key Policies and Objectives directly related to Biodiversity and European Sites in the Zone of Influence	Assessment of Compliance with Policy
Offaly County Development Plan 2021-2027	**Biodiversity and Landscape Policies** Designated and Non-Designated Sites **BLP-02** It is Council policy to conserve and protect habitats and species listed in the Annexes of the EU Habitats Directive (92/43/EEC) (as amended) and the Birds Directive (2009/147/EC), the Wildlife Acts 1976 (as amended) and the Flora Protection Orders. **BLP-03** It is Council policy to support and co-operate with statutory authorities and others in support of measures taken to manage proposed or designated sites in order to achieve their conservation objectives. **BLP-05** It is Council policy to ensure that development does not have a significant adverse impact, incapable of satisfactory avoidance or mitigation, on plant, animal or bird species protected by law. **BLP-06** It is Council policy to consult with the National Parks and Wildlife Service, and take account of any licensing requirements, when undertaking, approving or authorising development which is likely to affect plant, animal or bird species protected by law. Peatlands **BLP-14** It is Council policy to protect the county's designated peatland areas and landscapes, including any historical walkways through bogs and to conserve their ecological, archaeological and cultural heritage and to develop educational heritage. **BLP-17** It is Council policy to support the National Parks and Wildlife Service in carrying out an EU LIFE fund supported raised bog restoration project in restoring the following Special Areas of Conservation sites in the county to favourable conservation status: › Clara Bog; › Ferbane Bog; › Mongan Bog; › Moyclare Bog; › Raheenmore Bog; and	The Offaly County Development Plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to European Sites. There will be no residual adverse effects on European Sites as a result of the Proposed Project. The Proposed Project has been designed to avoid, in so far as possible, any residual adverse effects on QIs and SCI species. A range of mitigation measures are in place to ensure that there will be no adverse effects on habitats, species, or water quality that could undermine the integrity of any European Sites. The Proposed Project is not considered to be in contravention of the policies and objectives within the development plan. No potential for negative cumulative impacts were identified.

Plans	Key Policies and Objectives directly related to Biodiversity and European Sites in the Zone of Influence	Assessment of Compliance with Policy
	› Sharavogue Bog. **Biodiversity and Landscape Objectives** Designated and Non-Designated Sites **BLO-02** It is an objective of the Council that no plans, programmes or projects giving rise to significant cumulative, direct, indirect or secondary impacts on European sites arising from their size or scale, land take, proximity, resource requirements, emissions (disposal to land, water or air), transportation requirements, duration of construction, operation, decommissioning or from any other effects shall be permitted on the basis of this Plan (either individually or in combination with other plans, programmes, etc., or projects). **BLO-03** It is an objective of the Council that all projects and plans arising from this Plan will be screened for the need to undertake Appropriate Assessment under Article 6 of the Habitats Directive. A plan or project will only be authorised after the competent authority has ascertained, based on scientific evidence, Screening for Appropriate Assessment, and subsequent Appropriate Assessment where necessary, that: 1. The plan or project will not give rise to significant adverse direct, indirect or secondary effects on the integrity of any European site (either individually or in combination with other plans or projects); or 2. The plan or project will have significant adverse effects on the integrity of any European site (that does not host a priority natural habitat type/and or a priority species) but there are no alternative solutions and the plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature. In this case, it will be a requirement to follow procedures set out in legislation and agree and undertake all compensatory measures necessary to ensure the protection of the overall coherence of Natura 2000; or 3. The plan or project will have a significant adverse effect on the integrity of any European site (that hosts a natural habitat type and/or a priority species) but there are no alternative solutions and the plan or project must nevertheless be carried out for imperative reasons for overriding public interest, restricted to reasons of human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest. In this case, it will be a	

Plans	Key Policies and Objectives directly related to Biodiversity and European Sites in the Zone of Influence	Assessment of Compliance with Policy
	requirement to follow procedures set out in legislation and agree and undertake all compensatory measures necessary to ensure the protection of the overall coherence of Natura 2000. **BLO-04** It is an objective of the Council to ensure that the impact of development within or adjacent to national designated sites, Natural Heritage Areas, proposed Natural Heritage Areas, Ramsar Sites and Nature Reserves likely to result in significant adverse effects on the designated site is assessed by requiring the submission of an Ecological Impact Assessment prepared by a suitably qualified professional, which should accompany planning applications. **BLO-05** It is an objective of the Council in accordance with Article 4(4) of the Birds Directive and Regulation 27(4) of the European Communities (Birds and Habitats) Regulations 2011-2015 to strive to avoid pollution or deterioration of bird habitats outside Special Protection Areas. **BLO-06** It is an objective of the Council to take account of the objective and management practices proposed in any management or related plans for European Sites (SACs and SPAs) in and adjacent to the county published by the Department including the National Raised Bog Special Areas of Conservation (SACs) Management Plan 2017-2022 and any subsequent editions. Trees, Forestry and Hedgerows **BLO-17** It is an objective of the Council to encourage pursuant to Article 10 of the Habitats Directive, the management of features of the landscape, such as traditional field boundaries, important for the ecological coherence of the Natura 2000 network and essential for the migration, dispersal and genetic exchange of wild species. Invasive Species **BLO-20** It is an objective of the Council to require, as part of the planning application process, the appropriate eradication/control of invasive species when identified on site or in the vicinity of a site, in accordance with Regulation 49 of the European Communities (Birds and Natural Habitats) Regulations 2011 to 2015.	
4th National Biodiversity Action Plan 2023-2030	The purpose of the 4th National Biodiversity Action Plan is to set out the approach to governance and conservation of biodiversity through a series of targeted actions within the Plan. This is underpinned by five	The 4th National Biodiversity Action Plan was comprehensively

Plans	Key Policies and Objectives directly related to Biodiversity and European Sites in the Zone of Influence	Assessment of Compliance with Policy
	strategic objectives aimed at ensuring that Ireland's biodiversity and ecosystems are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally. The strategic objectives are: › Objective 1: Adopt a Whole-of Government, Whole of-Society Approach to Biodiversity › Objective 2: Meet Urgent Conservation and Restoration Needs › Objective 3: Secure Nature's Contribution to People › Objective 4: Enhance the Evidence Base for Action on Biodiversity › Objective 5: Strengthen Ireland's Contribution to International Biodiversity Initiatives	reviewed, with particular reference to Policies and Objectives that relate to European Sites. There will be no adverse effects on European Sites as a result of the Proposed Project. The Proposed Project has been designed to avoid, in so far as possible, any adverse effects on QIs and SCI species. A range of mitigation measures are in place to ensure that there will be no adverse effects on habitats, species, or water quality that could undermine the integrity of any European Sites The Proposed Project is not considered to be in contravention of the policies and objectives within the development plan. No potential for negative cumulative impacts were identified.

8.2 Projects

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

The dominant land uses in the area were also considered in the assessment, these included forestry, pastoral agriculture and turbary.

8.2.1.1 Other Wind Farm Projects

On a precautionary basis a 25km zone of influence was used to identify wind farm developments in the wider area. In total, 9 no. applications relating to wind energy were identified within 25km of the Proposed Project site. Each identified wind energy project is considered in further detail in the sections below.

Table 8-2 Wind farm projects within 25km of the Proposed Project

Wind Farm	Planning Ref.	Planning Status	No. of Turbines	Distance (turbine to turbine)	County
Bellair Wind Farm	N/A	Proposed	N/A	2.73km*	Offaly
Leabeg Wind Farm	10130	Existing	2	6.25km	Offaly
Lea Mor Single Turbine	OCC24/60326; ACP 321244	Permitted	1	6.75km	Offaly
Derrinlough Wind Farm	19.306706	Existing	21	10.68km	Offaly
Cloghan Wind Farm	14188, 19404	Existing	9	10.79km	Offaly
Umma More Wind Farm	25M.321595	Proposed	9	16.28km	Westmeath
Kilbeggan Turbine	22537	Permitted	1	17.08km	Westmeath
Cush Wind Farm	19.318816	Permitted	8	17.43km	Offaly
James Nally Single Turbine	114099	Existing	1	18.84km	Westmeath

*Please note, only the indicative site boundary is available in the public domain

8.2.1.1.1 *Leabeg Wind Farm (Existing)*

The potential for the Proposed Project to result in adverse cumulative effects on European Sites when assessed alongside the existing Leabeg Wind Farm was considered. The planning file was reviewed on the Offaly County Council planning register, and the associated Environmental Impact Report and Avian Impact Assessment were consulted. The existing Leabeg Wind Farm comprises two turbines

located within improved agricultural grassland, with adjacent commercial forestry and cutover bog habitats, situated more than 6 km south of the Proposed Project. While it lies within the same hydrological sub-catchment, it is a small-scale operational development.

The 'Environmental Impact Report' is available on the planning file[40] for the existing Leabeg Wind Farm and was consulted. Chapter 10 of this report ('Avian Impact Assessment') states that golden plover and lapwing were recorded during surveys, however, the collision risk model did not include golden plover or lapwing. No significant effects were predicted, and a low probability of collisions was concluded.

The ecological assessments did not identify adverse residual effects on European Sites as a result of the Leabeg Wind Farm, and appropriate mitigation measures were included to address any potential operational and decommissioning impacts. There are no residual adverse effects predicted as a result of the Proposed Project. Given the distance between the projects, the small scale of the existing Leabeg Wind Farm, the lack of identified operational impacts, and the absence of residual adverse effects associated with the Proposed Project, there is no potential for adverse cumulative effects on any European Sites.

8.2.1.1.2 *Derrinlough Wind Farm (Existing)*

The potential for the Proposed Project to result in adverse cumulative effects on European Sites when assessed alongside the existing Derrinlough Wind Farm was considered. The planning file was reviewed on the ACP planning register, and the associated NIS was consulted. The existing Derrinlough Wind Farm comprises 21 turbines located within cutover bog over 10km southwest of the Proposed Project and lies partially within the same hydrological sub-catchment.

A collision risk model was included for golden plover and lapwing, the predicted collisions of which are shown in Table 8-3 below.

The NIS did not identify residual adverse effects, and appropriate mitigation measures were incorporated to address any potential operational and decommissioning impacts. No residual adverse effects are predicted as a result of the Proposed Project. Given the separation distance between the two projects, the absence of identified operational impacts for the existing Derrinlough Wind Farm, and the lack of residual adverse effects associated with the Proposed Project, there is no potential for adverse cumulative effects on any European Sites.

8.2.1.1.3 *Cloghan Wind Farm (Existing)*

The potential for the Proposed Project to result in adverse cumulative effects on European Sites when assessed alongside the existing Cloghan Wind Farm was considered. The planning files for the original planning application and amendment application to alterations to turbine siting and dimensions were reviewed on the Offaly County Council planning register, and the NIS was consulted. The Cloghan Wind Farm comprises 9 turbines located within cutover bog habitat over 10 km southwest of the Proposed Project and lies within the same hydrological sub-catchment.

The EIS assessed collision risk for the operational phase of the existing Cloghan Wind Farm. A collision risk model was not included for golden plover and lapwing; however no significant effects were identified.

The NIS did not identify residual adverse effects, and appropriate mitigation measures were incorporated to address any potential operational and decommissioning impacts. Given the separation distance between the two projects, the absence of identified operational impacts for the existing

[40] https://www.eplanning.ie/OffalyCC/AppFileRefDetails/10130/0

Cloghan Wind Farm, and the lack of residual adverse effects associated with the Proposed Project, there is no potential for adverse cumulative effects on any European Sites.

8.2.1.1.4 Cush Wind Farm (Permitted)

The potential for the Proposed Project to result in adverse cumulative effects on European Sites when assessed alongside the permitted Cush Wind Farm was considered. The planning file was reviewed on the ACP planning register, and the associated NIS was consulted. The permitted Cush Wind Farm comprises 8 turbines located in cutover bog and woodland habitat over 17 km southwest of the Proposed Project within a separate hydrological sub-catchment.

A collision risk model was included for golden plover and lapwing, the predicted collisions of which are shown in Table 8-3 below.

The NIS did not identify residual adverse effects as a result of the permitted Cush Wind Farm, and appropriate mitigation measures were incorporated to address any potential impacts. No residual adverse effects are predicted for the Proposed Project. Given the substantial distance between both sites, the separate hydrological catchment, and the absence of predicted adverse effects for either development, there is no potential for adverse cumulative effects on any European Sites.

8.2.1.1.5 Bellair Wind Farm (Proposed)

The potential for the Proposed Project to result in adverse cumulative effects on European Sites when assessed alongside the proposed Bellair Wind Farm was considered. While the proposed Bellair Wind Farm has not yet been submitted for planning, and no proposed turbine dimensions or locations are available in the public domain. The indicative site location has been published and therefore surrounding aerial imagery was consulted. The proposed Bellair Wind Farm is indicatively proposed in cutover bog 2.5km north of the Proposed Project. It lies within the same hydrological sub-catchment and discharges to the River Shannon upstream of the Proposed Project.

Based on aerial imagery of the indicative site boundary, the proposed Bellair Wind Farm is located within bare cutover bog and has adjacent watercourses discharging to the River Shannon. As no NIS is yet available, detailed potential impacts cannot be characterised; however, any future proposal would be subject to its own Appropriate Assessment and mitigation requirements. Given the early stage of the proposed Bellair Wind Farm, the absence of design detail, the lack of residual adverse effects predicted for the Proposed Project, there is no potential for adverse cumulative effects at this time.

8.2.1.1.6 Umma More Wind Farm (Proposed)

The potential for the Proposed Project to result in adverse cumulative effects on European Sites when assessed alongside the proposed Umma More Wind Farm was considered. The planning file was reviewed on the ACP planning register, and the associated NIS was consulted. The proposed Umma More Wind Farm comprises 9 turbines located in agricultural land and commercial forestry over 16 km north of the Proposed Project within a separate hydrological sub-catchment.

A collision risk model was included for golden plover and lapwing, the predicted collisions of which are shown in Table 8-3 below.

The NIS did not identify residual adverse effects as a result of the proposed Umma More Wind Farm, and appropriate mitigation measures were incorporated to address any potential impacts. No residual adverse effects are predicted as a result of the Proposed Project. Given the substantial distance between the projects, their location in separate catchments, and the absence of identified residual impacts, there is no potential for adverse cumulative effects on any European Sites.

8.2.1.1.7 *Single Turbines*

Lea More Turbine (Permitted)

The potential for the Proposed Project to result in adverse cumulative effects on European Sites when assessed alongside the permitted Lea Mor single turbine was considered. The planning file was reviewed on the Offaly County Council and ACP planning registers, and the associated AASR was consulted. The permitted Lea Mor single turbine is located within arable land over 6.5 km south of the Proposed Project and lies within the same hydrological sub-catchment.

A collision risk model was included for golden plover and lapwing, the predicted collisions of which are shown in Table 8-3 below.

The AASR did not identify any potential for adverse effects on European Sites as a result of the permitted Lea Mor single turbine. No residual adverse effects are predicted as a result of the Proposed Project. Given the separation distance, the very small scale of the permitted Lea Mor single turbine, and the absence of identified adverse impacts, there is no potential for adverse cumulative effects on any European Sites.

Kilbeggan Turbine (Permitted)

The potential for the Proposed Project to result in adverse cumulative effects when assessed alongside the permitted Kilbeggan single turbine was considered. The planning file was reviewed on the Westmeath County Council planning register, and the associated AASR was consulted. The permitted Kilbeggan single turbine is located within agricultural land over 17 km east of the Proposed Project and lies in the same hydrological sub-catchment.

The AASR did not identify any potential for adverse effects on European Sites as a result of the permitted Kilbeggan single turbine. No residual adverse effects are predicted for the Proposed Project. Given the large separation distance, the very small scale of the single turbine, and the absence of identified impacts, there is no potential for adverse cumulative effects on any European Sites.

James Nally Turbine (Existing)

The potential for the Proposed Project to result in adverse cumulative effects when assessed alongside the existing James Nally single turbine was considered. The planning file was reviewed on the Westmeath County Council planning register, and no ecological information was available. The existing James Nally single turbine is located within agricultural land over 18 km north of the Proposed Project and within a separate hydrological catchment.

Given the very small scale of the development that is currently in operation, the considerable distance from the Proposed Project, and the absence of residual adverse effects associated with the Proposed Project, there is no potential for adverse cumulative effects on any European Sites.

Table 8-3 Available predicted collisions per annum from existing, permitted or proposed wind farms within 25km of the Proposed Project site

Wind Farm	Golden Plover[41]	Lapwing
Proposed Project	10.665	2.007

[41] *Predicted collisions for golden plover have been adjusted where relevant to reflect the more accurate avoidance rate of 99.6% emanating from new research (see Appendix 9 for more details). Collision rates adjusted are denoted with '*'.*

Proposed Bellair Wind Farm	N/A	N/A
Existing Leabeg Wind Farm	-	-
Existing Derrinlough Wind Farm	2.84*	3.55
Permitted Cush Wind Farm	1.55*	4.98
Proposed Umma More Wind Farm	10.842	19.562
Permitted Lea More Single Turbine	0.377	7.641
Cumulative Predicted Collisions	**26.274**	**37.65**

8.2.1.1.8 *Cumulative Assessment of SCI Bird Species*

Golden Plover

Golden plover were observed within, or partially within, the Proposed Project site on 62 occasions during the survey period. The majority of these observations related to birds in flight over the site. Birds were recorded landing and/or roosting within the Proposed Project site on 7 occasions over the 4.5 years of survey effort, with flock sizes ranging from two to 80 birds.

The potential for cumulative displacement and barrier effects was considered in combination with other existing, permitted or proposed wind farm developments within 25km of the Proposed Project. No adverse effects due to displacement or barrier effects for golden plover were identified in the available reports for these developments. Golden plover recorded within the Proposed Project site occurred at relatively low frequency and suitable foraging and roosting habitat remains widely available across the surrounding landscape. On this basis, the Proposed Project, when considered in combination with other existing, permitted or proposed wind farm developments in the wider area, is not predicted to result in cumulative displacement or barrier effects that would undermine the conservation objectives for wintering golden plover of Middle Shannon Callows SPA.

The habitats within the Proposed Project site principally comprise regenerating formerly cutover peatland and agricultural grassland. These habitat types are characteristic of the wider landscape and other existing, permitted or proposed wind farm sites within 25km. The existing Leabeg and Cloghan Wind Farms are located within agricultural grassland, the existing Derrinlough Wind Farm and the proposed Bellair Wind Farm are situated within regenerating cutover peatland, the existing Cush Wind Farm comprises commercial forestry with some peatland and grassland, and the proposed Umma More Wind Farm is located predominantly within agricultural grassland. While these habitats may provide foraging opportunities for golden plover, they are not of particularly high quality and are widely available across the county, with abundant good quality habitat present within the River Shannon catchment. Therefore, adverse cumulative effects as a result of ex situ habitat loss that would undermine the conservation objectives for wintering golden plover of Middle Shannon Callows SPA are not anticipated.

The cumulative predicted collision mortality from existing, permitted or proposed wind farms within 25km of the Proposed Project is 26.274 birds per annum, of which approximately 10 birds are associated with the proposed Umma More Wind Farm (Table 8-3 above). As set out in Section 6, birds recorded within the Proposed Project site are considered to form part of the wider county wintering population, which includes the SPA population, rather than representing a discrete SPA population. Only a proportion of the cumulative predicted mortality would therefore be attributable to birds associated with Middle Shannon Callows SPA.

When considered cumulatively, and taking into account that only a proportion of predicted mortality would be associated with the SPA population, the cumulative collision risk is not of a scale that would undermine the conservation objectives for wintering golden plover of Middle Shannon Callows SPA.

Having regard to the predicted displacement effects, the availability of suitable habitat within the wider landscape, and the cumulative predicted collision mortality, it is concluded that the Proposed Project, in combination with other plans and projects, will not adversely affect the integrity of Middle Shannon Callows SPA in respect of its conservation objectives for wintering golden plover.

Lapwing

Lapwing were observed within the Proposed Project site on 19 occasions across the five winter seasons surveyed. The majority of these observations related to birds in flight over the site.

The potential for cumulative displacement and barrier effects was considered in combination with other existing, permitted or proposed wind farm developments within 25km of the Proposed Project. No adverse effects due to displacement or barrier effects for wintering lapwing were identified in the available reports for these other existing, permitted or proposed wind farms. Lapwing recorded within the Proposed Project site occurred at low frequency and suitable foraging and roosting habitat remains widely available across the surrounding landscape. In addition, over the operational lifetime of the Proposed Project, natural succession to scrub mosaic on shallower peat is likely to reduce the suitability of the site for open habitat species such as lapwing. On this basis, the Proposed Project, when considered in combination with other existing, permitted or proposed wind farm developments in the wider area, is not predicted to result in cumulative displacement or barrier effects that would undermine the conservation objectives for wintering lapwing of Middle Shannon Callows SPA.

The habitats within the Proposed Project site broadly comprise regenerating formerly cutover peatland and agricultural grassland. These habitat types are characteristic of the wider landscape and other wind farm sites within 25km. The existing Leabeg and Cloghan Wind Farms are located within agricultural grassland, the existing Derrinlough Wind Farm and the proposed Bellair Wind Farm are situated within regenerating cutover peatland, the existing Cush Wind Farm comprises commercial forestry with some peatland and grassland, and the proposed Umma More Wind Farm is located predominantly within agricultural grassland. While these habitats may provide foraging and roosting opportunities for lapwing, they are not of particularly high quality and are widely available across the county, with abundant good quality habitat present within the River Shannon catchment. In addition, peatland rehabilitation schemes within parts of the wider landscape are likely to enhance habitat quality locally. Therefore, adverse cumulative effects as a result of ex situ habitat loss that would undermine the conservation objectives for wintering lapwing of Middle Shannon Callows SPA are not anticipated.

The cumulative predicted collision mortality from other existing, permitted or proposed wind farms within 25km of the Proposed Project is 37.65 birds per annum, 19 of which are associated with the proposed Umma More Wind Farm. As set out in Section 6, birds recorded within the Proposed Project site are considered to form part of the wider county wintering population, which includes the SPA population, rather than representing a discrete SPA population. Only a proportion of the cumulative predicted mortality would therefore be attributable to birds associated with Middle Shannon Callows SPA.

When considered cumulatively, and taking into account that only a proportion of predicted mortality would be associated with the SPA population, the cumulative collision risk is not of a scale that would undermine the conservation objectives for wintering lapwing of Middle Shannon Callows SPA.

Having regard to the predicted displacement effects, the availability of suitable habitat within the wider landscape, and the cumulative predicted collision mortality, it is concluded that the Proposed Project, in combination with other plans and projects, will not adversely affect the integrity of Middle Shannon Callows SPA in respect of its conservation objectives for wintering lapwing.

8.2.1.2 Other Large-scale Projects

A number of other large-scale projects (excluding wind farms) were identified within 10 km of the Proposed Project. These include the following:

- ACP Ref. 304056 - 38 kV underground electricity connection from the permitted Cloghan Wind Farm to Derrycarney substation (Galetech Energy Developments Cloghan Ltd; PL2/19/555).
- ACP Ref. 304951 - Extraction at Clonfinlough Quarry (Dermot Nally Stone Ltd; ABP-304951-19).
- ACP Ref. 323676 – Substitute Consent under the provisions of Section 177E of the Planning and Development Act 2000 (as amended) for peat extraction and ancillary works (Lemanaghan Bog, Co. Offaly).
- ACP Ref. 306246 – Application for leave to apply for substitute consent under section 177C of the Planning and Development Act 2000 (as amended) to regularise the planning status of Bord na Móna's historic peat extraction (and ancillary works) on the milled peat production bogs (Boora Bog Group, Co. Offaly).
- ACP Ref. 306490 – Application for leave to apply for substitute consent under section 177C of the Planning and Development Act 2000 (as amended) to regularise the planning status of Bord na Móna's historic peat extraction (and ancillary works) on the milled peat production bogs (Blackwater Bog Group, Co. Offaly).
- ACP Ref. 316303 – Development of a Solar Photovoltaic (PV) Energy Development (Lumcloon and surrounding townlands, Co. Offaly).
- ACP Ref. 300919 – The extraction of material over an area of 0.95 hectares and planning permission for the restoration to agricultural use of the same area (Clonaderg, Ballinahown, Co. Offaly).
- ACP Ref. 321244 – Construction of wind energy converter on a tower and all associated development works (Rin, Ferbane, Co. Offaly).
- ACP Ref. 322004 – Construction of two independent power provider (IPP) buildings, associated infrastructure and all associated works (Lumcloon, Cloghan, Co. Offaly).
- ACP Ref. 247027 – Upgrade Birr Water Supply Scheme comprising refurbishment of 2-storey masonry WTP building, demolition of open sludge lagoon, construction of new WTP process building and new tank structures (Seefin, Birr, Co. Offaly).
- (PL Ref: 25/60014) Midlands Trail Network (MTN)

The full list of projects considered is in Appendix 8. Industrial peat extraction activities ceased on Lemanaghan Bog in June 2020, therefore there is no potential for ongoing or future cumulative effects arising from those projects. Given the lack of residual adverse effects predicted as a result of the Proposed Project, and considering the nature, scale and locations of the above listed projects relative to the Proposed Project, no potential for adverse cumulative effects in combination with these projects is predicted for any European Sites.

8.2.1.3 Existing Habitats and Land Uses

The potential for in-combination effects on European Sites was considered with respect to existing land uses in the wider area. Land use in the wider area is dominated by agricultural pasture, as well as commercial forestry, turbary and uncut raised bog habitats. While agricultural and forestry activities can have potential to contribute to ongoing hydrological and water-quality pressures within the catchment, these land uses are established and do not introduce any new or additional pressures that could act cumulatively with the Proposed Project. With the implementation of the Proposed Project's drainage and pollution-prevention measures, there is no pathway for construction-related effects to combine with existing land-use pressures to impact any European Sites.

Agricultural land and bog habitats in the wider landscape may function as ex situ foraging or roosting habitat for golden plover and lapwing associated with the Middle Shannon Callows SPA, but these

existing land uses do not give rise to pressures that could act in combination with the Proposed Project in relation to ex situ habitat loss, disturbance, displacement, barrier effects or collision risk.

On this basis, there is no pathway through which the Proposed Project could act in combination with existing land uses the to give rise to adverse effects on the QIs/SCIs or conservation objectives of any European Site.

8.2.2 Decommissioning and Rehabilitation Plan

Lemanaghan Bog is subject to a Draft Cutaway Decommissioning and Rehabilitation Plan (Draft Rehabilitation Plan) (Appendix 3) prepared by BnM in accordance with the requirements of the EPA Integrated Pollution Control (IPC) Licence (P0500-01).

The Draft Rehabilitation Plan included provides a description of Lemanaghan Bog and its ecology and has been taken account in describing the baseline environment in this NIS. The objectives of the Draft Rehabilitation Plan are to achieve environmental stabilisation of cutaway peatlands, including the management of drainage, reduction of suspended solids and protection of receiving water quality. Their implementation is expected to result in gradual changes in ecological conditions over time through rewetting and natural revegetation. The decommissioning of the Proposed Wind Farm will be completed in compliance with the requirements of the Rehabilitation Plan for Lemanaghan Bog as appropriate.

It also provides a framework and outline of the works that will be undertaken to achieve the aims of successful rehabilitation (the criteria for which are defined in the plan) and a timescale for when the various elements of the Draft Rehabilitation Plan will be implemented. Irrespective any further development on the site, the measures outlined in the Draft Rehabilitation Plan will be implemented by BnM in agreement with the EPA, per BnM's IPC Licence Obligations.

The potential for cumulative effects between the Proposed Project and the implementation of the Draft Rehabilitation Plan has been assessed for all relevant European Sites identified in this NIS. Potential interaction pathways considered include habitat condition, hydrology and surface water quality, and indirect effects on downstream receptors.

The Proposed Project has been designed to be compatible with the planned rehabilitation of Lemanaghan Bog. There is no overlap in activities or impact pathways that would give rise to adverse cumulative effects on the QIs or SCIs of any European Sites.

In relation to aquatic habitats and species, both the Proposed Project and the Draft Rehabilitation Plan include measures to protect surface water quality. These measures are complementary and are not predicted to interact in a manner that would result in adverse cumulative effects on receiving watercourses or downstream European Sites.

Overall, when assessed in combination, the Proposed Project and the Draft Rehabilitation Plan are not predicted to give rise to adverse cumulative effects on any European Sites. The rehabilitation of cutaway peatlands is expected to contribute positively to the wider ecological context over the longer term, independent of the Proposed Project.

8.2.3 Peatland Climate Action Scheme

In 2023 the Peatland Climate Action Scheme (PCAS) selected Ballaghurt and Glebe Bogs located approximately 4.4km west of the Proposed Wind Farm at its closest point (i.e., T01). In 2024, PCAS has selected Curraghalassa Bog and Derrynagun bog which are adjacent to the Proposed Project site. These two areas are on the southern side of the R436 road which connects Ferbane, Co. Offaly to Ballycumber, Co. Offaly. The two sections include an area of drained high bog, Curraghalassa Bog,

located 65m south of the site and a larger section of cutaway bog, Derrynagun Bog, located 105m south of the site.

This form of enhanced peatland rehabilitation, which is above and beyond what is required under IPC license, has also been successfully implemented at the recently constructed Cloncreen Wind Farm. To date, approximately 20,955ha of peatland has been rehabilitated under the PCAS[42]. PCAS is supported by Government through the Climate Action Fund and Ireland's National Recovery and Resilience Plan administered by the Department of Environment, Climate and Communications (DECC). Please see https://www.bnmpcas.ie/ for details. The NPWS acts as the Scheme regulator and there is ongoing engagement with the EPA. This scheme is separate to the IPC licence requirements and does not form part of the Proposed Project application.

PCAS involves peatland rehabilitation measures including rewetting and revegetation which are intended to restore ecological function to degraded peatlands. These activities do not introduce hydrological, disturbance or habitat loss pathways that would interact with the Proposed Project in a manner that could result in significant negative cumulative effects on any European Sites.

8.3 Conclusion of Assessment of Cumulative Effects

Following the assessment provided in the preceding sections, it is concluded that the Proposed Project will not result in any residual adverse effects on the integrity of any European Sites. All pathways by which adverse effects could occur have been robustly blocked through the implementation of mitigation and best practice in the design of the development.

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

Having considered other projects in the area as listed above, no potential for the Proposed Project to contribute to any adverse cumulative effects on any European Sites was identified when considered in combination with other plans and projects.

[42] https://www.bnmpcas.ie/news-and-updates/

9. CONCLUDING STATEMENT

This NIS has provided an assessment of all potential direct or indirect adverse effects on European Sites, taking into account all relevant guidance including the European Commission's 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 (EC, 2021).

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

Following an examination, evaluation and analysis, in light of best scientific knowledge and the conservation objectives of the site, and, on the basis of objective information, having taken into account the relevant mitigation measures, it can be concluded that the Proposed Project will not have an adverse impact on any European Sites, either alone or in combination with other plans or projects.

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