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Bord na Móna

Oweninny Wind Farm Phase 3

Revised Natura Impact Statement

March 2024

PROJECT NAME: Oweninny Wind Farm Phase 3

REPORT NAME: Revised Natura Impact Statement

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A02	RFI	JS	07/03/2024	AS	14/03/2024	BG	15/03/2024

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1.0 INTRODUCTION

This revised Natura Impact Statement has been updated in response to a request for further information (RFI) in relation to a planning application for the Proposed Oweninny Wind Farm, Phase 3 located in North County Mayo. (Planning Reference: APB-313178-23). All revised/additional text has been highlighted in red for clarity.

This report forms a Natura Impact Statement (NIS) for the Proposed Oweninny Wind Farm, Phase 3, consisting of the construction and installation of 18 no. wind turbines, and ancillary works (including the construction of a substation, grid connection, meteorological mast and internal site roads and the decommissioning of an existing wind farm) (herein referred to as the Proposed Development) located in North Co. Mayo (further details on the Proposed Development can be seen in Section 0). The Proposed Development is situated approximately 12km west of Crossmolina and 15km east of Bangor Erris, and just north of the N59 National Primary Road. The overall area of Oweninny Bog is approximately 5,090 hectares, while the site area of the Proposed Development is approximately 2,345 hectares.

An Appropriate Assessment (AA) screening was produced to consider potential significant effects which may arise during the construction, operational and decommissioning phases of the Proposed Development. The AA Screening concluded, following a robust evaluation and beyond reasonable scientific doubt that it was not considered possible to rule out the potential for likely significant effects on the following protected European sites: Lough Dahybaun SAC, River Moy SAC, Owenduff/Nephin Complex SAC, Owenduff/Nephin Complex SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary SPA and Blacksod Bay/Broad Haven SPA.

Thus, this NIS was prepared in accordance with the provisions of Article 6(3) of the Habitats Directive and Part XAB of the Planning and Development Act 2000, as amended, providing information to enable the competent authority to perform its statutory function to undertake an AA in respect of the Proposed Development.

The purpose of this NIS is to inform the Appropriate Assessment (AA) process, which is carried out by the competent authority. Appropriate Assessment is an assessment of whether a plan or project, alone and/or in-combination with other plans or projects, may have significant effects on a European site, collectively known as the Natura 2000 network, in view of the site's conservation objectives.

The project design has sought to, in as far as possible, avoid impacts on European sites. This report considers the final design. It determines if direct, indirect or in-combination effects could arise, or if there is uncertainty regarding potential effects.

This report provides information to assist the competent authority in undertaking an Appropriate Assessment of the Proposed Development and was informed by a desktop and field study undertaken by the qualified and competent ecologist John Sherry (B.Sc.) at TOBIN Consulting Engineers (TOBIN) and was senior reviewed by Senior Ecologist Áine Sands (B.Sc.) (TOBIN).

John Sherry

John (B.Sc.) is a qualified Project Ecologist with TOBIN and has over four years post-graduate experience in ecology and environmental consultancy. John has mainly been involved in the surveying and reporting of large-scale renewable infrastructure projects where he has carried out Appropriate Assessment Screening reports, Natura Impact Statements, Environmental Impact Assessment Reports and Ecological Management Plans. John has a proven knowledge of field skills and has been involved with the planning and implantation of a variety of surveys including habitat surveys, non-volant mammal surveys and bat assessments. However, he has mainly been focused on ornithological surveys involving winter and breeding bird surveys associated largely with proposed wind farms or infrastructure developments.

Áine Sands

Áine (B.Sc.) is a qualified Senior Ecologist with TOBIN and has nine years post-graduate experience in ecology and environmental consultancy. Áine has predominantly been involved in large public and private renewable infrastructure projects where she has carried out numerous Screenings for Appropriate Assessments, Natura Impact Statements and Ecological Impact Assessments for the proposed developments. Áine has a strong understanding of National and European legislation associated with biodiversity and is cognisant of relevant rulings by the Court of Justice of the European Union (CJEU) associated with Appropriate Assessment. Áine also has experience with undertaking ecology surveys for protected habitats and species.

2.0 THE APPROPRIATE ASSESSMENT PROCESS

The AA process is an assessment of the potential for likely significant effects or negative effects of a plan or project, alone and/or in-combination with other plans or projects, on the conservation objectives of a European site(s). The Natura 2000 network is made up of European sites including Special Protection Areas (SPAs), established under the EU Birds Directive (2009/147/EC) (more generally referred to as the 'Birds Directive') and Special Areas of Conservation (SACs), established under the EU Habitats Directive (92/43/EEC) (more generally referred to as the 'Habitats Directive'). The Natura 2000 network helps provide for the protection and long-term survival of Europe's most valuable and threatened species and habitats.

2.1 Legislative Context

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as the 'Habitats Directive', provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000 network.

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect European sites (Annex 1.1). Article 6(3) establishes the requirement for AA:

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

Article 6(4) states:

> *'If, in spite of a negative assessment of the implications for the [Natura 2000] site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, Member States shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.'*

The provision for an AA is transposed into Irish law by the Planning and Development Act 2010 which inserted Part XAB into the Planning and Development Act 2000. Section 177U (4) of the said Acts provides for screening for Appropriate Assessment as follows:

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

Section 177U (5) provides as follows:

> *'The competent authority shall determine that an appropriate assessment of a […] Proposed Development, […], is not required if it can be excluded, on the basis of objective information, that the […] Proposed Development, individually or in combination with other plans or projects, will have a significant effect on a European site.'*

An AA should be based on best scientific knowledge and the competent authority should ensure that expertise such as ecological, geological, and hydrological are utilised, where relevant.

The Court of Justice of the European Union (CJEU) has made a number of rulings in relation to AA, regarding when it is required, its purpose, and the standards it should meet. Consideration has been given to the evolution in interpretation and application of directives and national legislation arising from jurisprudence of the European and Irish courts, in respect of Article 6 of the Habitats Directive.

2.2 Guidance

This report has been carried out using the following guidance (and relevant case law):

- Communication from the Commission on the Precautionary Principle. Office for Official Publications of the European Communities, Luxembourg (European Commission [EC] 2000)[1].
- Nature and biodiversity cases: Ruling of the European Court of Justice. Office for Official Publications of the European Communities, Luxembourg (EC, 2014)[2].
- Managing Natura 2000 Sites – The provisions of Article 6 of the Habitats Directive 92/43/EEC. European Commission (EC, 2018)[3].

[1] Communication from the Commission on the Precautionary Principle: https://op.europa.eu/en/publication-detail/-/publication/21676661-a79f-4153-b984-aeb28f07c80a/language-en

[2] Nature and Biodiversity Cases: https://ec.europa.eu/environment/nature/info/pubs/docs/others/ECJ_rulings%20Art_%206%20-%20Final%20Sept%202014-2.pdf

[3] European Commission (2018) https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/Provisions_Art_6_nov_2018_en.pdf

- 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)[4]
- OPR Practice Note PN01 Appropriate Assessment Screening for Development Management (OPR, 2021)[5]
- Interpretation Manual of European Union Habitats. Version EUR 28. European Commission (EC, 2013)[6].
- Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities, Department of the Environment, Heritage and Local Government (DoEHLG, 2010)[7].
- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. Office for Official Publications of the European Communities, Luxembourg (EC, 2007)[8].
- European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011).

Definitions of conservation status, integrity and significance used in this assessment are defined in accordance with '*Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC*' (EC, 2018):

- <u>Favourable conservation status</u> (FCS) can only be defined and achieved at the level of the natural range of a species or a habitat type. A broad conservation objective aiming at achieving FCS can therefore only be considered at an appropriate level, such as for example the national, biogeographical or European level. The conservation measures have to correspond to the ecological requirements of the natural habitat types in Annex I and of the species in Annex II present on the site. The ecological requirements of those natural habitat types and species involve all the ecological needs which are deemed necessary to ensure the conservation of the habitat types and species. They can only be defined on a case-by-case basis and using scientific knowledge.
- The <u>integrity of a European site</u> is defined as the coherent sum of the site's ecological structure, function, and ecological processes, across its whole area, which enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is designated.
- <u>Significant effect</u> should be determined in relation to the specific features and environmental conditions of the protected site concerned by the plan or project, taking particular account of the site's conservation objectives and ecological characteristics.

2.3 Stages Involved in the Appropriate Assessment Process

There are potentially four stages in the AA process; the result of each stage determines the requirement for assessment under the next.

Stage 1: Screening / Test of Significance

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[4] European Commission (2021): https://ec.europa.eu/environment/nature/natura2000/management/pdf/methodological-guidance_2021-10/EN.pdf
[5] Office of the Planning Regulator (2021): https://www.opr.ie/wp-content/uploads/2021/03/9729-Office-of-the-Planning-Regulator-Appropriate-Assessment-Screening-booklet-15.pdf
[6] Interpretation Manual: https://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf
[7] Appropriate Assessment of Plans and Projects: https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2009_AA_Guidance.pdf
[8] Guidance Document on Article 6 (4): https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/guidance_art6_4_en.pdf

This process identifies the likely significant effects upon a European site from a proposed project or plan. Its purpose is to determine, on the basis of a preliminary assessment and objective criteria, whether a plan or project which is not directly connected with or necessary to the management of the site as a European site, individually or in-combination with other plans or projects is likely to have a significant effect upon the European site, in view of its conservation objectives. A project may be 'screened-in' if there is a possibility or uncertainty of possible effects upon the European site, requiring a Stage Two AA. If there is no evidence to suggest significant effects due to the proposed plan or development the project is 'screened-out' from further assessment.

Stage 2: Appropriate Assessment

Consideration is given if potential impact(s) of a project or plan could cause likely significantly effects to the integrity of surrounding European sites, either alone or in-combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where likely significant effects have been identified, an assessment of the potential mitigation to avoid/reduce such impacts is required. A NIS is often produced at this stage to inform the AA which is undertaken by the competent authority. This stage is required where uncertainty of effect arises, or a potential effect has been defined which requires further procedures/mitigation to remove uncertainty of a defined impact.

Stage 3: Assessment of Alternatives

This stage of the potential process arises where adverse effects on the integrity of a European site cannot be excluded and examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the European site. However, in circumstances where there will not be any adverse effects on any European site, the developer places no reliance upon this third stage of the process in the context of this application for planning permission for the Proposed Development.

Stage 4: Assessment Where Adverse Effects Remain

This is the derogation process of Article 6(4), which examines whether there are imperative reasons of overriding public interest [IROPI] for allowing a project to proceed where adverse effects on the integrity of a European site have been predicted. Compensatory measures must be proposed and assessed as part of this stage and the EU Commission must be informed of the compensatory measures. Again, the developer places no reliance upon this stage of the process in the context of the application for planning permission for the Proposed Development.

2.4 Desktop Study and Information Sources

An ecological desktop study was undertaken to inform this NIS in September 2022. The desktop study comprised a review of the following key datasets and information sources:

- Identification of European sites within the Zone of Influence (ZoI) of the Proposed Development area through the identification of potential pathways/links from the Proposed Development area and European sites and/or supporting habitats;
- Review of the National Parks and Wildlife Service (NPWS) site synopsis, Natura 2000 data forms and Conservation Objectives for European sites identified through potential pathways from the Proposed Development (https://www.npws.ie/protected-sites).
- NPWS datasets on Annex I habitats;

- Review of available literature and web data. This included a detailed review of the NPWS database of areas designated (and proposed) for nature conservation[9] and National Biodiversity Data Centre (NBDC)[10] websites and database, including mapping and available reports for relevant sites and, in particular, Qualifying Interests and Special Conservation Interests described and their Conservation Objectives;
- Review of Inland Fisheries Ireland (IFI) research data. This included reviewing research studies carried out for the Habitats Directive and Red Data Book Fish species within the receiving environment[11];
- Information and data on water catchments from the River Basin Management Plan 2018-2021 [12]
- GSI Online mapping[13];
- Environmental Protection Agency (EPA) Appropriate Assessment tool[14];
- Information and data on water catchments from the River Basin Management Plan 2018-2021 (www.catchments.ie); and
- Heritage map viewer[15].

In addition, aerial photography (Google Maps, Bing Maps) and mapping (Ordnance Survey of Ireland, Geological Survey of Ireland) were used to identify non-designated habitats such as rivers, woodlands, and hedgerows of local ecological importance and invasive species.

2.5 Field Survey Methodology

Field surveys were undertaken by skilled and appropriately experienced ecologists between the periods April 2019 to September 2022 (refer to Table 2-1 below). The data collected is robust and allowed TOBIN to draw accurate, definitive and coherent conclusions on the possible impacts of the Proposed Development on ecological receptors associated with nearby protected European sites (SACs and SPAs).

During these surveys, areas of scientific and/or conservation interest in the vicinity of the Proposed Development were investigated. Further details of the survey methodologies are presented in Appendix 1 – Appropriate Assessment Screening Report.

Table 2-1: Survey Works and Periods Conducted

Survey		Survey Dates	Personnel
Habitat Surveys	Habitat walkover and Mapping	10 days in August 2020	TOBIN
Non-volant Mammal Surveys	Otter Surveys	10 days in August 2020	TOBIN

[9] National Parks and Wildlife Service: https://www.npws.ie/maps-and-data
[10] National Biodiversity Data Centre (NBDC): https://maps.biodiversityireland.ie/Map
[11] https://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html
[12] https://www.catchments.ie/guide-water-framework-directive/
[13] http://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228
[14] EPA Appropriate Assessment tool: https://gis.epa.ie/EPAMaps/AAGeoTool
[15] Data from the Heritage Map Viewer accessed through the heritage map viewer: https://heritagemaps.ie/WebApps/HeritageMaps/index.html

Survey		Survey Dates	Personnel
Aquatic Surveys	Aquatic Ecological Surveys (including kick sampling)	August 2020	TOBIN
	Electro-fishing	September 2021	Stillwaters Consultancy
Breeding Bird Surveys	Vantage Point Surveys	April to September 2019	Biosphere Consultants
		April to July 2020; April to September 2021 and 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Breeding Bird Transects	April to July 2020; April to September 2021and 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Hinterland Gull Surveys	April to July 2020, 2021 and 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Lowland Wader Surveys	April to July 2020, 2021 and 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Raptor and Merlin Surveys	April to July 2020; April to September 2021 and 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
Wintering Bird Surveys	Vantage Point Surveys	October 2019 to March 2020;	Biosphere Consultants
	Wintering Bird Transects	October 2020 to March 2021; October 2021 to March 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Hinterland Waterbird Surveys	October 2020 to March 2021; October 2021 to March 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Hen Harrier Roost Surveys	October 2020 to March 2021; October 2021 to March 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)

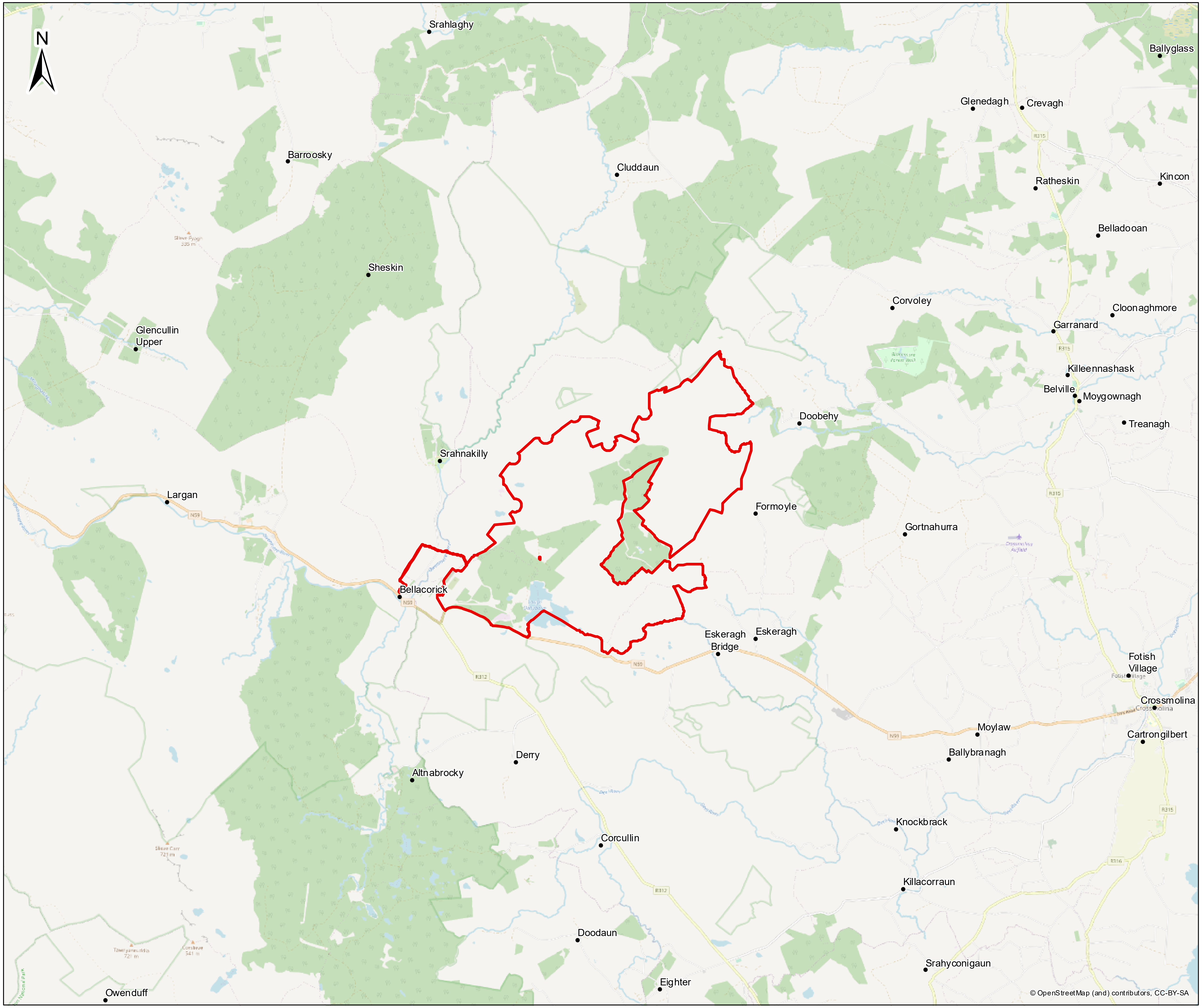
3.0 DESCRIPTION OF PROPOSED DEVELOPMENT

3.1 Site Location

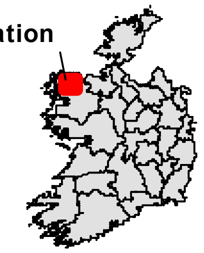
The Proposed Development is located at Oweninny Bog in North Co. Mayo, a relatively sparsely populated area. The location of the Proposed Development is shown in Figure 3-1 below. The closest settlement to the site is Bellacorick village which is located approximately 2km from the southwestern extents of the Proposed Development. To the east of the site a local road (L5292) runs northwards from the N59 to the townlands of Shanvolahan and Formoyle.

The site is located directly adjacent to the Oweninny River (Owenmore [Mayo] (EPA Code: 33O04), within the Blacksod-Broad Haven WFD catchment (33), flowing in a southernly direction, before discharging into the main tributary of the Owenmore River, at Bellacorick.

The Proposed Development is located to the east of two consented wind farm developments: the Oweninny Wind Farm Phase 1, located immediately west/northwest (commissioned in 2019), and Oweninny Wind Farm Phase 2 to the west which is currently under construction. In addition, since 1992, Ireland's first commercial wind farm, a 21-turbine development known as Bellacorick Wind Farm, which is owned and operated by Renewable Energy Ireland Limited, is also operating on the site.



Site Location



Legend

Planning Application Boundary

0 1 2 3 4
Kilometers

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D01	28/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client:

Bord na Móna

Project:

Oweninny Wind Farm
Phase 3

Title:

Figure 3-1:
Site Location Map

Scale @ A3: 1:80,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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10889-006-S.BO-OSM-TOB-D01

Draft: D01

3.2 Overview of the Proposed Development

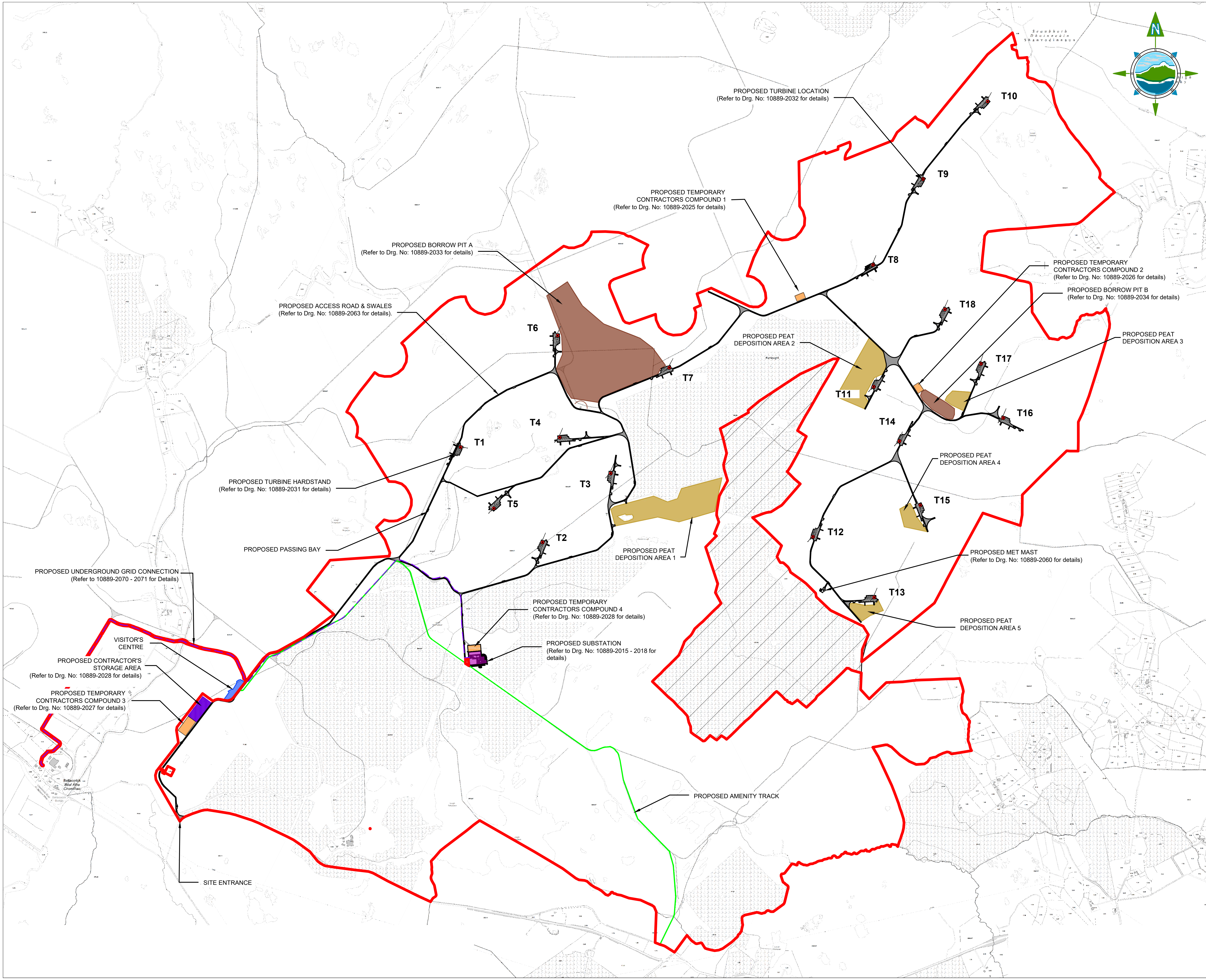
The Proposed Development comprises the construction of 18 no. wind turbines and ancillary works. The turbines will have a blade tip height of 200m above the top of the foundation level and will be accessible from internal access routes within the Bord na Móna site. More details of the Proposed Development can be found in Appendix 1 – Appropriate Assessment Screening Report, accompanying this report as part of the Planning Application.

The Proposed Development will comprise:

- 18 no. wind turbines (including tower sections, nacelle, hub, and rotor blades) and all associated foundations and hard-standing areas in respect of each turbine;
- Decommissioning and removal of 21 no. existing Bellacorick Wind Farm wind turbines (including tower sections, nacelle, hub, and rotor blades);
- New internal site access roads (permanent and temporary), passing bays, car parking and associated drainage;
- An amenity route through the site from the N59 at the main site entrance to the existing Visitors Centre, and access from a local road off the N59 near Dooleeg;
- 2 no. borrow pits;
- 5 no. peat deposition areas;
- 1 No. permanent Meteorological Mast 120m high, and the decommissioning and removal of an existing 100m Meteorological Mast on site;
- 4 no. temporary construction compounds, including material storage, site welfare facilities, and site offices;
- 1 no. 110kV electrical substation compound, including an Air Insulated Substation (AIS), control buildings and electrical plant and equipment;
- All associated underground electrical and communications cabling connecting the wind turbines to the proposed substation;
- All works associated with the connection of the proposed wind farm to the national electricity grid, including a 110kV underground electrical cable from the proposed on-site electrical sub-station to the existing sub-station at Bellacorick;
- Improvements to existing access junction on the N59 to facilitate the delivery of abnormal loads and construction access;
- Improvements and temporary modifications to public road infrastructure to facilitate the delivery of abnormal loads;
- All related site works and ancillary development including (but not limited to):
- Earthworks;
- Main and assist cranes;
- Peat management works;
- Site security;
- Groundwater management, as required;
- Overburden (soils/peat) storage and management; and
- Site reinstatement, landscaping and erosion control, to be aligned with the existing site rehabilitation plan.

A 10-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm is proposed.

The exact rating and design of the proposed turbine, subject to completion of the statutory processes, will be subject to a competitive tender and will be detailed by the turbine manufacturer on award of the contract. However, the proposed turbines will be a three bladed, horizontal axis type. The proposed site layout and proposed works are shown in Figure 3-2.



GENERAL LEGEND

APPLICATION BOUNDARY		PROPOSED ACCESS TRACK	
PROPOSED TURBINE HARDSTAND		PROPOSED TURBINE LOCATION	
PROPOSED AMENITY TRACK		PROPOSED GRID CONNECTION ROUTE	
PROPOSED BORROW PIT		CONTRACTOR'S COMPOUND	
PROPOSED SUBSTATION		VISITORS CENTRE	
PROPOSED PEAT DEPOSITION AREA		PROPOSED STORAGE AREA	
THIRD PARTY COROVODERRY LANDS		PROPOSED MET MAST	

NOTES:

1. DRAWINGS FOR PLANNING PURPOSES ONLY.
2. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
3. GRID REFERENCES TO IRISH NATIONAL GRID.
4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Co. Mayo

OSI 1:5,000 Sheet No's: 1175, 1176, 1177, 1241, 1242, 1243, 1310, 1311, 1312 & 1380.

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250m 0 250m 500m 750m

Rev	Date	Description	By	Chkd.
A	22.03.23	PLANNING ISSUE	EB	MN

Client: Bord na Móna

Project: OWENINNY WIND FARM PHASE 3

Title: Figure 3-2 SITE MASTER PLAN

Scale @ A3: 1:25,000

Prepared by: E. Beggs | Checked: M. Nolan | Date: February 23

Project Director: B. Gallagher

Drawing Status: Planning

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Drawing No.: 10889-2003 Revision: A

4.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

The detailed description of the existing environment was determined using desktop and field studies.

A desktop study was conducted, which examined available biodiversity records from the National Biodiversity Data Centre, to identify any potential protected and Annexed Flora and Fauna species, and the aquatic environment including surface and ground water systems which were examined using sources from the Water Framework Directive (WFD) and the Environmental Protection Agency (EPA).

Targeted field surveys were conducted to draw accurate, definitive, and coherent conclusions on the possible impacts of the Proposed Development on ecological receptors associated with nearby protected European sites (SACs and SPAs). Surveys focused on the habitats, fauna, flora and aquatic environments within the Proposed Development site.

The full details of the existing environment are contained in Appendix 1 – Appropriate Assessment Screening Report.

5.0 STAGE 1 - SCREENING FOR APPROPRIATE ASSESSMENT

Details on the methodology used, description of the proposed works, the existing environment and potential impacts as a result of the Proposed Development are contained within Appendix 1 – Appropriate Assessment

5.1 Screening Assessment Conclusion

The initial step in the assessment of potential significant effects on European sites was the determination of the number and nature of the sites within the ZoI of the Proposed Development (see Appendix 1 – Appropriate Assessment Screening Report). Initially, sites within a 15km buffer from the Proposed Development site boundary were considered to be within the potential ZoI (refer to Figure 5-1). Sites outside of the 15km buffer zone were also taken into account and assessed where potential pathways for effects were identified. A standard source-pathway-receptor conceptual model was then used to screen the initial list to determine a preliminary list of "relevant" European sites (i.e. those which could be potentially affected). This conceptual model is a standard tool in environmental assessment. In order for an effect to occur, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism means there is no likelihood for the effect to occur. In the context of the Proposed Development, the model comprises:

- Source (s) – potential impacts from the Proposed Development, e.g. the runoff of sediment;
- Pathway (s) – hydrological, physical or ecological connectivity to a European site; and
- Receptor (s) – qualifying interests and/or special conservation interests of the European sites.

The AA screening process considered potential significant effects which may arise during the construction, operational and decommissioning phases of the Proposed Development. The conclusion of the AA Screening was as follows:

"Following an evaluation of the relevant information, including details of the works carried out within the project site boundary and its relationship with European sites a total of thirteen Natura 2000 sites (nine SACs and four SPAs) were identified within the ZoI for the Proposed Development.

*It has been determined during the screening process, following the examination, analysis and evaluation of the relevant information, and in applying the precautionary principle that there is **no potential for significant impacts** on the following European sites:*

- *Bellacorick Iron Flush SAC*
- *Bellacorick Bog Complex SAC*
- *Carrowmore Lake Complex SAC*
- *Glenamoy Bog Complex SAC*
- *Slieve Fyagh Bog SAC*
- *Newport River SAC*
- *Carrowmore Lake SPA*
- *Illanmaster SPA*
- *Doogort Machair SPA*
- *Stags of Broad Haven SPA*

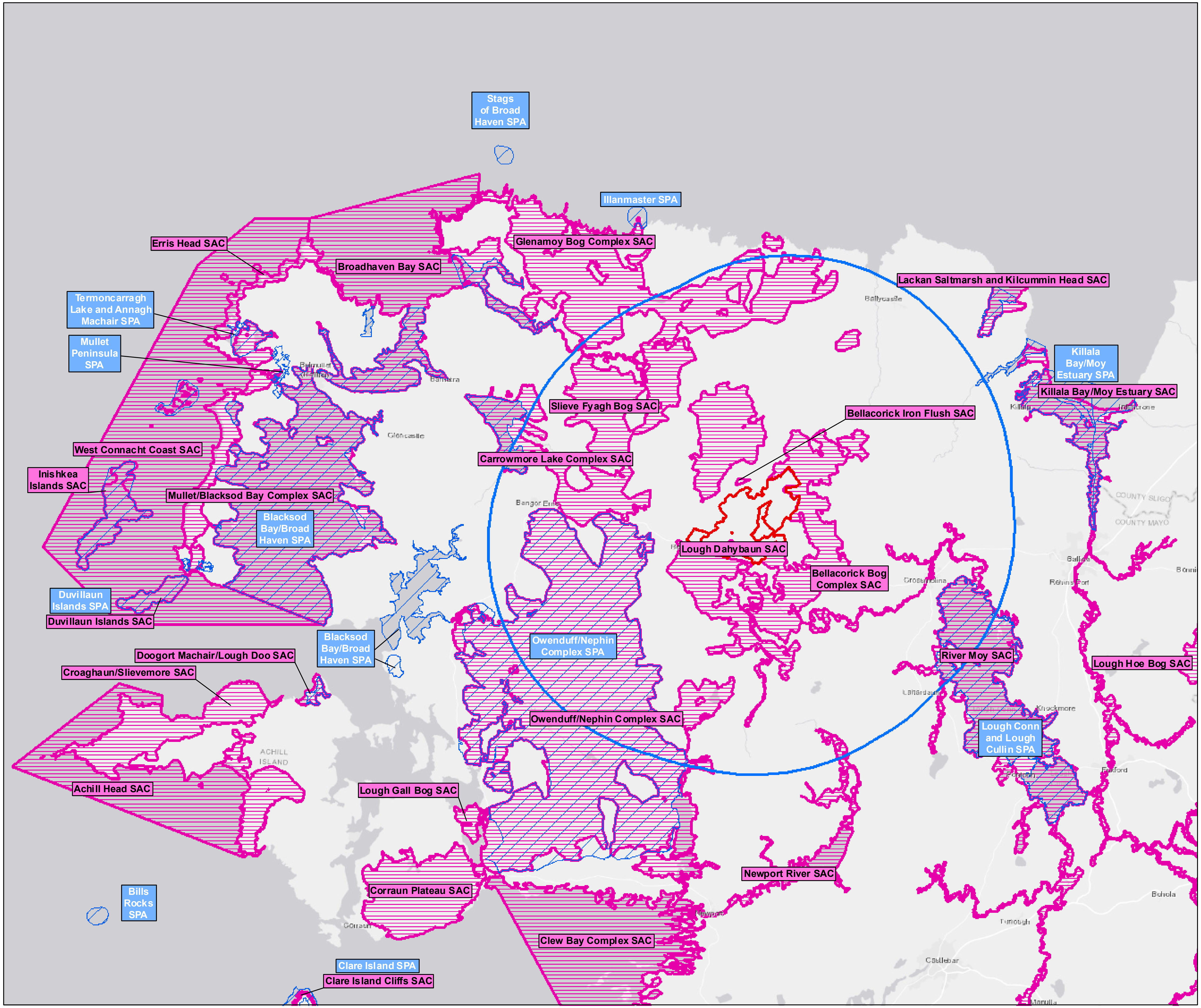
- *Mullet Peninsula SPA*
- *Termoncarragh Lake and Annagh Machair SPA*
- *Duvillaun Islands SPA*
- *Inishglora and Inishkeeragh SPA*
- *Inishkea Islands SPA*
- *Clare Island SPA*
- *Lough Carra SPA*

However, upon examination of the relevant information including in particular the nature of the Proposed Development, the proximity of European sites, the application of the precautionary principle and in the absence of mitigation measures, that ***there is potential for significant impacts*** *on seven European sites:*

- *Lough Dahybaun SAC,*
- *Owenduff/Nephin Complex SAC*
- *Owenduff/Nephin Complex SPA,*
- *River Moy SAC,*
- *Lough Conn and Lough Cullin SPA,*
- *Killala Bay/Moy Estuary SPA, and*
- *Blacksod Bay/Broad Haven SPA.*

It is therefore recommended that a Stage 2 assessment is required for these seven Natura 2000 sites."

Thus, this NIS was prepared in accordance with the provisions of Article 6(3) of the Habitats Directive and Part XAB of the Planning and Development Act 2000, as amended, providing information to enable the competent authority to perform its statutory function to undertake an AA in respect of the Proposed Development.



Legend

- Planning Application Boundary
- 15km Buffer from Planning Application Boundary
- Special Protection Area
- Special Area of Conservation

0 2.5 5 7.5 10
Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D02	28/03/2023	Draft issue	S.P	J.D
D01	01/02/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client:

Bord na Móna

Project:

Oweninny Wind Farm Phase 3

Title:

Figure 5-1:
Designated Sites

Scale @ A3: 1:250,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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Draft: D02

10889-009-D.S-BUF15-TOB-D02

6.0 STAGE 2 - NATURA IMPACT ASSEMSSMENT

In Stage 2 of the Appropriate Assessment process consideration is given to potential impacts of the Proposed Development that could cause likely significantly effects to the integrity of identified European sites within the ZoI, either alone or in-combination with other projects or plans, with respect to the European sites structure and function and its conservation objectives. Where likely significant effects have been identified, an assessment of the potential mitigation to avoid/reduce such impacts is required.

6.1 Description of European Sites within the ZoI and Assessment of Adverse Effects on Site Integrity

6.1.1 Lough Dahybaun SAC

Lough Dahybaun is located just north of the N59 and approximately 14km west of Crossmolina in Co. Mayo. It is situated within an extensive area of blanket bog and is one of the largest of the many small lakes which dot the bog surface[16]. The main conservation interest of the site is the occurrence of the plant Slender Naiad (*Najas flexilis*). This rare aquatic species is listed on Annex II of the E.U. Habitats Directive.

Lough Dahybaun SAC is situated partially within the Proposed Development's southern boundary (refer to Figure 5-1). A description of the extent and condition of the qualifying interest within the SAC is outlined in Table 6-1.

Table 6-1:Qualifying Interests and Extent of Habitats or Distribution of Species within the Site for Lough Dahybaun SAC

Qualifying Interests	Extent and distribution of Qualifying Interest [16]
Slender Naiad (*Najas flexilis*) [1833]	Slender naiad is a small, annual, submerged macrophyte, typically found on flat to gently sloping areas of the lake bed with soft substrata of mud, silt, or fine sand[17]. The species was first recorded in Lough Dahybaun in 1977 and recorded again in 1978 and 1995[16]. In August 2004, the south-eastern corner of the site was surveyed, and a large population of the species was found. It was also found that slender naiad in the site grew on an unconsolidated peat substratum that probably originated from the industrially exploited peatland in its catchment. While the species was growing on allochthonous peat, these deposits are likely to limit the species' abundance[18]. Lough Dahybaun was last surveyed in 2004 and the current conservation condition of the species is not known[18].

[16] NPWS (2014) Lough Dahybaun SAC: Site Synopsis Site Code 002177. Rev_13.Doc
[17] O Connor, Á. (2013) Article 17 assessment form and audit trail for Najas flexilis, the Slender Naiad (species code 1833). Backing Document. April 2013. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.
[18] NPWS (2021) Conservation Objectives: Lough Dahybaun SAC 002177. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

6.1.1.1 Potential for Direct Effects

Although the SAC is located partially within the Proposed Development site boundary, there are no construction worked proposed within the SAC site boundary. The closest construction work areas will be the proposed amenity track along an existing railway bed (at its closet point will be c.400m) and the proposed substation site which is setback c. 550m from the boundary of the SAC. There is therefore no potential for direct effects (i.e. habitat loss) on Lough Dahybaun SAC during the construction, operation or decommissioning phases.

6.1.1.2 Potential for Indirect Effects

Habitat Degradation (Surface Water Quality)

The SAC is hydrologically connected to the Proposed Development site via the Muing River. Given the hydrological connectivity, the nature of the Proposed Development and in the absence of mitigation and/ or best practice construction standards, there is potential for the Proposed Development to result in a degradation in water quality which would indirectly impact the qualifying interest, which requires good water quality to maintain/ restore a favourable conservation status.

Habitat Degradation (Dust Deposition)

The proposed construction works will result in the generation of dust. The generation of dust is likely to range between 25-50m from the work areas. The closest works area (the proposed substation site) will be located c. 550m from the boundary of the SAC and thus there is no potential for dust impacts on the SAC.

Habitat Degradation (Invasive Species)

The construction works may also result in the introduction and translocation of invasive plant species. O'Connor (2013)[17] notes the possibility of *'some invasive species are having direct impacts'* on the species. The establishment of the invasive species within the SAC could crowd out and negatively impact the Slender Naiad.

6.1.1.3 Evaluation of Potential Adverse Effects on Lough Dahybaun SAC

It has been determined, in the absence of appropriate mitigation measures, that the Proposed Development has the potential to result in indirect impacts on the qualifying interest via a degradation of water quality and via the introduction of invasive plant species. An assessment of the potential adverse effects on the integrity of Lough Dahybaun SAC is presented hereunder.

6.1.1.4 Conservation Objectives of Lough Dahybaun SAC

Site-specific conservation objectives were set by NPWS for the qualifying interests of Lough Dahybaun SAC[18]. The conservation objectives provide detailed measurable targets relative to the ecology of individual species or habitats for which a site is designated, which must be achieved or maintained to meet favourable conservation status. The conservation objectives for a site act as a reference point from which an assessment may be made of whether a project could adversely affect the integrity of a site.

An assessment of the potential impacts identified as having the potential to have adverse effects on the qualifying interests in view of the integrity of the site, with reference to their attributes and targets, is presented in Table 6-2.

Table 6-2: Evaluation of Potential Adverse Effects on the Conservation Objectives of the Lough Dahybaun SAC as a Result of the Proposed Development

Attribute	Target	Potential for Adverse Effects
Slender Naiad (*Najas flexilis*) [1883] **To restore the favourable conservation condition of Slender Naiad in Lough Dahybaun SAC**		
Population extent	Maintain the spatial extent of *Najas flexilis* (slender naiad) within the lake, subject to natural processes	**Yes –** Given the location of the SAC, within the Proposed Development site boundary and that hydrological links occur, there is a risk for a reduction in water quality, as a result of sediments or pollutants entering surface water during the construction of the Proposed Development. A degradation of water quality has the potential to result in a change in water colour, nutrient levels and acidification status which **would constitute an adverse effect on the qualifying interest.** The introduction or translocation of invasive plant species could negatively impact associated plant species and fringing habitat which support slender
Population depth	Maintain the depth range of *Najas flexilis* within the lake, subject to natural processes	
Population viability	No decline in plant fitness, subject to natural processes	
Population abundance	Maintain the cover abundance of *Najas flexilis*, subject to natural processes	
Species distribution	No decline, subject to natural processes	
Habitat extent	No decline, subject to natural processes	
Vegetation distribution: maximum (euphotic) depth	Maintain/restore maximum depth of vegetation, subject to natural processes	
Hydrological regime: water level fluctuations	Maintain appropriate natural hydrological regime necessary to support the habitat for the species	
Lake substratum quality	Maintain/restore appropriate substratum type, extent and chemistry to support the population of the species	

Attribute	Target	Potential for Adverse Effects
Slender Naiad (*Najas flexilis*) [1883] **To restore the favourable conservation condition of Slender Naiad in Lough Dahybaun SAC**		
Nutrients	Maintain the concentration of nutrients in the water column at sufficiently low levels to support the population of the species	naiad. Impacts to vegetation communities and fringing habitats that support the population of slender naiad **would constitute an adverse effect on the qualifying interest**
Water colour	Maintain/restore appropriate water colour to support the population of *Najas flexilis*	
Dissolved organic carbon (DOC)	Maintain/restore appropriate organic carbon levels to support the population of *Najas flexilis*	
Acidification status	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the population of *Najas flexilis*, subject to natural processes	
Associated species	Maintain/restore appropriate associated species and vegetation communities to support the population of *Najas flexilis*	
Fringing habitat: area and condition	Maintain/restore the area and condition of fringing habitats necessary to support the population of *Najas flexilis*	

6.1.2 Owenduff/Nephin Complex SAC

Owenduff/Nephin Complex is a large area of relatively intact blanket bog, and mountains incorporates the catchment of the Owenduff River and much of the Nephin Beg Mountain range, and is situated in Co. Mayo. Lough Feeagh, which is located approximately 5 km northwest of Newport Town, lies in the south-east corner of the site. From here, the site extends northwards to the Owenmore River and almost to the town of Bangor Erris, and westwards to the townland of Ballycroy.

Table 6-3: Qualifying Interests and Extent of Habitats or Distribution of Species within the Site for Owenduff/Nephin Complex SAC[19]

Qualifying Interests	Extent and distribution of Qualifying Interest
Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110]	Lake habitat 3110 is considered likely to occur in Lough Feeagh and other larger lakes (e.g. Bunaveela, Anaffrin) in Owenduff/Nephin Complex SAC. All lakes larger than 1ha were mapped as potential 3110. Lake habitat 3160 is likely to co-occur with this habitat in many lakes in the SAC, particularly at higher altitude (above 200m), owing to the base-poor geology (quartzite and schist) and blanket peats.
Natural dystrophic lakes and ponds [3160]	All lakes and ponds in the SAC, with the exception of Lough Feeagh, have been mapped as potential 3160 (see map 3). Atlantic blanket bog pools, including interconnecting pool systems, were recorded at Uggool, Sheeanmore and Altnabrocky, Owenglass West and East, Bellagaravaun, and other areas of the SAC.
Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation [3260]	The description of habitat 3260 covers from upland rivers with bryophytes and macroalgae to lowland depositing rivers with pondweeds and starworts. Owenduff/Nephin Complex SAC was selected for highly oligotrophic, base-poor rivers, with limited aquatic vegetation. The main rivers in the SAC are the Owenduff and its tributaries to the south, and parts of the Owenmore and tributaries to the northeast. The Owenduff system was rated as of unique conservation importance and had communities dominated by mosses, liverworts and algae.
Northern Atlantic wet heaths with *Erica tetralix* [4010]	Northern Atlantic wet heaths with *Erica tetralix* has not been mapped in detail for Owenduff/Nephin Complex SAC, but from current available data the total area of the qualifying habitat is estimated to be approximately 4,524ha, covering 17% of the SAC.
Alpine and Boreal heaths [4060]	Alpine and Boreal heaths have not been mapped in detail for Owenduff/Nephin Complex SAC, but from current available data the total area of the qualifying habitat is estimated to be approximately 1,150ha, covering 4% of the SAC. The habitat occurs on summits and ridges above 400-500m where it forms a mosaic with bare rock.

[19] NPWS (2017) Conservation Objectives: Owenduff/Nephin SAC 000534. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

Qualifying Interests	Extent and distribution of Qualifying Interest
Juniperus communis formations on heaths or calcareous grasslands [5130]	*Juniperus communis* formations on heaths or calcareous grasslands habitat has not been mapped in detail for Owenduff/Nephin Complex SAC and thus the total area of the qualifying habitat is unknown. It has been noted that the habitat is rare within the SAC and is largely confined to un-grazed islands within larger dystrophic and oligotrophic lakes and may also occur near well-drained areas of bog surrounding rock outcrops in the SAC, and often occurs in a mosaic with wet heath.
Blanket bogs (* if active bog) [7130]	Blanket bog has not been mapped in detail for Owenduff/Nephin Complex SAC, but from current available data the total area of the qualifying habitat is estimated to be approximately 18,393ha, covering 68% of the SAC. The habitat covers most of the western and northern parts of the SAC, as well as much of the upland areas in the east and south. Large areas of intact blanket bog are also present in the centre of the SAC.
Transition Mires and quaking bogs [7140]	Transition mires and quaking bogs have not been mapped in detail for Owenduff/Nephin Complex SAC and thus the total area of the qualifying habitat is unknown. The habitat occurs in locations where bog vegetation merges with base-rich flushes, and at the interface between water bodies and adjacent bog. Examples can be found at Owenglass West, Uggool, Sheeanmore and Lagduff.
Salmon *Salmo salar* [1106]	The exact distribution of salmon has not been mapped within this SAC. But the species is likely to utilise all freshwater areas of the SAC.
Otter *Lutra lutra* [1355]	The current range of otter in the SAC is estimated at 93.6%. This covers 10m terrestrial buffer, identified as critical for otters, along rivers and around waterbodies, based on evidence that otters tend to forage within this limit.
Slender Green Feathermoss *Hamatocaulis vernicosus* [1393]	The known population of slender green feather-moss in Owenduff/Nephin Complex SAC occurs in a flush within the blanket bog at Uggool, in the vicinity of Marsh Saxifrage (*Saxifraga hirculus*).
Marsh Saxifrage *Saxifraga hirculus* [1528]	Marsh Saxifrage is known to occur in the Owenduff/Nephin Complex SAC in five flushes at Sheean A, Sheean B, Sheean, C, Sheean D and Uggool.

6.1.2.1 Potential for Direct Effects

Although this European site is located directly to the south and east of the Proposed Development site boundary, there are no works proposed within this area. There is therefore no potential for direct effects on the Owenduff/Nephin Complex SAC during the construction, operation or decommissioning phases.

6.1.2.2 Potential for Indirect Effects

Habitat Degradation (Surface water quality, Impacts to Ground Water, Invasive Species, Dust)

Given the nature of the Proposed Development and in the absence of mitigation and/ or best practice construction standards, the qualifying interest habitats/ species are potentially vulnerable to indirect surface water, ground water, invasive species, or dust impacts as a result of the Proposed Development.

The Proposed Development is linked via a surface water feature (the Owenmore River) which flow from the Proposed Development site Along the northern boundary of the Owenduff/Nephin Complex SAC. However, as the majority of qualifying interest habitats and species are terrestrial or upstream of the Owenmore River and are not dependent on surface water features to maintain or restore their conservation objectives no significant effects are expected. However, there is potential that the aquatic qualifying interests; Atlantic salmon and otter may foraging/commute within the Owenmore River which runs along the northern boundary of the SAC and is hydrologically connected to the Proposed Development site, and thus may be indirectly impacted due to a degradation of water quality and disturbance.

The spread of invasive species onsite (Rhododendron) has the potential to outcompete other floral species reducing the diversity of habitats and impacting on the attributes of the qualifying interests. The transport of material, disturbance of ground (providing areas for invasive species germination) and the movement of machinery or personnel all have the risk of spreading invasive species into this SAC. However, as rhododendron spreads only by seed, which are wind dispersed, typically less than 100m from the parent plant[20] and that the closest works (substation) will be c.5.6km from the boundary to the SAC and that no machinery or personnel will need to enter the SAC, there is no potential for the spread of rhododendron.

The Proposed Development will require several excavations activities and a large amount of movement by heavy duty vehicles which may result in the generation of dust. The generation of dust is likely to range between 25-50m from the work areas. The closest works (substation) will be c.5.6m from the boundary to the SAC and so outside the impact from dust generation.

6.1.2.3 Evaluation of Potential Adverse Effects on Owenduff/Nephin Complex SAC

The specific attributes and targets used to define the conservation objectives of the qualifying interest habitats and species of the Owenduff/Nephin Complex SAC are presented in Table 6-4. The potential for the Proposed Development to adversely affect the habitat or species-specific conservation objectives are also considered.

[20] Higgins, G. T. 2008. *Rhododendron ponticum*: A guide to management on nature conservation sites. Irish Wildlife Manuals, No. 33. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Table 6-4: Evaluation of Potential Adverse Effects on the Conservation Objectives of the Owenduff/Nephin Complex SAC as a Result of the Proposed Development

Attribute	Target	Potential for Adverse Effects
Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] **To maintain the favourable conservation condition of Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) in Owenduff/Nephin Complex SAC**		
Habitat area	Area stable or increasing, subject to natural processes	No – although the SAC is hydrologically connected to the site Proposed Development (via the Owenmore River), this habitat is located upstream of the Owenmore River and so there is no potential for adverse effects on the attributes of this qualifying interest during the construction, operation or decommissioning phases and therefore no negative effect on the site integrity.
Habitat distribution	No decline, subject to natural processes	
Typical species	Typical species present, in good condition, and demonstrating typical abundances and distribution	
Vegetation composition: characteristic zonation	All characteristic zones should be present, correctly distributed and in good condition	
Vegetation distribution: maximum depth	Maintain maximum depth of vegetation, subject to natural processes	
Hydrological regime: water level fluctuations	Maintain appropriate natural hydrological regime necessary to support the habitat	
Lake substratum quality	Maintain appropriate substratum type, extent and chemistry to support the vegetation	
Water quality: transparency	Maintain appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	

Attribute	Target	Potential for Adverse Effects
Water quality: nutrients	Maintain the concentration of nutrients in the water column at sufficiently low levels to support the habitat and its typical species	
Water quality: phytoplankton biomass	Maintain appropriate water quality to support the habitat, including high chlorophyll a status	
Water quality: phytoplankton composition	Maintain appropriate water quality to support the habitat, including high phytoplankton composition status	
Water quality: attached algal biomass	Maintain trace/absent attached algal biomass (<5% cover) and high phytobenthos status	
Water quality: macrophyte status	Maintain high macrophyte status	
Acidification status	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	
Water colour	Maintain appropriate water colour to support the habitat	
Dissolved organic carbon (DOC)	Maintain appropriate organic carbon levels to support the habitat	
Turbidity	Maintain appropriate turbidity to support the habitat	

Attribute	Target	Potential for Adverse Effects
Fringing habitat: area and condition	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of habitat 3110	
Natural Dystrophic Lakes [3160] **To maintain the favourable conservation condition of Natural dystrophic lakes and ponds in Owenduff/Nephin Complex SAC**		
Habitat area	Area stable or increasing, subject to natural processes	No – although the SAC is hydrologically connected to the site Proposed Development (via the Owenmore River), this habitat is located upstream of the Owenmore River and so there is no potential for adverse effects on the attributes of this qualifying interest during the construction, operation or decommissioning phases and therefore no negative effect on the site integrity.
Habitat distribution	No decline, subject to natural processes	
Typical species	Typical species present, in good condition, and demonstrating typical abundances and distribution	
Vegetation composition: characteristic zonation	All characteristic zones should be present, correctly distributed and in good condition	
Vegetation distribution: maximum depth	Maintain maximum depth of vegetation, subject to natural processes	
Hydrological regime: water level fluctuations	Maintain appropriate natural hydrological regime necessary to support the habitat	
Lake substratum quality	Maintain appropriate substratum type, extent and chemistry to support the vegetation	
Water quality: transparency	Maintain appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	

Attribute	Target	Potential for Adverse Effects
Water quality: nutrients	Maintain the concentration of nutrients in the water column at sufficiently low levels to support the habitat and its typical species	
Water quality: phytoplankton biomass	Maintain appropriate water quality to support the habitat, including high chlorophyll a status	
Water quality: phytoplankton composition	Maintain appropriate water quality to support the habitat, including high phytoplankton composition status	
Water quality: attached algal biomass	Maintain trace/absent attached algal biomass (<5% cover) and high phytobenthos status	
Water quality: macrophyte status	Maintain high macrophyte status	
Acidification status	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	
Water colour	Maintain appropriate water colour to support the habitat	
Dissolved organic carbon (DOC)	Maintain appropriate organic carbon levels to support the habitat	
Turbidity	Maintain appropriate turbidity to support the habitat	

Attribute	Target	Potential for Adverse Effects
Fringing habitat: area and condition	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of habitat 3160	
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] **To maintain the favourable conservation condition of Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation in Owenduff/Nephin Complex SAC**		
Habitat area	Area stable or increasing, subject to natural processes	No – although the SAC is hydrologically connected to the site Proposed Development (via the Owenmore River), this habitat is located upstream of the Owenmore River and so there is no potential for adverse effects on the attributes of this qualifying interest during the construction, operation or decommissioning phases and therefore no negative effect on the site integrity.
Habitat distribution	No decline, subject to natural processes	
Hydrological regime: river flow	Maintain appropriate hydrological regimes	
Hydrological regime: groundwater discharge	Maintain appropriate hydrological regime	
Substratum composition: particle size range	Maintain appropriate substratum particle size range, quantity and quality, subject to natural processes	
Water quality	Maintain appropriate water quality to support the natural structure and functioning of the habitat	
Typical species	Typical species of the relevant habitat sub-types should be present and in good condition	
Floodplain connectivity: area	The area of active floodplain at, and upstream of, the habitat, necessary to support all sub-types of the habitat, should be maintained	

Attribute	Target	Potential for Adverse Effects
Fringing habitats: area and condition	Maintain the area and condition of fringing habitats necessary to support the habitat and its sub-types	
Wet Heath [4010] **To restore the favourable conservation condition of Northern Atlantic wet heaths with *Erica tetralix* in Owenduff/Nephin Complex SAC**		
Habitat area	Area stable or increasing, subject to natural processes	No – the nearest Annex I habitat is located c.3.8km (straight line measurement) from the Proposed Development and as it is a terrestrial habitat, has no hydrological links to the site. There is no potential for adverse effects to the attributes of this habitat and therefore no negative effect on the site integrity.
Habitat distribution	No decline, subject to natural processes	
Ecosystem function: soil nutrients	Maintain soil nutrient status within natural range	
Community diversity	Maintain variety of vegetation communities, subject to natural processes	
Vegetation composition: cross-leaved heath	Cross-leaved heath (*Erica tetralix*) present within a 20m radius of each monitoring stop	
Vegetation composition: positive indicator species	Cover of positive indicator species at least 50%	
Vegetation composition: lichens and bryophytes	Total cover of Cladonia and Sphagnum species, *Racomitrium lanuginosum* and pleurocarpous mosses at least 10%	
Vegetation composition: ericoid species and crowberry	Cover of ericoid species and crowberry (*Empetrum nigrum*) at least 15%	
Vegetation composition: dwarf shrub species	Cover of dwarf shrubs less than 75%	

Attribute	Target	Potential for Adverse Effects
Vegetation composition: negative indicator species	Total cover of negative indicator species less than 1%	
Vegetation composition: non-native species	Cover of non-native species less than 1%	
Vegetation composition: native trees and shrubs	Cover of scattered native trees and shrubs less than 20%	
Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	
Vegetation structure: Sphagnum condition	Condition at a representative number of 2m x 2m monitoring stops	
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	
Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	
Indicators of local distinctiveness	Occurrence and population size	

Attribute	Target	Potential for Adverse Effects
Alpine and Boreal heaths [4060] **To restore the favourable conservation condition of Alpine and Boreal heaths in Owenduff/Nephin Complex SAC**		
Habitat area	Area stable or increasing, subject to natural processes	No – the nearest Annex I habitat is located c.3.8km (straight line measurement) from the Proposed Development and as it is a terrestrial habitat, has no hydrological links to the site. There is no potential for adverse effects to the attributes of this habitat and therefore no negative effect on the site integrity.
Habitat distribution	No decline, subject to natural processes	
Ecosystem function: soil nutrients	Maintain soil nutrient status within natural range	
Community diversity	Maintain variety of vegetation communities, subject to natural processes	
Vegetation composition: lichens and bryophytes	Number of bryophyte or non-crustose lichen species present at each monitoring stop is at least three	
Vegetation composition: positive indicator species	Cover of positive indicator species at least 66%	
Vegetation composition: dwarf shrub species	Cover of dwarf shrub species at least 10%	
Vegetation composition: negative indicator species	Total cover of negative indicator species less than 10%	
Vegetation composition: non-native species	Cover of non-native species less than 1%	
Vegetation structure: signs of grazing	Less than 10% collectively of the live leaves of specific graminoids showing signs of grazing	

Attribute	Target	Potential for Adverse Effects
Vegetation structure: signs of browsing	Less than 33% collectively of the last complete growing season's shoots of ericoid and crowberry (*Empetrum nigrum*) showing signs of browsing	
Vegetation structure: burning	No signs of burning within the habitat	
Physical structure: disturbed bare ground	Cover of disturbed bare ground less than 10%	
Indicators of local distinctiveness	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	
***Juniperus communis* formations on heaths or calcareous grasslands [5130]** **To maintain the favourable conservation condition of *Juniperus communis* formations on heaths or calcareous grasslands in Owenduff/Nephin Complex SAC**		
Habitat area	Area stable or increasing, subject to natural processes	No – the nearest Annex I habitat is located c.3.8km (straight line measurement) from the Proposed Development and as it is a terrestrial habitat, has no hydrological links to the site. There is no potential for adverse effects to the attributes of this habitat and therefore no negative effect on the site integrity.
Habitat distribution	No decline, subject to natural processes	
Juniper population size	At least 50 plants per formation	
Vegetation composition: typical species	At least 50% of the listed positive indicator species for the relevant vegetation group present	
Vegetation composition: negative indicator species	Negative indicator species, particularly non-native invasive species, absent or under control	
Vegetation structure: cone bearing plants	At least 10% of juniper plants are bearing cones	

Attribute	Target	Potential for Adverse Effects
Vegetation structure: seedling recruitment	At least 10% of juniper plants are seedlings	
Vegetation structure: dead juniper	Mean percentage of each juniper plant dead less than 10%	
Blanket Bogs (Active)* [7130] **To restore the favourable conservation condition of Blanket bogs (* if active bog) in Owenduff/Nephin Complex SAC**		
Habitat area	Area stable or increasing, subject to natural processes	No – the nearest Annex I habitat is located c.3.8km (straight line measurement) from the Proposed Development and as it is a terrestrial habitat, has no hydrological links to the site. There is no potential for adverse effects to the attributes of this habitat and therefore no negative effect on the site integrity.
Habitat distribution	No decline, subject to natural processes	
Ecosystem function: soil nutrients	Maintain soil nutrient status within natural range	
Ecosystem function: peat formation	At least 99% of the total Annex I blanket bog area is active	
Ecosystem function: hydrology	Natural hydrology unaffected by drains and erosion	
Community diversity	Maintain variety of vegetation communities, subject to natural processes	
Vegetation composition: positive indicator species	Number of positive indicator species present at each monitoring stop is at least seven	
Vegetation composition: lichens and bryophytes	Cover of bryophytes or lichens, excluding *Sphagnum fallax*, at least 10%	

Attribute	Target	Potential for Adverse Effects
Vegetation composition: potential dominant species	Cover of each of the potential dominant species less than 75%	
Vegetation composition: negative indicator species	Total cover of negative indicator species less than 1%	
Vegetation composition: non-native species	Cover of non-native species less than 1%	
Vegetation composition: native trees and shrubs	Cover of scattered native trees and shrubs less than 10%	
Vegetation structure: Sphagnum condition	Less than 10% of the Sphagnum cover is crushed, broken and/or pulled up	
Vegetation structure: signs of browsing	Last complete growing season's shoots of ericoid, crowberry (*Empetrum nigrum*) and bog-myrtle (*Myrica gale*) showing signs of browsing collectively less than 33%	
Vegetation structure: burning	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	
Physical structure: disturbed bare ground	Cover of disturbed bare ground less than 10%	
Physical structure: drainage	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	

Attribute	Target	Potential for Adverse Effects
Physical structure: erosion	Less than 5% of the greater bog mosaic comprises erosion gullies and eroded areas	
Indicators of local distinctiveness	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	
Transition mires and quaking bogs [7140] **To restore the favourable conservation condition of Transition mires and quaking bogs in Owenduff/Nephin Complex SAC**		
Habitat area	Area stable or increasing, subject to natural processes	No – the nearest Annex I habitat is located c.3.8km (straight line measurement) from the Proposed Development and as it is a terrestrial habitat, has no hydrological links to the site. There is no potential for adverse effects to the attributes of this habitat and therefore no negative effect on the site integrity.
Habitat distribution	No decline, subject to natural processes	
Ecosystem function: soil nutrients	Maintain soil nutrient status within natural range	
Community diversity	Maintain variety of vegetation communities, subject to natural processes	
Vegetation composition: number of positive indicator species	Number of positive indicator species at each monitoring stop is at least three for infilling pools and flushes and at least six for fens	
Vegetation composition: number of core positive indicator species	At least one core positive indicator species present	
Vegetation composition: cover of positive indicator species	Total cover of positive indicator species is at least 25%	

Attribute	Target	Potential for Adverse Effects
Vegetation composition: negative indicator species	Total cover of negative indicator species less than 1%	
Vegetation composition: non-native species	Cover of non-native species less than 1%	
Vegetation structure: height	Proportion of live leaves and/or flowering shoots of vascular plants that are more than 15cm above the ground surface should be at least 50%	
Physical structure: disturbed bare ground	Cover of disturbed bare ground less than 10%	
Physical structure: drainage	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	
Indicators of local distinctiveness	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	
Slender Green Feather-moss *Drepanocladus vernicosus* [1393] **To maintain the favourable conservation condition of Slender Green Feather-moss (Shining Sickle-moss) in Owenduff/Nephin Complex SAC**		
Distribution	Area stable or increasing, subject to natural processes	No – the nearest occurrence of this species is located c.5km (straight line measurement) from the Proposed Development. It is a terrestrial species and has no hydrological links to the site. There is no potential for adverse effects to the attributes of this habitat and therefore no negative effect on the site integrity.
Population size	No decline, subject to natural processes	
Area of suitable habitat	No decline, subject to natural processes	
Hydrological conditions: water table level	Maintain suitable hydrological conditions	

Attribute	Target	Potential for Adverse Effects
Vegetation composition: tree cover	Mean percentage tree cover should be less than 15%	
Vegetation composition: shrub cover	Mean percentage shrub cover should be less than 20%	
Vegetation composition: grass cover	Mean percentage grass species cover should be less than 25%	
Vegetation composition: bryophyte cover	Mean percentage bryophyte cover should be more than 50%	
Vegetation composition: cover of *Calliergonella cuspidata*	Mean percentage cover of *Calliergonella cuspidata* should be less than 15%	
Vegetation structure: vegetation height	Mean vegetation height should not exceed 40cm	
Salmon *Salmo salmo* [1013] **To maintain the favourable conservation condition of Salmon in Owenduff/Nephin Complex SAC**		
Distribution: extent of anadromy	100% of river channels down to second order accessible from estuary	**Yes** – This species is known to occur in the Owenmore River, which is hydrologically connected the Proposed Development site and the SAC. The proposed construction works have the potential to result in the degradation of water quality, via silt discharge, cement or oil/fuel leaks which could remove suitable feeding and spawning habitat for
Out-migrating smolt abundance	No significant decline	
Adult spawning fish	Conservation limit (CL) for each system consistently exceeded	

Attribute	Target	Potential for Adverse Effects
Salmon fry abundance	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling	this species, in the Owenmore River impacting on Salmon distribution and population structure associated with the SAC. A change or decline in these attributes would **constitute an adverse effect on the integrity of the site**.
Number and distribution of redds	No decline in number and distribution of spawning redds due to anthropogenic causes	
Water Quality	At least Q4 at all sites sampled by EPA	
Otter *Lutra lutra* [1355] **To maintain the favourable conservation condition of otter in Owenduff/Nephin Complex SAC**		
Distribution	No significant decline	**Yes -** The current range of otter within the SAC is estimated at 93.6%. The proposed construction works have the potential to result in the disturbance of otter and degradation of their feeding resources inside and outside the SAC. Disturbance and changes to the species feeding resources could affect the distribution of otter within the SAC. A change or decline in the distribution of otter would **constitute an adverse effect on the integrity of the site**.
Extent of terrestrial habitat	No significant decline. Area mapped and calculated as 840.63ha along riverbanks/lake shoreline/ around ponds	No -The Proposed Development occurs outside the SAC boundary. There is no potential for the loss of terrestrial habitat for otter within the SAC. There is no potential for adverse effects.
Extent of freshwater (river) habitat	No significant decline. Length mapped and calculated as 382.65km	No -The Proposed Development occurs outside the SAC boundary. There is no potential for the loss of freshwater river habitat for otter within the SAC. There is no potential for adverse effects.

Attribute	Target	Potential for Adverse Effects
Extent of freshwater (lake) habitat	No significant decline. Area mapped and calculated as 540.66ha	No -The Proposed Development occurs outside the SAC boundary. There is no potential for the loss of freshwater lake habitat for otter within the SAC. There is no potential for adverse effects.
Couching sites and holts	No significant decline	No - No holts or couching sites were identified within the Proposed Development site boundary. No construction works will occur within the SAC site boundary. The proposed works will not result in the loss or decline in couching sites or holts; therefore, there is no potential for adverse effects.
Fish biomass available	No significant decline	**Yes -** A potential degradation in water quality within the Owenmore River could affect the availability of fish biomass to otter. A significant pollution event from the works area could result in a decline in available feeding resources for otter. A significant decline in fish biomass available for otter would **constitute an adverse effect on the integrity of the site**.
Barriers to Connectivity	No significant decline	No - The proposed construction works will not result in any barrier to connectivity in any waterbody within the SAC. There is no potential for adverse effects.
Marsh Saxifrage (*Saxifraga hirculus*) [1528] **To maintain the favourable conservation condition of Marsh Saxifrage in Owenduff/Nephin Complex SAC**		
Distribution	No loss in geographical spread and number of populations, subject to natural processes. See map 5 for 1km grid square locations	No – the nearest occurrence of this species is located c.5km (straight line measurement) from the Proposed Development. It is a terrestrial species and

Attribute	Target	Potential for Adverse Effects
Population size: number of rosettes	Maintain the size of each known population, subject to natural processes. The target numbers of rosettes are: at least 151,200 rosettes at Sheean A, at least 36,000 rosettes at Sheean B, at least 104,000 rosettes at Sheean C, at least 19,200 rosettes at Sheean D and at least 24,000 rosettes at Uggool	has no hydrological links to the site. There is no potential for adverse effects to the attributes of this species and therefore no negative effect on the site integrity.
Population size: area of occupancy	Maintain the area of occupancy of each known population, subject to natural processes. The target areas of occupancy are: at least 0.162ha at Sheean A, at least 0.042ha at Sheean B, at least 0.078ha at Sheean C, at least 0.051ha at Sheean D and at least 0.029ha at Uggool	
Hydrological conditions: water level	Maintain the appropriate natural hydrological regime necessary to support the habitat for the species	
Vegetation composition: positive indicator species	Knotted pearlwort (*Sagina nodosa*) should be present in at least two of five 1m x 1m monitoring stops	
Vegetation composition: negative indicator species	Mean percentage cover of purple moor-grass (*Molinia caerulea*) should not exceed 5%; mean percentage cover of Yorkshire fog (*Holcus lanatus*) should not exceed 15%	
Vegetation structure: grazing level	Maintain grazing at light to moderate levels to ensure an open vegetation structure and to allow flowering to occur	

6.1.3 River Moy SAC

This SAC comprises almost the entire freshwater element of the River Moy and its tributaries including both Loughs Conn and Cullin[22]. The system drains a catchment area of 805 sq. km. Most of the site is in Co. Mayo, though parts are in west Sligo and north Roscommon. Apart from the Moy itself, other rivers included within the site are the Deel, Bar Deela, Castlehill, Addergoole, Clydagh and Manulla on the west side, and the Glenree, Yellow, Strade, Gweestion, Trimogue, Sonnagh, Mullaghanoe, Owengarve, Eighnagh and Owenaher on the east side. The SAC is located approximately 2.5km from the Proposed Development site and is designated for seven Annex I habitats and five Annex II species. A description of the extent and condition of the qualifying interest within the SAC is outlined in Table 6-5.

Table 6-5: Qualifying Interests and Extent of Habitats or Distribution of Species within the Site for River Moy SAC[21,22]

Qualifying Interests	Extent and distribution of Qualifying Interest
Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510]	A review of the site's Conservation Objectives document[21] indicates that the extent of this habitat has not been mapped in detail for the river Moy SAC. However, it has been noted that the site is one of the most important in the country for the habitat 'lowland hay meadow'. Just over 9ha of the habitat were recorded by the Grassland Monitoring Survey (2015-2017) within the River Moy SAC, with significant areas found adjacent also. Based on the results of the Grassland Monitoring Survey (2015-2017), this habitat is largely confined to the southeast of the SAC (to the south of Foxford Co. Mayo)[23].
Active raised bogs [7110]	There are five raised bogs listed for the river Moy SAC including those at Kilgarriff, Gowlaun, Derrynabrock, Tawnaghbeg and Cloongoonagh. The total area of Active Raised Bog (ARB) habitat for these five bogs was mapped at 45.3ha. ARB occurs on most of the bogs in the River Moy SAC.
Degraded raised bogs still capable of natural regeneration [7120]	Areas of Degraded Raised Bog (DRB) on the High Bog (HB) has been modelled as 152.4ha. However, it is estimated that only 82.1ha is potentially restorable to ARB by drain blocking. DRB occurs on all five bogs in the river Moy SAC.
Depressions on peat substrates of the Rhynchosporion [7150]	Depressions on the bogs, pool edges and erosion channels, where the vegetation is dominated by White Beaked-sedge comprise the habitat 'Rhynchosporion vegetation'. Associated species in this habitat at the site include Bog Asphodel, Sundews, Deergrass (*Scirpus cespitosus*) and Carnation Sedge. Depressions on peat substrates of the Rhynchosporion is an integral part of good quality Active raised bogs (7110) and thus a separate conservation objective has not been set for the habitat in River Moy SAC.

[21] NPWS (2016) Conservation Objectives: River Moy SAC 002298. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs
[22] NPWS (2020) Site Synopsis: River Moy SAC 002298. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs
[23] https://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=0cdebbb63005462192ef12d8a167431b

Qualifying Interests	Extent and distribution of Qualifying Interest
Alkaline fens [7230]	The full extent of this habitat within the SAC is unknown. An extensive area is known to occur as part of a wetland complex on the Glore River, northwest of Ballyhaunis but there are likely to be other areas present in the SAC.
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	Old sessile oak woods are likely to occur as mosaics with other woodland types and the total extent within the SAC is unknown. The main location of this woodland type in the SAC is Pontoon Woods, of which 106.3ha was mapped as this Annex I habitat type (or mosaics containing it). Further areas are likely to be present within the SAC.
Alluvial forests with *Alnus glutinosa and Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0]	Total extent of this habitat within the SAC is unknown and it may occur in mosaics with other woodland types. Two sites within the SAC were surveyed as part of the National Survey of Native Woodlands (NSNW) (Perrin et al., 2008)[24], these woods occur at Prospect on the western shore of Lough Conn. There are also likely to be additional areas of this Annex I woodland type within the SAC.
Austropotamobius pallipes (White-clawed Crayfish) [1092]	The site's Conservation Objectives document[21] indicate the general distribution of white-clawed crayfish in the SAC is that it is widespread in the upper tributaries of the River Moy and the rivers which feed Loughs Conn and Cullin. It is absent from the main River Moy. The named tributaries that it is recorded from are the following: Upstream of Lough Conn: River Deel and its tributaries of the Toreen River, Rathnamagh River and Rappa Stream; Fiddaunglass; Addergoole River. Upstream of Lough Cullin: Tobergal River; Clydagh; tributaries of the Toormore and Manulla Rivers. Moy tributaries: Gweestion River; tributaries of the Pollagh, Glore, Yellow and Geestaun Rivers; Killeen River; Spaddagh River; Sonnagh River; Owenaher River; Owengarve River.
Petromyzon marinus (Sea Lamprey) [1095]	This SAC only covers the freshwater portion of the River Moy. The Sea Lamprey is regularly encountered in the lower stretches of the river around Ballina.
Lampetra planeri (Brook Lamprey) [1096]	The exact distribution of brook lamprey has not been mapped within this SAC. But the species is likely to utilise all freshwater areas of the SAC.
Salmo salar (Salmon) [1106]	The exact distribution of salmon has not been mapped within this SAC. But the species is likely to utilise all freshwater areas of the SAC.
Lutra lutra (Otter) [1355]	The current range of otter in the SAC is estimated at 93.6%. This covers 10m terrestrial buffer, identified as critical for otters, along rivers and around waterbodies and a foraging area within 80m of

[24] Perrin, P., Martin, J., Barron, S., O'Neill, F., McNutt, K. & Delaney, A. (2008) National Survey of Native Woodlands, 2003-2008. Unpublished report to the National Parks and Wildlife Service, Dublin

Qualifying Interests	Extent and distribution of Qualifying Interest
	the shoreline, based on evidence that otters tend to forage within this limit.

6.1.3.1 Potential for Direct Effects

This European site is located 2.5km to the south of the Proposed Development site boundary, there are no works proposed within this area. There is therefore no potential for direct effects (i.e., habitat loss) on the river Moy SAC during the construction, operation or decommissioning phases.

6.1.3.2 Potential for Indirect Effects

Habitat Degradation (Surface water run-off, Invasive Species, Dust)

Given the nature of the Proposed Development and in the absence of mitigation and/ or best practice construction standards, the qualifying interest habitats/ species are potentially vulnerable to indirect, surface water, invasive species, or dust impacts as a result of the Proposed Development.

Potential indirect effects on aquatic dependent habitats and species within the SAC arising from the construction phase include, deterioration of water quality due to sediment release during the excavation of turbine foundations, hardstanding areas, borrow pits, substation, internal haul roads and amenity roads, grid connection cabling or potential contamination of water from concrete and / or fuels during construction. Such potential effects in the absence of mitigation could cause indirect adverse effects on aquatic ecology as follows:

- Sedimentation – temporary smothering of gravel beds with consequent loss of fish and spawning habitat;
- Sediment deposition can also provide a base for growth of filamentous algae on gravel beds, leading to a build-up of sediment and loss of suitable habitat for crayfish, pearl mussel and spawning habitat for lamprey and salmonids;
- Sedimentation effects in the absence of mitigation include smothering fish eggs and causing mortalities in fish of all ages, reducing abundance of food and impeding movement of fish;
- Sedimentation effects in the absence of mitigation also include smothering of food prey for juvenile salmonids i.e. macro invertebrates;
- Sedimentation effects in the absence of mitigation can include increased nutrients or change in water chemistry leading to a change in vegetation composition of sensitive aquatic dependent habitats;
- Accidental leakage / spillage of oil and fuels from construction vehicles can have indirect effects on fish, fish food and fish habitats, other aquatic species and aquatic QI habitats;
- A reduction in water quality can have an indirect effect on otter through a reduction in prey availability; and
- The spread of invasive species resulting from the action of construction activities could have a prolonged adverse effect on aquatic habitats which could have the potential to indirectly effect prey availability for otters.

The spread of invasive species (Rhododendron) has the potential to outcompete other floral species reducing the diversity of habitats and impacting on the attributes of the qualifying interests. The transport of material, disturbance of ground (providing areas for invasive species germination) and the movement of machinery or personnel all have the risk of spreading invasive species into this SAC. However, as rhododendron spreads only by seed, which are wind dispersed, typically less than 100m from the parent plant[25] and that the closest works (at the most southerly borrow pit) will be c.4.3km from the boundary to the SAC and that no machinery or personnel will need to enter the SAC, there is no potential for the spread of rhododendron.

The Proposed Development will require several excavations activities and a large amount of movement by heavy duty vehicles which may result in the generation of dust. The generation of dust is likely to range between 25-50m from the work areas. The closest works (at the most southerly borrow pit) will be c.4.3km from the boundary to the SAC and so outside the impact from dust generation.

Disturbance/Displacement

Increased human activity, mechanical drilling and excavations, vehicular noise and habitat loss during the construction phase and decommissioning phase have the potential to result in disturbance or displacement effects on the following QI species:

- *Austropotamobius pallipes* (White-clawed Crayfish) [1092]
- *Petromyzon marinus* (Sea Lamprey) [1095]
- *Lampetra planeri* (Brook Lamprey) [1096]
- *Salmo salar* (Salmon) [1106]
- *Lutra lutra* (Otter) [1355]

Excavation works can result in disturbance impacts to otter holts to a distance of up to 150m, as per NRA guidelines (NRA 2008)[26]. A number of watercourses were recorded within the proposed wind farm site which included streams and drainage ditches. Signs of otter (live sightings) were recorded within the site during ecological surveys, but no evidence of holts or resting places were found. As otter signs have been recorded within the Proposed Development site, the potential for disturbance and displacement of otter at the Proposed Development site exists during the construction and decommissioning phases. Decommissioning phase effects will be similar to the construction phase but the potential for impacts is considerably less. During the operational phase the level of operational traffic and ongoing maintenance is expected to be sufficiently low so as to avoid any disturbance effects on otter that utilise the Proposed Development site. However, the potential for adverse disturbance effects on otter as a result of construction and decommissioning cannot be excluded.

A number of watercourses (such as the Fiddaunatooghaun [IE_WE_34S010400] and the Muing River [IE_WE_33M010100]) within the Proposed Development site offer suitable supporting habitat for crayfish, salmon and lamprey, based on the results of an electrofishing survey. No works are proposed to occur within any of the identified watercourses within the Proposed Development site and therefore any disturbance will not permanently displace these aquatic species. There will be no long-term disturbance or displacement of freshwater, white-clawed crayfish, Atlantic salmon, sea lamprey or brook lamprey during the construction phase which could result in significant adverse effects on these QI species.

[25] Higgins, G. T. 2008. *Rhododendron ponticum*: A guide to management on nature conservation sites. Irish Wildlife Manuals, No. 33. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
[26] National Roads Authority (2008) Guidelines for Assessment of Ecological Impacts of National Road Schemes (Rev 2), NRA, Dublin.

6.1.3.3 Evaluation of Potential Adverse Effects on the River Moy SAC

It has been determined, in the absence of appropriate mitigation measures, that the Proposed Development has the potential to result in indirect impacts on the qualifying interests of the SAC. An assessment of the potential adverse effects on the integrity of the river Moy SAC is presented hereunder.

6.1.3.4 Conservation Objectives of the River Moy SAC

Site-specific conservation objectives were set by NPWS for the qualifying interests of River Moy SAC, with the exception of the qualifying interest Lowland Hay Meadows [6510]. Reference was therefore made to site-specific conservation objectives available for other European sites with this corresponding qualifying interest habitat. The specific attributes and targets for the remaining qualifying interest habitats and species were available and used to define the conservation objectives of the Moy River SAC and are presented in Table 6-6. The potential for the Proposed Development to adversely affect the habitat or species-specific conservation objectives are also considered.

Table 6-6: Evaluation of Potential Adverse Effects on the Conservation Objectives of the River Moy SAC as a Result of the Proposed Development

Attribute	Target	Potential for Adverse Effects
Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510] **To restore the favourable conservation condition of Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) in Moy River SAC**		
Habitat area	Area stable or increasing, subject to natural processes	No – the nearest known location of this habitat is located c.28km in a straight line from the Proposed Development and has no hydrological links to the site. There is no potential for adverse effects to the attributes of this habitat and therefore no negative effect on the site integrity.
Habitat distribution	No decline, subject to natural processes	
Vegetation composition: positive indicator species	At least 7 positive indicator species present in monitoring stop or, if 5–6 present in stop, additional species within 20m of stop; this includes at least one 'high quality' species present in stop or within 20m of stop	
Vegetation composition: negative indicator species	Negative indicator species collectively not more than 20% cover, with cover by an individual species not more than 10%	
Vegetation composition: non-native species	Cover of non-native species not more than 1%	
Vegetation composition: woody species and bracken	Cover of woody species and bracken (*Pteridium aquilinum*) not more than 5%	
Vegetation structure: broadleaf herb: grass ratio	Broadleaf herb component of vegetation between 40% and 90%	
Vegetation structure: sward height	At least 50% of sward between 10cm and 50cm tall	
Vegetation structure: litter	Litter cover not more than 25%	

Attribute	Target	Potential for Adverse Effects
Physical structure: bare soil	Not more than 5% bare soil	
Physical structure: disturbance	Area of the habitat showing signs of serious grazing or other disturbance less than 20m²	
Raised Bog (Active)* **To restore the favourable conservation condition of Active raised bogs in River Moy SAC**		
Habitat area	Restore area of active raised bog to 132.4ha, subject to natural processes	No – the Annex I habitat is located c.40km (straight line measurement) from the Proposed Development and has no hydrological links to the site. There is no potential for adverse effects to the attributes of this habitat and therefore no negative effect on the site integrity.
Habitat distribution	Restore the distribution and variability of active raised bog across the SAC.	
High bog area	No decline in extent of high bog necessary to support the development and maintenance of active raised bog	
Hydrological regime: water levels	Restore appropriate water levels throughout the site	
Hydrological regime: flow patterns	Restore, where possible, appropriate high bog topography, flow directions and slopes	
Transitional areas between high bog and adjacent mineral soils (including cutover areas)	Restore adequate transitional areas to support/protect active raised bog and the services it provides	

Attribute	Target	Potential for Adverse Effects
Vegetation quality: central ecotope, active flush, soaks, bog woodland	Restore 66.2ha of central ecotope/active flush/soaks/bog woodland as appropriate	
Vegetation quality: microtopographical features	Restore adequate cover of high quality microtopographical features	
Vegetation quality: bog moss (Sphagnum) species	Restore adequate cover of bog moss (Sphagnum) species to ensure peat forming capacity	
Typical ARB species: flora	Restore, where appropriate, typical active raised bog flora	
Typical ARB species: fauna	Restore, where appropriate, typical active raised bog fauna	
Elements of local distinctiveness	Maintain features of local distinctiveness, subject to natural processes	
Negative physical indicators	Negative physical features absent or insignificant	
Vegetation composition: native negative indicator species	Native negative indicator species at insignificant levels	
Vegetation composition: non-native invasive species	Non-native invasive species at insignificant levels and not more than 1% cover	
Air quality: nitrogen deposition	Air quality surrounding bog close to natural reference conditions. The total N deposition should not exceed 5kg N/ha/yr.	

Attribute	Target	Potential for Adverse Effects
Water quality	Water quality on the high bog and in transitional areas close to natural reference conditions	
Degraded Raised Bog	The long-term aim for Degraded raised bogs still capable of natural regeneration is that its peat-forming capability is re-established; therefore, the conservation objective for this habitat is inherently linked to that of Active raised bogs (7110) and a separate conservation objective has not been set in River Moy SAC	No – habitat is located c.40km (straight line measurement) from the Proposed Development and has no hydrological links to the site. There is no potential for adverse effects to the attributes of this habitat and therefore no negative effect on the site integrity.
Rhynchosporion Vegetation	Depressions on peat substrates of the Rhynchosporion is an integral part of good quality Active raised bogs (7110) and thus a separate conservation objective has not been set for the habitat in River Moy SAC	No – habitat is located c.40km (straight line measurement) from the Proposed Development and has no hydrological links to the site. There is no potential for adverse effects to the attributes of this habitat and therefore no negative effect on the site integrity.
Alkaline Fens **To maintain the favourable conservation condition of Alkaline fens in River Moy SAC**		
Habitat area	Area stable or increasing, subject to natural processes	No – the nearest known location for this habitat is located c.40km (straight line measurement) from the Proposed Development and has no hydrological links to the site. There is no potential for adverse effects to the attributes of this habitat and therefore no negative effect on the site integrity.
Habitat distribution	No decline, subject to natural processes	
Hydrological regime	Appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat	
Peat formation	Active peat formation, where appropriate	

Attribute	Target	Potential for Adverse Effects
Water quality: nutrients	Appropriate water quality to support the natural structure and functioning of the habitat	
Vegetation structure: typical species	Maintain vegetation cover of typical species including brown mosses and vascular plants	
Vegetation composition: trees and shrubs	Cover of scattered native trees and shrubs less than 10%	
Physical structure: disturbed bare ground	Cover of disturbed bare ground less than 10%. Where tufa is present, disturbed bare ground less than 1%	
Physical structure: drainage	Areas showing signs of drainage as a result of drainage ditches or heavy trampling less than 10%	
Old Oak Woodlands **To maintain the favourable conservation condition of Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles in River Moy SAC**		
Habitat area	Area stable or increasing, subject to natural processes	No – the nearest known location for this habitat is located c.20km in a straight line from the Proposed Development and has no hydrological links to the site. There is no potential for adverse effects to the attributes of this habitat and therefore no negative effect on the site integrity.
Habitat distribution	No decline	
Woodland size	Area stable or increasing. Where topographically possible, "large"; woods at least 25ha in size and “small” woods at least 3ha in size	
Woodland structure: cover and height	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semimature trees and shrubs; and well-developed herb layer	

Attribute	Target	Potential for Adverse Effects
Woodland structure: community diversity and extent	Maintain diversity and extent of community types	
Woodland structure: natural regeneration	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	
Woodland structure: dead wood	At least $30m^3$/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter	
Woodland structure: veteran trees	No decline	
Woodland structure: indicators of local distinctiveness	No decline	
Vegetation composition: native tree cover	No decline. Native tree cover not less than 95%	
Vegetation composition: typical species	A variety of typical native species present, depending on woodland type, including oak (*Quercus petraea*) and birch (*Betula pubescens*)	
Vegetation composition: negative indicator species	Negative indicator species, particularly non-native invasive species, absent or under control	
Alluvial Forests* **To maintain the favourable conservation condition of Alluvial forests with *Alnus glutinosa and Fraxinus excelsior* (Alno-Padion, *Alnion incanae, Salicion albae*) in River Moy SAC**		

Attribute	Target	Potential for Adverse Effects
Habitat area	Area stable or increasing, subject to natural processes	No – the nearest known location for this habitat is located c.15km in a straight line from the Proposed Development and has no hydrological links to the site. There is no potential for adverse effects to the attributes of this habitat and therefore no negative effect on the site integrity.
Habitat distribution	No decline	
Woodland size	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and “small” woods at least 3ha in size	
Woodland structure: cover and height	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semimature trees and shrubs; and well-developed herb layer	
Woodland structure: community diversity and extent	Maintain diversity and extent of community types	
Woodland structure: natural regeneration	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	
Hydrological regime: Flooding depth/height of water table	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	
Woodland structure: dead wood	At least $30m^3$/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)	
Woodland structure: veteran trees	No decline	

Attribute	Target	Potential for Adverse Effects
Woodland structure: indicators of local distinctiveness	No decline	
Vegetation composition: native tree cover	No decline. Native tree cover not less than 95%	
Vegetation composition: typical species	A variety of typical native species present, depending on woodland type, including alder (*Alnus glutinosa*), willows (*Salix* spp.), oak (*Quercus robur*) and ash (*Fraxinus excelsior*)	
Vegetation composition: negative indicator species	Negative indicator species, particularly non-native invasive species, absent or under control	
White-clawed Crayfish (*Austropotamobius pallipes*) **To maintain the favourable conservation condition of White-clawed Crayfish in River Moy**		
Distribution	No reduction from baseline	**Yes –** This species is known to occur in the upper tributaries/catchments of the river Moy system, including the River Deel, which the Proposed Development site has a hydrological link to via the Shanvolahan River. The proposed construction works have the potential to result in the degradation of water quality, via silt discharge, cement or oil/fuel leaks which could remove suitable feeding and spawning habitat for this species, impacting on its distribution and population structure. A change or decline in these attributes would **constitute an adverse effect on the integrity of the site**.
Population structure: recruitment	Juveniles and/or females with eggs in all occupied tributaries	
Negative indicator species	No alien crayfish species	No – no machinery or personnel during construction, operation or decommissioning works are proposed to

Attribute	Target	Potential for Adverse Effects
Disease	No instances of disease	occur within surface water systems within the Proposed Development site and so, there is no potential to spread or introduce negative indicator species or disease into the SAC. There is no potential for adverse effects to these attributes for this species and therefore no negative effect on the site integrity.
Water quality	At least Q3-4 at all sites sampled by EPA	**Yes –** This species is known to occur in the upper tributaries/catchments of the River Moy system, including the River Deel, which the Proposed Development site has a hydrological link to via the Shanvolahan River. The proposed construction works have the potential to result in the degradation of water quality which lower water and habitat quality for this species. A change or decline in these attributes would **constitute an adverse effect on the integrity of the site**.
Habitat quality: heterogeneity	No decline in heterogeneity or habitat quality	
Sea Lamprey (*Petromyzon marinus*) **To maintain the favourable conservation condition of Sea Lamprey in River Moy SAC**		
Distribution: extent of anadromy	Greater than 75% of main stem length of rivers accessible from estuary	No – no machinery or personnel during construction, operation or decommissioning works are proposed to occur within surface water systems within the Proposed Development site or the SAC and so, there is no potential to reduce the extent of anadromy in the SAC. There is no potential for adverse effects to this attribute for this species and therefore no negative effect on the site integrity.
Population structure of juveniles	At least three age/size groups present	**Yes -** This species is known to occur in the freshwater sections of the River Moy system, the majority of records

Attribute	Target	Potential for Adverse Effects
Juvenile density in fine sediment	Mean catchment juvenile density at least 1/m²	located north of Ballina (which is over 70km downstream of the Proposed Development), however there is potential that the species could be found in the upper tributaries of the River Moy, including the River Deel, which the Proposed Development site has a hydrological link to via the Shanvolahan River. The proposed construction works have the potential to result in the degradation of water quality which could impact on the attributes for this species. A change or decline in these attributes would **constitute an adverse effect on the integrity of the site**.
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds	
Availability of juvenile habitat	More than 50% of sample sites positive	
Brook Lamprey (*Lampetra planeri*) **To maintain the favourable conservation condition of Brook Lamprey in River Moy SAC**		
Distribution	Access to all watercourses down to first order streams	No – during the construction, operation or decommissioning works no machinery or personnel are proposed to occur within surface water systems within the Proposed Development site or the SAC and so, there is no potential to reduce the access to all watercourses within the SAC. There is no potential for adverse effects to this attribute for this species and therefore no negative effect on the site integrity.
Population structure of juveniles	At least three age/size groups of brook/river lamprey present	**Yes** - this species is known to occur in sections of the River Moy system, including the River Deel, which the Proposed Development site has a hydrological link to via the Shanvolahan River. The proposed construction works have the potential to result in the degradation of water quality which could impact on the attributes for this
Juvenile density in fine sediment	Mean catchment juvenile density of brook/river lamprey at least 2/m²	
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds	

Attribute	Target	Potential for Adverse Effects
Availability of juvenile habitat	More than 50% of sample sites positive	species. A change or decline in these attributes would **constitute an adverse effect on the integrity of the site**.
Atlantic Salmon (*Salmo salar*) **To maintain the favourable conservation condition of Salmon in River Moy SAC,**		
Distribution: extent of anadromy	100% of river channels down to second order accessible from estuary	No – during the construction, operation or decommissioning works no machinery or personnel are proposed to occur within surface water systems within the Proposed Development site or the SAC and so, there is no potential to reduce the access to all watercourses within the SAC. There is no potential for adverse effects to this attribute for this species and therefore no negative effect on the site integrity.
Adult spawning fish	Conservation Limit (CL) for each system consistently exceeded	**Yes** - this species is known to occur in sections of the river Moy system, including the River Deel, which the Proposed Development site has a hydrological link to via the Shanvolahan River. The proposed construction works have the potential to result in the degradation of water quality which could impact on the attributes for this species. A change or decline in these attributes would **constitute an adverse effect on the integrity of the site**.
Salmon fry abundance	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling	
Out-migrating smolt abundance	No significant decline	
Number and distribution of redds	No decline in number and distribution of spawning redds due to anthropogenic causes	
Water quality	At least Q4 at all sites sampled by EPA	
Otter (*Lutra lutra*) **To maintain the favourable conservation condition of Otter in River Moy SAC**		

Attribute	Target	Potential for Adverse Effects
Distribution	No significant decline	**Yes** - Evidence of otter activity was recorded within the Proposed Development site during surveys. The evidence of otter activity suggests that the streams and lakes within the site provide foraging and commuting habitat for the species. Disturbance of otter caused by activities during the construction phase and decommissioning phase may have short-term adverse effects on their distribution. No disturbance related effects are anticipated during the operational phase. A significant decline in distribution for otter would **constitute an adverse effect on the integrity of the site**.
Extent of terrestrial habitat	No significant decline. Area mapped and calculated as 1068.8ha	No - The Proposed Development occurs outside the SAC boundary. There is no potential for the loss of terrestrial, river or lake habitat for otter within the SAC. There is no potential for adverse effects to these attributes for this species and therefore no negative effect on the site integrity.
Extent of freshwater (river) habitat	No significant decline. Length mapped and calculated as 479.4km	
Extent of freshwater (lake) habitat	No significant decline. Area mapped and calculated as 1248.2ha	
Couching sites and holts	No significant decline	No - there was no records of holts or couching sites within the Proposed Development site boundary. No construction works will occur within the SAC site boundary. The proposed works will not result in the loss or decline in couching sites or holts; There is no potential for adverse effects to these attributes for this species and therefore no negative effect on the site integrity.
Fish biomass available	No significant decline	**Yes -** The proposed construction works have the potential to result in the degradation of water quality which could impact on the availability of fish biomass to otter. A significant pollution event from the works area could

Attribute	Target	Potential for Adverse Effects
		result in a decline in available feeding resources for otter. A significant decline in fish biomass available for otter would **constitute an adverse effect on the integrity of the site.**
Barriers to connectivity	No significant increase	No – during the construction, operation or decommissioning works no machinery or personnel are proposed to occur within surface water systems within the Proposed Development site or the SAC and so, there is no potential to reduce the access to all watercourses within the SAC. There is no potential for adverse effects to this attribute for this species and therefore no negative effect on the site integrity.

6.1.4 Owenduff/Nephin Complex SPA

This large area of relatively intact blanket bog and mountains incorporates the catchment of the Owenduff River and much of the Nephin Beg Mountain range in Co. Mayo[27]. Within the SPA the terrain varies enormously, from the peaks of the Nephin Beg Mountains, which reach a maximum altitude of 717m, to the low-lying floodplain of the Owenduff River in the western sector. Along its southern and easterly limits, the site is bounded by coniferous plantations and/or the high mountain slopes of the Nephin Begs. Along its northern and western margins, the site is fringed by agricultural land reclaimed from bog or from wet floodplain vegetation.

The SPA is located approximately 3.8km south-west of the Proposed Development and is designated for two special conservation interests (SCI). A description of the SCIs within the SPA is outlined in Table 6-7.

Table 6-7: Distribution of the SCIs within the Owenduff/Nephin SPA[28,]

Qualifying Interests	Distribution of SCI within the SPA
Merlin (*Falco columbarius*) [A098]	Merlin nests within the SPA (population conservatively estimated at between four and eight pairs). This small falcon prefers heather bog areas, particularly marginal zones between blanket bog and heath/upland grassland. Merlin hunt small birds within this habitat, especially Meadow Pipits.
Golden Plover *(Pluvialis apricaria)* [A140]	A nationally important population of Golden Plover breeds within the SPA (15 pairs in 2004). The extensive tracts of blanket bog provide good breeding habitat and this site is a stronghold for the species.

6.1.4.1 Potential for Direct Effects

The SPA is located approximately 3.8km to the south-west of the Proposed Development site boundary, there are no worked proposed within this area. Considering the separation distance, there is no potential for direct effects (i.e. habitat loss) on the Owenduff/Nephin SPA during the construction, operation or decommissioning phases.

6.1.4.2 Potential for Indirect Effects

Habitat Degradation (Surface water run-off, Invasive Species, Dust)

The Proposed Development site is not hydrologically connected to SPA, there is therefore no potential for indirect effects via a degradation in water quality on the special conservation interest (SCI) species within the SPA arising from the construction phase.

The spread of invasive species onsite (Rhododendron) has the potential to outcompete other floral species reducing the diversity of habitats. The transport of material, disturbance of ground (providing areas for invasive species germination) and the movement of machinery or personnel all have the risk of spreading invasive species into this SPA. However, as Rhododendron spreads

[27] NPWS (2015) Site Synopsis for Owenduff/Nephin Complex SPA [004098]. Generic Version 9.0. Department of Housing, Local Government and Heritage.
[28]NPWS (2022) Conservation objectives for Owenduff/Nephin Complex SPA [004098]. Generic Version 9.0. Department of Housing, Local Government and Heritage.

only by seed, which are wind dispersed, typically less than 100m from the parent plant[25]and that the Proposed Development is located 3.8km and that no machinery or personnel will need to enter the SPA, there is no potential for the spread of Rhododendron within the boundary of the SPA.

The Proposed Development will require excavations activities and the regular movement of heavy-duty vehicles which may result in the generation of dust. As discussed in section 5.1 of the AA Screening report accompanying this NIS (see Appendix 1), the generation of dust is likely to range between 25-50m form the work areas. As the Proposed Development is located 3.8km the boundary to the SPA there is no potential for dust impacts.

Collision Risk

During the operational phase, the potential for birds to collide with turbines is one of the main impacts to consider in assessing the possible effects of a wind farm on SCIs. The core foraging range for Merlin is 5km, which overlaps the Proposed Development site, while the core range for Golden Plover is 3km, with a maximum of 11km (SNH, 2016)[29]. Although the Golden Plover's core foraging range falls outside the Proposed Development (which is located 3.8km away), it has been included following a precautionary approach as the species has been known to travel up to 11km. Similarly, considering the suitable habitat within the Proposed Development site (bog habitat), there is potential for Merlin and Golden Plover from the SPA to forage within the boundary of the Proposed Development site.

A collision risk model using Vantage Point (VP) survey data has been prepared to provide an indication of the likely collision risk imposed by the proposed wind farm on potentially sensitive avian species.

As detailed in section 4.2.4 of the accompanying AA Screening Report (Appendix 1), following extensive surveys between April 2019 to September 2022, a low level of Merlin activity (17 observations, consisting of one to two individuals) was recorded within and up to 2km from the Proposed Development site, of which, only four flights were recorded, two of which were observed at potential collision height. This confirmed that the potential of collision with operational turbines is negligible, due to the low level of flight activity recorded over the survey period and due to the flight behaviour of Merlin which typically fly's low to the ground, especially in open habitats (Warkentin *et.al,* 2020)[30] and therefore below the collision risk zone. Therefore, there is no evidence that there is a potential for adverse effects on this SCI as a result of collision risk.

As detailed in section 4.2.4 of the accompanying AA Screening Report (Appendix 1), following extensive surveys between April 2019 and September 2022, Golden Plover was recorded regularly over the survey period within the Proposed Development site. The majority of these observations were recorded during the winter season, with some records in the late breeding season. No breeding or breeding activity was confirmed or observed over the survey period, indicating the site is used mainly as a wintering ground. It should be noted that the

[29] Scottish Natural Heritage (SNH) (2016). Assessing Connectivity with Special Protection Areas (SPAs) Guidance. Version 3.

[30] Warkentin, I. G., N. S. Sodhi, R. H. M. Espie, A. F. Poole, L. W. Oliphant, and P. C. James (2020). Merlin (*Falco columbarius*), version 1.0. In Birds of the World (S. M. Billerman, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.merlin.01

Owenduff/Nephin SPA has been designated for a breeding population of Golden Plover[31]. As there is limited evidence of this species using the Proposed Development site within the peak breeding season, and limited observations recorded during the late breeding season, there is no evidence that there is a potential for significant effects on this SCI as a result of collision risk.

Disturbance / Displacement

During the construction, operation and decommissioning phases there will be an increase in human activity, mechanical drilling and excavations, vehicular noise, vegetation clearance and operational turbines, which have the potential to result in disturbance or displacement effects. The core foraging range for Merlin is 5km, which overlaps between the SPA and the Proposed Development site, while for Golden Plover it is 3km, with a maximum of 11km (SNH, 2016)[29]. Therefore, Merlin and Golden Plover from the SPA may potentially forage within the boundary of the Proposed Development site and be subject to disturbance/displacement impacts.

Merlin is designated within this SPA year-round[31], but the exact population size within the SPA is not known. Numbers are likely to be higher during the breeding period, as Merlin typically winter further lowland and along the coast during the non-breeding season (Dickson, 1988, cited in Hardey *et al.,* 2013). An approximate breeding population size within the SPA can be estimated from the results of Lusby *et al.,* (2022)[32], where in 2018 a survey of breeding Merlin's across six of the seven SPAs designated for the species was conducted. The report estimated a minimum of 27.5 to a maximum of 41 breeding pairs across all six SPAs (equalling approximately 1707.17km^2). These figures were extrapolated from the survey results, and it is acknowledged that these values only provide an initial estimate. Based on these findings and when focusing in on the Owenduff/Nephin Complex SPA (which equals approximately 257km^2), an estimated 4.1 to 6.1 breeding pairs occur within the SPA. This largely corresponds to a conservative estimate of between four and eight pairs, as outlined in the site synopsis for the SPA (NPWS, 2015)[27].

As detailed in Section 4.2.4 of the accompanying AA Screening Report (Appendix 1), following extensive surveys between April 2019 and September 2022, a low level of Merlin activity (17 observations, consisting of one to two individuals) was recorded within and up to 2km from the Proposed Development site. The majority of Merlin records over the survey period related to birds seen to the east and north of the site, most of which occur outside the Proposed Development boundary but within the 2km study area. Of all the observations over the survey period, the nearest to the SPA occurred approximately 6.3km from the boundary of the designated site. Although there is some suitable foraging and breeding habitat within the proposed development, it is limited in size and condition and as described in section 4.2.1 of the accompanying AA Screening Report (Appendix 1), it is dominated by cutover blanket bog and conifer forestry. More suitable breeding and foraging habitat can be found within the surrounds of the SPA and Proposed Development where more intact lowland blanket bog occurs. However, following a precautionary approach, Merlin from the SPA may potentially forage or breed in proximity to the Proposed Development. Therefore, there is potential for significant effects on the SCI population as a result of disturbance/displacement impacts.

Golden Plover has been designated within the Owenduff/Nephin Complex SPA for a national breeding population which was recorded at 15 pairs in 2004 (NPWS, 2015)[27]. This number is

[31] Available online at: https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=IE0000534 accessed January 2023

[32] Lusby, J., O'Brien, I., Lauder, A., Wilson-Parr, R., Breen, D., Cummins, S. & Tierney, D. (2022). Survey of breeding Merlin in the Special Protection Area network 2018. Irish Wildlife Manuals, No. 139. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

likely to be lower following more recent surveys by Suddaby & O'Brien (2020)[33], which in the areas surveyed within the SPA (27, in 1km squares), identified five pairs, the nearest occupied 1km square being approximately 4km from the Proposed Development. An Active Occupied territory (AOT) calculation was also determined and was calculated at 0.25km^2. This AOT figure can be used to estimate the total breeding population for the SPA but as discussed by the authors more research is needed to identify suitable breeding Golden Plover habitat within the SPA, before a total number of pairs can be calculated.

As detailed in section 4.2.4 of the accompanying AA Screening Report (Appendix 1), following extensive surveys between April 2019 and September 2022, Golden Plover was recorded regularly over the survey period within the Proposed Development site. The majority of these observations however, were recorded during the winter season, with some records in the late breeding season. No breeding or breeding activity was confirmed or observed over the survey period, indicating the site is used mainly as a wintering ground by Golden Plover. As noted previously, the Owenduff/Nephin SPA has been designated for a breeding population of Golden Plover. With this considered, there is some suitable foraging and breeding habitat within the proposed development site, although it is limited in size and condition and as described in section 4.2.1 of the accompanying AA Screening Report (Appendix 1), it is dominated by cutover blanket bog and conifer forestry. More suitable breeding and foraging habitat can be found within the surrounds of the SPA and Proposed Development site where more intact lowland blanket bog occurs. However, following a precautionary approach, Golden Plover from the SPA may potentially forage or breed in proximity to the Proposed Development and may be disturbed /displaced. Therefore, there is potential for significant effects on the SCI population as a result of disturbance/displacement impacts.

6.1.4.3 Evaluation of Potential Adverse Effects on the Owenduff/Nephin SPA

Site-specific conservation objectives have not yet been developed for the Owenduff/Nephin SPA. Reference was therefore made to site-specific conservation objectives available for other European sites with corresponding SCIs, in this case the attributes of the Connemara Bog Complex SPA 004181 were used (NPWS, 2023)[34]. The specific attributes and targets used to define the conservation objectives of the SCI species of the Owenduff/Nephin SPA are presented in Table 6-8. The potential for the Proposed Development to adversely affect the species-specific conservation objectives are also considered.

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[33] Suddaby, D. & O'Brien, C. (2020) A survey of breeding Golden Plover within the Owenduff/Nephin Complex SPA, County Mayo. Irish Wildlife Manuals, No. 120. National Parks and Wildlife Service, Department of Culture Heritage and the Gaeltacht, Ireland

[34] NPWS (2023) Conservation Objectives: Connemara Bog Complex SPA 004181. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

Table 6-8: Evaluation of Potential Adverse Effects as a Result of the Proposed Development

Attribute	Target	Potential for Adverse Effects
Merlin (*Falco columbarius*) [A098] **To maintain or restore the favourable conservation condition of Merlin within the Owenduff/Nephin SPA**		
Population size (Number of occupied territories)	Breeding population is increasing	No – As described in section 6.1.4.1 and 6.1.4.2, there is no potential for direct or indirect effects to this SCI due to the setback distance and lack of connectivity to the site. In addition, the collision risk model concluded that the potential for collision risk with the turbines for this species will be negligible and the identified populations within the Proposed Development and the SPA are not connected. There is therefore no potential for adverse effects on the attributes of this SCI species and therefore no negative effect on the site integrity.
Productivity rate (Number of fledge young per breeding attempt with known outcome)	Sufficient to meet the population size target	
Extent and condition of suitable open habitats for foraging (Hectares; condition assessment; prey biomass)	Sufficient availability of suitable foraging habitat across the SPA to support targets relating to population size, productivity rate and distribution.	
Distribution: extent of available nesting options within the SPA (Numbers and spatial distribution)	Sufficient availability of suitable nesting sites throughout the SPA to maintain the population	**Yes** – Although there is no potential for the disturbance or change in distribution of Merlin within the SPA boundary, there is potential for the disturbance of the SCI species if it forages/nests in proximity to the Proposed Development, which lies within its core range. Following a precautionary approach and with the potential for breeding Merlin to occur within and immediate surrounding of the Proposed Development site, disturbance and displacement impacts cannot be ruled out. Therefore, there is potential for adverse effects on this attribute of this SCI species, causing a negative effect on the site integrity.
Disturbance at breeding sites (Level of impact)	Disturbance occurs at levels that do not significantly impact upon breeding merlin.	
Golden Plover (*Pluvialis apricaria*) [A140] **To maintain or restore the favourable conservation condition of Golden Plover within the Owenduff/Nephin SPA**		

Attribute	Target	Potential for Adverse Effects
Breeding population trend (Percentage change in number of Apparently Occupied Territories [AOTs)])	Long term trend is stable or increasing.	No – As described in section 6.1.4.1 and 6.1.4.2, there is no potential for direct or indirect effects to this SCI due to the setback distance and lack of connectivity to the site. In addition, the collision risk model concluded that the potential for collision risk with the turbines for this species will be negligible and the identified populations within he Proposed Development and the SPA are not connected. There is therefore no potential for adverse effects on the attributes of this SCI species and therefore no negative effect on the site integrity.
Productivity rate (Number of young fledged per Apparently Occupied Territory [AOT])	Sufficient productivity to maintain the population trend as stable or increasing.	
Distribution of breeding habitat (Spatial distribution)	No significant loss of distribution in the long term, other than that occurring due to natural patterns of variation.	
Extent and condition of breeding habitat (Hectares of high-quality breeding habitat)	Sufficient area of high-quality habitat to support the population target	
Barriers to connectivity and site use (Number, location, shape and hectares)	Barriers do not significantly impact the breeding population's access to the SPA or other ecologically important sites outside the SPA	
Disturbance at breeding site (Intensity, frequency, timing and duration)	Disturbance occurs at levels that do not significantly impact upon population target	**Yes** – Although there is no potential for the disturbance or change in distribution of Golden Plover within the SPA boundary, there is potential for the disturbance of the SCI species if it forages/nests in proximity to the Proposed Development, which lies within its core range. Following a precautionary approach and with the potential for breeding Golden Plover to occur within and immediate surrounding the Proposed Development site, disturbance and displacement impacts cannot be ruled out. Therefore, there is potential for adverse effects on this attribute of
Forage spatial distribution, extent and abundance. (Location, hectares, and forage biomass)	Sufficient number of locations, area of suitable habitat, and available forage biomass to support the population target.	

Attribute	Target	Potential for Adverse Effects
		this SCI species, causing a negative effect on the site integrity.

6.1.5 Lough Conn and Lough Cullin SPA

Lough Conn and Lough Cullin are situated in north Co. Mayo and are connected by a narrow inlet near Pontoon. The main inflowing rivers to Lough Conn are the Deel, the Addergoole and the Castlehill while the main outflowing river from Lough Cullin is the river Moy. The lakes have a number of small islands. Fringing swamp vegetation occurs in some sheltered areas. Both Lough Conn and Lough Cullin are part of an important salmonid fishery. Lough Conn and Lough Cullin is of importance for wintering waterfowl, with a nationally important population recorded.

The SPA is located approximately 11km southeast of the Proposed Development and is designated for five SCIs. A description of the SCIs within the SPA is outlined in Table 6-9.

Table 6-9: Qualifying Interests and Extent of Habitats or Distribution of Species within the Site for Lough Conn and Lough Cullin SPA[35,36]

Qualifying Interests	Extent and distribution of Qualifying Interest
Tufted Duck (*Aythya fuligula*) [A061]	The site supports nationally important wintering populations of Tufted Duck, the exact locations of these populations has not been mapped, but likely to occur throughout the lake habitats.
Common Scoter (*Melanitta nigra*) [A065]	Lough Conn and Lough Cullin is one of only four breeding sites in the country for Common Scoter, which in Ireland is at the south-west end of its European range. A survey in 1995 recorded 31 pairs, however, a survey in 1999 gave a total of 30 birds for both lakes, comprising 5 pairs, 18 unpaired males and 2 unpaired females. The exact locations of these nest sites have not been mapped.
Common Gull (*Larus canus*) [A182]	Lough Conn is a traditional breeding site for gulls and terns. In 1977, Black-headed Gull (c. 1,000 individuals) and Common Gull (70 individuals) were recorded. A recent survey in 2000 recorded 40 pairs of Common Gull and 10 pairs of Lesser Black-backed Gull. The Common Gull colony is of national importance.
Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]	Lough Conn is utilised by a population of Greenland White-fronted Goose (123 - five year mean peak for the flock during the period 1994/95 to 1998/99). The geese feed mainly on Annagh Island and at a shoreline site near Cloonaghmore Point.
Wetland and Waterbirds [A999]	The extent of wetland habitat has not been mapped as part of the conservation objectives for this SPA. But the lakes have a number of small islands. Fringing swamp vegetation occurs in some sheltered areas.

[35] NPWS (2022) Conservation objectives for Lough Conn and Lough Cullin SPA [004228]. Generic Version 9.0. Department of Housing, Local Government and Heritage
[36] NPWS (2022) Site Synopsis for Lough Conn and Lough Cullin SPA [004228]. Department of Housing, Local Government and Heritage

6.1.5.1 Potential for Direct Effects

The SPA is located approximately 11km to the southeast of the Proposed Development site boundary, there are no worked proposed within this area. There is therefore no potential for direct effects (i.e., loss of habitat) on the Lough Conn and Lough Cullin SPA during the construction, operation or decommissioning phases of the Proposed Development.

6.1.5.2 Potential for Indirect Effects

Habitat Degradation (Surface water run-off, Invasive Species, Dust)

The Proposed Development site is hydrologically connected to the SPA via the Shanvolahan and Deel rivers which flow approximately 30km downstream into the protected site. There is therefore potential for indirect effects on the SCI species and habitats within the SPA arising from the construction phase. A degradation in water quality can negatively impact the avian species and decrease suitable foraging habitat.

The spread of invasive species onsite (Rhododendron) has the potential to outcompete other floral species reducing the diversity of habitats and impacting on the attributes of the qualifying interests. The transport of material, disturbance of ground (providing areas for invasive species germination) and the movement of machinery or personnel all have the risk of spreading invasive species into this SPA. However, as rhododendron spreads only by seed, which are wind dispersed, typically less than 100m from the parent plant[25] and that the Proposed Development is located 11km and that no machinery or personnel will need to enter the SPA, there is no potential for the spread of rhododendron.

The Proposed Development will require several excavations activities and a large movement of heavy-duty vehicles which may result in the generation of dust. The generation of dust is likely to range between 25-50m from the work areas. As the Proposed Development is located 11km from the boundary of the SPA there is no potential for dust related impacts.

Disturbance/Displacement

During the construction, operation and decommissioning phases there will be an increase in human activity, mechanical drilling and excavations, vehicular noise, vegetation clearance and operational turbines, which have the potential to result in disturbance or displacement effects.

The SPA is designated for four SCI species; Greenland White-fronted Goose, Tufted Duck are recorded using the site during the winter, while Common Scoter and Common Gull are known to breed within the SPA.

The core foraging range for Greenland White-fronted Goose is 5-8km (SNH 2016); as the SPA is located c. 11km from the Proposed Development site, it is determined to be beyond the core foraging range of this SCI species, additionally there was no Greenland White-fronted Geese recorded with the study are of the Proposed Development over the entire survey period. There is therefore no potential for Disturbance/Displacement impacts on this SCI species.

Core foraging ranges have not been described for Tufted Duck or Common Gull. And both of these species were recorded within the study area of the Proposed Development over the survey period. The numbers of both these species were recorded regularly and not believed to be part of the Lough Conn and Lough Cullin SPA. Furthermore, according to Mc Guinness *et al.*

(2015)[37], these species have not been identified as particularly sensitive to wind energy development. There is therefore no potential for Disturbance/Displacement impacts on these SCI species.

Core foraging ranges have not been described for Common Scoter, and the species has been identified as sensitive to wind energy development (Mc Guinness *et al.,* 2015)[37]. However, this species was not recorded within the study area of the Proposed Development over the survey period and the habitats within the Proposed Development site are considered to be sub-optimal compared to other habitats surrounding the Proposed Development site boundary. There is therefore no potential for impacts on these SCI species.

Collision risk

During the operation phase the potential for birds to collide with turbines is one of the main impacts to consider in the assessment of possible impacts of an operating wind farm. The presence of turbines in the landscape could potentially deter birds from using the area and its surroundings, resulting in a disturbance displacement effect. Disturbance can result in a significant impact if it reduces the availability of resources for avian receptors or if it impacts on a migration route or between a roost and feeding site.

A collision risk model using VP survey data has been prepared to provide an indication of the likely collision risk imposed by the proposed wind farm on potentially sensitive avian. The results from this collision risk model can be seen in Appendix 2 – Collision Risk Model Results. A low level of Tufted Duck and Common Gull flight activity was recorded within the Proposed Development site at potential collision height over the survey period and no flights were recorded for Common Scoter and Greenland White-fronted Goose. This confirmed that the potential of collision with operational turbines is negligible and no collision risk was therefore calculated.

6.1.5.3 Evaluation of Potential Adverse Effects on the Lough Conn and Lough Cullin SPA

The site-specific conservation objectives have not yet been developed for the Lough Conn and Lough Cullin SPA. Reference was therefore made to site-specific conservation objectives available for other European sites with corresponding SCIs. The specific attributes and targets used to define the conservation objectives of the special conservation interest species of the Lough Conn and Lough Cullin SPA are presented in Table 6-10. The potential for the Proposed Development to adversely affect the species-specific conservation objectives are also considered.

[37] Mc Guinness, S., Muldoon, C., Tierney, N., Cummins, S., Murray, A., Egan, S. & Crowe, O. (2015). Bird Sensitivity Mapping for Wind Energy Developments and Associated Infrastructure in the Republic of Ireland. BirdWatch Ireland, Kilcoole, Wicklow

Table 6-10: Evaluation of Potential Adverse Effects on the Conservation Objectives of the Lough Conn and Lough Cullin SPA as a Result of the Proposed Development

Attribute	Target	Potential for Adverse Effects
Tufted Duck (*Aythya fuligula*) [A061] **To maintain or restore the favourable conservation condition of Tufted Duck within the Lough Conn and Lough Cullin SPA**		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due to the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Tufted Duck, other than that occurring from natural patterns of variation	
Common Scoter (*Melanitta nigra*) [A065] **To maintain or restore the favourable conservation condition of Common Scoter within the Lough Conn and Lough Cullin SPA**		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due to the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Common Scoter other than that occurring from natural patterns of variation	
Common Gull (*Larus canus*) [A182] **To maintain or restore the favourable conservation condition of Common Gull within the Lough Conn and Lough Cullin SPA**		

Attribute	Target	Potential for Adverse Effects
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due to the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Common Gull, other than that occurring from natural patterns of variation	
Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] To maintain or restore the favourable conservation condition of Greenland White-fronted Goose within the Lough Conn and Lough Cullin SPA		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due to the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Greenland White-fronted Goose, other than that occurring from natural patterns of variation	
Wetland and Waterbirds [A999] To maintain or restore the favourable conservation condition of Wetland and Waterbirds within the Lough Conn and Lough Cullin SPA		
Habitat Area	The permanent area occupied by the wetland habitat should be stable and not significantly decreasing in hectares, other than that occurring from natural patterns of variation	**Yes** - A degradation in water quality due to the construction works associated with the Proposed Development would result in a decrease of the permanent area occupied by the wetland habitats in the SPA. A pollution event would constitute the decrease of useable wetland area, outside of a natural pattern of variation. **This change in wetland habitat would constitute a negative effect on site integrity.**

6.1.6 Killala Bay/Moy Estuary SPA

This large site comprises the estuary of the River Moy and the inner part of Killala Bay, including Lackan Bay and Rathfran Bay, in Counties Mayo and Sligo. It is a funnel-shaped estuary, c. 7 km wide at its outer limit. It is very well sheltered by a sandy island, Bartragh, and by a sandy peninsula that extends from Enniscrone on the eastern side. Extensive intertidal sand and mud flats are exposed at low tide. For the most part, these flats are unvegetated, but mats of Eelgrass (*Zostera* spp.), Beaked Tasselweed (*Ruppia maritima*) and green algae (*Ulva* spp.) occur, which provide important feeding material for waterfowl species. The site is very important for wintering waterfowl and provides excellent feeding grounds for the birds, as well as high-tide roosts. Eight species have populations of national importance.

The SPA is located approximately 14km northeast of the Proposed Development site boundary and is designated for nine SCI species and habitat. A description of the SCIs within the SPA is outlined in Table 6-11.

Table 6-11: Qualifying Interests and Extent of Habitats or Distribution of Species within the Site for Killala Bay/Moy Estuary SPA[38,39]

Qualifying Interests	Extent and distribution of Qualifying Interest
Ringed Plover (*Charadrius hiaticula*) [A137]	The site supports nationally important wintering populations of ringed plover, the species is relatively widespread through the entire SPA but feeds largely on the intertidal habitat.
Golden Plover (*Pluvialis apricaria*) [A140]	The site supports nationally important wintering populations of golden plover, the species is relatively restricted to known roosting sites within SPA, largely on the intertidal habitat.
Grey Plover (*Pluvialis squatarola*) [A141]	The site supports nationally important wintering populations of grey plover, the species is relatively widespread through the entire SPA but feeds largely on the intertidal habitat.
Sanderling (*Calidris alba*) [A144]	The site supports nationally important wintering populations of sanderling, the species is relatively widespread through the entire SPA but feeds largely on the intertidal habitat.
Dunlin (*Calidris alpina*) [A149]	The site supports nationally important wintering populations of dunlin, the species is relatively widespread through the entire SPA but feeds largely on the intertidal habitat.
Bar-tailed Godwit (*Limosa lapponica*) [A157]	The site supports nationally important wintering populations of bar-tailed godwit, the species is relatively widespread through the entire SPA but feeds largely on the intertidal habitat.
Curlew (*Numenius arquata*) [A160]	The site supports nationally important wintering populations of curlew, the species is relatively widespread through the entire SPA but feeds largely on the intertidal habitat.

[38] NPWS (2013) Conservation Objectives: Killala Bay/Moy Estuary SPA 004036. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
[39] NPWS (2013) Killala Bay/Moy Estuary SPA (site code 4036) Conservation objectives supporting document V1

Qualifying Interests	Extent and distribution of Qualifying Interest
Redshank (*Tringa totanus*) [A162]	The site supports nationally important wintering populations of redshank, the species is relatively widespread through the entire SPA but feeds largely on the intertidal habitat.
Wetland and Waterbirds [A999]	The wetland habitat area was estimated as 3204ha using OSi data and relevant orthophotographs. The wetland habitats can be categorised into three broad types: subtidal; intertidal; and supratidal.

6.1.6.1 Potential for Direct Effects

This SPA is located approximately 14km northeast of the Proposed Development site boundary, there are no works proposed within this area. There is therefore no potential for direct effects (i.e., loss of habitat) on the Killala Bay/Moy Estuary SPA during the construction, operation or decommissioning phases.

6.1.6.2 Potential for Indirect Effects

<u>Habitat Degradation (Surface water run-off, Invasive Species, Dust)</u>

The Proposed Development site is hydrologically connected to SPA via the Kilfian South and Cloonaghmore rivers which flow approximately 24km downstream into the SPA. There is therefore potential for indirect effects on the SCI species and habitat within the SPA arising from the construction phase. A degradation in water quality can negatively impact the avian species and decrease suitable foraging habitat.

The spread of invasive species onsite (Rhododendron) has the potential to outcompete other floral species reducing the diversity of habitats and impacting on the attributes of the qualifying interests. The transport of material, disturbance of ground (providing areas for invasive species germination) and the movement of machinery or personnel all have the risk of spreading invasive species into this SPA. However, as rhododendron spreads only by seed, which are wind dispersed, typically less than 100m from the parent plant[25] and that the Proposed Development is located 14km and that no machinery or personnel will need to enter the SPA, there is no potential for the spread of rhododendron.

The Proposed Development will require several excavations activities and the movement of heavy-duty vehicles which may result in the generation of dust. The generation of dust is likely to range between 25-50m from the work areas. The Proposed Development is located 14km the boundary to the SPA and so outside the impact from dust generation.

<u>Disturbance/Displacement</u>

During the construction, operation, and decommissioning phase there will be an increased human activity, mechanical drilling and excavations, vehicular noise, vegetation clearance, and the operation of the turbines which can result in disturbance.

However, considering the distance between the SPA and the Proposed Development site (ca. 14km) there is no potential for the disturbance of SCI species within the SPA. The core winter foraging ranges have not been described for SCI species of this SPA, however, the habitats within the Proposed Development site boundary are considered to be sub-optimal compared to other habitats surrounding the Proposed Development site boundary there is no potential for likely significant effects on these special conservation interest species.

Collision risk

During the operational phase the potential for birds to collide with turbines is one of the main impacts to consider in the assessment of possible impacts of an operating wind farm. The presence of turbines in the landscape could potentially deter birds from using the area and its surroundings, resulting in a disturbance displacement effect. Disturbance can result in a significant impact if it reduces the availability of resources for avian receptors or if it impacts on a migration route or between a roost and feeding site. A collision risk model has been prepared for the SCI species (see Appendix 2 – Collision Risk Model Results). A low level of Ringed Plover flight activity was recorded within the Proposed Development site at potential collision height over the survey period and no flights were recorded for Dunlin, Curlew, Grey Plover, Sanderling, Bar-tailed Godwit and Redshank. This confirmed that the potential of collision with operational turbines is negligible, and no collision risk was therefore calculated.

Golden Plover was recorded regularly over the survey period within the site, the majority of these recorded were recorded during the winter season, with some records in the late breeding season. No breeding or breeding activity was confirmed or observed over the survey period, indicating the site is used mainly as wintering ground. A total of seven flights were recorded at collision height over the survey period consisting of 173 individuals. A collision risk was calculated for these flights and (assuming a maximum diameter of 158m) an estimated 1.01 collisions per year was calculated, equating to 30.3 collisions over the estimated 30-year life span of the wind farm. According to Percival (2003)[40] the magnitude of impact on a species population as a result of collisions, would be negligible if the estimated mortalities does not increase the natural mortality rate by 1%. The wintering/non-breeding population in the Republic of Ireland is estimated at approximately 80,707 (Burke *et al.*, 2019)[41], of which the natural mortality rate is estimated at 27% a year (Sandercock, 2003)[42]. The estimated 1.01 collisions per year will not increase the natural mortality rate above 1% of the estimated 27% (mortality rate will only increase 0.00125%) therefore impacts on this species wintering population will be negligible and so no likely significant effects on this special conservation interest species.

6.1.6.3 Evaluation of Potential Adverse Effects on the Killala Bay/Mot Estuary SPA

The specific attributes and targets used to define the conservation objectives of the SCI habitats and species of the Killala Bay/Moy Estuary SPA are presented in Table 6-12. The potential for the Proposed Development to adversely affect the habitat or species-specific conservation objectives are also considered.

[40] Percival, S. M. (2003). Birds and wind farms in Ireland: A review of potential issues and impact assessment. *Ecology Consulting*, Coxhoe, Durham

[41] Burke, Brian & Lewis, Lesley & Fitzgerald, Niamh & Frost, Teresa & Austin, Graham & Tierney, David. (2019). Estimates of waterbird numbers wintering in Ireland, 2011/12-2015/16. 41. 1-12.

[42] Sandercock B.K. 2003. Estimation of survival rates for wader populations: a review of mark-recapture methods. Wader Study Group Bull. 100: 163–174

Table 6-12: Evaluation of Potential Adverse Effects on the Conservation Objectives of the Killala Bay/Moy Estuary SPA as a Result of the Proposed Development

Attribute	Target	Potential for Adverse Effects
Ringed Plover (*Charadrius hiaticula*) [A137] **To maintain the favourable conservation condition of Ringed Plover within the Killala Bay/ Moy Estuary SPA**		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due silt release, cement or oils/fuels during the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Ringed Plover, other than that occurring from natural patterns of variation	
Golden Plover (*Pluvialis apricaria*) [A140] **To maintain the favourable conservation condition of Golden Plover within the Killala Bay/ Moy Estuary SPA**		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due to the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Golden Plover other than that occurring from natural patterns of variation	

Attribute	Target	Potential for Adverse Effects
		chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Grey Plover (*Pluvialis squatarola*) [A141] **To maintain the favourable conservation condition of Grey Plover within the Killala Bay/ Moy Estuary SPA**		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due to the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Grey Plover, other than that occurring from natural patterns of variation	
Sanderling (*Calidris alba*) [A144] **To maintain the favourable conservation condition of Sanderling within the Killala Bay/ Moy Estuary SPA**		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due to the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and**
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Sanderling, other than that occurring from natural patterns of variation	

<table>
<tr><th>Attribute</th><th>Target</th><th>Potential for Adverse Effects</th></tr>
<tr><td></td><td></td><td>distribution would constitute a negative effect on site integrity.</td></tr>
<tr><td colspan="3">Dunlin (Calidris alpina) [A149]
To maintain the favourable conservation condition of Dunlin within the Killala Bay/ Moy Estuary SPA</td></tr>
<tr><td>Population Trend
(% Change)</td><td>Long term population trend stable and increasing</td><td rowspan="2">Yes - A degradation in water quality due to the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. A change in population trend and distribution would constitute a negative effect on site integrity.</td></tr>
<tr><td>Distribution
(Range, timing and intensity of use of areas)</td><td>No significant decrease in the range, timing or intensity of use of areas by Dunlin, other than that occurring from natural patterns of variation</td></tr>
<tr><td colspan="3">Bar-tailed Godwit (Limosa lapponica) [A157]
To maintain the favourable conservation condition of Bar-tailed Godwit within the Killala Bay/ Moy Estuary SPA</td></tr>
<tr><td>Population Trend
(% Change)</td><td>Long term population trend stable and increasing</td><td rowspan="2">Yes - A degradation in water quality due to the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. A change in population trend and</td></tr>
<tr><td>Distribution
(Range, timing and intensity of use of areas)</td><td>No significant decrease in the range, timing or intensity of use of areas by Bar-tailed Godwit other than that occurring from natural patterns of variation</td></tr>
</table>

Attribute	Target	Potential for Adverse Effects
		distribution would constitute a negative effect on site integrity.
Curlew (*Numenius arquata*) [A160] **To maintain or restore the favourable conservation condition of Curlew within the Killala Bay/ Moy Estuary SPA**		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due to the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Curlew, other than that occurring from natural patterns of variation	
Redshank (*Tringa totanus*) [A162] **To maintain or restore the favourable conservation condition of Redshank within the Killala Bay/ Moy Estuary SPA**		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due to the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and**
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Redshank, other than that occurring from natural patterns of variation	

Attribute	Target	Potential for Adverse Effects
		distribution would constitute a negative effect on site integrity.
Wetland and Waterbirds [A999] **To maintain or restore the favourable conservation condition of Wetland and Waterbirds within the Killala Bay/ Moy Estuary SPA**		
Habitat Area	The permanent area occupied by the wetland habitat should be stable and not significantly decreasing in hectares, other than that occurring from natural patterns of variation	**Yes** - A degradation in water quality due to the construction works associated with the Proposed Development would result in a decrease of the permanent area occupied by the wetland habitats in the SPA. A pollution event would constitute the decrease of useable wetland area, outside of a natural pattern of variation**. This change in wetland habitat would constitute a negative effect on site integrity.**

6.1.7 Blacksod Bay/Broad Haven SPA

Situated in the extreme north-west of Co. Mayo, this site comprises the sheltered open waters of the northern part of Blacksod Bay and its various bays and inlets, such as Trawmore Bay, Feorinyeeo Bay, Saleen Harbour, Elly Bay, Elly Harbour and others at Aghleam, Belmullet, Bunawillin, Emlybeg and Gweesalia, as well as the inner part of Broad Haven, including the bays and inlets of Sruwaddacon Bay, Moyrahan Bay, Traw-Kirtaun, Blind Harbour and Tullaghan Bay. At low tide extensive areas of intertidal sand and mudflats are exposed. These support a well-developed macroinvertebrate fauna. Eelgrass (*Zostera marina*) occurs at several localities. Salt marshes, which are often on a peat substrate, fringe parts of the site and provide useful roosts for the wintering waterfowl. Also included within the site are two small lakes on the Mullet Peninsula, Cross Lough and Leam Lough, and some areas of machair at Fahy, Doolough, Dooyork and Srah.

The SPA is located approximately 17km west of the Proposed Development site boundary, but is also hydrologically connected via the Owenmore River, which flows for over 30km downstream before entering the protected site. The SPA is designated for 14 SCI species and habitat. A description of the SCIs within the SPA is outlined in Table 6-13.

Table 6-13: Qualifying Interests and Extent of Habitats or Distribution of Species within the Site for Blacksod bay/Broad Haven SPA

Qualifying Interests	Extent and distribution of Qualifying Interest
Red-throated Diver (*Gavia stellata*) [A001]	The site supports nationally important wintering populations of Red-throated Diver.
Great Northern Diver (*Gavia immer*) [A003]	The site supports internationally important wintering populations of great northern diver, holding 20% of the all-Ireland population. The species primarily feed on fish that are caught by frequent dives from the surface. They are typically found in shallow waters (with a range of 4 – 10m) within the SPA.
Slavonian Grebe (*Podiceps auritus)* [A007]	The site supports nationally important wintering populations of Slavonian Grebe.
Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]	The site supports internationally important wintering populations of Light-bellied Brent Goose, holding 20% of the all-Ireland population. They are regularly recorded foraging in intertidal areas with Eelgrass *Zostera* sp., such as Doona Strand, Seafield Bay, Blacksod Point and Sruwaddacon Bay.
Common Scoter (*Melanitta nigra*) [A065]	The site supports nationally important wintering populations of Common Scoter. Common Scoters recorded foraging within the SPA at Doolough Bay and Claggan Strand, usually recorded within a few hundred metres of the shore, in shallow waters providing an ideal depth-range for them to dive for their preferred prey of bivalve molluscs.
Red-breasted Merganser (*Mergus serrator*) [A069]	The site supports nationally important wintering populations of Red-breasted Merganser. The species is a sea duck that feed on fish that are caught by frequent

Qualifying Interests	Extent and distribution of Qualifying Interest
	dives from the surface. They are typically found in shallow waters (range 3 – 6m) within the SPA.
Ringed Plover (*Charadrius hiaticula*) [A137]	The site supports nationally important wintering populations of Ringed Plover. They are regularly recorded in the SPA in a variety of habitat characteristics ranging from sheltered estuarine sediments to sandy shores to sheltered rocky shores.
Sanderling (*Calidris alba*) [A144]	The site supports nationally important wintering populations of Sanderling. They can be found in a variety of coastal habitats but are characteristic of sandy shorelines (strands) where they often forage along the tide line by rushing in and out with the waves searching for small prey such as sandhoppers.
Dunlin (*Calidris alpina*) [A149]	The site supports nationally important wintering populations of Dunlin. The distribution of Dunlin within the SPA is widespread with no clear pattern.
Bar-tailed Godwit (*Limosa lapponica)* [A157]	The site supports nationally important wintering populations of Bar-tailed Godwit. The species prefer coastal wetland sites dominated by sand. Within the SPA the highest densities were recorded within sites of sand, such as Trawmore Bay, Aghleam Bay, Saleen Harbour and Elly Bay.
Curlew (*Numenius arquata*) [A160]	The site supports nationally important wintering populations of Curlew. They are known to be widely and often evenly distributed across the SPA, foraging in intertial areas and on occasion in wet grasslands.
Sandwich Tern (*Sterna sandvicensis*) [A191]	The site supports nationally important Breeding colonies of Sandwich Tern, which nest on low-lying offshore islands or islets in bays or brackish lagoons on spits or remote mainland dunes. The largest colony can be found on Inishderry Island.
Dunlin (*Calidris alpina schinzii*) [A466]	The site supports nationally important breeding population of Dunlin, which nest in Machar habitat on the Mullet peninsula.
Wetland and Waterbirds [A999]	The wetland habitat area was estimated as 8,539ha using OSI data and relevant orthophotographs. The wetland habitats can be categorised into five broad types: subtidal; intertidal; supratidal; lake; and lake and associated habitats.

6.1.7.1 Potential for Direct Effects

This SPA is located approximately 17km west of the Proposed Development site boundary, there are no works proposed within this area. There is therefore no potential for direct effects (i.e. loss of habitat) on the Blacksod Bay/Broad Haven SPA during the construction, operation or decommissioning phases.

6.1.7.2 Potential for Indirect Effects

Habitat Degradation (Surface water run-off, Invasive Species, Dust)

The Proposed Development site is hydrologically connected to SPA via the Owenmore River which flow approximately 30km downstream into the SPA. There is therefore potential for indirect effects on the SCI species and habitat within the SPA arising from the construction phase. A degradation in water quality can negatively impact the avian species and decrease suitable foraging habitat.

The spread of invasive species (Rhododendron) has the potential to outcompete other floral species reducing the diversity of habitats and impacting on the attributes of the qualifying interests. The transport of material, disturbance of ground (providing areas for invasive species germination) and the movement of machinery or personnel all have the risk of spreading invasive species into this SPA. However, as rhododendron spreads only by seed, which are wind dispersed, typically less than 100m from the parent plant[25] and that the Proposed Development is located 14km and that no machinery or personnel will need to enter the SPA, there is no potential for the spread of rhododendron.

The Proposed Development will require several excavations activities and the movement of heavy duty vehicles which may result in the generation of dust. The generation of dust is likely to range between 25-50m from the work areas. The Proposed Development is located 17km the boundary to the SPA and so outside the impact from dust generation.

Disturbance/Displacement

During the construction, operation, and decommissioning phase there will be an increased human activity, mechanical drilling and excavations, vehicular noise, vegetation clearance, and the operation of the turbines which can result in disturbance.

However, considering the distance between the SPA and the Proposed Development site (ca. 17km) there is no potential for the disturbance of SCI species within the SPA. The core winter foraging ranges have not been described for SCI species of this SPA, however, the habitats within the Proposed Development site boundary are considered to be sub-optimal compared to other habitats surrounding the Proposed Development site boundary there is no potential for likely significant effects on these special conservation interest species.

Collision risk

During the operational phase the potential for birds to collide with turbines is one of the main impacts to consider in the assessment of possible impacts of an operating wind farm. The presence of turbines in the landscape could potentially deter birds from using the area and its surroundings, resulting in a disturbance displacement effect. Disturbance can result in a significant impact if it reduces the availability of resources for avian receptors or if it impacts on a migration route or between a roost and feeding site. A collision risk model has been prepared for the SCI species (see Appendix 2 – Collision Risk Model Results). A low level of Ringed Plover flight activity was recorded within the Proposed Development site at potential collision height over the survey period and no flights were recorded for Great Northern Diver, Brent Goose, Common Scoter, Red-breasted Merganser, Sanderling, Dunlin Bar-tailed Godwit, and Sandwich Tern. This confirmed that the potential of collision with operational turbines is negligible, and no collision risk was therefore calculated.

6.1.7.3 Evaluation of Potential Adverse Effects on the Blacksod Bay/Broad Haven SPA

The specific attributes and targets used to define the conservation objectives of the SCI habitats and species of the Blacksod Bay/ Broad Haven SPA are presented in Table 6-14. The potential for the Proposed Development to adversely affect the habitat or species-specific conservation objectives are also considered.

Table 6-14: Evaluation of Potential Adverse Effects on the Conservation Objectives of the Blacksod Bay/ Broad Haven SPA as a Result of the Proposed Development

Attribute	Target	Potential for Adverse Effects
Red-throated Diver (*Gavia stellata*) [A001] **To maintain the favourable conservation condition of Red-throated Diver within the Blacksod Bay/ Broad Haven SPA**		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due silt release, cement or oils/fuels during the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Redshank, other than that occurring from natural patterns of variation	
Great Northern Diver (*Gavia immer*) [A003] **To maintain the favourable conservation condition within the Blacksod Bay/ Broad Haven SPA**		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due silt release, cement or oils/fuels during the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Redshank, other than that occurring from natural patterns of variation	
Slavonian Grebe (*Podiceps auritus*) [A007]		

Attribute	Target	Potential for Adverse Effects
To maintain the favourable conservation condition within the Blacksod Bay/ Broad Haven SPA		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due silt release, cement or oils/fuels during the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Redshank, other than that occurring from natural patterns of variation	
Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] **To maintain the favourable conservation condition within the Blacksod Bay/ Broad Haven SPA**		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due silt release, cement or oils/fuels during the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Redshank, other than that occurring from natural patterns of variation	
Red-breasted Merganser (*Mergus serrator*) [A069] **To maintain the favourable conservation condition within the Blacksod Bay/ Broad Haven SPA**		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due silt release, cement or oils/fuels during the construction works associated with the Proposed

Attribute	Target	Potential for Adverse Effects
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Redshank, other than that occurring from natural patterns of variation	Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Ringed Plover (*Charadrius hiaticula*) [A137] **To maintain the favourable conservation condition within the Blacksod Bay/ Broad Haven SPA**		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due silt release, cement or oils/fuels during the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Redshank, other than that occurring from natural patterns of variation	
Sanderling (*Calidris alba*) [A144] **To maintain the favourable conservation condition within the Blacksod Bay/ Broad Haven SPA**		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due silt release, cement or oils/fuels during the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Redshank, other than that occurring from natural patterns of variation	

Attribute	Target	Potential for Adverse Effects
		is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Dunlin (*Calidris alpina*) [A149] **To maintain the favourable conservation condition within the Blacksod Bay/ Broad Haven SPA**		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due silt release, cement or oils/fuels during the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Redshank, other than that occurring from natural patterns of variation	
Bar-tailed Godwit (*Limosa lapponica)* [A157] **To maintain the favourable conservation condition within the Blacksod Bay/ Broad Haven SPA**		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due silt release, cement or oils/fuels during the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Redshank, other than that occurring from natural patterns of variation	

Attribute	Target	Potential for Adverse Effects
Curlew (*Numenius arquata*) [A160] **To maintain the favourable conservation condition within the Blacksod Bay/ Broad Haven SPA**		
Population Trend (% Change)	Long term population trend stable and increasing	**Yes** - A degradation in water quality due silt release, cement or oils/fuels during the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Distribution (Range, timing and intensity of use of areas)	No significant decrease in the range, timing or intensity of use of areas by Redshank, other than that occurring from natural patterns of variation	
Sandwich Tern (*Sterna sandvicensis*) [A191] **To maintain the favourable conservation condition within the Blacksod Bay/ Broad Haven SPA**		
Breeding population abundance: apparently occupied nests (AONs) (Number)	No significant decline	**Yes** - A degradation in water quality due silt release, cement or oils/fuels during the construction works associated with the Proposed Development would result in a decrease in suitable foraging habitats for the SCI species. A decrease in foraging habitats would result in a decrease in the carrying capacity of the SPA for the designated SCI species. This could potentially affect the long-term population of the SCI species within the site and change the distribution range of the SCI species. There is also potential for direct impacts on the SCIs in the event that they come into direct contact with, or ingest, harmful chemicals or oils. **A change in population trend and distribution would constitute a negative effect on site integrity.**
Productivity rate: fledged young per breeding pair. (Mean Number)	No significant decline	
Distribution: breeding colonies (Number; locations; area [ha])	No significant decline	
Prey biomass available (kg)	No significant decline	

Attribute	Target	Potential for Adverse Effects
Barriers to connectivity (Number; locations; shape; area [ha])	No significant increase	No – there is no potential for the Proposed Development to change barriers to connectivity or cause disturbance to breeding sites of the SCI. Sandwich terns are almost exclusively marine feeders, meaning they do not have to travel to or through the site, due to the location of the SPA (i.e. the coast is located to the west of SPA and the Proposed Development is located to the east). In addition, the collision risk model concluded that the potential for collision risk with the turbines for this species will be negligible, as no Sandwich Tern flights were recorded over the survey period. There is therefore no potential for adverse effects on these attributes of this SCI species.
Disturbance at the breeding stage (Level of impact)	Human activities should occur at levels that do not adversely affect the breeding sandwich tern population	
Dunlin (*Calidris alpina schinzii*) [A466] **To maintain the favourable conservation condition within the Blacksod Bay/ Broad Haven SPA**		
Breeding population abundance: apparently occupied nests (AONs) (Number)	No significant decline	No – there is no potential for the Proposed Development to impact on the attributes of this SCI. The breeding population of Dunlin in the SPA nest on the terrestrial Machar habitat. There is a lack of connectivity to the terrestrial site within the SPA and a large enough distance to not cause disturbances (Goodship & Furness [2022][43] suggest 100-200m buffer to protect nesting dunlin disturbance and the site is over 17km from the Proposed development). In addition, the collision risk model concluded that the potential for collision risk with the turbines for this species will be negligible. There is therefore no potential for adverse effects on the attributes of this SCI species and therefore no negative effect on the site integrity.
Productivity rate: fledged young per breeding pair. (Mean Number)	No significant decline	
Distribution: breeding colonies (Number; locations; area [ha])	No significant decline	
Wetland [A999] **To maintain the favourable conservation condition of the wetland habitat in Blacksod Bay/Broad Haven SPA as a resource for the regularly occurring migratory waterbirds that utilise it**		

[43] Goodship, N.M. and Furness, R.W. (MacArthur Green) Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283.

Attribute	Target	Potential for Adverse Effects
Habitat area (Hectares)	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 8,539 hectares, other than that occurring from natural patterns of variation.	**Yes -** A degradation in water quality due to the construction works associated with the Proposed Development would result in a decrease of the permanent area occupied by the wetland habitats in the SPA. A pollution event would constitute the decrease of useable wetland area, outside of a natural pattern of variation. **This change in wetland habitat would constitute a negative effect on site integrity.**

7.0 MITIGATION MEASURES

The assessment found that the Proposed Development, in the absence of appropriate mitigation measures, could result in potential adverse effects on the qualifying interests of Lough Dahybaun SAC, the River Moy SAC, Owenduff/Nephin Complex SAC and the SCIs of the Lough Conn and Lough Cull SPA, Killala Bay/Moy Estuary SPA and the Blacksod Bay/Broad Haven SPA.

In accordance with Article 6(3) of the Habitats Directive, the following mitigation measures are prescribed hereunder to avoid and/or reduce the significance of the potential impacts from the Proposed Development and prevent the occurrence of likely significant effects on European sites. The mitigation measures are described with respect to:

- How the measures will avoid/reduce the adverse impacts on the site;
- The degree of confidence in their likely success;
- The timescale, relative to the project, when they will be implemented and secured; and
- How and when the measures will be monitored.

7.1 Construction Phase Mitigation Measures

Mitigation measures which will be implemented during the construction phase are detailed hereunder.

7.1.1 Ecological Clerk of Works and CEMP

A suitably qualified Ecological Clerk of Works (ECoW) will be appointed by the Contractor and will be required full time on site during the construction works. The ECoW will ensure that all mitigation measures outlined within this NIS are implemented correctly during the construction works.

A Construction Environmental Management Plan (CEMP) has been prepared (see Appendix 3 - CEMP) and will be implemented during the construction phase of the development. All mitigation measures outlined within the NIS are captured within the CEMP.

7.1.2 Pollution Control Measures

Pollution control measures which will be implemented during the construction phase are summarised hereunder:

- All construction works will be undertaken with due regard to the guidance contained within the CIRIA Document C741 'Environment Good Practice on Site' (CIRIA, 2015) and with regard to IFI guidance Guidelines on the Protection Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (2016) to ensure the protection of watercourses located within the Proposed Development site.
- No instream works will be permitted during the construction works. Where stream crossing occurs on site, a clear-span design bridge will be used.
- Culverting will only be used for minor forestry/field drains and will be carried out in dry weather periods.
- Fuels and chemicals will be stored within bunded areas as appropriate to guard against potential accidental spills or leakages. The bund area will have a volume of at least 110 % of the volume of such materials stored.
- All on-site refuelling will be carried out by a trained competent operative.

- Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations.
- No refuelling will take place within 50m of any watercourse;
- All equipment and machinery will have regular checking for leakages and quality of performance and will carry spill kits.
- Any servicing of vehicles will be confined to designated and suitably protected areas such as construction compounds.
- Additional drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site.
- Soil/peat exposure will be minimized by controlling, in so far as is practical, where and when peat is stripped.
- Concrete is required for the construction of the turbine bases and foundations. No batching of wet-cement products will occur on site. Ready-mixed supply of small amounts of wet concrete products and emplacement of pre-cast elements will take place. Pre-cast elements for bridge, culverts and concrete works will be used.
- After concrete is poured at a construction site, the chutes of ready mixed concrete trucks must be washed out to remove the remaining concrete before it hardens. Wash out of the main concrete bottle will not be permitted on site; wash out will be restricted only to chute wash out. Wash down and washout of the concrete transporting vehicles will take place at an appropriate facility offsite.
- The best management practice objectives for concrete chute washout are to collect and retain all the concrete washout water and solids in leak proof containers or impermeable lined wash out pits, so that the wash material does not reach the soil surface and then migrate to surface waters or into the ground water. The collected concrete washout water and solids will be emptied on a regular basis.
- During the construction phase, four temporary site compounds will be required. Temporary on-site toilet facilities (chemical toilets) will be used. These will be sealed with no discharge to the surface water or groundwater environment adjacent to the site.

Sediment and Erosion Control Measures

Sediment control measures which will be implemented during the construction phase are summarised hereunder:

- The stripping of soils will be kept to a minimum and confined to construction areas only.
- Silt fencing will be erected at the location of watercourse crossings along the grid connection route.
- Silt curtains and floating booms will also be used where deemed to be appropriate and this will be assessed separately at each individual location.
- Excavated material will not be stockpiled or side-cast within 50m of any watercourse.
- During the side casting of peat, silt fences, straw bales and/or biodegradable geogrids will be used to control surface water runoff from the storage areas.
- All surface water run-off from the development will pass through settlement lagoons. It is proposed to locate settlement lagoons immediately downstream of the proposed infrastructure including each hardstand and along all site access tracks.
- Settlement lagoons will be located appropriately and will be installed concurrently with the formation of the access track. They will be located as close to the source of sediment as possible and as far as possible from the buffer zones of existing watercourses. The minimum buffer zone width will be 50m.
- The settlement lagoons will be regularly cleaned/maintained to provide effective and successful operation throughout the works. Outfalls and ditches will be cleaned, when required, starting up stream with the outfalls blocked temporarily prior to cleaning.

- Traffic on site will be kept to a minimum. Only the proposed onsite access track will be used for project-related traffic. Where onsite access tracks pass close to watercourses, silt fencing will be used to protect the streams.

7.1.3 Disturbance/Displacement Mitigation Measures

Signs of otter were recorded within and in the vicinity of the Proposed Development site. The following mitigation is proposed to avoid disturbance/displacement of otter:

- Pre-construction otter surveys will be undertaken in and within 150m of the Proposed Development site prior to the commencement of any works in order to identify any changes in otter activity or the establishment of any new holts which may arise in the interim of the original baseline surveys, and to ensure the following prescribed mitigation measures remain adequate.
- The pre-construction survey will be conducted no more than 10—12 months in advance of the construction works as per the NRA (2008) guidelines[44].In the event that a new holt is identified within the ZoI of the proposed works, NPWS will be notified, and all necessary measures will be implemented.
- In the event that temporary construction lighting is required on site, no lighting will be directed towards any watercourse which may be used as commuting/foraging routes by otter.

The potential for Merlin and Golden Plover to occur within and in the vicinity of the Proposed Development site cannot be ruled out. The following mitigation is proposed to avoid disturbance/displacement of Merlin and Golden Plover:

- A pre-construction survey will be undertaken by a suitably qualified ornithologist/ecologist for breeding Merlin and Golden Plover. Suitable habitat for both species will be surveyed following the methodologies set out in section 2.5.4.5 and 2.5.4.6 of the AA Screening Report accompanying this NIS (appendix 1), surveys will take place in the season before works commence to identify any breeding areas.
- Should Merlin or Golden Plover be recorded breeding within close proximity to construction areas, a buffer zone of 500m shall be established around the identified breeding area, and all works will be restricted outside of this buffer zone until it can be demonstrated by an ornithologist that the species has completed the breeding cycle. All restricted areas will be marked clearly, and all construction personnel will be alerted through toolbox talks.

Additional to the above, construction noise will be kept to a minimum in accordance with British Standard BS 5228-1:2009 'Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise'. The contract documents will specify that the Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and will comply with the best practice outlined in BS 5228 and the NRA guidelines 'Good practice Guideline for the Treatment of Noise during the Planning of National Road Schemes' (NRA 2014)[45]. No works will be undertaken outside of the Proposed Development footprint.

[44] NRA (2008) Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes
[45] National Roads Authority (NRA) (2014). Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes.

7.1.4 Management of Invasive Plant Species

In order to comply with Regulations 49 and 50 of the European Communities (Birds and Natural Habitat) Regulations (2011), the appointed Contractor will ensure biosecurity measures are implemented throughout the construction phase to ensure the introduction and translocation of invasive species is prevented. A site-specific Invasive Species Management Plan (ISMP) will be prepared by the appointed Contractor. The ISMP will focus on the identified invasive species but will also consider any new infestation that have occurred in the interim of the initial survey.

The following mitigation measures, are prescribed to control the translocation or spread of invasive species and / or pathogens:

- Prior to arrival all machinery and equipment used during the construction works will be thoroughly cleaned and then dried using a high-pressured steam cleaning, with water >65 °C, in addition to the removal of all vegetation material. Disinfectant, such as a Virkon® Aquatic solution, will be used. The appointed Contractor will establish and clearly delineate a bunded cleaning/washing area.
- No removed material or run-off will be allowed to enter any water bodies (e.g., drainage ditches).
- A strict biosecurity demarcation area will be installed by the ECoW within zones where invasive species exist.
- Evidence that all machinery and equipment has been cleaned will be required to be on file for review by the statutory authorities and the appointed ECoW.

7.2 Operation Phase Mitigation Measures

The following best practice measures will be implemented during the operational phase are outlined hereunder.

All fuel will be stored in bunded areas. The bund capacity will be sufficient to accommodate 110% of the largest tank's maximum capacity or 25% of the total maximum capacities of all tanks, whichever is the greater. The exception to this being double walled tanks equipped with leak detection, which do not require additional retention.

A hydrocarbon interceptor will be installed at the proposed substation site with regular inspection and maintenance, to ensure optimal performance. Given the requirement for sanitary facilities during occasional operation and maintenance works, wastewater effluent will be directed to an onsite holding tank, from where it will be tankered off site to a suitably licensed wastewater treatment plant.

The operational team will carry out maintenance works (to access tracks, substations and turbines) and will put in place control measures to mitigate the risk of hydrocarbon or oil spills during the operational phase of the windfarm. The potential impacts are limited by the size of the fuel tank of vehicles used on the site.

7.3 Decommissioning Phase Mitigation Measures

The expected life span of the Proposed Development is at least 30 years. The decommissioning works will comprise the removal of all over ground elements of the wind farm.

Given the classification of the potential impacts from the Proposed Development's decommissioning phase (i.e., of same nature as the potential impacts during the construction phase), the mitigation measures proposed for the construction phase of the Proposed

Development (Section 7.1), are also proposed for the Proposed Development's decommissioning phase.

7.4 Mitigation Effectiveness

The above outline mitigation measures are best practise and are proven technologies/methods. The mitigation measures, once correctly applied, will avoid or reduce the magnitude of potential impacts on the receiving environment, therefore ensuring avoidance of significant adverse effects on the integrity of the relevant Lough Dahybaun SAC, the River Moy SAC, Owenduff/Nephin Complex SAC, Owenduff/Nephin Complex SPA, Lough Conn and Lough Cullin SPA, Blacksod Bay/ Broad Haven SPA and Killala Bay/Moy Estuary SPA.

7.4.1 Mitigation Effectiveness on Lough Dahybaun SAC

The risk for a reduction in water quality, as a result of sediments or pollutants entering surface water during the construction of the Proposed Development and the introduction or translocation of invasive plant species was identified as an adverse effect on the qualifying interest of this SAC (see Section 6.1.1).

Following the mitigation measures proposed in Section 7.0, notably in Section 7.1.2 on the control of pollution and Section 7.1.4 the management of invasive species, any potential pathway for effect on this species is robustly blocked. The Proposed Development will have no impact on the ecological processes that influence the conservation objectives of this SAC.

7.4.2 Mitigation Effectiveness on the Owenduff/Nephin Complex SAC

The risk for a reduction in water quality, as a result of sediments or pollutants entering surface water during the construction of the Proposed Development was identified to have an adverse effect on the qualifying interest species of this SAC (see Section 6.1.2).

Following the mitigation measures proposed in Section 7.0, notably in Section 7.1.2 on the control of pollution, any potential pathway for effect on the QI species is robustly blocked. The Proposed Development will have no impact on the ecological processes that influence the conservation objectives of this SAC.

7.4.3 Mitigation Effectiveness on the River Moy SAC

The risk for a reduction in water quality, as a result of sediments or pollutants entering surface water during the construction of the Proposed Development was identified to have an adverse effect on the qualifying interest species of this SAC (see Section 6.1.3).

Following the mitigation measures proposed in Section 7.0, notably in Section 7.1.2 on the control of pollution, any potential pathway for effect on the QI species is robustly blocked. The Proposed Development will have no impact on the ecological processes that influence the conservation objectives of this SAC.

7.4.4 Mitigation Effectiveness on the Owenduff/Nephin Complex SPA

The risk for disturbance/displacement to Merlin and Golden Plover within suitable habitat located outside the SPA as a result of construction activity of the Proposed Development was identified to potentially have an adverse effect on the SCIsof this SPA (see section 6.1.4).

Following the mitigation measures proposed in Section 7.0, notably in Section 7.1.3 on the control of disturbance and displacement, any potential pathway for effect on the SCI species is robustly blocked. The Proposed Development will have no adverse effects on the ecological processes that influence the conservation objectives of this SPA.

7.4.5 Mitigation Effectiveness on the Lough Conn and Lough Cullin SPA

The risk for a reduction in water quality, as a result of sediments or pollutants entering surface water during the construction of the Proposed Development was identified to have an adverse effect on the qualifying interest species of this SAC (see Section 6.1.5).

Following the mitigation measures proposed in Section 7.0, notably in Section 7.1.2 on the control of pollution, any potential pathway for effect on the SCI species and habitat is robustly blocked. The Proposed Development will have no impact on the ecological processes that influence the conservation objectives of this SPA.

7.4.6 Mitigation Effectiveness on the Killala Bay/River Moy Estuary SPA

The risk for a reduction in water quality, as a result of sediments or pollutants entering surface water during the construction of the proposed development was identified to have an adverse effect on the qualifying interest species of this SAC (see Section 6.1.6).

Following the mitigation measures proposed in Section 7.0, notably in Section 7.1.2 on the control of pollution, any potential pathway for effect on the SCI species and habitat is robustly blocked. The Proposed Development will have no impact on the ecological processes that influence the conservation objectives of this SPA.

7.4.7 Mitigation Effectiveness on the Blacksod Bay/ Broad Haven SPA

The risk for a reduction in water quality, as a result of sediments or pollutants entering surface water during the construction of the Proposed Development was identified to have an adverse effect on the SCI species and habitat of this SPA (see Section 6.1.7).

Following the mitigation measures proposed in Section 7.0, notably in Section 7.1.2 on the control of pollution, any potential pathway for effect on the SCI species and habitat is robustly blocked. The Proposed Development will have no impact on the ecological processes that influence the conservation objectives of this SPA.

8.0 ANALYSIS OF POTENTIAL IN COMBINATION EFFECTS

Article 6(3) of the Habitats Directive requires that:

'Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives'.

It is therefore required that in-combination effects of the Proposed Development together with other plans and projects is assessed. The assessment of in-combination effects has regard for developments potentially affecting the European sites described in the conclusion of the AA screening report and in Section 6.0, these sites are:

- Lough Dahybaun SAC,
- River Moy SAC,
- Owenduff/Nephin Complex SAC,
- Lough Conn and Lough Cullin SPA,
- Killala Bay/Moy Estuary SPA, and
- Blacksod Bay/Broad Haven SPA.

8.1 Site Sensitivity

A review of the site-specific Natura Standard Data Forms for the each of the identified European sites was conducted to determine the most important negative impacts (high and medium) and activities with high effect on the sites. The results of which can be seen in Table 8-1. This review shows that the potential impacts associated with the Proposed Development were not identified as possible impacts of the relevant SACs and SPAs within the ZoI.

Table 8-1: High to medium, negative threats, pressures and activities with impacts on identified protected sites.

Impact Rank	Threats and pressures		Inside or outside the Protected Site
	Code	Description	
Lough Dahybaun SAC[46]			
High	C01.03	Peat Extraction	Inside
River Moy SAC[47]			
High	A02.01	Agricultural Intensification	Both
High	B01	Forest planting on open ground	Both
High	B05	Use of fertilizers (forestry)	Both
High	H01.05	Diffuse pollution to surface waters due to agricultural and forestry activities	Both
High	I01	invasive non-native species	Both
Medium	C01.03	Peat Extraction	Both
Medium	D04.02	Aerodrome, heliport	Both

[46] Available online at: https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=IE0002177 accessed January 2023
[47] Available online at: https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=IE0002298 accessed January 2023

Impact Rank	Threats and pressures		Inside or outside the Protected Site
	Code	Description	
Owenduff/Nephin Complex SAC[48]			
High	A04	Grazing	Both
High	B	Sylviculture, forestry	Outside
Medium	C01.03	Peat extraction	Both
Medium	F02.03	Leisure fishing	Inside
Medium	B	Sylviculture, forestry	Inside
Owenduff/Nephin Complex SPA[49]			
High	A04	Grazing	Both
High	B	Sylviculture, forestry	Outside
Medium	C01.03	Peat extraction	Both
Medium	F02.03	Leisure fishing	Inside
Medium	B	Sylviculture, forestry	Inside
Lough Conn and Lough Cullin SPA[50]			
Medium	A08	Agricultural Fertilisation	Outside
Medium	B	Sylviculture, forestry	Outside
High	F02.03	Leisure fishing	Inside
Killala Bay/Moy Estuary SPA[51]			
Medium	F02.03	Leisure fishing	Inside
Medium	A08	Agricultural Fertilisation	Outside
Medium	E01	Urbanised areas, human habitation	Outside
Medium	G01.02	Walking, horse riding and non-motorised vehicles	Inside
Blacksod bay/Broad Haven SPA[52]			
Medium	F02.03.01	Bait digging / collection	Inside
Medium	F01	Marine and Freshwater Aquaculture	Inside
Medium	E01	Urbanised areas, human habitation	Outside
Medium	F02.03	Leisure fishing	Inside

[48] Available online at: https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=IE0000534 accessed January 2023

[49] Available online at: https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=IE0000534 accessed January 2023

[50] Available online at: https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=IE0004228 accessed January 2023

[51] Available online at: https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=IE0004036 accessed January 2023

[52] Available online at: https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=IE0004037 accessed January 2023

8.2 Plans

A review of the Mayo County Development Plan 2022-2028[53] identifies policies and objectives associated with the protection of biodiversity and European sites (Policies: NEP1, NEP2 & Objectives: NEO4, NEO6, NEO8). All new plans and projects proposed within the local administrative area must adhere to the above-mentioned objectives. Adherence to the Council's policies and objectives will therefore ensure that all plans and projects proposed within the area are subjected to the tests of Appropriate Assessment which will assess the potential for likely significant effects to European Sites, and where deemed necessary, the potential for an adverse effect on European Site integrity, either alone or in-combination with other plans and projects.

8.3 Projects within the Vicinity

A search was conducted of planning applications (projects) within the vicinity of the Proposed Development, using the Mayo County Council planning portal map viewer[54] and the Department of Housing, Planning and Local Government EIA portal map viewer[55]. The search excluded retention applications (i.e., typically local-scale residential or commercial developments where an impact has already occurred), incomplete, withdrawn, expired and refused applications. The relevant projects with potential for in-combination adverse effects on the integrity of European sites, are detailed below.

8.3.1 Small Scale Developments

A review of the Mayo County Council planning portal indicates that proposed projects in close proximity to the Proposed Development site includes small scale residential and rural developments (e.g., residential one-off housing, sheds, garages, etc.) within close proximity to the site. These are not expected to have any in-combination effects with the Proposed Development due to the small-scale nature of the residential development and lack of connectivity to European sites.

8.3.2 Oweninny Wind Farm

The Oweninny Wind Farm Project is being developed by Oweninny Power Ltd. a joint venture between ESB Wind Development Limited and Bord na Móna Energy Limited. Phase 1 of the Oweninny Wind Farm project, which has been in operation since mid-2019, is located across lands immediately to the northwest of the Proposed Development site. While Phase 2 of the Oweninny Wind Farm Project, which is currently under construction and expected to be operational by winter 2022/Spring 2023, is located c. 2km west of the Proposed Development site, to the west of the Oweninny River.

A NIS of the Oweninny Wind Farm Project was undertaken in 2013 by Biosphere Environmental Services (2013), on behalf of ESB. The Screening Assessment identified the potential for likely significant effects on Bellacorick Bog Complex SAC, Bellacorick Iron Flush SAC, Lough Dahybaun SAC, River Moy SAC and Carrowmore Lake SAC, due to the risk of peat slippage due to the construction works and a degradation of water quality from a runoff of suspended solids

[53] Available online at: https://www.mayo.ie/planning/county-development-plans/2022-2028 Accessed January 2023
[54] Available online at https://www.eplanning.ie/mayocc/searchtypes Accessed January 2023.
[55] Available online at http://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1. Accessed January 2023.

and construction related pollutants. Mitigation measures to prevent potential impacts have been implemented. The assessment then concluded that:

'Whilst the Proposed Development could potentially have impacts on five European sites, it is considered that the sensitive design of the project along with rigorous mitigation measures proposed will ensure that the project, either alone or in-combination with other projects, will have no significant adverse impacts on the conservation of these European sites.'

Phase one of this wind farm is currently constructed and operational since 2019, phase two is currently under construction and is expected to be complete in 2023. There is not expected to be any potential for in-combination effects with this project on the identified protected Sites, with respect to potential surface water impacts. This is due to the similar robust mitigation measures proposed in both this project and the Proposed Development, similarly there will be a lack of overlap between the construction phases of this project and the Proposed Development.

Potential still exists for disturbance, barrier effects or collision risk with turbines in both developments. However, both this project and the results from the Proposed Development found that there is a lack of potential for collision with the SCIs identified in the Owenduff/Nephin Complex SPA and the Blacksod Bay/Broadhaven SPA. The areas in and around both developments also did not identify and migration routes or fly away populations associated with nearby SPAs. There is therefore no potential for in-combination effects with this project.

8.3.3 Sheskin Wind Farm

Sheskin Wind Farm (Mayo Co. Co. Planning reference: 15825) is comprised of 8 wind turbines with associated works, with an overall max height of 150 metres, is located approximately 5km form the Proposed Development site. It was granted conditional planning permission 2016.

The NIS for this project identified a number of Natura 2000 sites to be at risk from potential impacts, of these the following were also identified to be at risk of potential impacts as part of the Proposed Developments NIS: Bellacorrick Bog Complex SAC, Owenduff/Nephin Complex SPA Bellacorrick Iron Flush SAC, Lough Dahybaun, Blacksod Bay/Broadhaven SPA and the River Moy SAC. Potential impacts on these sites were associated with surface water degradation and disturbance and collision risk. Mitigation measures to prevent surface water degradation and disturbance impacts from lighting are proposed. The NIS for this project concluded:

" *That, with the application of the proposed mitigation measures and embedded environmental controls, the development of the wind farm at Sheskin will have no adverse impacts on the Natura 2000 sites in the wider hinterland on its own, or in combination with other known projects in the wider area."*

This wind farm is currently under construction and is expected to be complete in Q4 2023. There is not expected to be any potential for in-combination effects with this project on the identified protected Sites, with respect to potential surface water impacts. This is due to the similar robust mitigation measures proposed in both this projects and the Proposed Development, similarly there will be a lack of overlap between the construction phases of this project and the Proposed Development.

Potential still exists for disturbance, barrier effects or collision risk with turbines in both developments. However, both this project and the results from the Proposed Development found that there is a lack of potential for collision with the SCIs identified in the Owenduff/Nephin Complex SPA and the Blacksod Bay/Broadhaven SPA. The areas in and around both developments also did not identify and migration routes or fly away populations associated with nearby SPAs. There is therefore no potential for combination effects with this project.

8.3.4 Sheskin South Wind Farm

The Sheskin South Wind Farm (An Bord Pleanála [ABP] Planning reference: 315933-23) which is comprised of 21 proposed wind turbines with associated works, with an overall max height of 200 metres, is located approximately 5km from the Proposed Development site. This planning application was lodged with ABP in March 2023 and was granted conditional planning permission in March 2024.

The NIS prepared for the Sheskin South Wind Farm identified a number of Natura 2000 sites at risk from potential impacts, of these sites, the following were also identified to be at risk of potential impacts as part of the Proposed Development (Oweninny Wind Farm Phase 3): Owenduff/Nephin Complex SAC, Owenduff/Nephin Complex SPA. Potential impacts on these sites were associated with habitat degradation, surface water pollution, disturbance and displacement and collision risk. Mitigation measures to prevent adverse effects from these impacts are proposed and the NIS for the Sheskin South Wind Farm project concluded:

For the reasons set out in detail in this NIS, in the light of the best scientific knowledge in the field, all aspects of the Proposed Development which, by itself, or in combination with other plans or projects, which may affect the relevant European Sites have been considered. The NIS contains information which the competent authority, may consider in making its own complete, precise and definitive findings and conclusions and upon which it is capable of determining that all reasonable scientific doubt has been removed as to the effects of the Proposed Development on the integrity of the relevant Natura 2000 sites.

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

There is not expected to be any potential for in-combination effects with this project on theidentified protected Sites, with respect to potential surface water impacts. This is due to thesimilar robust mitigation measures proposed in both the Sheskin project and the ProposedDevelopment.

Potential still exists for disturbance, barrier effects or collision risk with turbines in both developments. However, both this project and the results from the Proposed Development found that there is a lack of potential for collision with the SCIs identified in the Owenduff/Nephin Complex SPA. The areas in and around both developments also did not identify any migration routes or fly away populations associated with nearby SPAs. In addition, both projects will be undertaking pre-construction bird surveys prior to the construction works commencing. There is therefore no potential for combination effects with this project.

8.3.5 Dooleeg Wind Turbine

Permission for a single wind turbine generator (Mayo Co. Co. Planning reference: 20467), with an overall max height of 180 metres and 20kV grid connection to Bellacorick 110kV substation, is located approximately 300m from the Proposed Development site. It was granted conditional permission in 2021.

Of the protected sites identified in the NIS for this project, only the river Moy SAC was found to be at risk from potential negative impacts, in the absence of mitigation measures, associated with the discharge of surface drainage waters during the construction phase. Mitigation measures are to be implemented with this project to prevent any discharge of silt, pollutants, cement or sewage into the river Deel catchment (River Moy SAC) during the construction phase. The NIS for this project concluded that:

Based upon the information provided in this NIS, it is the considered view of the authors of this NIS that it can be concluded by Mayo County Council that the project will not, alone or in-combination with other plans or projects, result in the significant adverse effects to the integrity and conservation status of European Sites in view of their conservation objectives and on the basis of the best scientific evidence and there is no reasonable scientific doubt as to that conclusion.

There is not expected to be any potential for in-combination effects with this project on the identified protected Site, with respect to potential surface water impacts. This is due to the similar robust mitigation measures proposed in both this projects and the Proposed Development.

8.3.6 Mayo Green Hydrogen Production Plant

The development of a hydrogen plant (22502) that will produce hydrogen by the electrolysis of water, is proposed at a site approx. 1km from the Phase 3 site boundary. The hydrogen produced will be stored on site and available for Injection into the transmission gas network or the removal off site by trucks with tube trailers. Water will be abstracted from the adjacent Oweninny river, ground water or a combination of both. The oxygen produced from electrolysis will be vented to atmosphere.

An NIS for this development has been produced, which included an assessment of potential significant adverse effects from the Proposed Development on nearby European sites. The NIS identified the potential for the proposed hydrogen plant to result in adverse effect on two protected sites, of which the Blacksod Bay / Broad Haven SPA, was also identified to be at risk of potential impacts as part of the Proposed Developments NIS.

The NIS for this project concluded that following the application of mitigation measures, potential significant adverse effects will be avoided or reduced and determined that there will be no risk of significant adverse effects on the qualifying interests habitats and species, or on overall site integrity, nor in the attainment of the specific conservation objectives for the Owenduff / Nephin Complex SAC and Blacksod Bay / Broad haven SPA.

There is not expected to be any potential for in-combination effects with this project on the identified protected Site, with respect to potential surface water impacts. This is due to the similar robust mitigation measures proposed in both this projects and the Proposed Development.

8.4 In-Combination Effects Conclusion

Following an examination, review and analysis, of projects and plans in the area, in light of best scientific knowledge, the conservation objectives and site sensitivity of the identified European sites, it can be concluded that the Proposed Development in-combination with other plans or projects will not have any impact on any of the QIs/SCIs of the identified European sites within the ZoI.

In the review of the projects within the area, that could potentially result in additional or in combination effects, the mitigation measure proposed for the maintaining of water quality and habitats are deemed to be robust to prevent cumulative impacts. Similarly, no avian or terrestrial species were identified to be ask risk from collision or disturbance and no important migrating or flyaway populations were found. Therefore, no potential for in-combination effects on these SCIs.

9.0 CONCLUSION

This NIS has been prepared in accordance with best practice and scientific advice and following all relevant guidance. The function of this report is to assist the competent authority with undertaking an Appropriate Assessment in accordance with the Habitats Directive, Part XAB of the Planning and Development Act 2000 and case law.

The assessment considers whether the Proposed Development, alone or in-combination with other projects or plans, will result in adverse effects on the integrity of Lough Dahybaun SAC, River Moy SAC, Owenduff/Nephin Complex SAC, Owenduff/Nephin Complex SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary SPA and the Blacksod Bay/Broad Haven SPA.

In the absence of mitigation, the potential risks to the Lough Dahybaun SAC, River Moy SAC, Owenduff/Nephin Complex SAC, Owenduff/Nephin Complex SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary and the Blacksod Bay/Broad Haven SPA is a potential degradation of habitat quality from the release of suspended solids, pollutants and/or the disturbance to Annex species as a result of construction, operational and decommissioning works.

Following an analysis and evaluation of the relevant information and in light of best scientific knowledge, in particular, the nature of the Proposed Development, characteristics of the qualifying and special conservation interests, the potential link between the Proposed Development, the identified European sites within the ZoI, and the mitigations measures to be implemented, it can be concluded that no significant adverse effects are anticipated alone or in-combination with any other plans or projects on the following European sites: Lough Dahybaun SAC, River Moy SAC, Owenduff/Nephin Complex SAC, Owenduff/Nephin Complex SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary SPA and Blacksod Bay/ Broad Haven SPA.

Appendix 1 – Appropriate Assessment Screening Report

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Bord na Móna

Oweninny Wind Farm Phase 3

Revised Appropriate Assessment Screening Report

March 2024

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PROJECT NAME: Oweninny Wind Farm Phase 3

REPORT NAME: Revised Appropriate Assessment Screening Report

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A02	RFI	JS	28/02/2024	AS	14/03/2023	BG	15/03/2024

TOBIN Consulting Engineers

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<u>Appendices</u>

1.0 INTRODUCTION

This revised Appropriate Assessment Screening Report has been updated in response to a request for further information (RFI) in relation to a planning application for the Proposed Oweninny Wind Farm, Phase 3 located in North County Mayo (Planning Reference: APB-313178-23). All revised/additional text has been highlighted in red for clarity.

This report forms a Screening for Appropriate Assessment (AA) Report for the Proposed Oweninny Wind Farm, Phase 3 (herein referred to as the 'Proposed Development') located in North County Mayo. The Proposed Development is situated approximately 12km west of Crossmolina and 15km east of Bangor Erris, and just north of the N59 National Primary Road. The overall area of Oweninny Bog is approximately 5,090 hectares, while the site area of the Proposed Development is approximately 2,345 hectares.

The purpose of this AA Screening Report is to inform the AA process, which is carried out by the competent authority Mayo County Council. Appropriate Assessment is an assessment of whether a plan or project, alone and/or in-combination with other plans or projects, may have significant effects on a European site, collectively known as the Natura 2000 network, in view of the site's conservation objectives.

The project design has sought to, in as far as possible, avoid impacts on European sites. This report considers the final design. It determines if direct, indirect or in-combination effects could arise, or if there is uncertainty regarding potential effects.

This report provides information to assist the competent authority in undertaking a Screening Assessment of the Proposed Development and was informed by a desktop study undertaken by the qualified and competent ecologists Jason Cahill (B.Sc), and John Sherry (B.Sc.) at TOBIN Consulting Engineers and was senior reviewed by Senior Ecologist Joao Martins (B.E. (Hons) M.Sc.).

John Sherry

John Sherry (B.Sc.) is a qualified Project Ecologist with TOBIN's Environment & Planning Division and has over three years post-graduate experience in ecology and environmental consultancy. John has mainly been involved in the surveying and reporting of large-scale renewable infrastructure projects where he has carried out Appropriate Assessment Screening reports, Natura Impact Statements, Environmental Impact Assessment Reports and Ecological Management Plans. John has a proven knowledge of field skills and has been involved with the planning and implantation of a variety of surveys including habitat surveys, non-volant mammal surveys and bat assessments. However, he has mainly been focused on ornithological surveys involving winter and breeding bird surveys associated largely with proposed wind farms or infrastructure developments.

Jason Cahill

Jason Cahill (B.Sc.) is a Project Ecologist in TOBIN's Environment & Planning Division. He graduated from IT Tralee with a BSc (Hons) in Field Biology with Wildlife Tourism. Jason has experience with ornithological surveys and ecological clerk of works, including bat, badger, and amphibian surveys. During his time in TOBIN, Jason has gained experience with GIS mapping, report writing and multidisciplinary field surveys.

Joao Martins

Joao is a qualified Senior Ecologist with TOBIN's Environment & Planning Division, Joao is a Freshwater Ecologist with 14 years' experience in freshwater monitoring of both lotic and lentic systems. He has worked on the EU Water Framework Directive (WFD - e.g. macroinvertebrates, habitat/hydromorphology), and on other freshwater projects of scientific nature, in Germany, Portugal and Ireland. Beyond his considerable field experience, Joao has extensive experience in management of data collation, analysis and technical input to relevant environmental assessments, of both freshwater and terrestrial systems. Joao has played important roles in the preparation of screenings for Appropriate Assessment (AA), Natura Impact Statements (NIS), Ecological Impact Assessments (EcIA) and being Lead Ecologist of Environmental Impact Assessment Reports (EIAR).

2.0 THE APPROPRIATE ASSESSMENT PROCESS

The AA process is an assessment of the potential for likely significant effects or negative effects of a plan or project, alone and/or in-combination with other plans or projects, on the conservation objectives of a European site(s). The Natura 2000 network is made up of European sites including Special Protection Areas (SPAs), established under the EU Birds Directive (2009/147/EC) (more generally referred to as the 'Birds Directive') and Special Areas of Conservation (SACs), established under the EU Habitats Directive (92/43/EEC) (more generally referred to as the 'Habitats Directive'). The Natura 2000 network helps provide for the protection and long-term persistence of Europe's most valuable and threatened species and habitats.

The Screening Stage of the AA process identifies any likely significant effects upon European sites from the proposed development alone or in-combination with other projects or plans. A series of questions are asked during the Screening Stage of the AA process to determine:

- whether a plan or project can be excluded from AA requirements because it is directly connected with, or necessary to, the management of a European site; and
- whether the project or plan will have a potentially significant effect on a European site, either alone and/or in-combination with other projects or plans, in view of the site's conservation objectives, or if residual uncertainty exists regarding potential impacts.

2.1 Legislative Context

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as the 'Habitats Directive', provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of community interest through the establishment and conservation of an EU-wide network of sites known as the Natura 2000 network.

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect European sites (Annex 1.1). Article 6(3) establishes the requirement for AA:

> '*Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the*

conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.'

Article 6(4) states:

'If, in spite of a negative assessment of the implications for the [Natura 2000] site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, Member States shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.'

The provision for an AA is transposed into Irish law by the Planning and Development Act 2010 which inserted Part XAB into the Planning and Development Act 2000. Section 177U (4) of the said Act provides for screening for Appropriate Assessment as follows:

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

Section 177U (5) provides as follows:

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

An AA should be based on best scientific knowledge and the competent authority should ensure that expertise, such as ecological, geological, and hydrological are utilised, where relevant.

The Court of Justice of the European Union (CJEU) has made a number of rulings in relation to AA, regarding when it is required, its purpose, and the standards it should meet. Consideration has been given to the evolution in interpretation and application of Directives and national legislation arising from jurisprudence of the European and Irish courts in respect of Article 6 of the Habitats Directive.

2.2 Legislation and Guidance

This report has been carried out using the following guidance (and relevant case law):

- Communication from the Commission on the Precautionary Principle. Office for Official Publications of the European Communities, Luxembourg (European Commission [EC] 2000)[1].

[1] Communication from the Commission on the Precautionary Principle: https://op.europa.eu/en/publication-detail/-/publication/21676661-a79f-4153-b984-aeb28f07c80a/language-en

- Nature and biodiversity cases: Article 6 of the Habitats Directive Ruling of the European Court of Justice. Office for Official Publications of the European Communities, Luxembourg (EC, 2014)[2].
- Managing Natura 2000 Sites – The provisions of Article 6 of the Habitats Directive 92/43/EEC. European Commission (EC, 2018)[3].
- 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)[4]
- OPR Practice Note PN01 Appropriate Assessment Screening for Development Management (OPR, 2021)[5]
- Interpretation Manual of European Union Habitats. Version EUR 28. European Commission (EC, 2013)[6].
- Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities, Department of the Environment, Heritage and Local Government (DoEHLG, 2010)[7].
- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. Office for Official Publications of the European Communities, Luxembourg (EC, 2007)[8].
- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg (EC, 2021)[9].
- European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011), as amended.

This report has similarly been prepared with regard to relevant rulings by the Court of Justice of the European Union (CJEU), the High Court, and the Supreme Court.

Definitions of conservation status, integrity and significance used in this assessment are defined in accordance with '*Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC*' (EC, 2018):

- Favourable conservation status (FCS) can only be defined and achieved at the level of the natural range of a species or a habitat type. A broad conservation objective aiming at achieving FCS can therefore only be considered at an appropriate level, such as for example the national, biogeographical or European level. The conservation measures

[2]Nature and Biodiversity Cases:
https://ec.europa.eu/environment/nature/info/pubs/docs/others/ECJ_rulings%20Art_%206%20-%20Final%20Sept%202014-2.pdf
[3]European Commission (2018):
https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/Provisions_Art_6_nov_2018_en.pdf
[4]European Commission (2021):
https://ec.europa.eu/environment/nature/natura2000/management/pdf/methodological-guidance_2021 10/EN.pdf
[5] Office of the Planning Regulator (2021): https://www.opr.ie/wp-content/uploads/2021/03/9729-Office-of-the-Planning-Regulator-Appropriate-Assessment-Screening-booklet-15.pdf
[6]Interpretation Manual:
https://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf
[7]Appropriate Assessment of Plans and Projects:
https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2009_AA_Guidance.pdf
[8]Guidance Document on Article 6 (4):
https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/guidance_art6_4_en.pdf
[9]Assessment of plans and projects significantly affecting Natura 2000 sites:
https://ec.europa.eu/environment/nature/natura2000/management/pdf/methodological-guidance_2021-10/EN.pdf

have to correspond to the ecological requirements of the natural habitat types in Annex I and of the species in Annex II present on the site. The ecological requirements of those natural habitat types and species involve all the ecological needs which are deemed necessary to ensure the conservation of the habitat types and species. They can only be defined on a case-by-case basis and using scientific knowledge.

- The integrity of a European site is defined as the coherent sum of the site's ecological structure, function, and ecological processes, across its whole area, which enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is designated.
- Significant effect should be determined in relation to the specific features and environmental conditions of the protected site concerned by the plan or project, taking particular account of the site's conservation objectives and ecological characteristics.

2.3 Stages Involved in the Appropriate Assessment Process

There are potentially four stages in the AA process; the result of each stage determines the requirement for assessment under the next.

Stage 1: Screening / Test of Significance

This process identifies the likely significant effects upon a European site from a proposed project or plan. Its purpose is to determine, on the basis of a preliminary assessment and objective criteria, whether a plan or project which is not directly connected with or necessary to the management of the site as a European site, individually or in-combination with other plans or projects is likely to have a significant effect upon the European site, in view of its conservation objectives. A project may be 'screened-in' if there is a possibility or uncertainty of possible effects upon the European site, requiring a Stage Two AA. If there is no evidence to suggest significant effects due to the proposed plan or development the project is 'screened-out' from further assessment. It is this stage that is the focus of this report.

Stage 2: Appropriate Assessment

Consideration is given if potential impact(s) of a project or plan could cause likely significantly effects to the integrity of surrounding European sites, either alone or in-combination with other projects or plans, with respect to the European site's structure and function and its conservation objectives. Additionally, where likely significant effects have been identified, an assessment of the potential mitigation to avoid/reduce such impacts is required. A Natura Impact Statement (NIS) is often produced at this stage to inform the AA which is undertaken by the competent authority. This stage is required where uncertainty of effect arises, or a potential effect has been defined which requires further procedures/mitigation to remove uncertainty of a defined impact. Where there are adverse effects, an assessment of the potential mitigation to ameliorate those effects is required. If the assessment results in a negative conclusion, i.e., adverse effects on the integrity of a site cannot be excluded (by design or mitigation) or there is uncertainty as to whether an adverse impact arises, then the process must consider alternatives (Stage 3) or proceed to Stage 4.

Stage 3: Assessment of Alternatives

This stage of the potential process arises where adverse effects on the integrity of a European site cannot be excluded and examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the European site. However, in circumstances where there will not be any adverse effects on any European site, the developer places no reliance upon this third stage of the process in the context of this application for planning permission for the Proposed Development.

Stage 4: Assessment Where Adverse Effects Remain

This is the derogation process of Article 6(4), which examines whether there are imperative reasons of overriding public interest [IROPI] for allowing a project to proceed where adverse effects on the integrity of a European site have been predicted. Compensatory measures must be proposed and assessed as part of this stage and the EU Commission must be informed of the compensatory measures. Again, the developer places no reliance upon this stage of the process in the context of the application for planning permission for the Proposed Development.

2.4 Desktop Study and Information Sources

An ecological desktop study was undertaken to inform this screening for AA in September 2022. The desktop study comprised a review of the following key datasets and information sources:

- Identification of European sites within the Zone of Influence (ZoI[10]) of the Proposed Development area through the identification of potential pathways/links from the Proposed Development area and European sites and/or supporting habitats;
- Review of the National Parks and Wildlife Service (NPWS) site synopsis, Natura 2000 data forms and Conservation Objectives for European sites potentially connected with the Proposed Development (https://www.npws.ie/protected-sites);
- NPWS datasets on Annex I habitats[11] and Annex II species;
- Review of available literature and web data. This included a detailed review of the NPWS database of areas designated (and proposed) for nature conservation[12] and National Biodiversity Data Centre (NBDC)[13] websites and database, including mapping and available reports for relevant sites and, in particular, Qualifying Interests and Special Conservation Interests and their Conservation Objectives;
- Review of Inland Fisheries Ireland (IFI) research data. This included reviewing research studies carried out for the Habitats Directive and Red Data Book Fish species within the receiving environment[14];
- Information and data on water catchments from the River Basin Management Plan 2018-2021[15];
- GSI Online mapping[16];
- Environmental Protection Agency (EPA) Appropriate Assessment tool[17]; and
- Heritage map viewer[18].

In addition, aerial photography (Google Maps, Bing Maps) and mapping (Ordnance Survey of Ireland, Geological Survey of Ireland) were used to identify non-designated habitats such as rivers, woodlands, and hedgerows of local ecological importance and invasive species.

[11] https://www.npws.ie/maps-and-data/habitat-and-species-data
[12] National Parks and Wildlife Service: https://www.npws.ie/maps-and-data
[13] National Biodiversity Data Centre (NBDC): https://maps.biodiversityireland.ie/Map
[14] https://www.fisheriesireland.ie/what-we-do/research
[15] https://www.catchments.ie/guide-water-framework-directive/
[16] http://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228
[17] EPA Appropriate Assessment tool: https://gis.epa.ie/EPAMaps/AAGeoTool
[18] Data from the Heritage Map Viewer accessed through the heritage map viewer: https://heritagemaps.ie/WebApps/HeritageMaps/index.html

2.5 Field Survey Methodology

Multidisciplinary ecological field surveys were undertaken by skilled and appropriately experienced ecologists between the periods April 2019 to September 2022 (Table 2-1). The ecological surveys that were carried out and that are relevant to the consideration of the potential for the proposed development to affect the conservation objectives of the European sites in the vicinity of the proposed development: namely the habitat survey, otter survey, bird surveys, a river assessment and electrofishing survey, are described hereunder. The surveys were carried out by TOBIN Ecologists and other specialist ecologists. The data collected is robust and allowed TOBIN to draw accurate, definitive and coherent conclusions on the possible impacts of the Proposed Development on ecological receptors associated with protected European sites (SACs and SPAs).

During these surveys, areas of scientific and/or conservation interest in the vicinity of the Proposed Development were investigated. Relevant survey reports are included as Appendices A and B .

Table 2-1: Survey Works and Periods Conducted

Survey		Survey Dates	Personnel
Habitat Surveys	Habitat walkover and Mapping	August 2020 (10 days)	TOBIN
Non-volant Mammal Surveys	Otter	August 2020 (10 days)	TOBIN
Aquatic Surveys	Aquatic Ecological Surveys Kick sampling	August 2020	TOBIN
	Electro-fishing	September 2021	Stillwaters Consultancy
Breeding Bird Surveys	Vantage Point Surveys	April to September 2019	Biosphere Consultants
		April to July 2020; April to September 2021 and 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Breeding Bird Transects	April to July 2020; April to September 2021and 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Hinterland Gull Surveys	April to July 2020, 2021 and 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)

Survey		Survey Dates	Personnel
	Lowland Wader Surveys	April to July 2020, 2021 and 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Raptor and Merlin Surveys	April to July 2020; April to September 2021 and 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
Wintering Bird Surveys	Vantage Point Surveys	October 2019 to March 2020;	Biosphere Consultants
		October 2020 to March 2021; October 2021 to March 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Wintering Bird Transects	October 2020 to March 2021; October 2021 to March 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Hinterland Waterbird Surveys	October 2020 to March 2021; October 2021 to March 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Hen Harrier Roost Surveys	October 2020 to March 2021; October 2021 to March 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)

2.5.1 Habitat and Flora Survey

Multi-disciplinary walkover surveys were carried out within the proposed development site during August 2020 following the methodology outlined by '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*' (NRA, 2009[19]). Surveys were undertaken at the proposed turbine locations, including all hardstand areas, proposed met mast locations, substation location, grid connection routes and internal haul roads. These visual surveys were deemed to be adequate to assess habitats of low ecological interest (following methodology outlined in Smith *et al.*, 2011[20]). These surveys aimed to record the habitats, and flora and fauna present within the survey area as described in the following paragraphs.

The proposed development site was surveyed for protected flora and fauna and any evidence of Annex I habitats or Annex II species listed on the EU Habitats Directive (92/43/EEC) and Annex I bird species listed on the EU Birds Direct (2009/147/EC). All semi-natural habitats encountered were surveyed, including data collection on dominant vegetation, qualitative consideration of plant species diversity, presence of protected flora, vegetation structure, topography, drainage, disturbance and management. Data was recorded, and the habitats

[19] National Roads Authority (NRA, 2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. Available from https://www.tii.ie/technical-services/environment/planning/Ecological-Surveying-Techniques-for-Protected-Flora-and-Fauna-during-the-Planning-of-National-Road-Schemes.pdf

[20] Smith, G. F., O'Donoghue, P., O'Hora, K., & Delaney, E. (2011). Best practice guidance for habitat survey and mapping. The Heritage Council: Ireland.

encountered during site visits were classified in accordance with Fossitt (2000)[21] with reference made to the '*Interpretation Manual of EU Habitats*' (EC, 2013)[6], as appropriate. Specific surveys of hedgerows and treelines were also undertaken with a view to assessing their ecological importance, upon their species composition, structure and management. Although hedgerows were not commonly encountered at the site, the methodology used during the survey of hedgerows broadly followed those proposed by Murray (2003)[22].

The proposed development site was also searched for evidence of invasive plant species listed in Part 1 of the Third Schedule of S.I No. 477 of 2011, European Communities (Birds and Natural Habitats) Regulations (2011).

Species identification and nomenclature followed Parnell and Curtis (2012)[23] for higher plants, British Bryological Society (2010)[24] for bryophytes and Fitter *et al.* (1984)[25] for grasses and sedges.

Following the completion of desktop analysis and field surveys, habitat maps of the of the Proposed Development site were prepared, according to the methodology outlined in Smith *et al.* (2011). The habitat maps detail habitats and habitat complexes recorded within this area. The mapping takes account of whether the habitat determination was made by detailed field survey, visual field inspection from a distance or from remote sensing techniques, as recommended by Smith *et al.* (2011). The findings of the surveys were used to inform this assessment.

In addition to habitat surveys, fauna surveys were conducted to assess usage of the areas by mammals, and other fauna such as reptiles and amphibians (and is discussed in the following Sections). Considering the characteristics of the habitats present and the nature of the Proposed Development, it was considered unnecessary to carry out evaluations of more specialised groups, such as invertebrate (with the exception of Marsh Fritillary), although incidental records of Lepidoptera (Butterflies and Moths), as per Sterry (2016)[26] and Odonata (Dragonflies and Damselflies), as per Dijkstra *et al.* (2006)[27], were noted.

2.5.2 Non-volant Mammal Surveys

Mammal surveys were carried out within the Proposed Development site, targeting potential breeding habitat in the vicinity of the proposed turbine locations. Key target mammal species which are likely to be associated with nearby SACs include Otter (*Lutra lutra*).

Otter surveys were conducted in accordance with NRA (2009b)[19] guidelines and within 'Monitoring the Otter Lutra Lutra' (Chanin, 2003), at waterbodies close to any proposed infrastructure site to confirm otter presence in the area. In addition, all drains and watercourses at lands accessed were checked for signs of Otter presence and activity, such as holts (breeding and temporary), slides and territorial marking points (spraints), with each sign recorded.

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[21] Fossitt, J. A. (2000). A guide to habitats in Ireland. Heritage Council/Chomhairle Oidhreachta.
[22] Murray, A. (2003). Draft Methodology for a National Hedgerow Survey. Unpublished Networks for Nature Document
[23] Parnell, J., Curtis, T., & Cullen, E. (2012). Webbs An Irish Flora. Cork University Press.
[24] British Bryological Society, 2010. *Mosses and Liverworts of Britain and Ireland - a field guide.* 1st ed. Plymouth: British Bryological Society.
[25] Fitter, R., & Fitter, A. (1984). *Collins* guide *to the grasses, sedges, rushes and ferns of Britain and northern Europe*. William Collins Sons & Co. Ltd.
[26] Sterry, P. (2016). Collins Complete Guide to British Butterflies and Moths. Published by HaperCollins.
[27] Dijkstra, K.D.B., Bechly, G., Bybee, S.M., Dow, R.A., Dumont, H.J., Fleck, G., Garrison, R.W., Hämäläinen, M., Kalkman, V.J., Karube, H. and May, M.L. (2013). The classification and diversity of dragonflies and damselflies (Odonata). *Zootaxa*, *3703*(1), 36-45.

Other protected mammal species such as Badger (*Meles meles*), Deer species, Red Squirrel (*Sciurus vulgaris*), Pine Marten (*Martes martes*), Stoat (*Mustela erminea ibernica*), Irish Hare (*Lepus timidus hibernicus*), Hedgehog (*Erinaceus europaeus*), and Pygmy Shrew (*Sorex minutus*), were also surveyed for but these species are not Qualifying Interests for any SAC in the area and will not be discussed further.

2.5.3 Aquatic Surveys

A baseline aquatic ecological assessment was carried out at seven locations hydrologically connected with the Proposed Development site in August 2020 and September 2021. These sites, where feasible, were selected as being representative of the local aquatic environment, to inform the ecological impact appraisal from the Proposed Development on freshwater ecology (Figure 2-1).

Sites were also deemed suitable based on suitable access available and if the river was wadable to allow for an aquatic habitat assessment and macroinvertebrate survey to be carried out.

2.5.3.1 Riverine habitat

The surveys included an aquatic assessment of the riverine habitat available to support fish and aquatic species, an assessment of the macroinvertebrate community and an analysis of the biological water quality of the watercourse. A broad appraisal / overview of the upstream and downstream habitat at each site undertaken to evaluate the wider contribution to salmonid and lamprey spawning to assess if the water course could support salmonids and access the general fisheries habitat.

The purpose of the surveys was to assess the overall aquatic habitat value of the river downstream of the proposed development, particularly in relation to protected species such as Atlantic salmon (*Salmo salar*), lamprey (*Lampetra spp.*) and white-clawed crayfish (*Austropotamobius pallipes*). The surveys would help identify the presence of habitats capable of supporting the aforementioned species.

The river habitat assessment surveys and fisheries assessments were carried out utilising elements of the approaches in the River Habitat Survey Methodology (Environment Agency, 2003) and Fishery Assessment Methodology (O'Grady, 2006) and '*Ecology of the Atlantic Salmon'* (Hendry & Cragg-Hine, 2003) to broadly characterise the river sites (i.e. channel profiles, substrata etc.). An evaluation of potential lamprey habitats within the study area was made with reference to methodologies outlined in *'Ecology of the River, Brook, and Sea Lamprey'* (Maitland, 2003) and also NPWS Irish Wildlife Manuals lamprey surveys (O'Connor, 2007). An assessment of the habitat to support white-clawed crayfish was also undertaken following methodologies outlined in '*Guidance on Habitat for White-clawed Crayfish*' (Peay, 2002).

Each sampling site along the watercourse was described in terms of the important aquatic habitats and species recorded (i.e. based on their conservation value). This determined the ecological evaluation of each aquatic survey site and informed site-specific mitigation for the proposed development. Watercourse characteristics including bankside vegetation, substrate and flow rate were recorded onsite. A number of physical habitat variables were measured at each site. These included the percentage of overhead shade present, percentage of substrate type and instream cover, bank height and bank width. The percentage of riffle, glide and pool was also measured over each site surveyed.

2.5.3.2 Macroinvertebrate survey

In addition, a semi-quantitative sampling of benthic (or bottom dwelling) aquatic macroinvertebrates was undertaken at the four selected sites using standard EPA kick-sampling methods (EPA, 2021) ensuring an accurate representative sample of the fauna present at each site was collected. The Quality Rating (Q) System (Toner *et al.*, 2005) was used to obtain a water quality rating for each site.

Biological water quality was assessed by the Q-value methodology, following the Standard Operating Procedures of the EPA (2021). The Q value is used to determine the ecological status of the waterbody, which is an action required under the obligations set out in the EU Water Framework Directive. Under this Directive, all water bodies are required to meet good status within a certain time period. Ireland is now in the third cycle of the Water Framework Directive and therefore good status should be achieved in all water bodies by the end of this current cycle, i.e., 2024. If a waterbody is unlikely to achieve this status, then it is deemed to be At Risk.

In order to determine the biological quality of the river, the Q-scheme index is used whereby the analyst assigns a Biotic Index value (Q-Value) based on macroinvertebrate results. For the purpose of this assessment benthic invertebrates have been divided into five indicator groups according to tolerance of pollution, particularly organic pollution (Lucey *et al.*, 1999). The Biotic Index is a quality measurement for freshwater bodies that range from Q1 – Q5 with Q1 being of poorest quality and Q5 being pristine/unpolluted (see Table 2-2).

Table 2-2: Biotic Index scoring system for the Q-Scheme

Biotic Index	Quality Status	Quality Class
Q5, 4-5, 4	Unpolluted	Class A
Q3-4,	Slightly Polluted	Class B
Q3, 2-3	Moderately Polluted	Class C
Q2, 1-2, 1	Seriously Polluted	Class D

Four of the seven sites were selected for kick sampling. At each site, notes on the physical habitat were recorded. A semi-quantitative, two-minute macroinvertebrate kick-sample was collected from the riverbed, with the aim of targeting faster flowing riffle habitats where possible. A further one-minute hand search was carried out to locate macroinvertebrates that may have remained attached to the underside of the cobbles if possible. This sampling approach is sufficient to achieve a suitable representation of taxa for bioassessment. Due to the substratum (e.g. bedrock), flow conditions and heavy sediment present, it made kick-sampling difficult, and the abundance of macroinvertebrates collected was extremely low. It was necessary to spend a longer amount of time sampling the river to accumulate a sufficient diversity and abundance of macroinvertebrates. This sampling approach requires avoidance of obvious localized disturbance (e.g. cattle access points) which may adversely influence the sample taken.

The species assemblage list was used to assign a Biotic Index value (Q-Value) to the sampled stream. It involved recording the taxa present at a suitable and attainable taxonomic resolution (i.e. genus or species) and their categorical relative abundance, determined using approximate counts. Once all taxa and their relative abundance were recorded, the sample was returned to the river.

2.5.3.3 *Electrofishing*

An electrofishing survey was carried out (with Section 14 Authorisation from the Department of Environment, Climate and Communications (DECC)), on the 15th and 16th of September 2021 by Stillwaters Consultancy, following methodologies outlined within Matson et. al (2018). The electrofishing surveys were undertaken at 10 locations both within and downstream of the proposed development. Electrofishing was carried out to establish the fish species richness and species of conservation importance such as Atlantic salmon (*Salmo salar*), lamprey (*Lampetra spp.*) and also record the white-clawed crayfish (*Austropotamobius pallipes*) if present. A copy of the Electrofishing Report is included within Appendix A of this report.

2.5.4 *Breeding and Winter Bird Surveys*

A number of bird survey methodologies were selected and implemented in order to obtain an adequate usage of the site by target Annex I bird species and those listed as SCIs of SPAs within the ZoI, including Vantage Point (VP) surveys, Breeding and Wintering Transects, Lowland Wader surveys, Breeding Raptor surveys, Waterbird surveys and Hen Harrier (*Circus cyaneus*) Roost survey. Other surveys were also implemented including, Woodcock (*Scolopax*) and Red Grouse (*Lagopus lagopus scotica*) Surveys, however in order to inform the AA process and as these species are not listed on Annex I, they will not be examined further in this report.

2.5.4.1 *Study area*

The Proposed Development includes an 18 no. turbine wind farm in County Mayo and all associated infrastructure. The study area for the Ornithological Assessment comprised the proposed wind farm site and the wider surrounding hinterland up to 2km for some surveys. The study area is illustrated in Figure 2-2.

2.5.4.2 *Vantage Point Surveys*

VP surveys aim to quantify the level of flight activity and its distribution over the survey area. The data collected during the VP surveys will inform a Collision Risk Model (CRM), which will estimate bird collisions with turbines.

VPs are fixed locations, strategically positioned to provide maximum visibility of the study area from a minimum number of locations. When selecting VP locations, the survey area from each VP should not extend to a distance beyond 2km from the VP, with an arc no greater than 180 degrees (Scottish Natural Heritage [SNH], 2017)[28]. In the case of the Proposed Development, seven VPs guaranteed 100% coverage of the study area.

Following SNH (2017)[28] guidance, VP surveys were undertaken for 36 hours per VP, per season (breeding and non-breeding). The timing of watches was tailored to the ecology of the target species present on site, including dawn, day and dusk. Recorded information included dates, VP location, weather, survey start and end time, species observed, time of observation, number of individuals per observation, height of flight, duration of flight, amongst other relevant behaviour. All flight lines of target species were mapped on field sheets. The VPs and viewshed are illustrated on Figure 2-3.

[28] Scottish Natural Heritage (SNH) (2017). Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms. SNH Guidance. Scottish Natural Heritage, Battleby. Version 2.

The results of the VP surveys will feed into a Collision risk model according to the Band *et al.* (2007)[29]. Data collected during flight activity VP surveys were used to predict the number of individuals per species expected to collide with the turbine rotors per season. The swept area of the rotor blade is the area in which a collision is theoretically possible. Potential collision height (PCH) is therefore defined as the area of space occupied by the turbine rotors. Potential collision height will vary between wind farms and with the specification of the manufacturer. At Oweninny, PCH was considered to be within the height band of 25-200m[30] above ground level. In general, three height bands were used by surveyors to characterise flight height: below PCH, at PCH and above PCH.

2.5.4.3 Breeding and Winter Bird Transects

The aim of the transect walkover surveys is to establish the distribution and abundance of breeding and wintering birds within the study area. A transect survey follows a defined linear route through a specific area, to achieve maximum coverage of suitable bird habitat to recorded locations and distributions of breeding birds. These transects covered a large and representative portion of the survey area. Where access allowed, all areas of suitable habitat were surveyed on site to a 500m radius from the planning/development boundary, as per SNH (2017)[28], the transects used can be seen in Figure 2-4. The transect surveys were walked at a standard speed. Notes on aural and visual registrations of bird species were recorded during field surveys. Visual registrations were recorded with the aid of binoculars and if necessary, with the aid of a telescope, Particular emphasis was paid to waders in areas of bare peat and other target species.

Breeding season transect surveys were conducted between April and September in 2020, 2021 and 2022 and winter bird transects were conducted between October to March in 2020/2021 and 2021/2022. These are the recommended periods for conducting breeding and wintering bird surveys. Birds present were recorded by sight and song/call. For all species, every effort was made to minimise disturbance risks that might be caused by the human intrusion associated with undertaking the survey. The surveyor regularly stopped to allow rapid detection of species presence, such as displaying birds and to take appropriate avoidance measures.

2.5.4.4 Hinterland Gull Surveys

Gull surveys were undertaken for Black-headed Gull (*Larus ridibundus*) and Common Gull (*Larus canus*) within suitable breeding gull habitat the study area (up to 2km from the redline boundary) between April and July in 2020 and 2021. Suitable breeding gull habitat included any large freshwater lakes, ponds or watercourse, which contained small islands or were relatively predator free. The Breeding Gull survey followed methodologies outlined in Gilbert *et. al* (1998)[31]. Suitable breeding gull habitat around lakes and watercourses within the site were surveyed. The aim of the survey was to establish the distribution and abundance of breeding gulls within the study area. Where surveyors encountered colony breeding species such as breeding gulls, survey methods were further adopted to ensure the most accurate count data was produced. All assemblages of gulls were counted and recorded.

[29] Band, W., Madders, M. & Whitfield, D.P. (2007) Developing field and analytical methods to assess avian collision risk at wind farms. In: de Lucas, M., Janss, G.F.E. & Ferrer, M. (Eds.) Birds and Wind Farms: Risk Assessment and Mitigation, pp 259-275. Quercus, Madrid.
[30] This height is based on predictions of turbine hub heights and rotor blade lengths.
[31] Gilbert, G., Gibbons, D & Evans, J. (1998). Bird Monitoring Methods. RSPB, Sandy.

2.5.4.5 Lowland Wader Surveys

The Breeding Wader survey followed methodologies outlined in Gilbert *et. al* (1998)[31] and Brown & Shepherd (1993)[32] . Suitable breeding habitat for waders were surveyed within the study area (up to 2km from the redline boundary) between April and July in 2020 and 2021 which included wetlands, bogs, wet grassland, marsh, fens, river valleys, raised bog, degraded raised bog, cutover bog and blanket bog. The aim of the survey was to establish the distribution and abundance of breeding waders within the study area.

2.5.4.6 Raptor Surveys

The aim of this survey was to establish the distribution and abundance of breeding raptors within the study area with particular reference to breeding species, which are Special Conservation Interests for SPAs within the Zone of Influence.

The breeding raptor survey methodology broadly followed Hardey *et al.* (2013)[33], as recommended by SNH (2017)[28]. The recommendation made by Hardey *et al.* (2013)[33] is for at least four visits to the study area. Suitable habitat for breeding raptors was surveyed each month from April to July in 2020 and April to September in 2021 and 2022. The timing of visits was tailored to the ecology of targeted breeding raptor species, spanning dawn, day and dusk. To account for the wide-ranging nature of breeding raptors, the study area included both the proposed wind farm site and the surrounding hinterland to a 2km radius from the planning/ development boundary.

2.5.4.7 Hinterland Waterbird Surveys

Survey methodology followed the 'look-see' method by Bibby *et al.* (1992). This involves recording the number of individuals of each waterbird species at local wetland water bird sites during daylight hours (ideally at dawn and dusk) from suitable VPs using binoculars and/or a telescope as required. Counts were undertaken once per month, from October to March, during the 2020/2021 and 2021/2022 winter seasons. The area surveyed included the hinterland of the site to a 5km radius from the planning/development boundary.

These surveys aimed to assess the distribution and abundance of wintering water birds within the wider surroundings of the Proposed Development site and to determine if populations of species of national or international importance occur within the study area.

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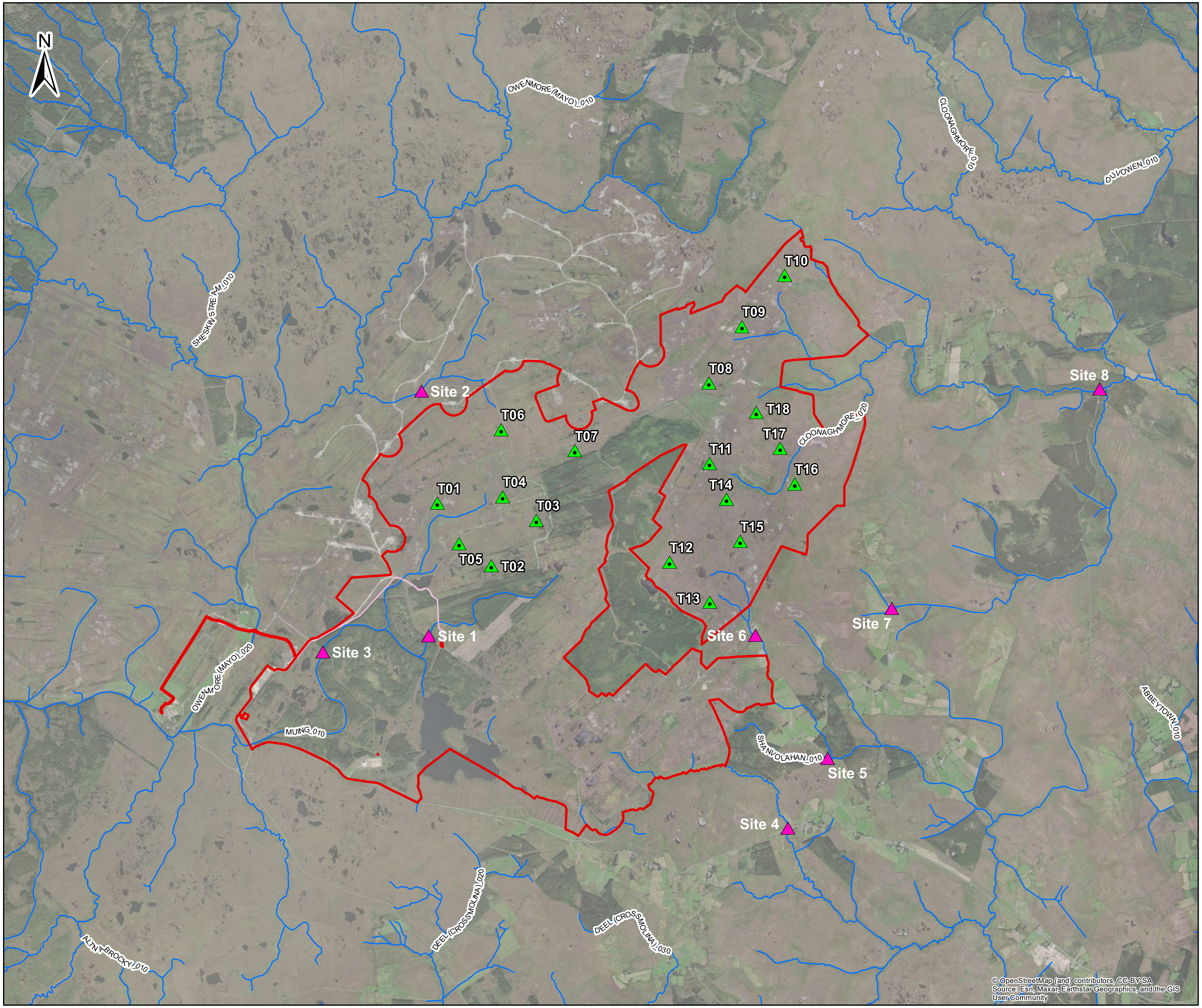
[32] Brown, A. F., & Shepherd, K. B. (1993). A method for censusing upland breeding waders. Bird Study, 40(3), 189-195.
[33] Hardy, J., Crick, H., Wernham, C., Riley, H., Etheridge, B., Thompson, D. (2013). Raptors: A Field Guide for Surveys and Monitoring.



Legend

- Planning Application Boundary
- Aquatic Survey Locations
- Proposed Turbine Locations
- Grid Connection Route
- Rivers

0 0.5 1 1.5 2
Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D02	22/03/2023	Draft issue	S.P	J.D
D01	01/02/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project:
Oweninny Wind Farm
Phase 3

Title:
Figure 2-1:
Aquatic Survey Sites

Scale @ A3: 1:40,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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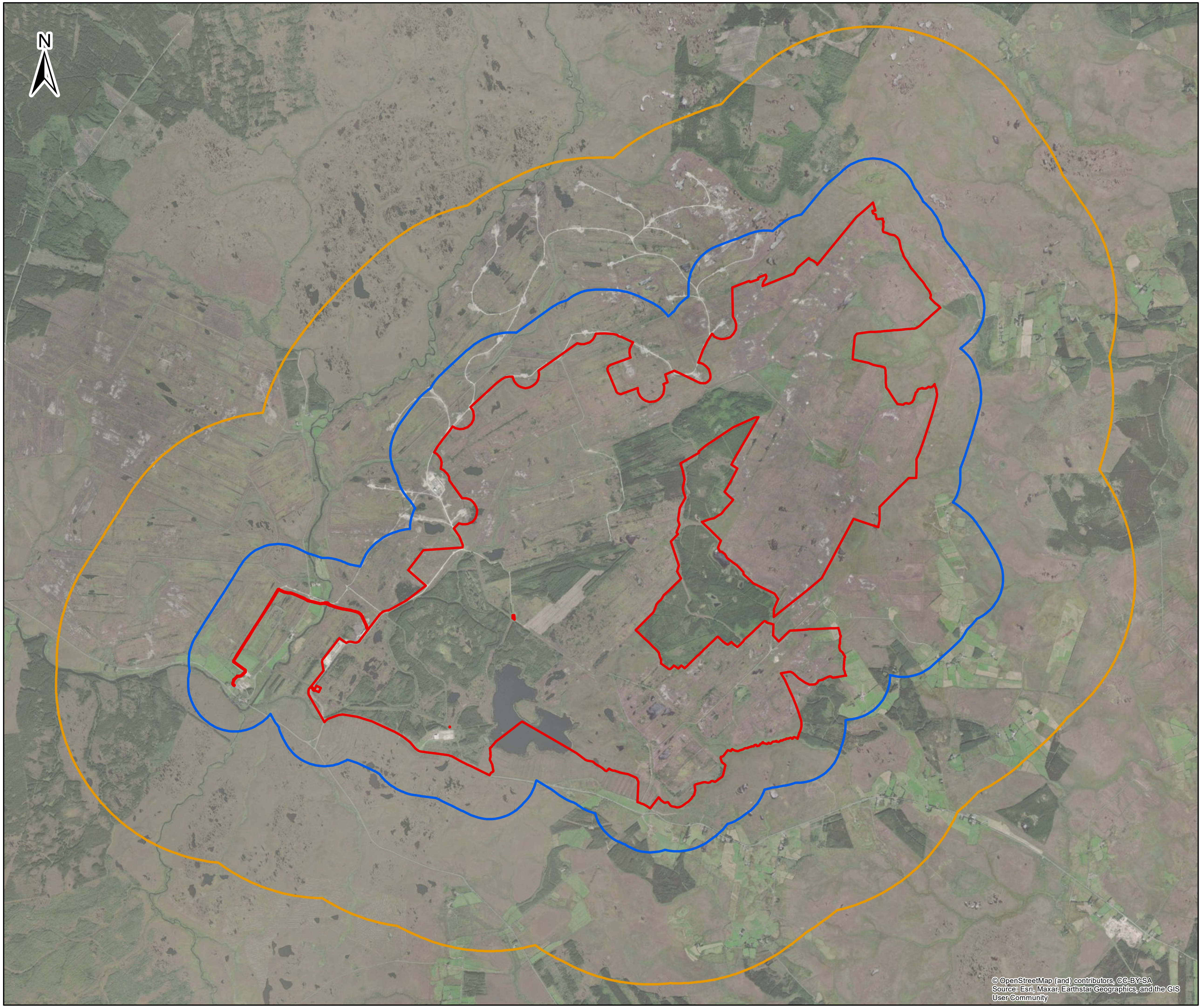

Legend

- Planning Application Boundary
- 2km Study Area
- 500m Study Area

0 0.5 1 1.5 2
Kilometres

NOTES

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2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D02	22/03/2023	Draft issue	S.P	J.D
D01	01/02/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client:

Bord na Móna

Project:

Oweninny Wind Farm
Phase 3

Title:

Figure 2-2:
Breeding and Winter Bird Study Area

Scale @ A3: 1:40,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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Draft: D02

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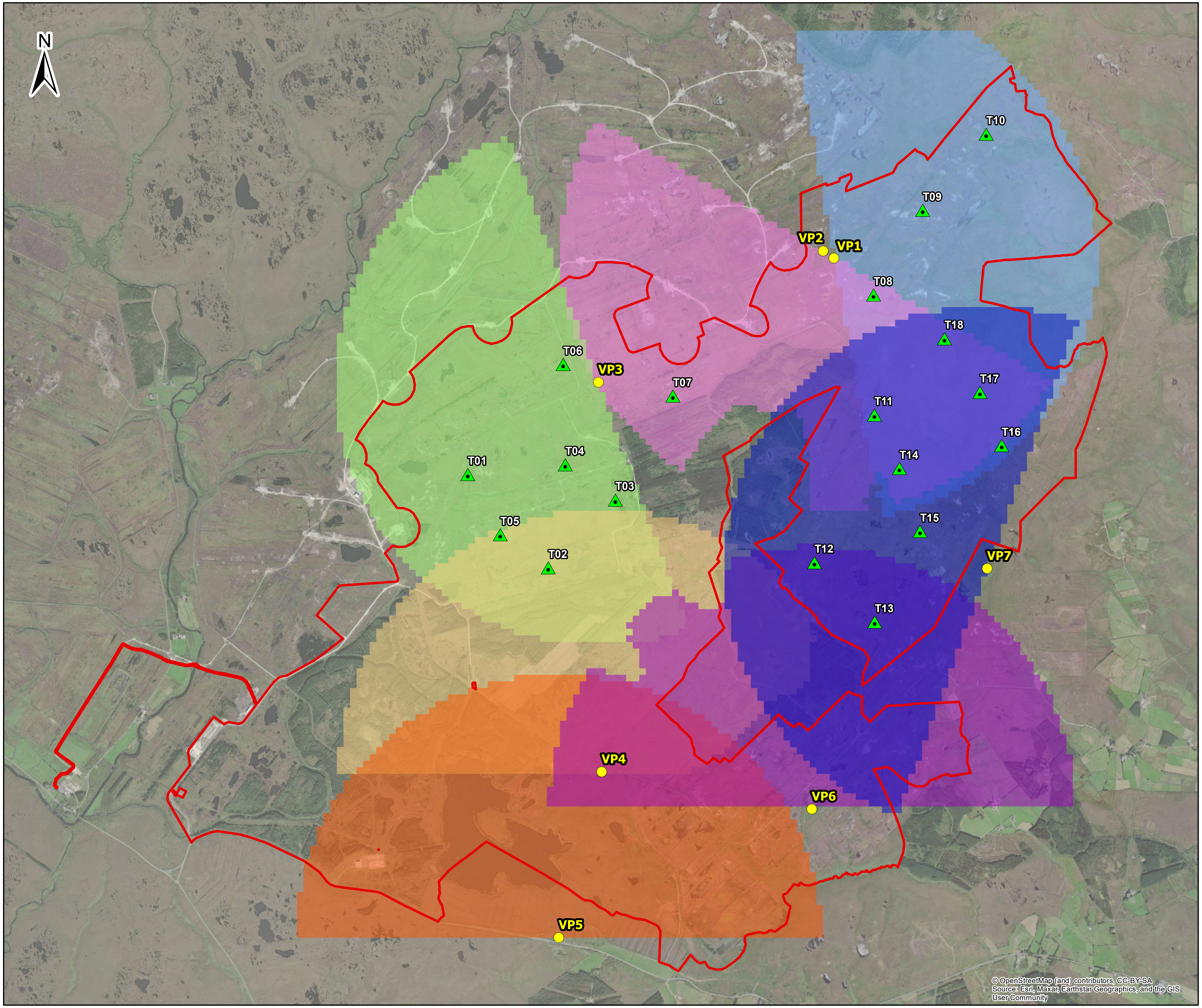

Legend

- Planning Application Boundary
- Proposed Turbine Locations
- Vantage Points

VP7
- Not Visible
- Visible

VP6
- Not Visible
- Visible

VP5
- Not Visible
- Visible

VP4
- Not Visible
- Visible

VP3
- Not Visible
- Visible

VP2
- Not Visible
- Visible

VP1
- Not Visible
- Visible

0 0.25 0.5 0.75 1
Kilometres

NOTES

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D02	22/03/2023	Draft issue	S.P	J.D
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Issue	Date	Description	By	Chkd.

Client:

Bord na Móna

Project:

Oweninny Wind Farm
Phase 3

Title:

Figure 2-3:
Vantage Points and
Viewshed

Scale @ A3: 1:27,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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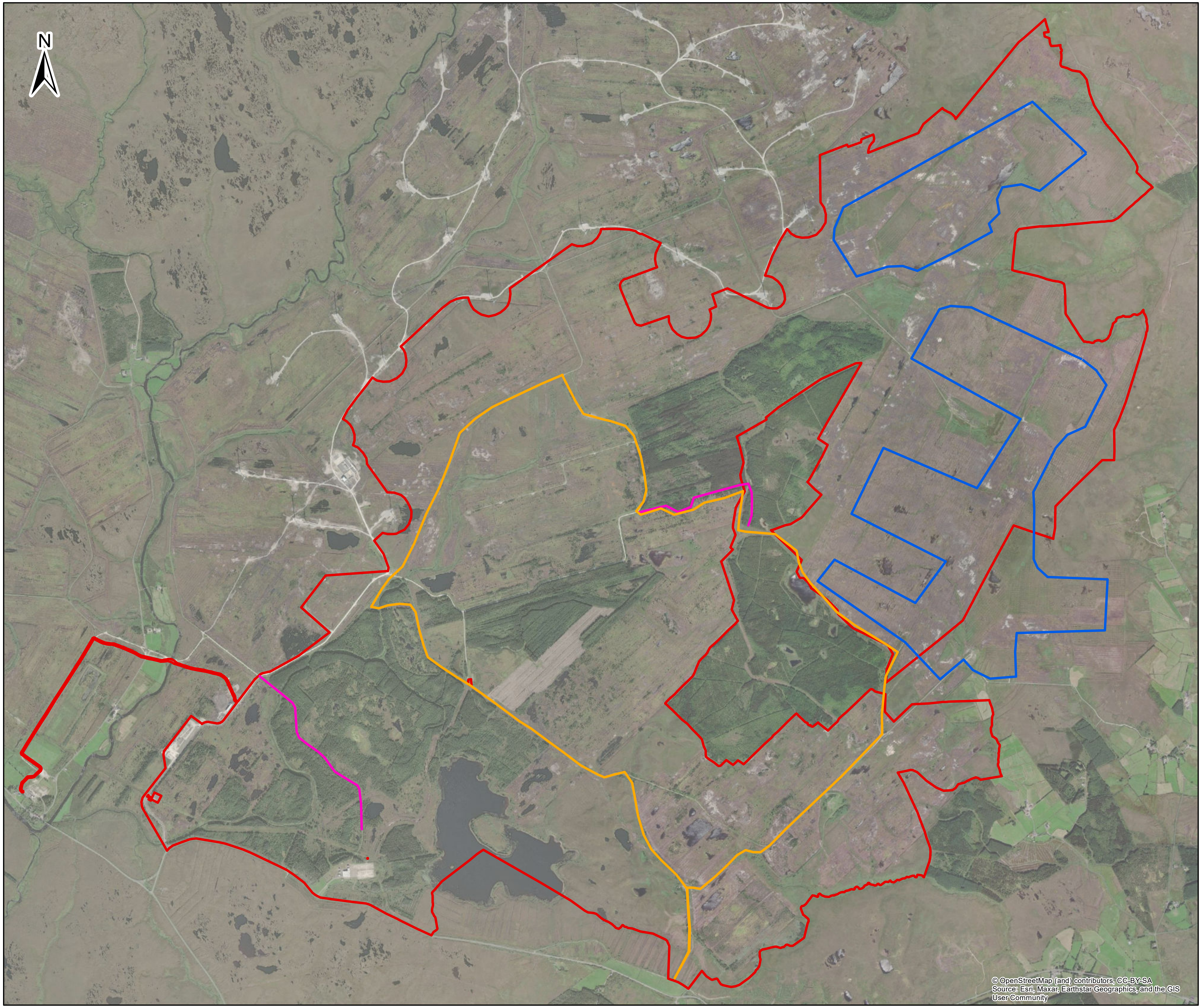

Legend

- Planning Application Boundary
- Breeding Wader Transects
- Breeding and Winter Bird Transects
- Breeding Woodcock Transect

0 0.25 0.5 0.75 1
Kilometres

NOTES

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Issue	Date	Description	By	Chkd.
D02	22/03/2023	Draft issue	S.P	J.D
D01	01/02/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Figure 2-4: Breeding and Winter Bird Transects

Scale @ A3: 1:25,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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Draft: D02

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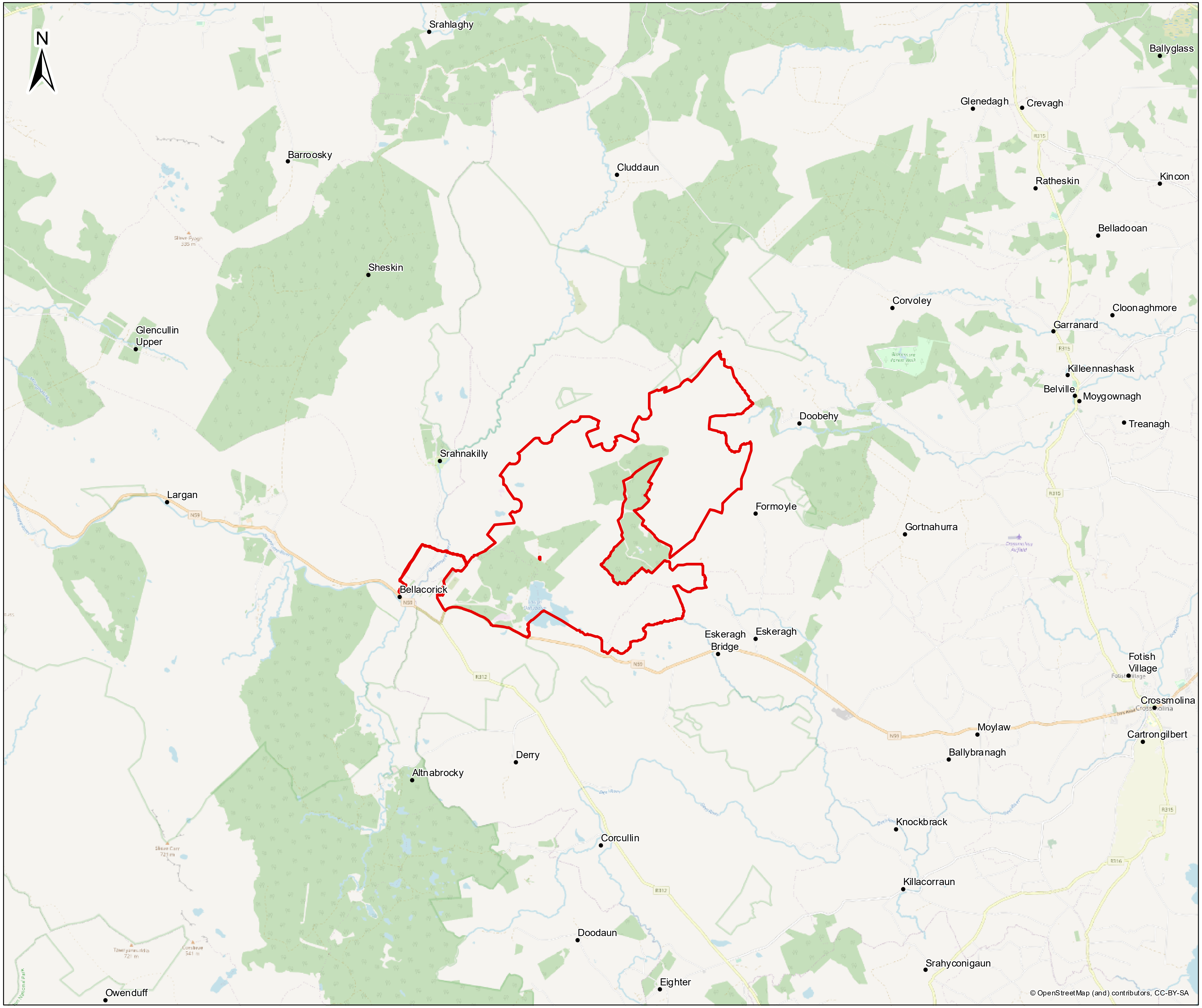
3.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1 Site Location

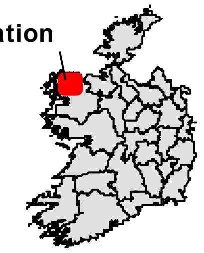
The Proposed Development is located at Oweninny Bog, in North Co. Mayo, a relatively sparsely populated area (Figure 3-1). The nearest settlement to the Proposed Development site is Bellacorick village, which is located approximately 2km from the southwestern extent of the Proposed Development. To the east of the Proposed Development site, a local road (L5292) runs northwards from the N59 to the townlands of Shanvolahan and Formoyle.

The site is located directly adjacent to the Oweninny River (Owenmore [Mayo] (EPA Code: 33O04), within the Blacksod-Broad Haven WFD catchment (33), flowing in a southernly direction, before discharging into the main tributary of the Owenmore River, at Bellacorick.

The Proposed Development is located to the east of two consented wind farm developments on Oweninny bog: the Oweninny Wind Farm Phase 1, located immediately west/northwest (commissioned in 2019); and Oweninny Wind Farm Phase 2 to the west, which is currently under construction. In addition, since 1992, Ireland's first commercial wind farm, a 21-turbine development known as Bellacorick Wind Farm which is owned and operated by Renewable Energy Ireland Limited, is operating on the site.



Site Location



Legend

Planning Application Boundary

0 1 2 3 4
Kilometers

NOTES

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D01	28/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client:

Bord na Móna

Project:

Oweninny Wind Farm
Phase 3

Title:

Figure 3-1:
Site Location Map

Scale @ A3: 1:80,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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Draft: D01

3.2 Overview of Proposed Development

The Proposed Development comprises the construction of 18 no. wind turbines and ancillary works. The turbines will have a blade tip height of 200m above the top of the foundation level and will be accessible from internal access routes within the Bord na Móna site. More details of the proposed development can be found in Chapter 3 of the EIAR.

The proposed development will comprise:

- 18 no. wind turbines (including tower sections, nacelle, hub, and rotor blades) and all associated foundations and hard-standing areas in respect of each turbine;
- Decommissioning and removal of 21 no. existing Bellacorick Wind Farm wind turbines (including tower sections, nacelle, hub, and rotor blades);
- New internal site access roads (permanent and temporary), passing bays, car parking and associated drainage;
- An amenity route through the site from the N59 at the main site entrance to the existing Visitors Centre, and access from a local road off the N59 near Dooleeg;
- 2 no. borrow pits;
- 5 no. peat deposition areas;
- 1 no. permanent Meteorological Mast 120m high, and the decommissioning and removal of an existing 100m Meteorological Mast on site;
- 4 no. temporary construction compounds, including material storage, site welfare facilities and site offices;
- 1 no. 110kV electrical substation compound including an Air Insulated Substation (AIS), control buildings and electrical plant and equipment;
- All associated underground electrical and communications cabling connecting the wind turbines to the proposed substation;
- All works associated with the connection of the proposed wind farm to the national electricity grid, including a 110kV underground electrical cable from the proposed on-site electrical sub-station to the existing sub-station at Bellacorick;
- Improvements to existing access junction on the N59 to facilitate the delivery of abnormal loads and construction access;
- Improvements and temporary modifications to public road infrastructure to facilitate the delivery of abnormal loads; and
- All related site works and ancillary development including (but not limited to):
    - Earthworks;
    - Main and assist cranes;
    - Peat management works;
    - Site security;
    - Groundwater management, as required;
    - Overburden (soils/peat) storage and management; and
    -
- Site reinstatement, landscaping and erosion control, to be aligned with the existing site rehabilitation plan.

A 10-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm.

The exact rating and design of the proposed turbine, subject to completion of the statutory processes, will be subject to a competitive tender and will be detailed by the turbine manufacturer on award of the contract. However, the proposed turbines will be a three bladed, horizontal axis type. The proposed site layout and proposed works are shown in Figure 3-2.

3.3 Construction Phase Activities

3.3.1 Construction Phase Description and Duration

It is expected that the construction works will take approximately 24 months from starting onsite to completion of commissioning of the turbines. The total number of construction staff on-site will vary during the construction phase of the works but are expected to peak at approximately 100 - 200 persons.

Normal working hours during the construction period are expected to be Monday to Friday 08.00 to 20.00 hours. During certain stages of the construction phase, it is expected that some work will have to be carried out outside of normal working hours however this will be kept to a minimum.

3.3.2 Wind Turbines

The exact rating and design of the proposed turbine will be subject to a competitive procurement process that will only commence if the project receives consent. The proposed turbine will be detailed by the turbine manufacturer on award of the contract. However, the proposed Oweninny Wind Farm Phase 3 turbines will be the 18 no. three bladed, horizontal axis type with installed capacities of approximately 5MW per turbine resulting in an estimated 90MW in total for the wind farm.

The blades of modern turbines are made of fibreglass or carbon fibre reinforced polyester and are aerodynamically shaped to improve efficiency and lower noise production. The rotor diameter will be 158m. This rotor diameter corresponds to a hub height of 121m and a blade length of 77.5m. The turbines will have a tip height of 200m above the top of foundation level. Blades will turn at 9 to 18 revolutions per minute (rpm) depending on wind speed and type of turbine. Turbines will typically begin generating electricity at wind speeds of 2.5 to 3.5m/s with optimum power generation at wind speeds of approximately 12 to 20m/s. Turbines usually shut down at wind speeds greater than 25m/s in order to protect themselves from excessive wear.

Construction of the turbine bases will require excavation of the surrounding soil or peat from the foundation and crane hardstanding area to founding level with access being provided from adjacent tracks at or near the surrounding ground level. The soil or peat will be replaced with granular fill where required.

Each wind turbine will require piled foundations or a gravity foundation of reinforced concrete (RC) comprising a base slab bearing onto rock or other competent substrata with a central upstand to support the tower. The foundations for each turbine will be designed by the appointed Designer. Piled foundation bases are generally 24-26 m in diameter and gravity foundation bases are also 24-26 m in diameter with detailed foundation design being dictated by the local ground conditions.

Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground surface. The turbine foundation transmits any load on the wind turbine into the ground. After the foundation level of each turbine has been formed using piling methods or on competent strata, the bottom section of the turbine tower or cage. Reinforcing steel is then built up around and through the cage and the outside of the foundation is shuttered with demountable formwork to allow the pouring of concrete.

Hardstand 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, for offloading and storage of turbine components, and generally provide a safe level working area around each turbine position. The hard-standing areas are extended to cover the turbine foundations once the turbine foundation is in place.

3.3.3 Site Roads

The proposed development site will be accessed via the N59 road using the existing operational entrance for Oweninny Wind Farm Phase 1. Internal site roads will be constructed as part of the initial phase of the construction of the wind farm. Material will either be imported into the site or won from the proposed borrow pits within the site to provide the required base of the internal roads. The internal roads will be a mixture of permanent (construction/operational and amenity) roads, temporary (construction only) roads and amenity pathways/cycleways (permanent).

New roadways will have a running width of approximately 6 metres (6.5m including shoulders), with wider section at corners, bends and on the approaches to turbine locations. The proposed new roadways incorporate passing bays to allow traffic to pass easily while traveling around the site. Peat/soil excavated as part of the construction of the internal roads will be sidecast, bermed and profiled on either side of the trackway or brought to the nearest peat deposition area.

Two road construction methodologies will be used:

- Floating Roads
- Founded Roads

These construction methodologies are detailed in the section on road construction and can be summarised as follows:

Construction of New Floating Roads

A base geogrid is laid directly onto the existing peat surface. Up to 1,200mm of granular fill is laid with 2 no. layers of geogrid and possibly a geotextile separator. 5m wide pressure berms (typically 1m in height) may be required either side of the access road in some of the deeper peat areas. Granular material is end-tipped, and a bulldozer spreads the tipped stone over the base geogrid along the line of the road. A final surface layer is placed over the floating road and graded to accommodate wind turbine construction and delivery traffic. The finished road surface width will be approximately 6m.

Construction of New Founded Roads

Interceptor drains are installed upslope of the access road alignment to divert any surface water away from the construction area. Excavation takes place to a competent stratum beneath the peat. Road construction is carried out in sections of approximately 50m lengths. Where appropriate, excavated peat is placed/spread alongside the excavations. Battering of the side slopes of the excavations is carried out as the excavation progresses. A layer of geogrid/geotextile may be required at the surface of the competent stratum. A final surface layer shall be placed over the excavated road, as per design requirements, to provide a road profile and graded to accommodate wind turbine construction and delivery traffic. The surface of the finished excavated access road is 1.2m above existing ground level.

3.3.4 Borrow Pits

There are two potential borrow pit locations which have been identified to produce excavated material to provide fill material for roads (permanent, temporary, amenity), passing bays, hardstands, upfill to foundations and temporary compounds. The borrow pits are located on the north-west and north-east corners of the proposed development and are at advantageous locations with regards to the hauling of materials within the site.

The total approximate volume of potentially usable material is up to 300,000m^3. No rock breakers or blasting is proposed for extracting material from these borrow pits. Extraction from borrow pits will be from above and below the water table. Where extraction is taken place above the water table, refuelling areas may be provided within the pit to allow for ease of work. The refuelling area will consist of a concrete slab upon which the fuel bowser will sit. This slab is designed to retain any fuel spillage which would fall to the centre of the slab. Drainage is via an interceptor.

Given the volumes of material available from these borrow pits, it is possible that they will fulfil a portion of the material requirements for the project. The use of on-site borrow pits will reduce the environmental effect of other aspects of the development such as by reducing the need to transport material to the site.

Post-construction, the borrow pit area will be partially backfilled with overburden and excavated material from elsewhere on the site and permanently secured. The temporary access roads to the borrow pits will be removed. Berms will be erected around the area to prevent access as necessary. Appropriate health and safety signage will also be erected on the berms and at locations around the borrow pit.

3.3.5 Electricity Substation and Control Room

It is proposed to construct one 110 kV substation within the site. The construction and electrical components of the substations will be to EirGrid specifications. The footprint of the proposed substation is approximately 135m in length by approximately 75m in width. The substation footprint will include two control buildings and electrical apparatus necessary to facilitate the generated power from the wind turbines to export onto the transmission system.

The two substation control buildings will be located within the substation compound. Control Building 1 (Asset Owner Control Building) will measure approximately 25mx15m and approximately 9.6m in height. Control Building 2 (IPP Control Building) will measure approximately 19m x 12m and approximately 7m in height.

The wind farm control buildings will include welfare facilities for the staff that will work on the proposed wind farm during the operational phase of the project. Toilet facilities will be installed with a low-flush cistern and low-flow wash basin. Due to the specific nature of the proposed development, there will be a very small water requirement for occasional toilet flushing and hand washing and therefore the water requirement of the Proposed Development is small. It is proposed to install a groundwater well adjacent to the substation. The well will be flush to the ground and covered with a standard manhole. A pump house is not currently required as an in-well pump will direct water to a water tank within the roof space of the control building (subject to final design).

It is proposed to manage wastewater from the staff welfare facilities in the control buildings by means of a sealed storage tank, with all wastewater being tankered off-site by a permitted waste collector to a wastewater treatment plant. It is not proposed to treat wastewater on-site, and therefore the EPA's 'Code of Practice: Wastewater Treatment and Disposal Systems Serving Single Houses' (EPA, 2021) does not apply. Similarly, the EPA's manual on 'Treatment Systems for Small Communities, Business, Leisure Centres and Hotels' (EPA, 1999) also does not apply, as it too deals with on-site treatment of wastewater.

Such a proposal for managing the wastewater arising on site has become standard practice on wind farm sites, which are often proposed in areas where finding the necessary percolation requirements for on-site treatment would be challenging and has been accepted by numerous Planning Authorities and An Bord Pleanála as an acceptable proposal. The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. Full details of the proposed tank alarm system will be submitted to the Planning Authority in advance of any works commencing on-site. The wastewater storage tank alarm will be integrated with the on-site electrical equipment for alarm notification that will be monitored remotely 24 hours a day, 7 days per week. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007 (as amended), will be employed to transport wastewater away from the site. When the final destination of the materials is known following the appointment of a permitted contractor, this information will be submitted to the Planning Authority if necessary.

3.3.6 Underground Cabling from Turbines to Substation and Grid Connection

Clusters of turbines will be connected to the on-site proposed 110kV substation via underground MV cables. Fibre-optic cables will also connect each wind turbine to the wind turbine control system located within the IPP Control Building. The electrical and fibre-optic cables running from the turbines to the substation compound will be run in cable ducts approximately 1.2 metres below the ground surface alongside the proposed wind farm internal roadways.

The proposed 110kV substation will be connected to the national grid at the existing 110kV Bellacorick substation via underground MV cables and will export power via the existing 110 kV overhead line infrastructure from Bellacorick substation.

The MV cables to Bellacorick substation will follow a route, utilising the existing internal road network for part of the route before crossing open bog and the Oweninny River (the cable will be attached to an existing bridge over the river, no instream works or directional drill required) and connecting with the substation. This will require approximately 5km of transmission cable from the substation to the Bellacorick substation. The cables will be laid in trenches as per ESB Networks Specification and excavations will be reinstated entirely/backfilled during reinstatement works.

At one crossing point on local Shranakilla Road (approximately 180m from the Oweninny River), the cable duct will be drilled under the road using single shot Horizontal Directional drilling (HDD). The cable duct will be drilled at 2 metre depth. A launch pit for the directional drilling run will be excavated on one side of the road and a reception pit will be excavated on the other side. A pilot borehole will be drilled on the proposed route and this hole will be enlarged by passing a larger cutting tool of sufficient diameter to allow the cable duct to pass. The cable duct will be pulled through the hole by the drill stem and cutting head to allow for the centring of the pipe through the newly cut hole.

3.3.7 Anemometry Mast

One permanent anemometry mast is proposed as part of the proposed development. The anemometry mast will be equipped with wind monitoring equipment at various heights. The mast will be a slender, free-standing lattice structure up to 120m in height. The mast will be constructed on a hardstanding area sufficiently large to accommodate the crane that will be used to erect the mast, adjacent to an existing track.

3.3.8 Amenity Track

An amenity track, approximately 5.2km in length, will be provided as part of the development facilitating a route through the site from the N59 via pedestrian access at the main site entrance to the existing Oweninny Wind Farm visitor centre Marcon, and also from a local road off the N59 at Dooleeg. These access points are close to the Western Way (Slí an Iarthair) Trail which runs along the N59 and continues north to Ballycastle, along the western periphery of the Bellacorick Bog Complex.

The amenity track will be suitable for both walking and cycling. Feedback from public consultation suggests that current users would prefer that the existing surface of the track be retained where possible. Where this is not possible, in localised areas gravel/crushed stone will be used to improve the track surface.

3.3.9 Culvert Crossings

Culverts will be required where site roads, crane pads and turbine pads cross main bog drainage networks. Precast concrete culverts of minimum 300mm in diameter shall be provided. Culverts will be installed to conform, wherever possible, to the natural slope and alignment of the drainage line. Where required, culverts will be buried at an appropriate depth below the channel bed and the original bed material placed at the bottom of the culvert. The sizing of any new internal drainage crossings will maintain existing depth of flow and channel characteristics. Installation of culverts will follow the guidelines on the protection of fisheries during construction works in and adjacent to waters[34].

3.3.10 Temporary Compounds, Hardstands Material Storage Areas and Site Offices

At the commencement of the construction phase, four temporary compound areas will be constructed to provide office space, welfare facilities, hardstands for storing materials and hazardous materials.

The site accommodation is likely to consist of temporary porta-cabins constructed on a granular platform. The peat/topsoil will be stripped where hardstands or development is proposed. The hard standings shall be constructed to heights of 0.5 or 1.0m above existing ground level based on the various extents of potential surface water flooding across the site.

3.3.11 Surface Water Management

Runoff will be maintained at Greenfield runoff rates. The layout of the development has been designed to collect surface water runoff from hardstanding areas within the development and

[34] Guidelines Report 2016.pdf (fisheriesireland.ie)

discharge to associated surface water attenuation lagoons adjacent to the proposed infrastructure. It will then be managed by gravity flow at Greenfield runoff rates.

It is proposed, that during the ground clearance of the proposed development, water control measures will be implemented to limit the impact on water quality. Suspended solid (silt) removal features will be implemented in accordance with CIRIA C697 SuDS Manual, and CIRIA C648 Control of water pollution from linear construction projects.

All temporary and permanent drainage from the site shall be designed to have as a minimum three stages of treatment, as defined in the SuDS Manual. Management of runoff will include the following:

- Filtration of water through filter media (sand / stone check dam, silt fence);
- Detention / settlement in settlement ponds or behind check dam in swales; and
- Conveyance of shallow depths of water in vegetated swale.

3.3.11.1 Interceptor Drains

Interceptor drains/diversion ditches will be installed ahead of the main earthworks activities to minimise the effects of collected water on the stripped/exposed soils once earthworks commence. This drainage will integrate into the existing peatland drainage. These drainage ditches will be installed on the upgradient boundary of the areas affected by the access track earthworks operations and installed ahead of the main track construction operations commencing. They will generally follow the natural flow of the ground. The interceptor drains will intercept any storm water surface run-off and collect it to the existing low points in the ground, allowing the clean water flows to be transferred independently through the works without mixing with the construction drainage. It will then be directed to areas where it can be redistributed over the ground by means of a level spreader.

3.3.11.2 Swales

Track edge drainage/swales are required to control run-off from the running surface to lower water levels in the subgrade, to control surface water and to carry this flow to outlet points. Swales along access tracks are to be installed in advance of the main construction phase. On sections of track where there is significant longitudinal gradient, regular surface water interception channels will be employed – these will typically be at 10-20m intervals to collect any surface water that is discharging as sheet flow along the track and discharge the flow into the trackside swale.

3.3.11.3 Settlement Ponds

Settlement ponds will be located downstream of road swale sections and at turbine/hardstand locations to manage/buffer volumes of runoff discharging from the drainage system during periods of high rainfall, thereby reducing the hydraulic loading to watercourses. Settlement ponds are designed in consideration of the greenfield runoff rates.

Settlement lagoons will be installed concurrently with the formation of the road and will be fenced off for safety. They will be located as close to the source of sediment as possible and as far as possible from the buffer zones of existing watercourses. The minimum buffer zone width will be 50m.

Subject to potential planning conditions and prior to commencement of construction activity, this drainage design (including construction specific measures) will be reviewed by the appointed Contractor as part of the review of the Construction Environmental Management Plan (CEMP).

The protection of water quality and prevention of pollution events requires a sustained and concentrated input from the Contractor with regard to the provision and maintenance of sediment control structures. The drainage system, as it is designed, does not impact on the existing drainage regime on site.

3.3.11.4 Silt Control

Silt control measures e.g. silt bags, will be implemented as required during the construction process.

Dewatering silt bags allow the flow of water through them while trapping any silt or sediment suspended in the water. The silt bags provide a passive non-mechanical method of removing silt from silt-laden water collected from works areas within a construction site. Silt bags are easily disposed by a licensed waste contractor.

In specific locations, silt fences will be installed as an additional water protection measure around existing watercourses, particularly where works are proposed within the 50m buffer zone of a stream.

3.3.12 Decommissioning of Existing Bellacorick Wind Farm

Decommissioning of Bellacorrick windfarm will be carried out with reference to 'Decommissioning of Onshore Wind Turbines – Industry Guidance Document' WindEurope 2020[35]. The key stages in the decommissioning of the infrastructure are the following:

- Definition of the extent of decommissioning and dismantling – In this case all of the wind turbines and associated control building will be removed. The turbine foundations, internal roads and connecting ducting will remain in situ;
- Determination of further use of the dismantled wind turbines – a decisions on whether the wind turbines are of sufficient robustness for sale for reuse as a turbine or not is required as this will influence the nature of the dismantling phase;
- Review of existing restrictions, limitations, conditions, obligations- A review of planning conditions that arise from this application, local permitting requirements, grid connection conditions and EU legislation such as laws, regulations, rules, technical norms, standards, specifications, guidelines, directives will be required prior to commencement of site works;
- Preparation and Planning of Dismantling procedures;
- Preparation and Planning of Disposal route/destinations;
- Completion of tendering and awarding of contract(s);
- Check of conditions and preparation of risk assessment;
- Briefing on dismantling compliance with removal instructions health and safety requirements - The dismantling company must familiarise and instruct the employees on the construction site before starting their work on construction site-specific risk assessment and the dismantling or removal instructions (occupational safety);

[35] Decommissioning of Onshore Wind Turbines – Industrial Guidance Document: https://windeurope.org/intelligence-platform/product/decommissioning-of-onshore-wind-turbines/

- Decommissioning of Wind turbines - The first step is to safely shut down and decommission the WTG intended for dismantling. The second step is physically separated from the internal cable route (usually the MV grid);
- Dismantling of Wind Turbine to Top of Foundation - The sequence of dismantling and are determined as follows, 1. Rotor star (rotor blades and hub); 2. Nacelle (gondola); 3. Tower sections;
- Decommissioning and dismantling of Control Building;
- Proper disposal of electrical and Wind turbine components - The waste fractions resulting from the dismantling the Wind turbines and control building, are transported in accordance with the waste management plan drawn up to the specialist waste management companies appointed as part of the contract, and disposed of (reused, recycled or recovered); and
- Revegetation of turbine foundations and control building footprints: Peat and soils excavated as part of the Oweninny Phase 3 wind farm infrastructure development will be used to cover over these areas. These areas will then be allowed to natural reseed and revegetate.

3.4 Operational Phase Activities

The proposed wind farm development is expected to have a lifespan of 30 years. During this period, on a day-to-day basis the wind turbines will operate automatically, responding by means of anemometry 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 control centre. Each turbine will also be monitored off-site by the wind turbine supplier or Operations and Maintenance (O&M) service provider. The monitoring of turbine output, performance, wind speeds, and responses to any key alarms will be monitored at a control centre 24-hours per day.

Each turbine would be subject to a routine maintenance programme involving a number of checks and changing of consumables, including oil changes. In addition, there will 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 electricity substations components and site tracks will also require periodic maintenance in accordance with appropriate operation maintenance plans, procedures and health and safety plans.

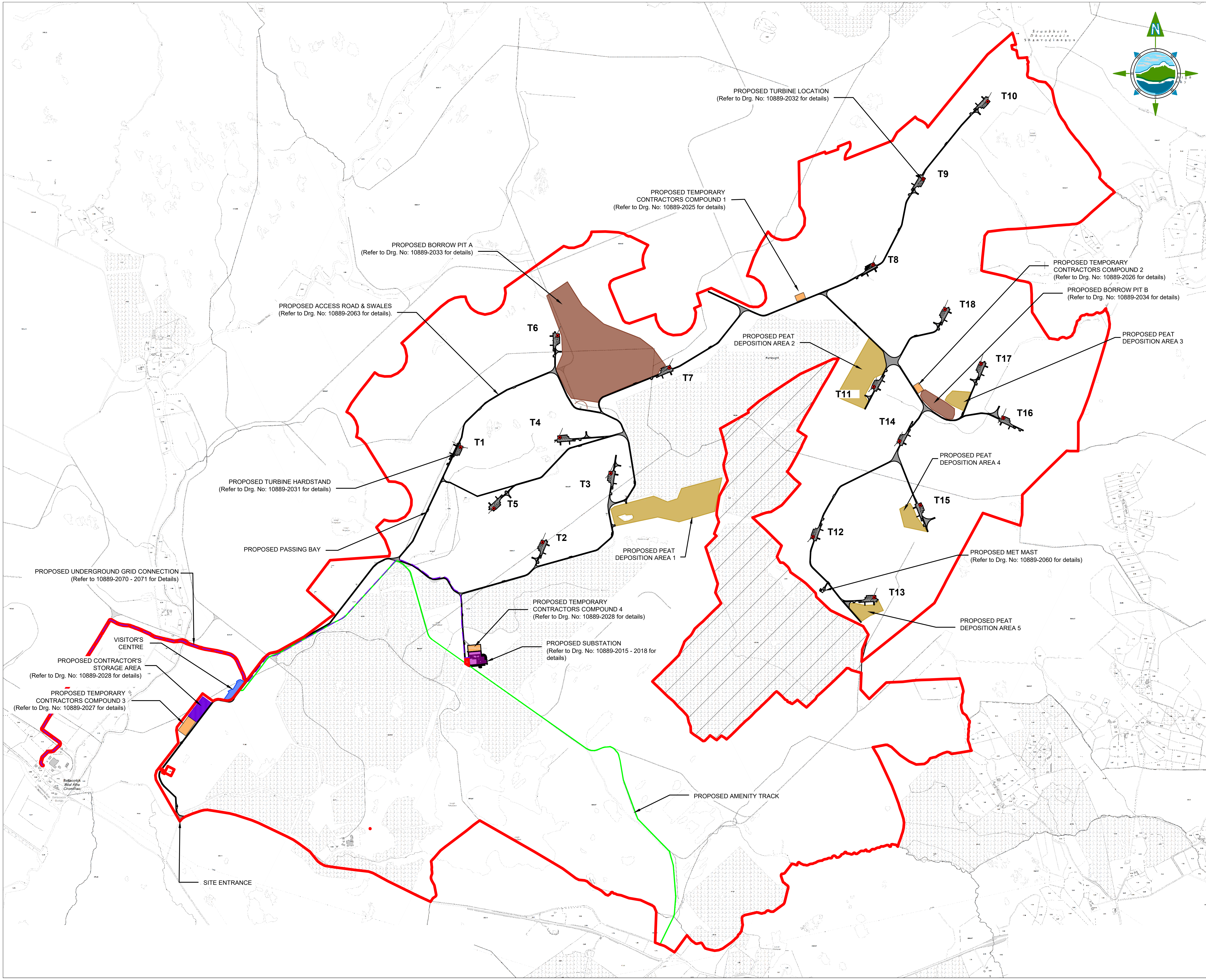
During the operational phase of the project, the management of surface water will be carried out in accordance with the proposed design and associated management features. The design of the wind farm has been developed following a detailed examination of the existing drainage on site. The drainage design ensures that any surface water arising from the proposed wind farm during operation will be contained and treated to ensure it can be dispersed out from the Proposed Development without any significant impact.

3.5 Decommissioning Phase Activities

The wind turbines proposed as part of the Proposed Development are expected to have a lifespan of 30 years. Following the end of their useful life, the wind turbines may be replaced with a new set of machines, subject to planning permission being obtained, or the site may be decommissioned fully, with the exception of the electricity substation.

Upon decommissioning of the proposed wind farm, the wind turbines would be disassembled in reverse order to how they were erected. All above ground turbine components would be separated and removed off-site for recycling. Turbine foundations would remain in place underground and would be covered with earth and allowed to revegetate or reseed 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 potentially significant environment nuisances such as noise, dust and/or vibration. The majority of the site roadways will be in use for additional purposes to the operation of the wind farm (such as a mature amenity and recreational use) by the time the decommissioning of the project is to be considered, and therefore it will be more appropriate to leave the site roads in situ for future use. If it were to be confirmed that the roads were not required in the future for any other useful purpose, they could be removed.

The on-site substation will not be removed at the end of the useful life of the wind farm project as it will form part of the national electricity network. Therefore, the substation will be retained as a permanent structure and will not be decommissioned.



GENERAL LEGEND

APPLICATION BOUNDARY	PROPOSED ACCESS TRACK
PROPOSED TURBINE HARDSTAND	PROPOSED TURBINE LOCATION
PROPOSED AMENITY TRACK	PROPOSED GRID CONNECTION ROUTE
PROPOSED BORROW PIT	CONTRACTOR'S COMPOUND
PROPOSED SUBSTATION	VISITORS CENTRE
PROPOSED PEAT DEPOSITION AREA	PROPOSED STORAGE AREA
THIRD PARTY COROVODERRY LANDS	PROPOSED MET MAST

NOTES:

1. DRAWINGS FOR PLANNING PURPOSES ONLY.
2. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
3. GRID REFERENCES TO IRISH NATIONAL GRID.
4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Co. Mayo

OSI 1:5,000 Sheet No's: 1175, 1176, 1177, 1241, 1242, 1243, 1310, 1311, 1312 & 1380.

Ordnance Survey Ireland Licence number CYAL50311153.

250m 0 250m 500m 750m

Rev	Date	Description	By	Chkd.
A	22.03.23	PLANNING ISSUE	EB	MN

Client:
Bord na Móna

Project:
OWENINNY
WIND FARM PHASE 3

Title:
Figure 3-2
SITE
MASTER PLAN

Scale @ A3: 1:25,000		
Prepared by: E. Beggs	Checked: M. Nolan	Date: February 23
Project Director: B. Gallagher		
Drawing Status: Planning		

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Drawing No.: 10889-2003
Revision: A

4.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

As noted, the Proposed Development occupies approximately an area of 2,345 hectares (ha) and is situated approximately 12km west of Crossmolina and 15km east of Bangor Erris. A description of the existing environment, which was informed by desktop assessment and field surveys is provided hereunder.

4.1 Desktop Assessment

Result of the desktop assessment are provided hereunder.

4.1.1 National Biodiversity Data Centre

A search of the NBDC database was carried out in November 2021 for protected flora and species listed under Annex II of the Habitats Directive 92/43/EEC and Annex I of the Birds Directive 2009/147/EC within hectads F91, F92, G01 and G02 which encompass the Proposed Development site. Invasive species listed on the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2011) were also obtained. Results of protected flora and fauna are listed in Table 4-1 and Third Schedule invasive species in Table 4-2 below.

Table 4-1: Protected Flora and Fauna

Species Group	Species name	Hectad	Conservation status*
Fauna	Common Frog (*Rana temporaria*)	F91, G01, G02	EU HD Annex V, WA
Fauna	Freshwater White-clawed Crayfish (*Austropotamobius pallipes*)	G01	EU HD Annex II, V
Fauna	Marsh Fritillary (*Euphydryas aurinia*)	F92, G01	EU HD Annex II
Fauna	Geyer's Whorl Snail (*Vertigo (Vertigo) geyeri*)	G01, G02	EU HD Annex II
Fauna	European Otter (*Lutra lutra*)	F91, F92, G01, G02	EU HD Annex II, VI, WA
Fauna	Brown Long-eared Bat (*Plecotus auritus*)	F92, G01	EU HD Annex VI, WA
Fauna	Daubenton's Bat (*Myotis daubentonii*)	F91, F92, G01, G02	EU HD Annex VI, WA
Fauna	Lesser Noctule (*Nyctalus leisleri*)	F91, F92, G01, G02	EU HD Annex VI, WA
Fauna	Pipistrelle (*Pipistrellus pipistrellus* sensu lato)	F92, G01	EU HD Annex VI, WA
Fauna	Soprano Pipistrelle (*Pipistrellus pygmaeus*)	F91, F92, G01, G02	EU HD Annex VI, WA
Fauna	Pine Marten (*Martes martes*)	F91, F92, G01, G02	EU HD Annex V, WA
Fauna	Irish Hare (*Lepus timidus subsp. hibernicus*)	F91, F92, G01, G02	EU HD Annex V, WA
Fauna	Common Coot *(Fulica atra)*	G01	WA, EU HD Annex II, III, BoCCI Amber Listed

Species Group	Species name	Hectad	Conservation status*
Fauna	Common Pheasant *(Phasianus colchicus)*	F91, G01, G02	WA, EU HD Annex II, III
Fauna	Common Pochard *(Aythya ferina)*	F91	WA, EU HD Annex II, III, BoCCI Amber Listed
Fauna	Common Snipe *(Gallinago gallinago)*	F91, F92, G01, G02	WA, EU HD Annex II, III, BoCCI Amber Listed
Fauna	Corn Crake *(Crex crex)*	F92, G01, G02	WA, EU HD Annex I
Fauna	Dunlin *(Calidris alpina)*	F91, F92, G02	WA, EU HD Annex I
Fauna	Eurasian Curlew *(Numenius arquata)*	F91, F92, G01, G02	WA, EU HD Annex II, BoCCI Red Listed
Fauna	Eurasian Teal *(Anas crecca)*	F91, F92, G01, G02	WA, EU HD Annex II, III, BoCCI Amber Listed
Fauna	Eurasian Wigeon *(Anas penelope)*	F92, G01	WA, EU HD Annex II, III, BoCCI Amber Listed
Fauna	Eurasian Woodcock *(Scolopax rusticola)*	F91, F92, G01, G02	WA, EU HD Annex II, III, BoCCI Amber Listed
Fauna	European Golden Plover *(Pluvialis apricaria)*	F91, F92, G01, G02	WA, EU HD Annex I, II, III, BoCCI Red Listed
Fauna	Greylag Goose *(Anser anser)*	G01	Invasive Species, WA, EU HD Annex II, III, BoCCI Amber Listed
Fauna	Hen Harrier *(Circus cyaneus)*	F91, F92, G01, G02	WA, Annex I
Fauna	Jack Snipe *(Lymnocryptes minimus)*	F91, F92, G02	WA, EU HD Annex II, III
Fauna	Mallard *(Anas platyrhynchos)*	F91, F92, G01, G02	WA, EU HD Annex II, III
Fauna	Merlin *(Falco columbarius)*	F91, F92, G01, G02	WA, EU HD Annex I
Fauna	Northern Lapwing *(Vanellus vanellus)*	F91, G01, G02	WA, EU HD Annex II, BoCCI Red Listed
Fauna	Peregrine Falcon *(Falco peregrinus)*	F91, F92, G02	WA, EU HD Annex I
Fauna	Red Grouse *(Lagopus lagopus)*	F91, F92, G01, G02	WA, EU HD Annex II, III, BoCCI Red Listed
Fauna	Ringed Plover *(Charadrius hiaticula)*	F92, G02	WA, BoCCI Amber Listed
Fauna	Rock Pigeon *(Columba livia)*	G01	WA, EU HD Annex II
Fauna	Sand Martin *(Riparia riparia)*	F91, F92, G01, G02	WA, BoCCI Amber Listed
Fauna	Sky Lark *(Alauda arvensis)*	F91, F92, G01, G02	WA, BoCCI Amber Listed
Fauna	Snowy Owl *(Bubo scandiaca)*	F91, F92	WA, EU HD Annex I
Fauna	Tufted Duck (*Aythya fuligula*)	F91, G01	WA, EU HD Annex II, Annex III, BoCCI Amber Listed

Species Group	Species name	Hectad	Conservation status*
Fauna	Whooper Swan (*Cygnus cygnus)*	F91, G01, G02	WA, EU HD Annex I
Flora	Fir Clubmoss (*Huperzia selago*)	F91, G02	EU HD Annex V
Flora	Marsh Saxifrage (*Saxifraga hirculus*)	G02	EU HD Annex II, IV
Flora	Slender Naiad (*Najas flexilis*)	G02	EU HD Annex II, IV
Flora	Varnished Hook-moss (*Hamatocaulis vernicosus*)	F91, F92	EU HD Annex II, FPO
Flora	Large White-moss (*Leucobryum glaucum*)	F91, G02	EU HD Annex IV

Note: * EU HD = European Union Habitats Directive, WA = Wildlife Acts, FPO= Flora Protection Order, BoCCI= Birds of Conservation Concern Ireland[36].

Table 4-2: Invasive Species listed on Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2011)

Species name	Hectad
Giant-rhubarb (*Gunnera tinctoria*)	F92
Japanese Knotweed (*Fallopia japonica*)	F92, G01
Rhododendron ponticum	F92, G01, G02

4.1.2 Aquatic Environment

4.1.2.1 Surface Water

The Proposed Development is located within the Moy & Killala Bay (34) and Blacksod-Broadhaven (33) WFD Catchments, reaching out to the Cloonaghmore_SC_010 (34_13), Deel [Crossmolina]_SC_010 (34_14), Owenmore [Mayo]_SC_020 (33_4) and Owenmore [Mayo]_SC_010 (33_1) WFD sub catchments.

The hydrological pathway from the Proposed Development includes 16 WFD river water bodies, 2 WFD lake water bodies and 2 WFD transitional water bodies (Figure 4-1). A search has been undertaken to the EPA Unified GIS Application[17] and the EPA Catchments database[15] was conducted for these surface water bodies that form the hydrological pathway from the Proposed Development and their WFD water quality status for 2016-2021 (Table 4-3).

The overall excellent water quality of the WFD surface water bodies forming the Proposed Development's hydrological pathway is observable in Table 4-3, with the exception of the Conn (IE_WE_34_406b) WFD lake water body and Deel (Crossmolina)_060 (IE_WE_34D010400) WFD river water body, located approximately 11km from the Proposed Development, and the Shanvolahan_010 (IE_WE_34S010400) WFD river water body, which drains the south-eastern section of the Proposed Development (Figure 4-1).

[36] Gilbert G., Stanbury A. & Lewis L. (2021). Birds of Conservation Concern in Ireland 4: 2020–2026. Irish Birds 43: 1-22

Table 4-3: WFD Surface Water Bodies within Proposed Development's Hydrological Pathway

Water Body EU Code	WFD Water Body Name	WFD Water Quality Status (2016-2021)
WFD River Water Bodies		
IE_WE_33M010100	MUING_010	Good
IE_WE_33O040050	OWENMORE (MAYO)_010	High
IE_WE_33O040200	OWENMORE (MAYO)_020	High
IE_WE_33O040250	OWENMORE (MAYO)_030	High
IE_WE_33O040270	OWENMORE (MAYO)_040	High
IE_WE_33O040325	OWENMORE (MAYO)_050	Good
IE_WE_33O040500	OWENMORE (MAYO)_060	High
IE_WE_34C030100	CLOONAGHMORE_020	Good
IE_WE_34C030150	CLOONAGHMORE_030	High
IE_WE_34C030200	CLOONAGHMORE_040	Good
IE_WE_34C030270	CLOONAGHMORE_050	Good
IE_WE_34C030300	CLOONAGHMORE_060	Good
IE_WE_34D010120	DEEL (CROSSMOLINA)_040	Good
IE_WE_34D010300	DEEL (CROSSMOLINA)_050	Good
IE_WE_34D010400	DEEL (CROSSMOLINA)_060	High
IE_WE_34S010400	SHANVOLAHAN_010	Moderate
WFD Lake Water Bodies		
IE_WE_33_1912	Dahybaun	High
IE_WE_34_406b	Conn	Good
WFD Transitional Water Bodies		
IE_WE_390_0100	Tullaghan Bay	Good
IE_WE_420_0100	Cloonaghmore Estuary	High*

Note: * WFD water quality status for 2013-2018

4.1.2.2 Groundwater

The proposed development is located within the Bellmullet (IE_WE_G_0057) and Bellacorick-Killala (IE_WE_G_0041) WFD ground water bodies, both of which have been assigned 'Good' ground water status (2013-2018)[17].

The description of these two ground water bodies (GWB) have been summarised using data obtained from the Geological Survey Ireland (GSI) website[37].

Bellmullet GWB[38]:

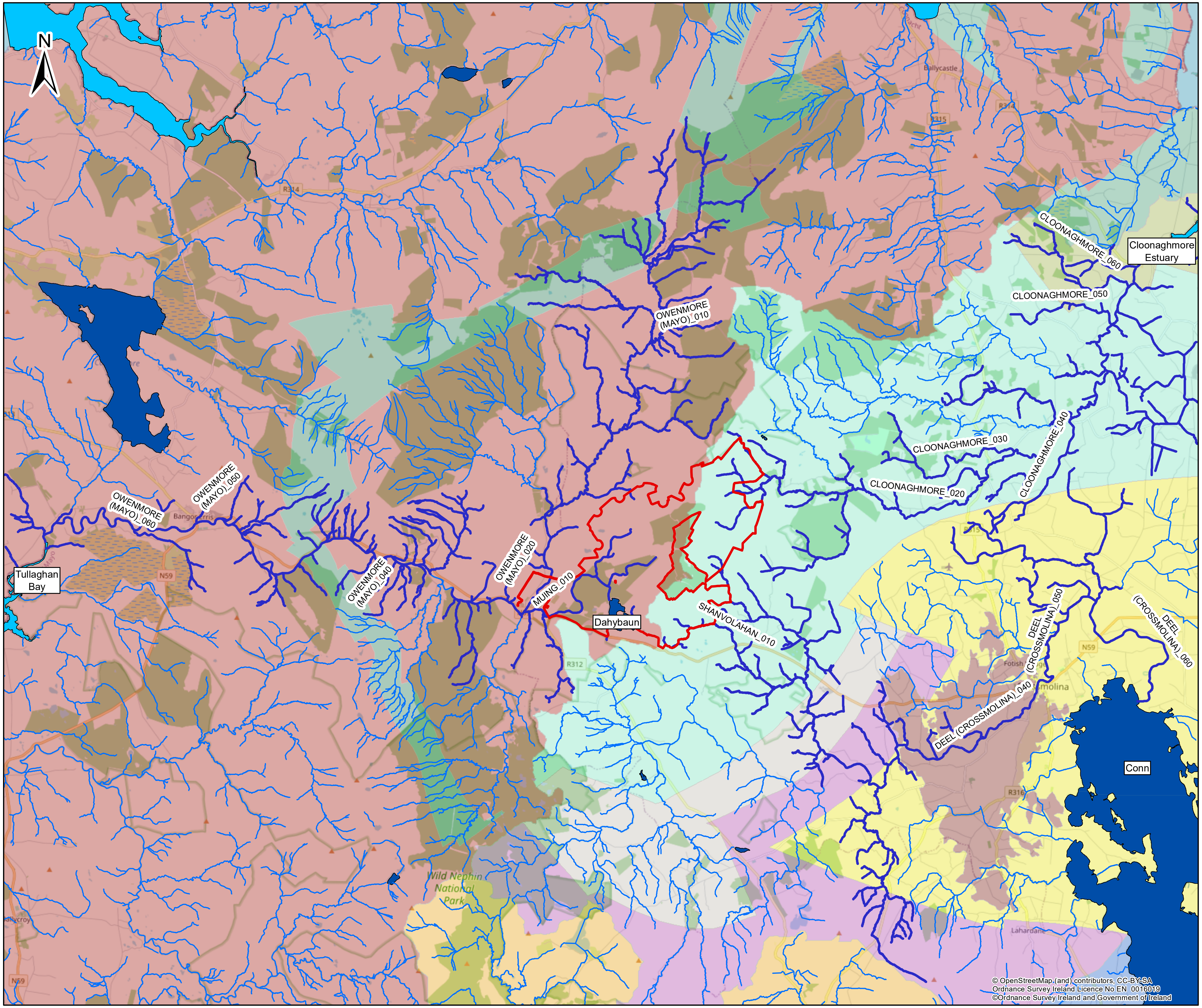
[37] Ground Water Bodies GSI: https://www.gsi.ie/en-ie/programmes-and-projects/groundwater/activities/understanding-ireland-groundwater/Pages/Groundwater-bodies.aspx
[38] GSI (2004), Belmullet GWB: Summary of Initial Characterisation. *1st Draft Belmullet GWB Description July .2004* https://gsi.geodata.gov.ie/downloads/Groundwater/Reports/GWB/BelmulletGWB.pdf

- The northern, western and southern boundaries of the GWB are bounded by coastline. The eastern boundary of the GWB is an upland area dividing water draining to the west to the Atlantic from water draining east to Killala Bay and L. Conn. The land surface is characterised by steep slopes and mountainous terrain (Nephin Beg range) in the central portion of the GWB, flattening to the east and west.
- The GWB is composed primarily of low transmissivity rocks. Most of the groundwater flux is in the uppermost part of the aquifer: comprising a broken and weathered zone typically less than 3m thick; and a zone of interconnected fissuring typically less than 15m.
- Groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones.
- Recharge occurs diffusely through the subsoils and via outcrops. Recharge is limited by the peat and the low permeability bedrock, thus most of the available recharge discharges rapidly to nearby streams.
- Flow paths are likely to be short (30-300m) with groundwater discharging rapidly to nearby streams and small springs and flow directions are expected to follow topography.
- Groundwater discharges rapidly to nearby small streams, lakes, small springs and seeps. Overall flow direction is west toward the coast.
- The rock units in GWB are generally of low permeability and baseflow to rivers and streams is likely to be relatively low.

Bellacorick-Killala GWB[39]:

- The GWB comprises a relatively low lying area between Bellacorick and Killala. Elevations range from sea level to 230m above the Ordnance Datum (AOD).
- The western boundary and part of the northern comprise an upland area that acts as surface water catchment divide and include the catchment boundary with hydrometric area 33. The eastern boundary is bounded by the coastline. The eastern section of the northern boundary and the southern boundary comprise the Ballina, Deel and Killala South GWB's.
- The GWB is composed primarily of low transmissivity rocks. Most of the groundwater flux is likely to be in the uppermost part of the aquifer: comprising a broken and weathered zone typically less than 3m thick; a zone of interconnected fissuring 10-15m; and a zone of isolated, poorly connected fissuring typically less than 150m.
- Recharge occurs diffusely through the subsoils and rock outcrops. Recharge is limited by the peat and the low permeability bedrock, thus most of the available recharge discharges rapidly to nearby streams and small springs.
- The groundwater has a calcium bicarbonate (Ca HCO3) signature.
- Groundwater flow occurs near the surface (10-15m), although deep water strikes have been observed. The water table is from 1-9m below ground level and follows topography. Flow paths are likely to be up to 300m, with groundwater discharging rapidly to nearby streams and small springs. Overall flow direction is in a westerly direction.
- The rock units in GWB are generally of low permeability and baseflow to rivers and streams is likely to be relatively low.

[39] GIS (2004), Bellacorick-Killala GWB: Summary of Initial Characterisation. 1st Draft Bellacorick-Killala GWB Description July .2004.
https://gsi.geodata.gov.ie/downloads/Groundwater/Reports/GWB/BellacorickKillalaGWB.pdf



Legend

Planning Application Boundary

WFD Rivers

- Rivers Connected to the Proposed Development Site
- Non-Connected Rivers
- WFD - Lakes
- WFD - Transitional Waterbodies

WFD - Ground Waterbodies

- Ballina
- Bangor
- Bellacorick-Killala
- Belmullet
- Beltra Lough North
- Crossmolina Gravels
- Deel
- Killala North
- Killala South
- Laherdaun
- Malranny

0 1 2 3 4
Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D02	22/03/2023	Draft issue	S.P	J.D
D01	01/02/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Figure 4-1: WFD Surface and Ground Waterbodies

Scale @ A3: 1:115,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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10889-007-RI-S.BO-TOB-D02

Draft: D02

4.2 Field Survey Results

The results of the ecological field surveys undertaken within the proposed development are discussed hereunder.

4.2.1 Habitats and Flora

In general, the Proposed Development is dominated by cutover blanket bog (PB4), which was harvested commercially between the 1950s and the early 2000s. In addition to the cutover bog, there are a large number of remnant bog areas, which lie scattered throughout the site. Although these remnant areas are dominated by lowland blanket bog (PB3), they also contain areas of dry heath (HH1) and wet heath (HH3) and patches of transition mires and quaking bog (PF3). Various lakes and ponds, some of recent origin, occur scattered through the site. In the western and central areas of the site there are a number of areas dominated by commercial conifer plantation (WD4) on peat. An overview of all habitats recorded during the walkover surveys can be seen in Table 4-4 and Figure 4-2.

Table 4-4: Summary of Habitat Recorded Onsite, Including Corresponding Annex I Habitats Where Relevant

Habitat Type (Fossitt)	EU Habitats Directive
Dystrophic lakes (FL1)	Natural dystrophic lakes and ponds (3160)
Acid oligotrophic lakes (FL2)	Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* (3130)
Artificial lakes (FL8)	-
Eroding/upland rivers (FW1)	-
Depositing/lowland rivers (FW2)	-
Drainage ditches (FW4)	-
Calcareous springs (FP1)	*Petrifying springs with tufa formation (*Cratoneurion*) (7220)
Improved grassland (GA1)	-
Amenity grassland (improved) (GA2)	-
Dry meadows and grassy verges (GS2)	-
Dry-humid acid grassland (GS3)	-
Wet grassland (GS4)	-
Dry siliceous heath (HH1)	European dry heaths (4030)
Wet heath (HH3)	Northern Atlantic wet heaths with *Erica tetralix* (4010)
Lowland blanket bog (PB3)	Blanket bogs (* if active bog) (7130)
Cutover blanket bog (PB4)	-
Poor fen and flush (PF2)	-
Transition mire and quaking bog (PF3)	Transition mires and quaking bogs (7140)
Bog Woodland (WN7)	
Conifer plantation (WD4)	-
Scrub (WS1)	-
Immature Wood (WS2)	-
Recently Felled Woodland (WS5)	-
Treelines (WL2)	-
Exposed sand, gravel, or till (ED1)	-
Buildings and artificial surfaces (BL3)	-

** Indicates Annex I habitat with priority status*

4.2.1.1 Annex I Habitats

Annex I habitats were recorded within the Proposed Development site including Natural dystrophic lakes and ponds (3160), Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* (3130), Northern Atlantic wet heaths with *Erica tetralix* (4010), Blanket bogs (* if active bog) (7130) and Transition mires and quaking bogs (7140). These habitats are discussed in detail hereunder.

Dystrophic lakes (FL1)

Dystrophic lakes, which usually have a sharply defined, peaty, lake edge, occur within some of the bog remnant areas on site. There is generally little associated vegetation in these lakes apart from some sparse pondweed (*Potamogeton* spp) and some common reed (*Phragmites australis*) white beaked sedge (*Rhynchospora alba*) and several *Sphagnum* species along the margins.

Most of the best examples of dystrophic lakes within the survey area are found near the wettest central areas of the larger bog remnants to the east of the site. It is often difficult to separate this lake type from acid oligotrophic lakes, which generally have a stony lake shore. Some of these lakes correspond to the Annex I habitat "natural dystrophic lakes and ponds (3160)" due their physical characteristics, such as brown tinted water, peaty substrates and low pH, also indicator plants such as white beaked sedge and several *Sphagnum* species.

Photo 4-1: Dystrophic Lake (FL1)

Acid oligotrophic lakes (FL2)

A number of small, lowland oligotrophic lakes occur throughout the site. These generally lie within the blanket bog remnant areas. Although it can be difficult to distinguish the lake type from dystrophic lakes, the fringing vegetation is usually better developed. Fringing vegetation on the recorded lakes were sparse and confined to narrow bands of bottle sedge (*Carex rostrata*) swamp with occasional stunted willows. Additional swamp species which grow along the shallow water of the margins include water horsetail (*Equisetum fluviatile*), bog bean (*Menyanthes trifoliate*) and common reed though extensive areas of swamp dominated by these species is rare.

Lough Dahybaun SAC is an excellent example of an acid, oligotrophic lake and contains a population of the legally protected (Flora Protection Order) and Annex II listed plant species Slender naiad (*Najas flexilis*). This rare aquatic plant was recorded at the site in 1987 and 1995. Slender naiad occurs in association with a range of other aquatic and emergent species. No Slender naiad was recorded in 2020 but other species recorded included common reed, bulbous rush (*Juncus bulbous*), bottle sedge, bulrush (*Typha latifolia*), yellow water-lily (*Nuphar lutea*), pondweed species (*Potamogeton* spp,), water horsetail. These lakes correspond to the Annex I habitat "oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* (3130)".

Photo 4-2: Acid Oligotrophic Lake (FL2), Lough Dahybaun.

Calcareous springs (FP1)

One small area of calcareous spring habitat with tufa formation occurs beside an old railway bed in cutaway bog in the south-eastern corner of the site. The spring vegetation at this location is dominated by mounds of the moss *Philonotis calcarean* with frequent marsh horsetail (*Equisetum palustre*), colt's foot (*Tussilago farafara*), black bog-rush (*Schoenus nigricans*) and common reed. This area of habitat corresponds to the priority Annex I habitat "petrifying springs with tufa formation (*Cratoneurion*) (7220).

Photo 4-3: Calcareous Spring (FP1), note the calcium deposits visible on surface in foreground.

Wet heath (HH3)

In areas where wet heath was recorded, purple moor grass was dominated with cross leaved heath (*Erica tetralix*), deer grass (*Trichophorum cespitosum*) and various Sphagnum mosses also conspicuous. Areas of wet heath occurred in relatively shallow peat cover or along the margins of bog remnants where there has been recent drainage. Some areas of this habitat have evidence of historic drainage or showing signs of heavy grazing from sheep, other areas present correspond to the Annex I habitat Northern Atlantic wet heaths with *Erica tetralix* (4010).

Photo 4-4: Wet Heath (HH3).

Lowland blanket bog (PB3)

Throughout the site there are blanket bog remnants which were not subject to peat extraction in the past. A total of 49 remnants have been identified and their distribution shown in Figure 4-2. Some of these remnants remained untouched by Bord na Móna as they were unsuitable for development under the peat extraction method of the time. Others are intact but had been ditched and drained in preparation for peat exploitation (which never occurred). Some of these had the surface vegetation removed but good recovery has since occurred. As part of the site rehabilitation programme, most of the drainage networks on these bogs have been blocked in order to restore the hydrology of the remnant. Most of the remnants are relatively small in size (< 20ha) but there are several larger ones between 20 and 50ha.

The calculated total area of the bog remnants (equating to lowland blanket bog) on site is 1,413 ha. The peat depth within the bog remnants is generally between 1 and 4m and they are now mostly surrounded by cutover bog – this gives many of them a 'perched' appearance.
The dominant plant species in the vegetation are purple moor-grass and ling heather, with cross-leaved heath, black bog-rush, bog asphodel (*Narthecium ossifragum*) and deergrass (*Trichophorum cespitosum*) in the more intact areas. The main bryophyte species are generally *Sphagnum capillifolium, Sphagnum papillosum, Hypnum jutlandicum* and *Racomitrium lanuginosum,* with the lichen species *Cladonia* spp. also frequent. The central areas of the larger remnants are more hydrologically intact and here bog pools and small dystrophic lakes are often present. These typically contain species such as bog bean, common bog-cotton (*Eriophorum angustifolium*) and the aquatic moss *Sphagnum cuspidatum*. Central areas of the undrained blanket bog remnants are usually wet and have a high cover of *Sphagnum* mosses, the marginal areas of blanket bog remnants are often quite dry and modified, as a result of drainage effects from the surrounding cutover bog. Blanket bog remnants with a relatively intact hydrology correspond to the Annex I habitat blanket bogs (* if active bog) (7130). Many of the bog remnant areas contain substantial drains which have lowered the water table. Most of these drains have been blocked with peat dams in recent years.
The majority of the blanket bog areas located along the north-eastern and eastern edges of the site boundary, are large (a total area of approx. 160ha), some of these areas have experienced past drainage but much of the drains have been blocked in recent years and are showing signs of bog flora regeneration, other areas have avoided past peat extraction activities and have well developed blanket bog vegetation. These areas along the north-eastern and eastern edges of the site boundary, are directly adjacent to the Bellacorick Bog Complex SAC, where high quality open bog habitat can be seen.

Photo 4-5: Large area of Lowland Blanket Bog (PB3), near eastern boundary of the proposed development which is connected to adjacent Bellacorick Bog Complex SAC.

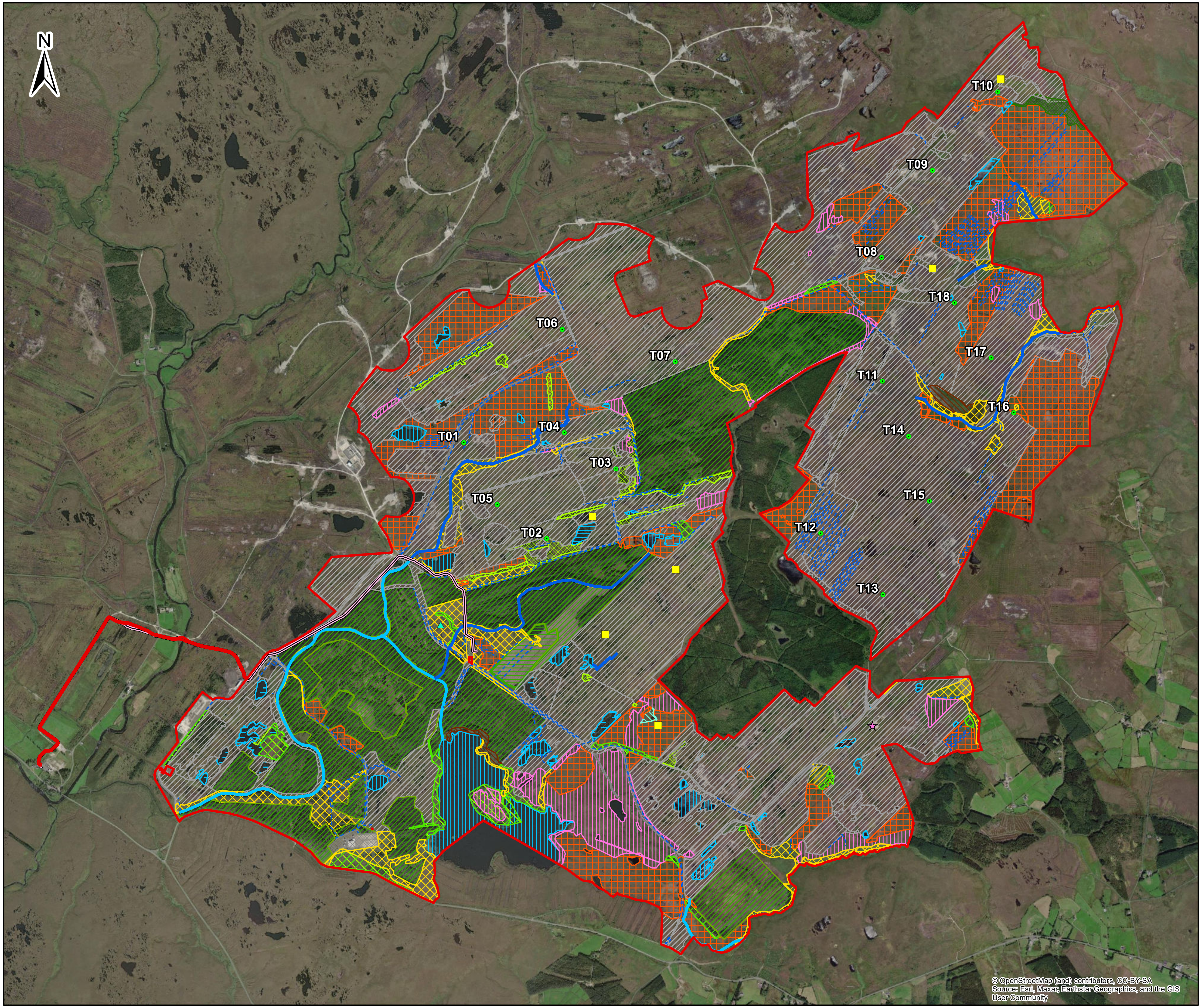
Transition mire and quaking bog (PF3)
A small area of PF3 was located to the south of the Proposed Development site boundary. This area was noted as being very wet and quaking underfoot. It is occurring between areas of wet heath (HH3) and lowland blanket bog (PB3). The vegetation was dominated with cotton grass species and purple moor grass, with black bog rush, sphagnum species, bog bean and white beaked sedge also occurring. This habitat corresponds to the annexed habitat, 'transition mires and quaking bogs (7140)'.

Photo 4-6: Transition Mire and Quaking Bog (PF3).

4.2.1.2 Invasive Spices – Rhododendron

Rhododendron (*Rhododendron ponticum*), an invasive species listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) was recorded at several locations during the extensive field surveys undertaken at the Proposed Development site (See Figure 4-3). Most of these locations were recorded close to the western or north-western edge of the site boundary. The number of stands ranged at each location from one to several plants. The majority of the recorded stands were cable of producing flowers and seeds.

Photo 4-7: Mature Rhododendron plant located under existing turbine (which is proposed to be decommissioned) in Bellacorick wind farm, note the seedpods on the left of the plant.



Legend

- Planning Application Boundary

Habitats

- FP1 Calcareous springs
- PF2 Poor fen and flush
- PF3 Transtion mire and quaking bog
- FW1_Eroding/uplan...
- FW2_Depositing/lo...
- FW4_Drainage_ditc...
- BL3 Buildings and artificial surfaces
- FL1 Dystrophic lakes
- FL2 Acid oligotrophic lakes
- FL8 Other artificial lakes and ponds
- GA1 Improved agricultural grassland
- GA2 Amenity grassland (improved)
- GS2 Dry meadows and grassy verges
- GS3 Dry humid acid grassland
- GS4 Wet grassland
- HH1 Dry siliceous heath
- HH3 Wet heath
- PB3 Lowland blanket bog
- PB4 Cutover bog
- PF3 Transition mire and quaking bog
- WD3 (Mixed) conifer woodland
- WD4_Conifer_plant...
- WN7 Bog woodland
- WS1 Scrub
- WS2 Immature woodland
- WS5 Recently felled woodland

0 0.25 0.5 0.75 1
Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D02	24/03/2023	Draft issue	S.P	J.D
D01	16/02/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Figure 4-2: Habitat Map

Scale @ A3: 1:26,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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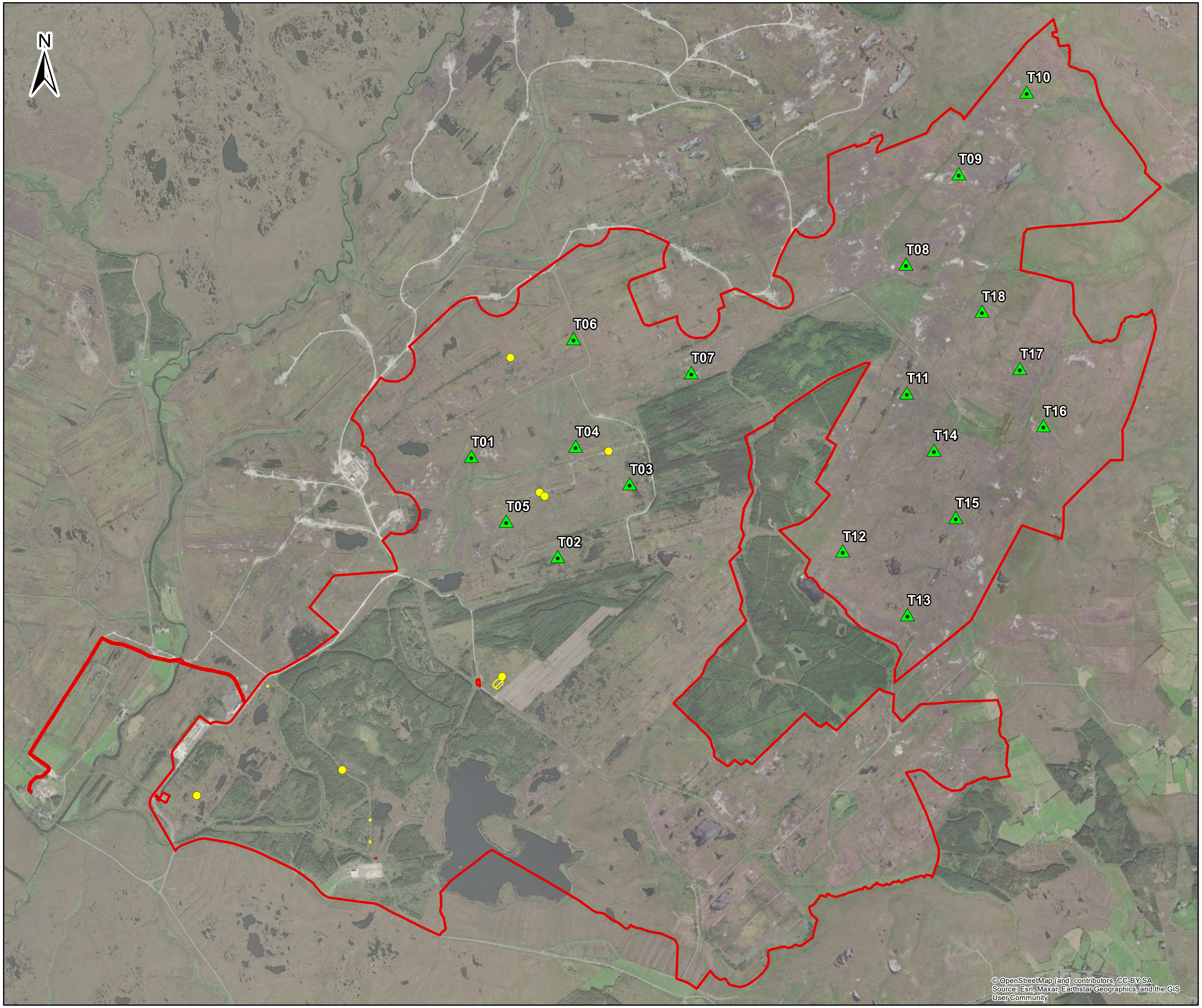
10889-021-HAB-S.BO-TOB-D02



Legend

- Planning Application Boundary
- Proposed Turbine Locations

Invasive Species

- Single Stand of Rhododendron
- Extensive Stands of Rhododendron

0 0.25 0.5 0.75 1
Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D02	22/03/2023	Draft issue	S.P	J.D
D01	01/02/2023	Draft issue	S.P	J.S

Client:

Bord na Móna

Project:

Oweninny Wind Farm
Phase 3

Title:

Figure 4-3:
Rhododendron Distribution Map

Scale @ A3: 1:25,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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10889-008-RHOD-S.BO-TOB-D02

4.2.2 Non-volant Mammal Surveys

Surveys for protected fauna species were undertaken within the Proposed Development site in August 2020 as well as other incidental observations recorded during other surveys (between the period of April 2020 – September 2021). Otter surveys were undertaken along the drainage ditches, rivers and lakes located within the proposed development site and within a 150m buffer of the site. No signs of otter (tracks, slides and spraints) or holts/resting sites were found within the study area.

Two incidental records of the Annex II and IV species, otter were recorded near waterbodies in October 2020. These were live sightings of otter foraging in lakes within the site on cutover bog, one located to the northwest of the site, and one located near the centre of the site. No otter breeding or resting sites were recorded at these locations or within the site. No signs of otter (tracks, slides and spraints) or holts/resting sites were found within the study area again in subsequent visits. Due to the records of otter and the suitability habitat within the study area, there is potential that otter may commute or forage along the river in proximity to the proposed development site, at least on occasion. Otter are a qualifying interest of the Owenduff/Nephin Complex SAC which is located approximately 3.5km (8.5km downstream) of the proposed development site. Otter territories can stretch for several kilometres, ranging from as small as 2km and extending up to 20km in cases.

No other Annex species were recorded onsite.

4.2.3 Aquatic Surveys

The aquatic survey sites were located in the Owenmore (Mayo)_SC_010 and Owenmore (Mayo)_SC_020 sub-catchments within the wider Blacksod-Broadhaven catchment or in Cloonaghmore_SC_010 and Deel (Crossmolina)_SC_010 sub-catchments within the wider Moy & Killala Bay catchment.

The watercourses within and in the vicinity of the Proposed Development site are typically small, upland eroding (FW1) or lowland depositing (FW2) channels.

The sites were surveyed in August 2020 and again in September 2021. Kick sampling was undertaken at four locations around the Proposed Development site due to access restrictions or unsuitable conditions. Kick samples and Q-values were recorded at sites 1, 3, 4 and 6. Samples were transferred to a white sorting tray to be examined bankside and an EPA Q-value was given. The location of all sample sites are shown in Figure 2-1.

Site 1

Site 1 on the Muingaleeaun Stream (WFD code: IE_WE_33M010100) is a small lowland depositing watercourse (FW2), located to the southwest of the Proposed Development site, c.180m west of the substation or c. 1km southwest from the nearest turbine (T02). The bank width was 1.5m with a wetted width of 1m and an average water depth of 75cm. There was a very slow flow at the time of surveying and consisted entirely of glide. The substrata comprised of gravel, with the presence of peat and silt also on the riverbed. The banks were straight and vertical. The riparian vegetation present consisted of soft rush (*Juncus effusus*), marsh thistle, bramble (*Cirsium palustre*) and flag iris (*Iris pseudacorus*). No instream macrophytes were recorded present.

The watercourse was noted as having no potential for salmonid spawning due to lack of suitable spawning gravels and also the absence of holding pools and riffles for salmonid nursery habitat. This site had contained suitable lamprey habitat due to the present of silt however lacked habitat for crayfish.

The kick sampling results recorded Group B and Group C macroinvertebrates invertebrates. It was assigned an EPA Q value of Q3 (Moderate) based on the results. Four brown trout were recorded during the electrofishing survey at a nearby site on this river. Their length ranged between 8-15cm. This is a valuable nursery and holding area for brown trout in the Muing River and possibly contributes to the trout population at Lough Dahybaun.

Site 2

Site 2 located on the Sruffaunnamuinggabatia River (WFD code: IE_WE_33O040050), is a medium lowland depositing watercourse (FW2) located to the north of the Proposed Development site, c.900m northwest of the nearest borrow pit or c. 1km northwest from the nearest turbine (T06). The bank width was 14m, with a wet width of 4m and an average water depth of 150cm. There was a very slow flow at the time of surveying and consisted entirely of glide. The substrata comprised entirely of silt and was noted as being extremely soft during assessment. The banks were straight and vertical. The riparian vegetation consisted of soft rush, ling heather (*Calluna*), bramble (*Rubus fructicosus*), dandelion (*Taraxacum vulgaria*), marsh bedstraw (*Galium palustre*) and jointed rush (*Juncus articulates*). No instream macrophytes were recorded present.

No kick sample was carried out at this site due to a high amount of silt and soft riverbed. Therefore no Q-value was obtained for this site.

The watercourse was noted as having low potential for salmonid spawning due to lack of suitable gravels which would provide suitable spawning habitat. There was also a lack of riffle and which provide nursery however this stretch of river was deep and contained holding habitat for salmonids. Electrofishing results in a nearby section of this river showed this river to contain four species, Atlantic salmon, brown trout, threespine stickle back (*Gasterosteus aculeatus*) and minnow (*Phoxinus phoxinus*). A total of 28 salmon (4-9.2cm in length),10 brown trout (4.8-14cm in length), 10 stickle back and one minnow were recorded. This indicates that this section of river has nursery and holding habitat for salmonids and there is potential to provide suitable spawning habitat. No crayfish or lamprey were recorded at this section of river and it did not contain suitable habitat for these species.

Site 3

Site 3 on the Muing River (WFD code: IE_WE_33M010100), is a medium lowland depositing watercourse (FW2), located to the southwest of the Proposed Development site, c.1.4m west of the substation or c. 2.1km southwest from the nearest turbine (T02). The bank width was 4m with a wet width of 4m and an average water depth of 70cm. There was a moderate flow at the time of surveying and consisted entirely of glide. The riverine substrate comprised of gravels and silt. The banks were straight and vertical. The riparian vegetation consisted of soft rush, heather, bramble, soft rush, marsh bedstraw, jointed rush and dandelion. Instream macrophytes recorded present included Pondweed, *Potamogeton Spp*. and floating Bur- reed (*Spargarium angustifolium*).

Kick sampling showed the presence of Group C and D species. An EPA Quality Rating of Q3 (Moderate) was assigned to the site.

Electrofishing results showed this section of river to contain five species, Atlantic salmon, brown trout, lamprey, threespine stickle back and minnow. A total of two salmon (11 and 13.9cm), five brown trout (12.4-17.4cm), five lamprey (8.4-9cm), three stickle back and four minnow were recorded. This indicates that this section of river has nursery and holding habitat for salmonids. Overall, this is a productive stream providing spawning and nursery areas for salmonids and lamprey. No crayfish were recorded at this section of river and it did not contain suitable habitat for this species.

Site 4

Site 4 on the Fiddaunatooghaun (WFD code: IE_WE_34S010400) is a medium lowland depositing watercourse (FW2) located to the south of the Proposed Development site, c. 2.7km south from the nearest turbine (T13). The bank width was 2m with a wet width of 2m and an average water depth of 15cm. The river was fast flowing at the time of surveying and consisted mostly of riffles with some glide present. The riverine substrate comprised of boulders, gravels and cobbles. The banks were vertical with undercutting present in some areas. The riparian vegetation consisted of Yorkshire fog, meadow sweet, bramble and dandelion. Instream macrophyte cover was low and comprised of fools watercress (*Apium nodiflorum*) and water mint *Mentha aquatica*).

Kick sampling results showed the presence of group A, group B and some group E species. An EPA Quality Rating of Q4 (Good) was assigned to the site.

The watercourse was noted as having potential for salmonid spawning due to the presence of suitable spawning gravels. One ad hoc record of crayfish was caught in a net during kick sampling.

The electro-fishing survey carried out at this site recorded both brown trout and salmon. A total of 14 brown trout (5.5-15.8cm) and four salmon (6.7-11.3cm) were recorded. This indicated that this section of river holds good salmonid spawning and nursery habitat for salmonids. There is no potential for lamprey here due to the absence of silt. It indicates this river supports crayfish and contains adequate habitat for the species.

Site 5

Site 5 on the Shanvolahan (WFD code: IE_WE_34S010400) is a small lowland depositing watercourse (FW2) located to the south of the Proposed Development site, c. 2.2km south from the nearest turbine (T13). The bank width was 1.5m with a wet width of 0.5m and an average water depth of 15cm. There was a fast flow at the time of surveying and consisted mostly of riffles with some glide present. The riverine substrate comprised of boulders, gravels, cobbles and silt. The section of river had steep banks and there was also evidence of some bank undercutting in areas. The riparian vegetation consisted of Yorkshire fog (*Holcus lanatus*), meadow sweet (*Filipendula ulmaria*), bramble, willow (*Salix spp.*) and dandelion. Instream macrophyte cover was low and comprised of fools watercress and water mint.

No kick sample was carried out at this site therefore no Q-value was obtained for this site.

The watercourse was noted as having potential for salmonid spawning due to the presence of some suitable spawning gravels.

The electro-fishing survey carried out at this site recorded brown trout, salmon and minnow. A total of 12 brown trout (7.2-16.4cm) and three salmon (6.6-11cm) were recorded. This indicated that this section of river holds good spawning and nursery habitat for salmonids. There is no potential for lamprey here due to the absence of silt. It indicates this river supports crayfish as it contained adequate habitat for the species however, they were no recorded present.

Site 6

Site 6 on the Fiddaunnagosty (WFD code: IE_WE_34S010400) is a small lowland depositing watercourse (FW2). The bank width was 1m with a wet width of 1m and an average water depth of 15cm. The stream was fast flowing at the time of surveying and consisted mostly of riffles with some glide present. The riverine substrate comprised of boulders, gravels, cobbles and sand. The section of river had steep banks and there was also evidence of some undercut in areas. The riparian vegetation consisted of Yorkshire fog and devils-bit scabious (*Succisa pratensis*). Instream macrophyte cover was low and comprised of Branched Bur-reed (*Sparganium erectum*). There is a ford located on this stream upstream of the sampling site creating a barrier to fish migration. The stream percolates through the rock armoury.

Kick sampling results recorded the presence of group C species (dominant) with a few group B and group D species. An EPA Quality Rating of Q4 (Good) was assigned to the site.

The electro-fishing survey carried out at this site recorded brown trout, salmon and stickle back. A total of 2 brown trout (6-9.6cm) and one salmon (12.5cm) were recorded. This indicated that this section of river holds spawning and nursery habitat for salmonids however the barrier recorded may deem this site unsuitable and this is reflected in the low numbers of salmonids present. Two crayfish were recorded also present at this site indicating this section of river supports crayfish and contains adequate habitat for the species. There is also no potential for lamprey here due to the absence of silt.

Site 7

Site 7 on the Fiddaunnamuing (WFD code: IE_WE_34C030100) is a small upland eroding watercourse (FW1) located to the east of the Proposed Development site, outside the site boundary, c. 1.8km from the nearest turbine (T15). The bank width was 2m with a wet width of 0.75m and an average water depth of 30cm. There was a moderate flow at the time of surveying and consisted mostly of glide with some riffles. The riverine substrate is comprised of boulders, gravels and cobbles. The section of river had steep banks and there was also evidence of some undercut in areas. The riparian vegetation consisted of Willowherb (*Chamaenerion angustifolium*), angelica (*Angelica sylvestris*), bracken (*Pteridium aquilinum*), Yorkshire fog, and willow. No instream macrophyte was present.

No kick sample was carried out at this site therefore no Q-value was obtained for this site.

Electro-fishing surveys recorded eight brown trout (6.6-17.3cm) and one eel (*Anguilla Anguilla*) (22cm) at this site. This indicates that this section of river holds good spawning, nursery and holding habitat for salmonids. There is no potential for lamprey here due to the absence of silt. Potential crayfish habitat was also recorded in the form of boulders and cobbles for refuge.

Site 8

Site 8 on the Owenmore River (WFD code: IE_WE_34C030100), is a medium lowland depositing watercourse. It is located to the northeast of the Proposed Development site, outside the site boundary, c. 2.9km from the nearest turbine (T10). The bank width was 10m with a wet width of 9m and an average water depth of 30cm. There was a moderate flow at the time of surveying and had a mixture of glide, pools and riffles. The riverine substrate comprised of boulders, gravels and cobbles. The section of river had steep banks and there was also evidence of some undercut in areas. Riparian vegetation consisted of willowherb, bent grasses, gorse (*Ulex europaeus*) and ragwort (*Jacobaea vulgaris*). No instream macrophyte was present.

No kick sample was carried out at this site therefore no Q-value was obtained for this site.

Electro-fishing surveys recorded 10 brown trout, salmon, eel and minnow present. This is a good salmonid stream providing a spawning and nursery habitat for salmonids.

The electro-fishing survey carried out at this site recorded brown trout, salmon, minnow and eel. A total of 10 brown trout (6-20.3cm), 27 salmon (4.3-12cm), one eel (25cm) and 10 minnow were recorded. This indicated that this section of river holds good spawning, nursery and holding habitat for salmonids. There is no potential for lamprey here due to the absence of silt. It indicates this river supports crayfish as it contained adequate habitat for the species in the form of boulders and cobbles for refuge however, they were not recorded present.

4.2.4 Breeding and Wintering Bird Surveys

A total of 69 species of bird have been recorded during ongoing ornithology surveys within the proposed development, over the survey period between April 2019 and September 2022. The full list of species recorded can be seen in 7.0Appendix B . For the purpose of this Appropriate Assessment process only the birds recorded within the proposed development study area which are also found to be Special Conservation Interests for nearby SPAs will be examined in further detail (more detail on SPAs which occur within the Zone of Influence for this proposed development can be seen in section 5.3). These are listed in Table 4-5 and discussed individually below.

Table 4-5: Bird species recorded over the survey period between 2019 and 2022, within the Proposed Development Site which are SCIs for nearby SPAs

Species name	Conservation status
Common Gull *(Larus canus)*	BoCCI Amber List (Breeding and Wintering)
Curlew *(Numenius arquata)*	BoCCI Red List (Breeding and wintering)
Dunlin (*Calidris alpina*)	BoCCI Red List (Breeding and wintering)
Golden Plover *(Pluvialis apricaria)*	Annex I Birds Directive (BD); BoCCI Red List (Breeding and wintering)
Herring Gull *(Larus argentatus)*	BoCCI Amber List (Breeding and Wintering)
Lapwing *(Vanellus vanellus)*	BoCCI Red List (Breeding and wintering)
Lesser Black-backed Gull *(Larus fuscus)*	BoCCI Amber List (Breeding and Wintering)
Merlin *(Falco columbarius)*	Annex I BD; BoCCI Amber List (Breeding)
Redshank (*Tringa totanus*)	BoCCI Red List (Breeding and wintering)
Ringed Plover (*Charadrius hiaticula*)	BoCCI Amber List (Breeding and Wintering)
Tufted Duck (*Aythya fuligula*)	BoCCI Amber List (Breeding and wintering)
Whooper Swan (*Cygnus cygnus*)	Annex I BD; BoCCI Amber List (Breeding and Wintering)

Note: BoCCI = Birds of Conservation Concern Ireland

Common Gull

Common Gull was recorded 163 times throughout the 2019, 2020, 2021 and 2022 breeding seasons during vantage point, breeding transect and targeted gull surveys. The species typically occurred in small numbers, ranging from single individual to flocks up to seven birds on occasion. The species were predominantly recorded around Lough Dahybaun but was recorded at a number of other small lakes present around the proposed development site (predominantly to the north). They were confirmed breeding within the study area at several different locations throughout the breeding surveys, the nearest confirmed location being 1.7km from proposed infrastructure and the nearest probable location being 500m. Further information regarding flightlines and observations can be found in 7.0Appendix B . A desktop study found this species to be a SCI for four SPAs within the area, which is discussed in more detail in section 5.0 below.

Curlew

Curlew were recorded on one occasion at Lough Dahybaun in June 2020. The were no records of curlew breeding within the proposed development site during the surveys and this bird recorded was likely on migration or a failed breeder from elsewhere. Further information regarding flightlines and observations can be found in 7.0Appendix B . A desktop study found this species to be a SCI for two SPAs within the area, which is discussed in more detail in section 5.0 below.

Dunlin

Dunlin were rarely recorded within the site and was only found twice, one bird in July 2021 and a pair in July 2022 during the breeding season, where they were observed during a breeding wader survey. The birds were located roughly in the same location in both 2021 and 2022, in suitable breeding habitat approximately 1.7km from the nearest infrastructure site, however there was no evidence to that it bred at this location, and it was not recorded here during previous visits or in subsequent surveys. Further information regarding these observations can be found in 7.0Appendix B . A desktop study found this species to be a SCI for five SPAs within the area, which is discussed in more detail in section 5.0 below.

Golden Plover

Golden Plover were regularly recorded at the site during the 2019/2020, 2020/2021 and 2021/2022 winter seasons and during late 2019, 2021 and 2022 breeding seasons. A total of 2,635 sightings were recorded over the survey period during VP surveys, breeding bird transects, winter bird transects and waterfowl surveys, the vast majority of which (2,591) occurred during the winter seasons. Flocks varied between months with a mean flock size of c.50 birds, but a flock of up to 400 was recorded February 2021. The majority of golden plover recorded relate to flights, or roosting flocks which were relatively spread across the site and within the 2km study area. There were no confirmed records of Golden plover breeding on site and as only five of the sightings occurred within the late breeding seasons in 2019, 2021 and 2022, all of which occurred in the month of September. These records likely relate to birds on migration or failed breeders from elsewhere. Further information regarding these observations can be found in 7.0Appendix B . A desktop study found this species to be a SCI for two SPAs within the area, which is discussed in more detail in section 5.0 below.

Herring Gull

Herring Gull are rare at the proposed development site and were only recorded on one occasion during the Winter VP survey in December 2021. The Herring Gull was observed flying north over the site from VP5. They were not confirmed breeding during the surveys. Further information regarding flightlines and observations can be found in 7.0Appendix B . A desktop study found this species to be a SCI for two SPAs within the area, which is discussed in more detail in section 5.0 below.

Lapwing

Lapwing were only observed once during the end of the 2021 breeding season, where two birds were recorded flying over the site during vantage point surveys. These birds were likely on migration to their wintering grounds. No other observations of lapwing were recorded. Further information regarding flightlines and observations can be found in 7.0Appendix B . A desktop study found this species to be a SCI for one SPA within the area, which is discussed in more detail in section 5.0 below.

Lesser Black-backed Gull

Lesser Black-backed Gull were recorded during surveys in the 2019, 2020, 2021 and 2022 breeding seasons, with a small number recorded in the late 2020/2021 and 2021/2022 winter seasons. A total of 71 sightings were recorded during vantage points and breeding and winter transect surveys during both the breeding and winter surveys. The majority of recordings were of one or two birds flying over waterbodies or bog habitat with a maximum of seven birds seen flying over during the 2020 breeding season. The Lesser Black-backed Gull were regularly found in the breeding season throughout the proposed development site and were rarely recorded in winter. They were not confirmed breeding at the site and the site contained few areas of suitable nesting habitat, the large amount of records seen over the breeding season are likely to be non-breeders or juveniles. Further information regarding flightlines and observations can be found in 7.0Appendix B . A desktop study found this species to be a SCI for one SPA within the area, which is discussed in more detail in section 5.0 below.

Merlin

Merlin were recorded within the site during the 2020, 2021 and 2022 breeding season and the 2020/2021 and 2021/2022 winter seasons. A total of 17 sightings were recorded over the survey period during VP surveys, breeding bird transect surveys, merlin and raptor surveys and waterfowl surveys. All sightings involved just one bird observed hunting or flying. During the breeding seasons, merlin was recorded as having a possible breeding status onsite, as birds were often recorded within or near suitable breeding habitat, although there were no confirmed records of nesting or juveniles during the surveys. The majority of merlin records over the breeding season related to birds seen to the east and north of the site, within the 2km study area, with the nearest recorded 30m from proposed infrastructure. These locations contained more suitable foraging and nesting habitat and are more remote (less human disturbance) compared to within the proposed development site boundary. Breeding is more probable at these locations although no nests or juveniles could be found over the survey period. During the winter seasons, merlin was infrequently recorded and typically occurred more to the north of the proposed development. Further information regarding flightlines and observations can be found in 7.0Appendix B . A desktop study found this species to be a SCI for one SPA within the area, which is discussed in more detail in section 5.0 below.

Redshank

Redshank were rarely recorded within the site and was only found twice in April 2020 during the breeding season, where it was observed during a breeding wader survey and a gull survey. These records related to single bird, foraging in suitable breeding habitat approximately 1.9km from the nearest infrastructure site, however there was no evidence to that it bred at this location, and it was not recorded here during previous visits or in subsequent surveys. Further information regarding flightlines and observations can be found in 7.0Appendix B . A desktop study found this species to be a SCI for one SPA within the area, which is discussed in more detail in section 5.0 below.

Ringed Plover

Ringed Plover were commonly recorded onsite mostly during the 2020, 2021 and 2022 breeding seasons, with a small number recorded in the late 2020/2021 and 2021/2022 winter seasons. A total of 181 sightings were recorded over the survey period during, vantage point surveys, breeding bird transects, and winter bird transect surveys. Sightings typically recorded pairs or individuals, with the highest count of three birds recorded at once. The majority of records related to pairs of Ringed Plover recorded within the large areas of cutover bog to the northeast, east and southeast of the site. During the breeding seasons pairs were recorded as having either a confirmed or probable breeding status in these areas, as suitable habitat could be found, birds were observed preforming courtship displays, appeared to be holding permanent territories (recorded in same areas on repeat visits) or some birds were recorded performing distraction displays. Further information regarding flightlines and observations can be found in 7.0Appendix B . A desktop study found this species to be a SCI for three SPAs within the area, which is discussed in more detail in section 5.0 below.

Tufted Duck

Tufted ducks are common during winter months within the study area, having been recorded in the 2019/2020, 2020/2021 and 2021/2022 winter seasons, and also during the 2020 breeding season. Tufted Duck were recorded a total of 169 times within the proposed development site, during vantage point, hen harrier roost, and waterfowl surveys (7.0Appendix B). During winter months, the species typically occurred in small numbers, but flocks of up to 24 were sighted, typically feeding or roosting on Lough Dahybaun. During the breeding season, in April 2020, four tufted duck (three male and one female) were recorded at three occasions, during a vantage point survey on VP4. The species was recorded in suitable habitat (small lake/pond), but breeding was not confirmed, as they were not recorded again in subsequent visits. A desktop study found this species to be a SCI for three SPAs within the area, which is discussed in more detail in section 5.0 below.

Whooper Swan

Whooper Swan was recorded 88 times during vantage point and walkover surveys during the winter seasons of 2019/2020, 2020/2021 and 2021/2022, with no records of whooper swans during the breeding season surveys. Flocks were typically small and ranged from a single bird up to eight (Appendix 8-1). The peak number of eight individuals is less than 1% of the county Mayo population of 973 (Burke et al 2021)[40].The majority of whooper swan recorded relate to flights, which were relatively spread across the site. There were no consistent records of Whooper Swan during any of the winter seasons, which suggests that birds seen were commuting to breeding or wintering grounds elsewhere. A smaller proportion of records note small flocks feeding or roosting on small lakes within the site, including a roost that is found on Lough Dahybaun. The roost is located on suitable habitat over 500m away from the proposed infrastructure. Further information regarding flightlines and observations can be found in

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[40] Burke, B., McElwaine, J.G., Fitzgerald, N., Kelly, S.B.A., McCulloch, N., Walsh, A.J. and Lewis, L.J., (2021). Population size, breeding success and habitat use of Whooper Swan *Cygnus cygnus* and Bewick's Swan *Cygnus columbianus bewickii* in Ireland: results of the 2020 International Swan Census. *Irish Birds*, *43*, pp.57-70.

7.0Appendix B . A desktop study found this species to be a SCI for one SPA within the area, which is discussed in more detail in section 5.0 below.

5.0 STAGE 1 - SCREENING FOR APPROPRIATE ASSESSMENT

5.1 Overview of Potential Impacts

There are a number of elements associated with the Proposed Development's construction, operation and decommissioning phases that may result to direct and indirect impacts that have the potential to result in likely significant effects on European sites, either alone or in combination with other plans and projects. The significance of these likely significant effects depends on the scale of the impact as well as the ecological condition and the sensitivities of the Qualifying Interests and Special Conservation Interests. Elements of the Proposed Development that may give rise to ecological impacts, which have been considered with regards to potential effects to European sites, are:

- Loss of habitat as a result of the proposed infrastructure;
- Potential release of sediment and pollutants, which may be discharged into surface water, particularly during high rainfall events;
- Movement of vehicles and machinery associated with construction works and the potential for spillages of oils, fuels or other pollutants, which could be transported to the surface water system during rainfall events;
- Transportation, pouring of concrete onsite and washing of concrete lorry flume – risk for entry into surface water;
- Increased silt loading which may stunt aquatic plant growth, limit dissolved oxygen capacity and overall reduce the water quality of watercourses, with the most critical period associated with low flow conditions;
- The introduction or spread of invasive alien species due to construction works;
- Disturbance to fauna (e.g. through noise from construction or operation activities, human presence, and/or barrier effects as a result of operation wind turbines) resulting in the displacement of affected species; and
- Accidental mortality of wildlife from machinery during the construction, operation or decommissioning phases or collision with wind turbines during the Operational Phase.

5.1.1 Construction Phase

Potential construction phase impacts associated with the proposed development are discussed hereunder.

5.1.1.1 Habitat Loss

The Proposed Development and its associated infrastructure will result in a direct habitat loss of approximately 97.2ha as a result of the proposed infrastructure. The Proposed Development is primarily restricted to highly modified and altered habitats of low ecological importance cutover bog. Other habitats within the Proposed Development footprint include upland/eroding rivers, depositing/lowland rivers (FW2), dry siliceous heath (HH1), wet heath (HH3), lowland blanket bog (PB3) and scrub (WS1). A summary of the approximate habitat loss from the Proposed Development can be seen in Table 5-1.

Table 5-1: Approximate Habitat Loss of Habitats from the Proposed Development

Habitats	Proposed Infrastructure components (ha)								Total Area (ha)
	Amenity Walkway	Borrow Pit Areas	Cable Route	Construction Compounds	Peat Deposition Areas	Proposed Roads	Substation	Turbine Hardstands	
BL3 - Buildings and artificial surfaces	0.671	0.623	0.203	0.836	-	3.933	0.067	0.017	**6.349**
FL8 - Other artificial lakes and ponds	-	-	-	-	-	0.040	-	-	**0.040**
GA1 - Improved agricultural grassland	-	-	0.031	-	-	-	-	-	**0.031**
GS2 - Dry meadows and grassy verges	-	0.021	-	-	-	0.048	-	-	**0.069**
GS3 - Dry humid acid grassland	-	-	-	-	-	0.037	-	-	**0.037**
GS4 - Wet grassland	0.122	0.005	0.081	0.109	0.008	0.587	0.926	-	**1.837**
HH1 - Dry siliceous heath (non-Annex)	-	2.492	-	0.005	0.013	0.018	-	-	**2.529**
HH3 - Wet heath (non-Annex)	0.000	-	-	0.033	1.796	0.180	-	-	**2.010**
PB3 - Lowland blanket bog (non-Annex)	0.002	0.936	0.037	-	0.079	0.832	0.636	0.210	**2.733**
PB4 - Cutover bog	0.590	39.696	0.665	0.463	17.406	7.596	-	9.034	**75.450**
WS1 - Scrub	0.004	-	-	0.141	-	0.018	-	-	**0.162**
WS2 -Immature woodland	-	-	-	-	1.599	0.051	-	0.423	**2.073**
Total Area (ha)	**1.389**	**43.774**	**1.017**	**1.586**	**20.902**	**13.340**	**1.629**	**9.683**	**93.320**

There will be no direct loss of any annex habitat from the proposed development. Three habitats which have the potential to correspond with Annex habitat (Dry siliceous heath, Wet heath and Lowland blanket bog), did not conform with the vegetation communities or physical characteristics of their annex habitats or were too degraded.

5.1.1.2 Runoff of Sediment and/or Construction Pollution

Site clearance, excavation activities, and the stockpiling of material have the potential to result in sediment laden runoff, if not appropriately managed, which may result in the sedimentation of nearby watercourses. Increased silt loading in watercourses can stunt aquatic plant growth, limit dissolved oxygen capacity and reduce the overall ecological quality of watercourses, with the most critical period associated with low flow conditions.

The pouring of concrete will be required to facilitate the foundation works associated with the turbine hardstands and other infrastructure sites. Surface water runoff can be contaminated by leaks and spills of fuel, oil or other construction material from construction vehicles/machinery if not properly managed. The runoff of contaminated surface water can result in the degradation of water quality and impacts to aquatic fauna and flora, particularly if concrete is present.

The concentration of suspended solids and nutrients in the water column could increase and cause excessive fine silt deposition and degrade water quality. The Oweninny River supports a number of protected aquatic species such Otter, Atlantic salmon and Brook lamprey.

5.1.1.3 Impacts to Groundwater

The habitats/species of some protected sites require good/intact ground water to maintain/restore a favourable conservation status. Potential indirect effects on ground water dependent habitats and species within the SACs or SPAs arising from the construction phase include deterioration or lowering of the water table during the excavation of turbine foundations, hardstanding areas, borrow pits, substation, internal haul roads and amenity roads, grid connection cabling.

5.1.1.4 Invasive Species

The invasive plant species Rhododendron was identified within the footprint of the Proposed Development (at the proposed substation location and along site roads near T4 and T5) and at other locations within the Proposed Development site boundary (see Figure 4-3). The spread of Rhododendron has the potential to outcompete other floral species, reducing the diversity and/or altering habitats conditions or structure (e.g. changing soil chemistry). The transport of material, disturbance of ground (providing areas for invasive species germination) and the movement of machinery or personnel carry the risk of spreading invasive species.

5.1.1.5 Dust

Excavation activities may also result in the temporary generation of dust in the locality of the works area, which could lead to dust deposition on vegetation which can inhibit plant growth. The Institute of Air Quality Management provides guidelines *'Guidance on the Assessment of Dust from Demolition and Construction'* (Holman *et al.*, 2014)[41], which prescribes potential dust

[41] Holman, C., Barrowcliffe, R., Birkenshaw, D., Dalton, H., Gray, G., Harker, G., & Vining, L. (2014). IAQM Guidance on the Assessment of Dust from Demolition and Construction. Institute of Air Quality Management, London http://iaqm.co.uk/wpontent/uploads/guidance/iaqm_guidance_report_draft1.4.pdf.

emission risk classes to ecological receptors. Following the guidelines and considering the size of the proposed development, the scale of the earthworks was considered Large (total site area >10,000m). The guidelines specify that receptor sensitivity is 'High' up to 20m from the source and reduces to 'Medium' at 50m. Dust may also be generated from track out due to heavy duty vehicle (HDV) movements from the site entrance. It is anticipated that HDV movement will range between 10-50 outward movements a day which equates to 'Medium' track out movement. The guidelines indicate that medium track out equates to dust occurring between 50-100m from the site.

5.1.1.6 Noise and disturbance

The proposed construction works will result in an increase in noise levels during the construction phase of the Proposed Development. The construction works will also result in an increase in personnel and traffic movement to and from the site. It should be noted that no rock breaking, or blasting will be required during the construction phase. It is likely that temporary construction lighting will be required during the construction phase. Fugitive lighting could deter movement of species in the area. A temporary increase in noise levels, disturbance and lighting within the Proposed Development site may result in disturbance to wildlife within the immediate vicinity of the site.

5.1.2 Operational Phase

Potential operational phase impacts associated with the proposed development are discussed hereunder.

5.1.2.1 Fuels and Hydrocarbons

Occasional vehicle access to the Proposed Development site will be required for periodical maintenance. The movement of vehicles may lead to occasional accidental emissions in the form of lubricants and/or fuel, which could cause localised contamination of site drainage channels or other watercourse within the site. However, due to the periodic nature of visits, the risk of surface water pollution during operation is considered to be low.

5.1.2.2 Collision Risk

The potential for birds to collide with turbines is one of the main impacts to consider in the assessment of possible impacts of an operating wind farm. Bird collision is dependent on a number of factors: species of bird involved the number of flights and individuals per flight, turbine height and blade length, weather (i.e. fog), topography, geography, etc. Collision risk is only associated with operating wind farms. Given the nominal 30-year life span of a wind farm, impacts are considered to be long term.

It is considered that the physical characteristic of the bird plays a crucial role in predicting the probability of a bird suffering a collision while passing through the airspace occupied by an operating turbine. The probability is predicted based on the bird wing length, weight, tail length and total body length (Janss, 2000)[42]. Moreover, flight behaviour can be influenced by wing loading (ratio of body weight to wing area) and aspect ratio (ratio of wingspan squared to wing area) which can affect collision risk. High wing loading is associated with species which demonstrate low manoeuvrability (e.g. swans and several species of geese), which can determine the probability of a bird successfully avoiding an imminent collision with a turbine

[42] Janss, G.F.E. (2000). Avian mortality from power lines: a morphologic approach of a species-specific mortality. Biological Conservation 95:353-359.

(Drewitt & Langston, 2008)[43]. Other species such as farmland passerines are generally more manoeuvrable and as a consequence are less susceptible to collisions (Bright *et al.,* 2008)[44].

Radar-tracking studies at operating wind farms have shown that birds will generally avoid colliding with turbines and do not fly into them blindly.

In practice, most birds do take avoiding action when they encounter operating turbines in the landscape. Birds in flight may detect either the wind farm as a whole or an individual turbine and alter their flight paths accordingly. Avoidance may also occur as an emergency action performed by birds at close quarters with the rotating blade of an operating turbine. To account for this avoidance rate, an analysis of collision risk must incorporate an 'avoidance factor'. The avoidance factor incorporates the ability of birds to successfully avoid collisions with objects in their environment into the analysis. A high proportion of birds successfully avoid collisions with operating turbines, this is reflected in a recommended default avoidance rate of 98% (SNH, 2016)[45].

5.1.2.3 Noise, Disturbance Displacement and Barrier Effect

The presence of turbines in the landscape could potentially deter birds from using the area and its surroundings, resulting in a disturbance displacement effect. Disturbance can result in a significant impact if it reduces the availability of resources for avian receptors. The literature is not in agreement on the magnitude of disturbance displacement impact associated with operating turbines; moreover, there is an increasing body of evidence to suggest that wind farms do not affect bird distribution (Powlesland, 2009)[46]. In the event that displaced individuals can secure alternative habitat, the impact may actually be inconsequential.

It is considered that the availability of alternative feeding habitat may play a role in the disturbance effects. When resources are limited, birds are less sensitive to disturbance impacts (Percival, 2005[47] & Powlesland, 2009[46]). If disturbance displacement is said to be impacting an avian receptor, then, the significance of the impact is a product of the scale of the deterrence, as opposed to, the ability of the wider surroundings to support displaced individuals (Langston & Pullan, 2003)[48]. The majority of studies which show a disturbance effect relate to waterfowl, over distances of up to 800m (wintering birds) and 300m (breeding birds).

An additional possible disturbance effect is the disruption to flight lines, which may result in a wind farm acting as a partial barrier to bird movements. Such a disturbance effect could be felt as either a barrier to a migration route or between a roost and feeding site. The ecological impact could prove significant if the increased energy expenditure involved in avoiding the barrier depleted the body fat reserves of an already stressed population.

The effect of disturbance/displacement is expected to decrease over time. The foraging behaviour of local avian communities is expected to adjust as habituation occurs to the disturbance. In addition, Percival (2001)[49] recommends locating turbines at a minimum of 200m apart to facilitate the free movement of birds and thereby avoid a barrier effect (Percival,

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[43] Drewitt and Langston (2006) Assessing the impact of wind farms on birds. Ibis. 148, 29-42.
[44] Bright, J., Langston, R., Bullman, R., Evans, R., Gardner, S., & Pearce-Higgins, J. (2008). Map of bird sensitivities to wind farms in Scotland: a tool to aid planning and conservation. *Biological Conservation*, *141*(9), 2342-2356.
[45] SNH (2016) Avoidance rates for the onshore SNH Wind Farm Collision Risk Model
[46] Powlesland, R. G. (2009). Impacts of Wind Farms on Birds: A Review. *Science for conservation*, (289).
[47] Percival, S.M. (2005) Birds and wind farms—what are the real issues? *British Birds 98*: 194–204.
[48] Langston & Pullan (2003) Wind farms and Birds: An analysis of the effects of wind farms on birds. Guidance on environmental assessment criteria and site selection issues. RSPB

2001)[49]. In the present case, all turbines are proposed to be located at distances greater than 400m from their nearest neighbour.

The proposed development will be minimally manned with a dedicated team with responsibility for carrying out routine maintenance and security services. Disturbance during the operational phase will be limited and will not result in significant effects on the receiving environment.

5.1.3 Decommissioning Phase

The proposed development is expected to be operational for at least 30 years Decommissioning phase effects will be similar to the construction phase but the potential for likely significant effects considerably less. Decommissioning of the Proposed Development would result in the cessation of renewable energy generation, and include the dismantling and removal of turbines, and the potential (though unlikely) removal of other infrastructural elements, minor excavation activities. Impacts during decommissioning are expected to be similar type and magnitude to those anticipated during the construction phase but generally of a shorter duration.

5.2 Determining the Likely Zone of Influence

Guidance in AA of plans and projects in Ireland notes that a minimum distance of 15km is recommended for the identification of relevant European sites in the case of plans[50]. For some projects the distance could be much less than 15km, and in some cases less than 100m, but this must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in-combination effects.

Using the source-receptor-pathway model[51, 52] an examination of the potential effects of the Proposed Development was undertaken (alone and / or in-combination) to identify what European sites, and which of their qualifying interests or special conservation interest species were potentially at risk. This was required to determine the Zone of Influence (ZoI) for the Proposed Development.

This conceptual model is a standard tool in environmental assessment. In order for an effect to occur, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism means there is no likelihood for the effect to occur. In the context of the Proposed Development, the model comprises:

- Source (s) – potential impacts from the Proposed Development, e.g. the runoff of sediment;
- Pathway (s) – hydrological, physical or ecological connectivity to a European site; and
- Receptor (s) – qualifying interests and/or special conservation interests of the European sites.

It is vital that an assessment of potential source-pathway-receptor links is undertaken to assess potential impact links between the receptor (European sites) and source (proposed development) to establish the risk of any likely significant effects. Additional designated sites

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[49] Percival S. M. (2001) Assessment of the effects of offshore wind farms on birds. Unpublished report for the UK Department of Trade and Industry, ETSU W/13/00565/REP, DTI/Pub URN 01/1434. 93 p. www.berr.gov.uk/files/file20258.pdf (viewed 23 September 2008).
[50] Department of the Environment, Heritage and Local Government DEHLG (2010). Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities.
[51] Cooper, L. M. (2004). Guidelines for Cumulative Effects Assessment in SEA of plans. EPMG Occasional Paper 04/LMC/CEA, Imperial College London.
[52] OPW (2012), Arterial Drainage Maintenance categories, Source » Pathway » Receptor Chains for Appropriate Assessment. OPW, Galway

including proposed Natural Heritage Areas (pNHA's), Natural Heritage Areas (NHA's) and RAMSAR sites were also reviewed, as although they do not form part of the AA, they often provide important supporting functions to European sites.

With regards potential habitat degradation effects associated with the release of sediment and other pollutants to surface water, the ZoI of the Proposed Development is considered to include receiving waterbodies adjacent to or downstream of the Proposed Development site during the Construction and Operational Phase. The distance downstream is associated with the current biological condition of the accepting waterbody and its capacity to accept and assimilate sediment and other pollutants.

Noise from construction activity has the potential to cause disturbance to resting, foraging and commuting qualifying and special conservation interest species. With regards to disturbance effects, the potential ZoI is considered to be in the local vicinity (within 300m) of the Proposed Development during the construction phase.

Collision with active wind turbines has the potential to cause mortality of bird species and thus the ZoI should take into account the regular commuting or foraging distance of that bird species. Therefore, the ZoI for potential collision risk is assessed per species or species group (i.e. Gulls, Ducks, Waders), as some bird species may have significantly larger foraging distances to others.

5.3 Identification of Relevant European Sites

As mentioned above, the source-receptor-pathway conceptual model was used to identify a list of 'relevant' European sites (i.e. those which could be potentially affected).

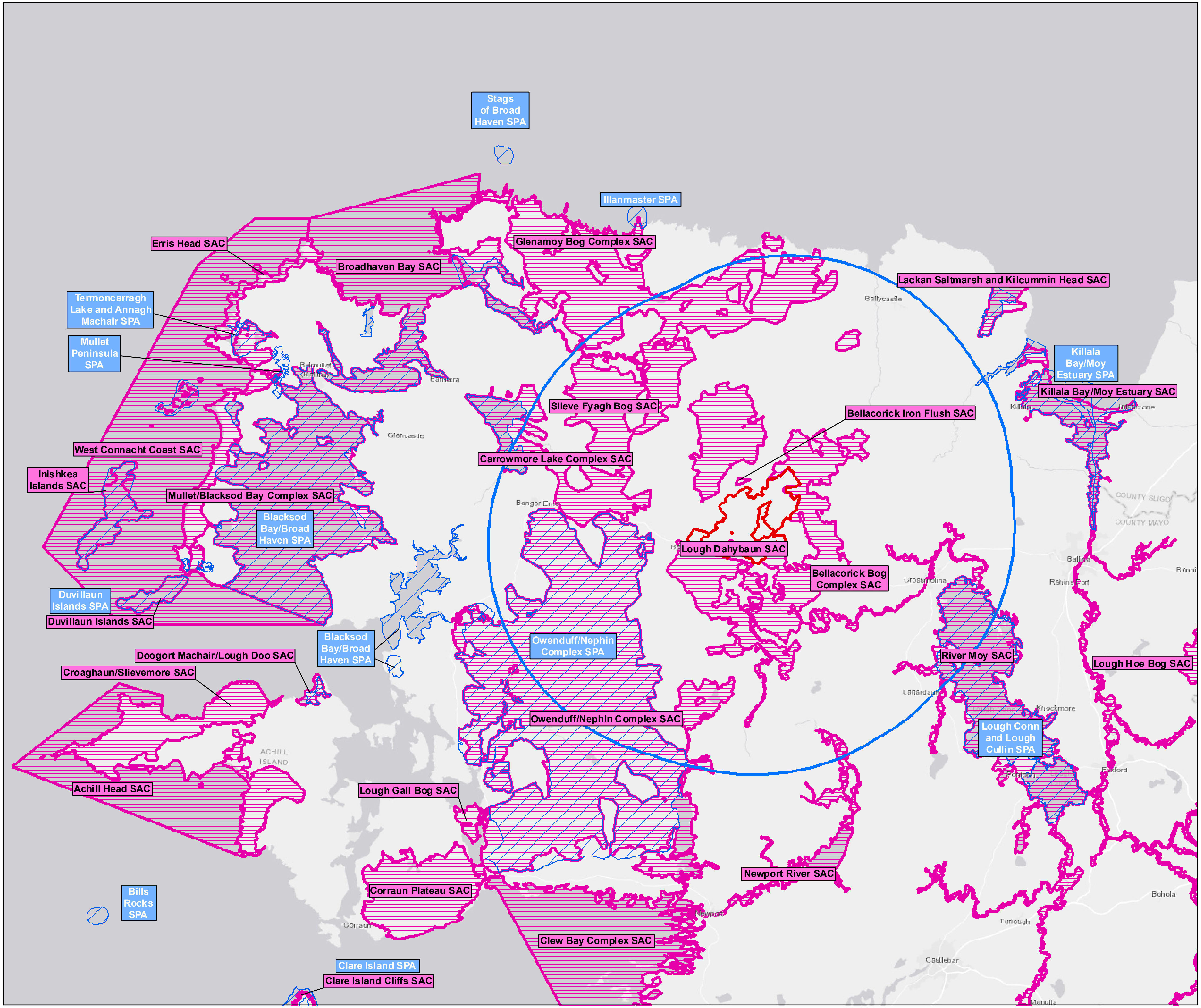
There are thirteen European sites (nine SACs and four SPAs) within the arbitrary 15km radius of the site, but a further eleven (all SPAs) were identified beyond this 15km buffer, these were considered as potential pathways (surface waters, commuting or foraging birds) were identified (Table 5-2 and Figure 5-1).

Table 5-2: European Sites within 15km of the Proposed Development Site

Designated Site	Site Code	Approximate Distance from Proposed Development (km)
Lough Dahybaun SAC	001922	Within site boundary
Bellacorick Bog Complex SAC	002177	Borders site to the south and east
Bellacorick Iron Flush SAC	000466	Approximately 500m north
River Moy SAC	002298	Approximately 2.5km south
Owenduff/Nephin Complex SAC	000534	Approximately 3.8km west
Carrowmore Lake Complex SAC	000476	Approximately 4.8km west
Glenamoy Bog Complex SAC	000500	Approximately 7.3km northwest
Slieve Fyagh Bog SAC	000542	Approximately 8km northwest
Newport River SAC	002144	Approximately 12.7km south
Owenduff/Nephin Complex SPA	004098	Approximately 3.8km west
Lough Conn and Lough Cullin SPA	004228	Approximately 11km southeast
Carrowmore Lake SPA	004052	Approximately 13.6km west
Killala Bay/Moy Estuary SPA	004036	Approximately 14km northeast
Blacksod Bay/Broad Haven SPA	004037	Approximately 17km west
Illanmaster SPA	004074	Approximately 22km northwest
Doogort Machair SPA	004235	Approximately 29km southwest
Stags of Broad Haven SPA	004072	Approximately 29km northwest

Designated Site	Site Code	Approximate Distance from Proposed Development (km)
Mullet Peninsula SPA	004227	Approximately 32km west
Termoncarragh Lake and Annagh Machair SPA	004093	Approximately 34km west
Duvillaun Islands SPA	004111	Approximately 37km west
Inishglora and Inishkeeragh SPA	004084	Approximately 37km west
Inishkea Islands SPA	004004	Approximately 43km southwest
Clare Island SPA	004136	Approximately 43km southwest
Lough Carra SPA	004051	Approximately 45km south

Potential impacts and their significance, if any, within the SAC's and SPA's are considered in Table 5-3 below. Impacts are considered in light of the Qualifying Interests/Special Conservation Interests for which these SAC's and SPA's are designated.



Legend

- Planning Application Boundary
- 15km Buffer from Planning Application Boundary
- Special Protection Area
- Special Area of Conservation

0 2.5 5 7.5 10
Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D02	28/03/2023	Draft issue	S.P	J.D
D01	01/02/2023	Draft issue	S.P	J.S

Client:

Bord na Móna

Project:

Oweninny Wind Farm Phase 3

Title:

Figure 5-1: Designated Sites

Scale @ A3: 1:250,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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Draft: D02

10889-009-D.S-BUF15-TOB-D02

Table 5-3: Brief Description of the European Sites within ZoI, with Qualifying Interests / Special Conservation Interests, and Likely Significant Effects

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
Lough Dahybaun SAC (001922)	• Slender Naiad (*Najas flexilis*) [1833]	This SAC is partially located within the project site boundary. The proposed construction works will not result in direct habitat loss within the SAC. However, the Proposed Development is hydrologically connected to the protected site, via surface waters. There is potential for habitat loss/degradation from the run-off of sediments and pollutants from the site, machinery and/or storage materials. A source-pathway-receptor link exists between the Proposed Development site and the SAC.	**Yes** – In the absence of mitigation, Slender Naiad, the qualifying interest species of this SAC, has specific water quality requirements with regard to pH, alkalinity, calcium and phosphate, as well as turbidity and depth. These factors could be negatively impacted by works on site.
Bellacorick Bog Complex SAC (002177)	• Natural dystrophic lakes and ponds [3160] • Northern Atlantic wet heaths with *Erica tetralix* [4010] • Blanket bogs (* if active bog) [7130] • Depressions on peat substrates of the Rhynchosporion [7150] • Alkaline fens [7230]	The SAC borders the south and east of the Proposed Development site. However, no construction works will occur within the European site and so will not result in direct habitat loss within the SAC. The nearest construction works will be approximately 250m from the SAC and thus, occur outside the ZoI of dusts effects and the introduction of invasive plant species.	No potential for likely significant effects

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
	• Marsh Saxifrage (*Saxifraga hirculus*) [1528] • Geyer's Whorl Snail (*Vertigo geyeri*) [1013]	The Proposed Development is hydrologically connected to the protected site via surface waters but it is not connected to any of the sites qualifying interest species or habitat. Therefore, there no is potential for habitat loss/degradation from surface water run-off of sediments and pollutants from the site, machinery and/or storage materials. The Proposed Development is connected to the SAC via ground water links. Both the proposed development site and the SAC occur within the Belmullet Groundwater Body, however findings from the Soil and Geology and the Hydrogeology chapters of the EIAR accompanying this proposed development (Chapter 9 and Chapter 10) reveal due to the distances from the nearest construction works and the soils and geology of the area within the prosed development area and the SAC, there is no potential for impacts as a result of ground water changes. No source-pathway-receptor link exists between the Proposed Development site and the SAC.	
Bellacorick Iron Flush SAC (000466)	• Marsh Saxifrage (*Saxifraga hirculus*) [1528]	This SAC is located approximately 500m north of the Proposed Development site. thus, occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to	No potential for likely significant effects

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
		the distance there is no potential for the introduction of invasive plant species within the SAC. There is no surface water hydrological connectivity between the Proposed Development site and the SAC. Both the Proposed Development site and the SAC occur within the Belmullet Groundwater Body. Marsh saxifrage requires a stable, moving water table close to the soil surface (NPWS, 2019)[53]. A hydrogeological conceptual model was prepared and found that around the iron flush comprised of blanket peat overlying 20 to 30m of sandstone till (mineral subsoil). The underlying parent material (i.e., bedrock) is mapped as bedded siltstone/sandstones. Areas where peat is absent are generally located on the elevated ground 100m to the east of the iron flush. The ground water zone of contribution to the Iron Flush was delineated as part of the 2013 Oweninny Wind farm (phases 1 and 2) application[54]. It was found that the zone of contribution to the flush does not extend into the Phase 3	

[53] NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report.

[54] ESB Wind Development & Bord na Móna (2013), Oweninny Wind Farm, Environmental Impact Statement: Chapter 18 Hydrogeology of Iron Flush Areas.

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
		development. As there are no construction works in the ground water catchment of the iron flush, there is no potential for impacts to the qualifying interests. No source-pathway-receptor link exists between the Proposed Development site and the SAC.	
River Moy SAC (002298)	• Active raised bogs*[7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] • Alkaline fens [7230] • Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)* [91E0] • Brook Lamprey (*Lampetra planeri*) [1096] • Salmon (*Salmo salar*) [1106] • Otter (*Lutra lutra*) [1355]	This SAC is located Approximately 2.5km south of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SAC. The Proposed Development is hydrologically connected to the SAC via the Shanvolahan river, which flows south and east approximately 6.5km from the Proposed Development site into the Deel River (which is part of the SAC). There is potential for habitat loss/degradation from surface water run-off of sediments and pollutants from the site, machinery and/or storage materials. As well as impacts to habitats which support the aquatic species within the SAC.	**Yes** – Hydrological connectivity exists between the Proposed Development site and this SAC. In the absence of mitigation measures, a degradation of surface water quality due to the proposed construction works could result in indirect effects on the qualifying interests designated within the SAC. There is therefore potential for likely significant effects on the SAC.

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
	• White-clawed Crayfish (*Austropotamobius pallipes*) [1092] • Sea Lamprey (*Petromyzon marinus*) [1095]	Although the Proposed Development occurs outside the SAC boundary there is potential that the river Moy supports five aquatic Qualifying Interest species within the SAC. The SAC is designated for otter which is sensitive to anthropogenic disturbance. There is also potential that otter forage, commute and breed along the River Moy. Atlantic salmon, Sea lamprey and brook lamprey may migrate, feed and spawn upstream along the Moy River in proximity to the proposed development site. A source-pathway-receptor link exists between the Proposed Development site and the SAC.	
Owenduff/Nephin Complex SAC (000534)	• Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] • Natural dystrophic lakes and ponds [3160] • Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation [3260]	The SAC is located approximately 3.8km southwest of the main Proposed Development site. The proposed construction works will not result in direct habitat loss within the SAC. Similarly, the SAC occurs outside the spatial limit of dust impacts of all elements of the proposed development. The Proposed Development is hydrologically connected to the protected site via surface waters (Owenmore River), which runs along the northern boundary of the SAC. However, the proposed development is but not	**Yes** – Hydrological connectivity exists between the Proposed Development site and this SAC. In the absence of mitigation measures, a degradation of surface water quality due to the proposed construction works could result in indirect effects on the Atlantic Salmon and Otter designated within the SAC. There is therefore potential for likely significant effects on the SAC.

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
	• Northern Atlantic wet heaths with *Erica tetralix* [4010] • Alpine and Boreal heaths [4060] • *Juniperus communis* formations on heaths or calcareous grasslands [5130] • Blanket bogs (* if active bog) [7130] • Transition mires and quaking bogs [7140] • Marsh Saxifrage (*Saxifraga hirculus*) [1528] • Salmon (*Salmo salar*)[1106] • Slender Green Feather-moss (*Drepanocladus vernicosus)* [1393] • Otter (*Lutra lutra*) [1355]	connected to any of the sites qualifying interest species or habitat within the SAC, which are all located upstream of the Owenmore River or are terrestrial habitats or species with no links to surface waters. Therefore, there no is potential for habitat loss/degradation from surface water run-off of sediments and pollutants from the site, machinery and/or storage materials within the SAC. There is however potential that the Owenmore River may support populations of Atlantic Salmon and Otter which also use the SAC. A degradation of water quality as a result of the proposed development could result in likely significant effects on the foraging, commuting or breeding of these QIs. A source-pathway-receptor link exists between the Proposed Development site and the SAC.	
Owenduff/Nephin Complex SPA (004098)	• Golden Plover (*Pluvialis apricaria*) [A140] • Merlin (*Falco columbarius*) [A098]	This SPA is located approximately 3.8km west of the Proposed Development site and therefore occurs outside the ZoI of direct habitat impacts and dust effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA.	**Yes -** Following a precautionary approach, connectivity exists between the Proposed Development site and this SPA. In the absence of mitigation measures, the potential for adverse effects on the conservation objectives for Merlin and Golden Plover, due to

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
		The SPA is designated for two Special Conservation Interests (SCIs); Merlin and Golden Plover. Both species are known to breed within the SPA (NPWS 2015)[55]. Considering the distance between the SPA and the Proposed Development site there is no potential for the disturbance of the SCIs within the SPA boundary. The Proposed Development site contained comparatively low numbers of Merlin and breeding Golden Plover and no important migration flight line routes or breeding territories were found over the survey period for both species. However, considering the core foraging range for Merlin is 5km while for Golden Plover it is 3km, with a maximum range of 11km (SNH, 2016)[56], and considering the suitable habitat present within the Proposed Development site (bog habitat), there is potential for the disturbance of Merlin and Golden Plover that may forage and or nest within or in proximity to the Proposed Development site boundary.	the potential loss of suitable foraging habitat, displacement, and collision risk, cannot be ruled out during the proposed construction and operational works. Therefore, there is potential for likely significant effects on the SPA.

[55] NPWS (2015) Site Synopsis for Owenduff/Nephin Complex SPA [004098]. Generic Version 9.0. Department of Housing, Local Government and Heritage.
[56] Scottish Natural Heritage (SNH) (2016). Assessing Connectivity with Special Protection Areas (SPAs) Guidance. Version 3.

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
		A source-pathway-receptor link exists between the Proposed Development site and the SCIs of this SPA.	
Carrowmore Lake Complex SAC (000476)	• Blanket bogs (* if active bog) [7130] • Depressions on peat substrates of the *Rhynchosporion* [7150] • Slender Green Feather-moss (*Hamatocaulis vernicosus*) [1393] • Marsh Saxifrage (*Saxifraga hirculus*) [1528]	This SAC is located approximately 4.8km west of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SAC. There is no surface water hydrological connectivity between the Proposed Development site and the SAC. The SAC is designated for groundwater dependent habitats and species. Both the SAC and the Proposed Development site are located within the same groundwater body (Bellmullet GWB [WFD code: IE_WE_G_0057]) and therefore hydrogeological connectivity exists. However, as the SAC is located, at the closest point, approximately 4.8km from the Proposed Development there is no potential for impacts to the qualifying interests.	No potential for likely significant effects

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
		No source-pathway-receptor links exists between the Proposed Development site and the SAC.	
Glenamoy Bog Complex SAC (000500)	• Vegetated Sea cliffs of the Atlantic and Baltic coasts [1230] • Machairs (* in Ireland) [21A0] • Natural dystrophic lakes and ponds [3160] • Northern Atlantic wet heaths with *Erica tetralix* [4010] • *Juniperus communis* formations on heaths or calcareous grasslands [5130] • Blanket bogs (* if active bog) [7130] • Transition mires and quaking bogs [7140] • Depressions on peat substrates of the Rhynchosporion [7150] • Salmon (*Salmo salar*) [1106] • Petalwort (*Petalophyllum ralfsii*) [1395] • Marsh Saxifrage (*Saxifraga hirculus*) [1528]	The SAC is located 7.3km north west of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SAC. There is no surface water hydrological connectivity between the Proposed Development site and the SAC. There is no potential for impacts to the aquatic designated species. The SAC is designated for groundwater dependent habitats. A review of the GSI website indicates that the proposed development site occurs within the Belmullet Groundwater Body (European Code: IE_WE_G_0057). The SAC occurs within the Bangor Groundwater Body (European Code: IE_WE_G_0057). There is therefore no hydrogeological connectivity between the SAC and the proposed development. No source-pathway-receptor links exists between the Proposed Development site and the SAC.	No potential for likely significant effects

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
	• Slender Green Feather-moss (*Hamatocaulis vernicosus*) [1393]		
Slieve Fyagh Bog SAC (000542)	• Blanket bogs (* if active bog) [7130]	The SAC is located 8km north west of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SAC. There is no surface water hydrological connectivity between the Proposed Development site and the SAC. A review of the GSI website21 indicates that the proposed development site occurs within the Belmullet Groundwater Body. The SAC occurs within the Bangor Groundwater Body. There is therefore no hydrogeological connectivity between the SAC and the proposed development. There is therefore no hydrogeological connectivity between the SAC and the proposed development. No source-pathway-receptor links exists between the Proposed Development site and the SAC.	No potential for likely significant effects

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
Lough Conn and Lough Cullin SPA (004228)	• Tufted Duck (*Aythya fuligula*) [A061] • Common Scoter (*Melanitta nigra*) [A065] • Common Gull (*Larus canus*) [A182] • Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] • Wetland and Waterbirds [A999]	This SPA is located approximately 11km southeast of the Proposed Development site. The SPA is designated for four Special Conservation Interests species; Greenland white-fronted goose, tufted duck is recorded using the site during the winter, while common scoter and common gull are known to breed within the SPA. Considering the distance between the SPA and the Proposed Development site there is no potential for the disturbance of the species within the SPA. The core foraging range for Greenland White-fronted Goose is 5-8km (SNH 2016). Therefore, the project is located beyond the core foraging range of this special conservation interest species. Core foraging ranges have not been described for the remaining SCIs, but a review of disturbance distances from Goodship & Furness (2022)[57] for wintering Tufted duck (<50m), breeding Common Scoter (300-500m) and breeding Common Gull (200-300m), show that the distance from the proposed development will not cause disturbances to these SCIs. Additionally, the habitats within the Proposed Development site boundary are	**Yes** – Hydrological connectivity exists between the Proposed Development site and this SPA. In the absence of mitigation measures, a degradation of water quality due to the proposed construction works could result in indirect effects of the SCIs designated within the SPA. There is therefore potential for likely significant effects on the SPA.

[57] Goodship, N.M. and Furness, R.W. (MacArthur Green) Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283.

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
		considered to be sub-optimal compared to other habitats surrounding the Proposed Development site boundary there is no potential for likely significant effects on these special conservation interest species during the construction, operation and decommissioning phases. A surface water pathway exists between the Proposed Development and this SPA via the Shanvolahan and the Deel river which flow approximately 30km downstream into the SPA. A source-pathway-receptor link therefore occurs between the Proposed Development site and the SPA.	
Newport River SAC (002144)	• Freshwater Pearl Mussel (*Margaritifera margaritifera*) [1029] • Salmon (*Salmo salar*) [1106]	The SAC is located 12.7km south of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SAC. There is no surface water hydrological connectivity between the Proposed Development site and the SAC and both occur in separate sub catchments. There is no	No potential for likely significant effects.

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
		potential for impacts to the aquatic designated species. No source-pathway-receptor links exists between the Proposed Development site and the SAC.	
Carrowmore Lake SPA (004052)	• Sandwich Tern (*Sterna sandvicensis*) [A191]	The SPA is located approximately 14km west of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development there is no potential for the disturbance of Sandwich Terns within the SPA. There is potential that Sandwich tern may be connected to the Proposed Development site via their large foraging range, which can range from 30-70km from breeding colonies (Eglington & Parrow, 2014)[58]. However, Sandwich Terns are almost exclusively marine feeders, meaning they do not have to travel to or through the site due to the location of the	No potential for likely significant effects.

58 Eglington S., & Perrow M. (2014). Literature review of tern (*Sterna & Sternula* spp.) foraging ecology. The Joint Nature Conservation Committee, Norwich. Available online at: https://data.jncc.gov.uk/data/926cdbbd-c384-42a9-b9e5-81abd778bbd0/JNCC-Report-500-Annex8-Eglington-Perrow2014.pdf [accessed January 2023].

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
		SPA (i.e. the coast is located to the west of SPA and the Proposed Development is located to the east). In addition, there were no recordings of Sandwich tern over the course of the survey period. There is also no habitat within the Proposed Development site to support the SCI. No source-pathway-receptor links exists between the Proposed Development site and the SAC.	
Killala Bay/Moy Estuary SPA (004036)	• Ringed Plover (*Charadrius hiaticula*) [A137] • Golden Plover (*Pluvialis apricaria*) [A140] • Grey Plover (*Pluvialis squatarola*) [A141] • Sanderling (*Calidris alba*) [A144] • Dunlin (*Calidris alpina*) [A149] • Bar-tailed Godwit (*Limosa lapponica*) [A157] • Curlew (*Numenius arquata*) [A160] • Redshank (*Tringa totanus*) [A162] • Wetland and Waterbirds [A999]	The SPA is located approximately 14km northeast of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development site, there is no potential for the disturbance of SCI species within the SPA. The core winter foraging ranges have not been described for SCI species of this SPA. However, the habitats within the project site boundary are considered to be sub-optimal compared to other habitats surrounding the Proposed Development site boundary. There	**Yes** – Hydrological connectivity exists between this SPA and the Proposed Development site. In the absence of mitigation measures, a degradation of water quality due to the proposed construction works could result in indirect effects of the SCIs designated within the SPA. Therefore, there is potential for likely significant effects on the SPA.

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
		is no potential for likely significant effects on these special conservation interest species. A surface water pathway exists between the Proposed Development and this SPA via the Kilfian South and Cloonaghmore rivers which flow south approximately 24km downstream into the SPA. A source-pathway-receptor link therefore occurs between the Proposed Development site and the SPA.	
Blacksod Bay/Broad Haven SPA (004037)	• Red-throated Diver (*Gavia stellata*) [A001] • Great Northern Diver (*Gavia immer*) [A003] • Slavonian Grebe (*Podiceps auritus*) [A007] • Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] • Common Scoter (*Melanitta nigra*) [A065] • Red-breasted Merganser (*Mergus serrator)* [A069] • Ringed Plover *Charadrius hiaticula* [A137] • Sanderling (*Calidris alba)* [A144]	The SPA is located approximately 17km west of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development site there is no potential for the disturbance of SCI species within the SPA. The core winter foraging ranges have not been described for SCI species of this SPA, however, the habitats within the project site boundary are considered to be sub-optimal compared to other habitats surrounding the	**Yes** – Hydrological connectivity exists between this SPA and the Proposed Development site. In the absence of mitigation measures, a degradation of water quality due to the proposed construction works could result in indirect effects of the SCIs designated within the SPA. Therefore, there is potential for likely significant effects on the SPA.

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
	• Dunlin (*Calidris alpina alpina)* [A149] • Bar-tailed (*Godwit Limosa lapponica)* [A157] • Curlew (*Numenius arquata)* [A160] • Sandwich Tern (*Sterna sandvicensis)* [A191] • Dunlin (*Calidris alpina schinzii)* [A466] • Wetlands and waterbirds [A999]	Proposed Development site boundary there is no potential for likely significant effects on these special conservation interest species. A surface water pathway exists between the Proposed Development and this SPA via the Owenmore River which flow approximately 30km downstream into the SPA. A source-pathway-receptor link therefore occurs between the Proposed Development site and the SPA.	
Illanmaster SPA (004074)	• Storm Petrel (*Hydrobates pelagicus*) [A014]	The SPA is located approximately 22km northwest of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development there is no potential for the disturbance of Storm Petrel within the SPA. There is potential that Storm petrel may be connected to the Proposed Development site via their large foraging range. However, Storm Petrel are exclusively marine feeders meaning they do not have to travel to or through the site due to the	No potential for likely significant effects.

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
		location of the SPA (i.e. the coast is located to the north of SPA and the Proposed Development is located to the southeast). In addition, there were no recordings of Storm petrel over the course of the survey period and there is no habitat within the Proposed Development site to support the SCIs. No source-pathway-receptor links exists between the Proposed Development site and the SAC.	
Doogort Machair SPA (004235)	• Dunlin (*Calidris alpina schinzii*) [A466]	The SPA is located approximately 29km southwest of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development there is no potential for the disturbance of Dunlin within the SPA. There is no potential that the breeding Dunlin within the SPA are connected to the Proposed Development site due to their short foraging range (core range of 500m[56]). In addition, there were limited recordings of Dublin over the course of the survey period indicating the Proposed	No potential for likely significant effects.

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
		Development site is not a supporting site for this SCI. No source-pathway-receptor links exists between the Proposed Development site and the SAC.	
Stags of Broad Haven SPA (004072)	• Storm Petrel *(Hydrobates pelagicus)* [A014] • Leach's Storm-petrel *(Oceanodroma leucorhoa)* [A015]	The SPA is located approximately 29km northwest of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development there is no potential for the disturbance of SCIs within the SPA. There is potential that Storm Petrel and Leach's Storm-petrel may be connected to the Proposed Development site via their large foraging ranges. However as these are exclusively marine feeders, they do not have to travel to or through the site due to the location of the SPA (i.e. the coast is located to the north of SPA and the Proposed Development is located to the southeast). In addition, there were no recordings of either species over the course of the survey period and there is no habitat within the Proposed Development site to support these SCIs.	No potential for likely significant effects.

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
		No source-pathway-receptor links exists between the Proposed Development site and the SAC.	
Mullet Peninsula SPA (004227)	• Corn Crake *(Crex crex)* [A122]	The SPA is located approximately 32km west of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development, there is no potential for the disturbance of Corn Crake within the SPA. There also no potential that Corn Crake are connected to the Proposed Development site via their foraging ranges, as the species remains in its breeding territories once established. In addition, there were no recordings of the species over the course of the survey period and there is no habitat within the Proposed Development site to support the SCI. No source-pathway-receptor links exists between the Proposed Development site and the SAC.	No potential for likely significant effects.
Termoncarragh Lake and Annagh	• Barnacle Goose *(Branta leucopsis)* [A045]	The SPA is located approximately 34km west of the Proposed Development site and thus	No potential for likely significant effects.

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
Machair SPA (004093)	• Lapwing *(Vanellus vanellus)* [A142] • Greenland White-fronted Goose *(Anser albifrons flavirostris)* [A395] • Corncrake *(Crex crex)* [A122] • Dunlin *(Calidris alpina schinzii)* [A466] • Chough (*Pyrrhocorax pyrrhocorax*) [A346] • Whooper Swan (*Cygnus cygnus*) [A038]	occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development, there is no potential for the disturbance of SCIs within the SPA. There also no potential that the SCIs are connected to the Proposed Development site via their foraging ranges, due to the lack of suitable habitat for Choughs and Barnacle Goose and the short commuting and foraging distances of some species (including Whooper Swan, Greenland White Fronted Goose, Lapwing, Corn Crake and Dunlin). In addition, there were no or limited recordings of these species over the course of the survey period indicating the Proposed Development area is not a supporting site to the SPA. No source-pathway-receptor links exists between the Proposed Development site and the SAC.	
Duvillaun Islands SPA (004111)	• Barnacle Goose *(Branta leucopsis)* [A045] • Storm Petrel *(Hydrobates pelagicus)* [A014]	The SPA is located approximately 37km west of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to	No potential for likely significant effects.

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
	• Fulmar *(Fulmarus glacialis)* [A009]	the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development, there is no potential for the disturbance of SCIs within the SPA. There is potential that these species may be connected to the Proposed Development site via their large foraging ranges. However as these species are exclusively marine or coastal feeders, they do not have to travel to or through the site due to the location of the SPA (i.e. the coast is located to the west of SPA and the Proposed Development is located to the east). In addition, there were no recordings of either species over the course of the survey period and there is no habitat within the Proposed Development site to support the SCIs. No source-pathway-receptor links exists between the Proposed Development site and the SAC.	
Inishglora and Inishkeeragh SPA (004084)	• Herring Gull *(Larus argentatus)* [A184] • Shag *(Phalacrocorax aristotelis)* [A018] • Storm Petrel *(Hydrobates pelagicus)* [A014]	The SPA is located approximately 37km west of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the	No potential for likely significant effects.

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
	• Lesser Black-backed Gull *(Larus fuscus)* [A183] • Cormorant *(Phalacrocorax carbo)* [A017] • Arctic Tern *(Sterna paradisaea)* [A194] • Barnacle Goose *(Branta leucopsis)* [A045]	introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development, there is no potential for the disturbance of SCIs within the SPA. There is potential that some species may be connected to the Proposed Development site via their large foraging ranges. However, as these are exclusively marine or coastal feeders, they do not have to travel to or through the site due to the location of the SPA (i.e. the coast is located to the west of SPA and the Proposed Development is located to the east). In addition, there were no or limited recordings these species over the course of the survey period and there is no habitat within the Proposed Development site to support the SCIs. No source-pathway-receptor links exists between the Proposed Development site and the SAC.	
Inishkea Islands SPA (004004)	• Little Tern *(Sterna albifrons)* [A195] • Arctic Tern (*Sterna paradisaea)* [A194] • Dunlin (*Calidris alpina schinzii)* [A466]	The SPA is located approximately 43km west of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the	No potential for likely significant effects.

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
	• Ringed Plover (*Charadrius hiaticula*) [A137] • Common Gull (*Larus canus*) [A182] • Shag (*Phalacrocorax aristotelis*) [A018] • Purple Sandpiper (*Calidris maritima*) [A148] • Turnstone (*Arenaria interpres*) [A169] • Sanderling (*Calidris alba*) [A144] • Barnacle Goose (*Branta leucopsis*) [A045] • Herring Gull (*Larus argentatus*) [A184]	introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development, there is no potential for the disturbance of SCIs within the SPA. There is potential that some species may be connected to the Proposed Development site via their large foraging ranges. However, as the majority are exclusively marine or coastal feeders, they do not have to travel to or through the site due to the location of the SPA (i.e. the coast is located to the west of SPA and the Proposed Development is located to the east). In addition, there were no or limited recordings these species over the course of the survey period and there is no habitat within the Proposed Development site to support the SCIs. Common Gull was recorded attempting to breed within the Proposed Development site. However, the Common Gull within the Proposed Development site were found to be resident over the survey period, and the population is not believed to be associated with this SPA.	

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
		No source-pathway-receptor links exists between the Proposed Development site and the SAC.	
Clare Island SPA (004136)	• Shag *(Phalacrocorax aristotelis)* [A018] • Chough *(Pyrrhocorax pyrrhocorax)* [A346] • Common Gull *(Larus canus)* [A182] • Razorbill *(Alca torda)* [A200] • Kittiwake *(Rissa tridactyla)* [A188] • Fulmar *(Fulmarus glacialis)* [A009] • Guillemot *(Uria aalge)* [A199]	The SPA is located approximately 43km southwest of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development, there is no potential for the disturbance of SCIs within the SPA. There is potential that some species may be connected to the Proposed Development site via their large foraging ranges. However, as the majority are exclusively marine or coastal feeders, they do not have to travel to or through the site due to the location of the SPA (i.e. the coast is located to the west of SPA and the Proposed Development is located to the east). In addition, there were no or limited recordings these species over the course of the survey period and there is no habitat recorded within the Proposed Development site to support the SCIs.	No potential for likely significant effects.

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
		Common Gull was recorded attempting to breed within the Proposed Development site. However, the Common Gull within the Proposed Development site were found to be resident over the survey period, and the population is not believed to be associated with this SPA. No source-pathway-receptor links exists between the Proposed Development site and the SAC.	
Lough Carra SPA (004051)	• Common Gull *(Larus canus)* [A182]	The SPA is located approximately 43km southwest of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development, there is no potential for the disturbance of SCIs within the SPA. Common Gull was recorded attempting to breed within the Proposed Development site. However, the Common Gull within the Proposed Development site were found to be resident over the survey period, and the	No potential for likely significant effects.

European Site	Qualifying Interests / Special Conservation Interests	Source-Pathway-Receptor Link	Possibility of Likely Significant Effects
		population is not believed to be associated with this SPA. No source-pathway-receptor links exists between the Proposed Development site and the SAC.	

6.0 IDENTIFICATION OF LIKELY SIGNIFICANT EFFECTS

6.1 Potential for Likely Significant Effects

Following the precautionary principle and as outlined in Table 5-3, potential for likely significant effects were identified between the proposed development and seven European sites:

- Lough Dahybaun SAC;
- Owenduff/Nephin Complex SAC
- Owenduff/Nephin Complex SPA
- River Moy SAC;
- Lough Conn and Lough Cullin SPA;
- Killala Bay/Moy Estuary SPA; and
- Blacksod Bay/Broad Haven SPA

Following the source-receptor-pathway model of the relevant European sites outlined in section 5.3 and using the rational describe in Table 5-3 the following sites were screened out and will not be discussed any further:

- Bellacorick Iron Flush SAC
- Bellacorick Bog Complex SAC
- Carrowmore Lake Complex SAC
- Glenamoy Bog Complex SAC
- Slieve Fyagh Bog SAC
- Newport River SAC
- Carrowmore Lake SPA
- Illanmaster SPA
- Doogort Machair SPA
- Stags of Broad Haven SPA
- Mullet Peninsula SPA
- Termoncarragh Lake and Annagh Machair SPA
- Duvillaun Islands SPA
- Inishglora and Inishkeeragh SPA
- Inishkea Islands SPA
- Clare Island SPA
- Lough Carra SPA

6.2 Potential for Indirect Impacts

There is no potential for direct impacts on any European site, however there is potential for indirect impacts on the aforementioned sites.

Lough Dahybaun SAC

The Proposed Development is hydrologically connected to Lough Dahybaun SAC. In the absence of mitigation measures, surface waters flowing into Lough Daybaun may become polluted with sediment or other pollutants and enter the lake. Slender Naiad, the qualifying interest species of this SAC, has specific water quality requirements with regard to pH, alkalinity, calcium and phosphate, as well as turbidity and depth. A degradation of water quality would result in likely significant effects on the qualifying interest in view of their conservation objectives.

Owenduff/Nephin Bog Complex SAC

The Proposed Development is hydrologically connected to the protected site via surface waters (Owenmore River), which runs along the northern boundary of the SAC. Although the proposed development is but not connected to any of the sites qualifying interest species or habitat within the SAC, which are all located upstream of the Owenmore River or are terrestrial habitats or species with no links to surface waters. There is however potential that the Owenmore River may support populations of Atlantic Salmon and Otter which also use the SAC. A degradation of water quality as a result of the proposed development could result in likely significant effects on the foraging, commuting or breeding of these QIs.

Owenduff/Nephin Bog Complex SPA

The Proposed Development will not directly impact SCI species within the SPA, however, the Proposed Development site lies within the core foraging range for Merlin (5km) and Golden Plover (3km) (SNH, 2016)[56] from the SPA, Although no breeding activity and only limited foraging activity of the two SCI species was recorded during the surveys, a precautionary approach was taken and the potential for impacts to ex situ SCI species occurring within the ZoI of the Proposed Development was considered.

In the absence of mitigation measures, there is potential for likely significant effects on the SCIs designated within the SPA, due to disturbance/displacement, loss of suitable foraging habitat, and potential collisions with turbines due to the proposed construction and operational works, which will result in indirect effects on the SCIs designated within the SPA, in view of their conservation objectives.

River Moy SAC

The Proposed Development is hydrologically connected to this protected site. In the absence of mitigation measures, a degradation of surface water quality due to the proposed construction works could result in indirect effects on the qualifying interests designated within the SAC. There is potential that the aquatic qualifying interests; Atlantic Salmon, Lamprey, Crayfish and Otter may foraging/commute, spawn within the Moy River which is hydrologically connected to the development site and thus may be indirectly impacted due to a degradation of water quality and disturbance.

Lough Conn and Lough Cullin SPA

The Proposed Development will not directly impact on SCI species within the SPA. The core foraging range for Greenland White-fronted Goose is 5-8km (SNH 2016); therefore, the project is located beyond the core foraging range of this special conservation interest species. Core foraging ranges have not been described for Tufted Duck, Common Scoter, or Common Gull, however, the habitats within the project site boundary are not considered to be sub-optimal compared to other habitats surrounding the Proposed Development site boundary there is no potential for likely significant effects on these special conservation interest species.

However, the Proposed Development is hydrologically connected to SPA via the Shanvolahan and Deel rivers which flow approximately 30km downstream of this protected site. In the absence of mitigation measures, a degradation of surface water quality due to the proposed construction works can result in indirect effects on the SCIs designated within the SPA in view of their conservation objectives.

Killala Bay/Moy Estuary SPA

The Proposed Development will not directly impact on SCI species within the SPA. The core winter foraging ranges have not been described for SCI species of this SPA. However, the habitats within the project site boundary are considered to be sub-optimal compared to other habitats surrounding the Proposed Development site boundary. there is no potential for likely significant effects on these special conservation interest species.

However, the Proposed Development is hydrologically connected to SPA via the Kilfian South and the Cloonaghmore River which both flow approximately 24km downstream to this protected site. In the absence of mitigation measures, a degradation of surface water quality due to the proposed construction works could result in indirect effects on the SCIs designated within the SPA in view of their conservation objectives.

Blacksod Bay/Broad Haven SPA

The Proposed Development will not directly impact on SCI species within the SPA. The core winter foraging ranges have not been described for SCI species of this SPA, However the habitats within the project site boundary are considered to be sub-optimal compared to other habitats surrounding the Proposed Development site boundary. There is no potential for likely significant effects on these special conservation interest species.

Hydrological connectivity exists between the proposed development and Blacksod Bay/Broad Haven SPA through a surface water pathway via the Owenmore River which flows approximately 30km downstream into the SPA. In the absence of mitigation measures, a degradation of surface water quality due to the proposed construction works could result in indirect effects on the SCIs designated within the SPA in view of their conservation objectives.

7.0 SCREENING ASSESSMENT CONCLUSION

Following an evaluation of the relevant information, including details of the works carried out within the project site boundary and its relationship with European sites in view of their qualifying interests and on the basis of the best scientific evidence, a total of 24 Natura 2000 sites (nine SACs and fifteen SPAs) were identified within the ZoI for the Proposed development. The screening assessment determined that, in view of best scientific knowledge and in the absence of mitigation measures, potential likely significant effects from the proposed development cannot be ruled out for seven of these European sites:

- Lough Dahybaun SAC,
- Owenduff/Nephin Bog Complex SAC
- River Moy SAC,
- Owenduff/Nephin Bog Complex SPA
- Lough Conn and Lough Cullin SPA
- Killala Bay/Moy Estuary SPA and
- Blacksod Bay/Broad Haven SPA

It is therefore recommended that a Stage 2 assessment is required for these seven Natura 2000 sites.

A Stage 2 (Appropriate Assessment) is therefore required to assist the competent authority in undertaking an Appropriate Assessment of the potential for adverse effects of this proposed development alone or in-combination with other plans and projects on the integrity of these seven European sites

Appendix A Oweninny Electrofishing Survey Report

Report

on

Electro-fishing at Sites

in the area of a

Proposed Wind Farm

September 2021

Table of Contents

1.0 Introduction

Stillwaters Consultancy was asked to provide fish data in the vicinity of sites for which fauna data was being collected, Fig 1. Electrofishing sites were then selected on the basis of suitability as close as practical to the fauna sites.

Tributaries at the extremes of three catchments, the Oweninny-Owenmore, the Shanvolahan river part of the Moy Catchment and the Cloonaghmore/Owenmore river drain the proposed development area to some extent.

The extent of the proposed development is shown in Appendix 1.

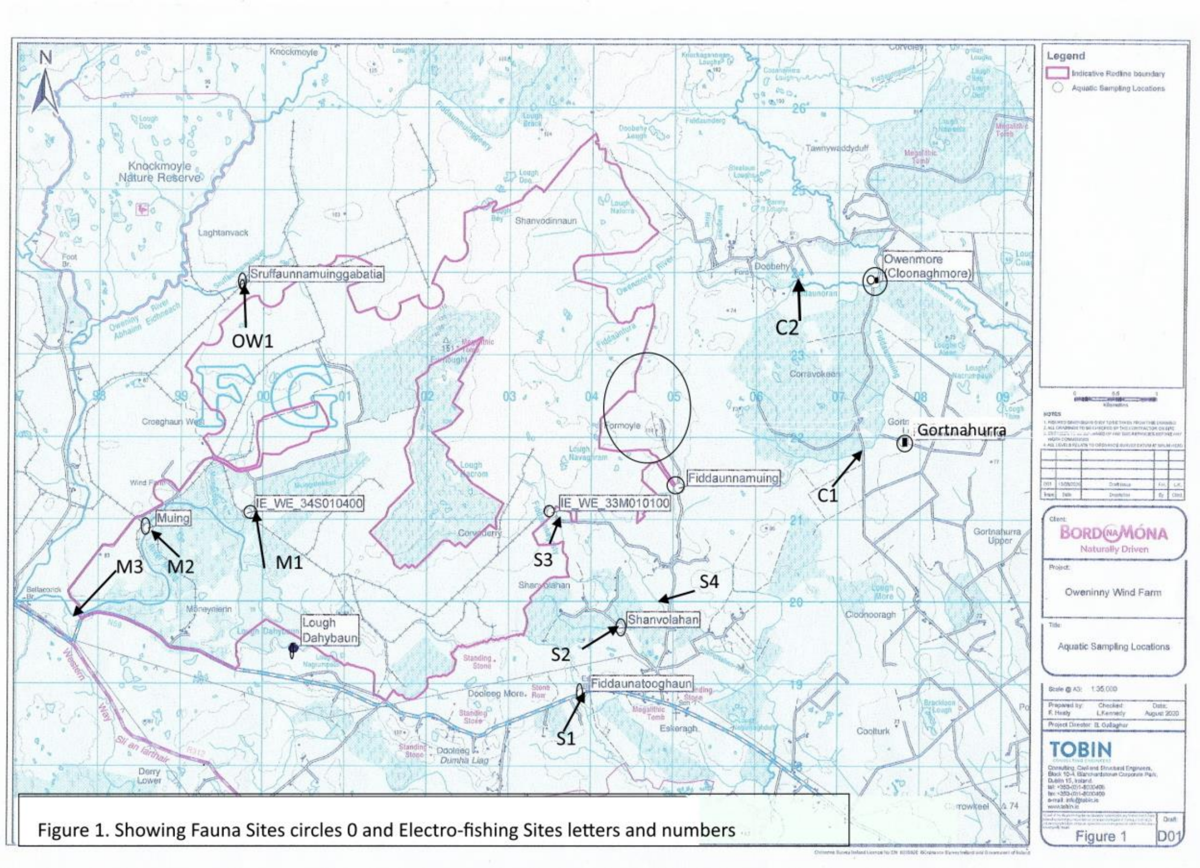


Figure 1. Showing Fauna Sites circles 0 and Electro-fishing Sites letters and numbers

1.1 Methods.

Electric fishing was carried out to characterise the fish populations on these tributaries at sites, OW1, M1,M2,M3, S1,S2,S3,S4, C1,and C2, Fig1.

A timed (10-minute) electrofishing method (Matson et al., 2017) was used. Fishing took place on the 15 and 16 September 2021.

The electrofishing equipment used was a backpack-mounted unit, FEG 1500, manufactured by EFKO, Leutkirch im Allgäu, Germany . A voltage of approximately 150V (variable) pulsed DC with a pulse rate of 50Hz was used for most sites. An Electrocatch, ELBP2 back pack, was available as a backup.

1.2 Species

The species recorded were:
3-spined stickleback (Gasterosteus aculeatus)
Trout (Salmo trutta)
White clawed crayfish (Austropotamobius pallipes)*1
Brook/River Lamprey amnocoete (Lampetra sp.)*2

Lengths are given in centimetres (cm). Fork lengths are recorded for salmon and trout and full lengths for other species. The carapace length (cm) is given for crayfish. Fish are designated as (0+) in their first year and (1+) in their second year.

The survey complied with the Certificate of Authorisation provide by the Department of Communications, Climate Action & Environment.

*1 protected under both Irish law (Wildlife Act 1976) and the EU Habitats Directive Annexes II and V. It is classified as endangered in the (IUCN) Red List. It is listed in Appendix III of the Bern Convention
*2 Brook and river Lamprey are listed in Annex II of the Habitats Directive and in Appendix III of the Bern Convention.

2.0 The Cloonaghmore System.

Sites C1 and C2

These sites are located at the top extreme of the proposed location Fig.1, on streams known locally as the Owenmore and the Fiddaunmuig. The Owenmore joins with the Duvowen to become the Cloonaghmore. The Cloonaghmore is an important salmonid river. Stocks are presently below their conservation limit and the river is open for catch and release only.

2.1 Site C1

Photo C1-1. View of site fished

Photo C1-2 Upstream

Start position:	54.137586	-9.418032
End position:	54.137534	-9.418704
Fishing method:	10 minute timed fishing.	
Length Fished:	45m	
Water colour	Dark brown	

This is a small stream with banks of wild grasses and heathers. Downstream Photo C1-1 shows sheer high banks. This section was probably drained and deepened to provide better drainage for turf cutting. There is some instream vegetation but very little cover for fish.

Table C1-1	
Trout	Eel
17.3	22.0
15.7	
15.6	
14.6	
13.6	
7.2	
7.0	
6.6	

The width was 2-3m with a depth 15cm to 50cm with a mostly peat substrate with little or no gravels. Upstream is more natural, Photo C1-2 with wild grasses with occasional stunted trees. Bank grasses overhang the stream providing some cover for fish.This stream despite its barren aspect holds 0+and 1+trout, Table C1-1. There was also eel present. It is expected that the more natural upstream areas supports greater numbers. Aerial 1, Appendix 2, shows the extent of bog around this stream but it has good sinuosity upstream suggesting good trout habitat.

2.1.1 Fishery Value:. This stream is an important trout nursery area for the Cloonaghmore system.

2.2 Site C2

C2-1 Upstream view of the site

Photo C2-2 View of the downstream area

Start position:	54.155275	-9.431421
End position :	54.155516	-9.431613
Fishing method:	10 minute timed fishing	
Length fished :	34m	
Water:	Slightly coloured	

The substrate is cobble gravel and occasional boulder with some instream vegetation. The landscape is agricultural grazing land with forestry well separated from the river. There is a good mixture of glide, deep flow pool, pool and riffle. The width varied between 9-10m.

This tributary supports a good population of salmon both 0+ and 1+ and also a population of trout both 0+ 1nd 1+. Minnow and eel were also present, Table 2-1

Table C2-1			
Salmon	Trout	Minnow	Eel
12.0	20.3	5.1	25.0
11.7	16.5	5.0	
11.0	15.2	4.6	
10.4	14.0	4.5	
10.3	13.6	4.2	
9.6	8.3	4.0	
6.5	8.0	2.1	
6.4	7.4	2.0	
6.1	6.4	2.0	
6.1	6.0		
6.0			
6.0			
6.0			
6.0			
5.8			
5.7			
5.6			
5.5			
5.5			
5.5			
5.5			
5.5			
5.0			
4.9			
4.6			
4.5			
4.3			

Aerial 2, Appendix 2, shows the natural sinuosity of the river and the predominance of forestry. There is however a reasonable river margin, free of trees. Photo C2-2

2.2.1 Fishery Value. This is an important tributary particularly for salmon with a good mixture of 0+ and 1+ trout.

3.0 The Owenmore System

The sites on the Muing (M1-M3) and the site OW1, all enter the Oweninny river. The Oweninny is an important tributary of the Owenmore. The Owenmore is a major angling river and is currently meeting its conservation target. The Owenmore River is currently open for “brown tag” salmon fishing.

3.1 Site OW1

Photo OW1-1, Looking upstream

PhotoOW1-2, looking downstream

Start position: 54.152677 -9.541471
End position: 54.152739 -9.540769
Fishing method: 10 minute timed fishing.
Length fished: 47m
Water Colour: Brown

Banks are grass and rushes over peat with low bushes and little overhanging cover. The first part of site is deep and slow flowing Photo OW1-1, the upper reach has patches of riffle area Photo OW1-2. There is little instream vegetation. The substrate is a gravel base with peat and silt. The width was between 2m and 3m and the depth varied between 40-60cm.The deeper pool areas have deposits of mud and silt. Historically there were silt traps above the site Photo OW1-3

Photo OWI-3 shows silt trap on the left bank.

Aerial 3, Appendix 2, shows the extent of peatland around this tributary and its junction with the Oweninny.

Table OW1-1			
Salmon	Trout	Stickleback	Minnow
8.6	14.0	x10	6.6
9.2	11.0		
8.7	10.6		
8.2	6.1		
7.1	5.7		
5.8	5.6		
5.3	5.0		
5.2	5.0		
5.2	5.0		
5.2	4.8		
5.1			
5.0			
5.0			
5.0			
5.0			
5.0			
4.8			
4.8			
4.8			
4.8			
4.7			
4.7			
4.7			
4.6			
4.5			
4.2			
4.1			
4.0			

Salmon were plentiful with 0+ predominant and possibly some1+ fish, Table OW1-1. There were 0+ and 1+ trout present. Stickleback and minnow were recorded.

3.1.1 **Fishery Value.** This is a good salmonid river with salmon the main species. This river despite the presence of silt and obviously traditional problems of siltation is a valuable nursery for the Oweninny.

3.2 Site M1

Photo M1-1 and M1-2 Showing enclosed nature of the site

Start position: 54.130416 -9.531647
End position : 54.13037 -9.531049
Fishing method: 10 minute timed fishing.
Length fished: 42m

Site M1 is little more than a drain, 0.5 to 0.7m wide and 20-40cm deep, Photos M1-1 and M1-2. The substrate is cobble and fines at the start of the stretch and then mud. It is in rough grazing land. It supports both 1+ and 0+ trout, Table M1-1. This is a tributary of the Muing and acts as a nursery area.

Table M1-1
Trout
15.0
9.7
9.2
8.1

Aerial 4, Appendix 2, shows the stream surrounded by forestry , worked peatland and rough pasture.

3.2.1 Fishery Value. Despite its small size this is a valuable nursery area for the MuIng river and possibly contributes to the lake, Lough Dahybaun.

3.3 Site M2


Photo M2-1 Upstream view


Photo M2-2 Downstream view

Start position: 54.129218 -9.548741
End position : 54.129589 -9.54854
Fishing method: 10 minute timed fishing.
Length fished: 43m
Water Colour: Dark Brown

This is a slow flowing canal like stretch 1.5 to 2m wide. Varying in depth between 40cm and 60cm.There was some instream vegetation. It has open grass banks with thistle before meeting forestry. The left bank was of peat and scrub. Aerial 5, Appendix 2, shows the extent of forestry and peat land. There was Potamagen and starworth instream. The substrate is clay with peat and sand. It supports a population of mainly 1+trout. Salmon were also present. Although Stickleback and minnow were present the dominant feature of this site was the presence of lamprey. Lamprey, because of their preferred habitat, are difficult to electro-fish and it is assumed that the numbers shown are understated.

Table M2-1

Trout	Salmon	Stickleback	Minnow	Lamprey
17.4	13.9	x3	8.3	8.4
16.6	11.0		6.2	9.7
15.6			5.7	9.5
15.0			5.7	9.5
12.4				9.0

one trout missed 3+ (~25cm)

3.3.1 Fishery Value: This is a valuable tributary providing nursery areas for salmon and mainly 1+ trout . A large trout was reported around 25cm but not measured. There were stickleback and minnow present. Lamprey were plentiful in the stretch. Overall this is a productive stream. The presence of a good population of lamprey makes this a sensitive section of river and will require careful monitoring.

3.4 Site M3

Photo M3-1

Photo M3-2

Start position: 54.117353 -9.56488
End position: 54.117397 -9.564255
Fishing method: 10 minute timed fishing.
Length fished : 42m
Water Colour: Dark Brown.

The river Muing is slow flowing and canal like 2m wide at this point. There is a defunct dam before it reaches the Oweninny river, which was designed to trap silt. The stretch has been drained to remove silt and improve flow. Waste was deposited on the banks. The banks are steep and sheer and provide little cover for fish. There was a further silt trap (dam) above this point. These dams are not now operating but must have had a negative impact on salmon. There was some instream vegetation mainly (Sparganium emersum) and *Callitriche sp.*

Table C2-1

Salmon 0+	Salmon 1+	Trout	Minnow
7.0	10.3	19.2	7.0
6.6	11.4	14.6	6.6
6.4	10.0	14.3	6.4
6.4		13.1	6.0
6.0		11.8	5.8
6.0		7.4	5.8
6.0		6.3	
5.8		5.8	
5.8			
5.7			
5.7			
5.7			
5.5			
5.5			
5.5			
5.5			
5.4			
5.4			
5.4			
5.0			

The substrate is gravel and cobble with some peat and coarse sand. The upstream end of the site is soft with mud and peat. Aerial 6, Appendix 2, shows the canal like nature of the river.

There are 0+ and 1+ salmon in good numbers. There are also 0+ and 1+ trout, Table C2-1. Minnow and stickleback (16) were also present. One lamprey was recorded (8.0cm).

3.4.1 Fishery Value: Despite traditional turf exploitation, dredging and siltation problems this is a good nursery area for salmon and trout, especially 0+salmon and will contribute to the Oweninny. It also has lamprey present and the river is likely to have pockets of lamprey and must therefore be regarded as sensitive.

4.0 The Moy System.

The small streams that drain this area form the Shanvolahan river that flows to the Deel River and ultimately to the Moy. The Deel river forms part of the River Moy Special Area of Conservation which affords protection to Salmon, Crayfish and Lamprey.

4.1 Site S1

Photo S1-1

Photo S1-2

Start position: 54.110144 -9.470258
End position: 54.110521 -9.470256
Fishing method: 10 minute timed fishing.
Length fished: 44m
Water: Dark brown

The stream at this point varied between 1.5m and 2.0m, Photo S1-1 and is canal like Photo S1-2. The water depth was 15cm deepening to 40cm at the upstream end of the site where there was a glide/pool area. A good salmonid substrate with rock and boulder with some fine gravels in moderately good patches of agricultural land Aerial 7, Appendix 2.

Table S1-1	
Trout	Salmon
15.8	11.3
13.0	10.0
7.2	9.3
7.1	6.7
7.1	
7.0	
6.9	
6.8	
6.6	
6.3	
5.9	
5.6	
5.5	
5.5	

Further upstream it reverts to bog and forestry. There was little or no overhanging vegetation to provide cover and little instream vegetation. The downstream section of the site is at the location of an old road bridge which has been knocked down. This has contributed some boulder and stone to this part of the site.

There were trout (0+ and 1+) and salmon present Table S1-1. The fish were very dark in colour reflecting the water colour. The trout were very thin suggesting poor feeding.

Aerial 7, Appendix 2. shows the mixture of peatland and poor agricultural land.

4.1.1 Fishery Value. For its size this is a good salmonid stream providing a nursery area for trout and salmon. The site is sensitive as it produces salmon.

4.2 Site S2

Photo S2-1 Downstream view

Photo S2-2 Upstream view

Start position : 54.117348 -9.463843
End position : 54.117417 -9.46484
Fishing method: 10 minute timed fishing.
Length fished: 72m
Water: Dark brown difficult to fish.

This was a small stream varying in width from 0.5m to 1m, Photo S2-1, flowing through poor overgrown agricultural land with forestry at the outer end. It has been dredged to provide better flow so that the banks are steep Photo S2-1. It had however a hard substrate of gravel and cobble with little peat or muds. It was 20cm deep with some pools 40cm. It had no bank cover except for Carex species and sedges that some times over lapped the stream and some instream vegetation Photo S2-2. The site supported 0+ and 1+ trout, salmon and minnow (11) ranging from 5cm to 8cm. The fish were dark in colour reflecting the water type.

Table S2-1		
Trout	Salmon	Minnow
16.4	11.0	11 (5-8cm)
12.8	6.8	
12.0	6.6	
9.8		
9.6		
9.0		
8.3		
8.1		
8.0		
7.7		
7.3		
7.2		

Aerial 8, Appendix 2, shows the mixture of forestry and open peat ground.

4.2.1 Fishery Value: This is a good trout producing stream with some salmon production. The site is sensitive because of the presence of salmon.

4.3 Site S3

Photo S3-1, Downstream view

Photo S3-2, Upstream view

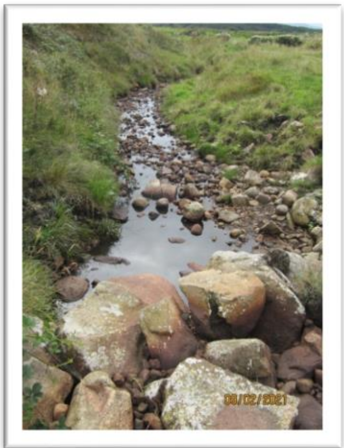


Photo S3-3, The rock armoury

Photo S3-4, Upstream of the site

Start position: 54.128166 -9.475058
End position: 54.128892 -9.475221
Fishing method: 10 minute timed fishing.
Length fished: 83m
Water Colour: Brown

This stream had a good substrate of cobble gravel and boulder, Photo S3-1 and S3-2. It had a fairly constant width of 1m to 1.5m. It was 10 to 20cm in depth with few pools and no glides. Good agricultural land on right bank, Aerial 9, Appendix 2, with bramble and scrub on the left bank with some overhang. The upstream section of the stream has been blocked to provide a road ford for farm traffic. Photo S3-3. The stream percolates through the rock armoury. There were trout and salmon present but in low numbers, Table S3-1. There were sticklebacks of 3 different age groups. Two crayfish were found.

Table S3-1

Trout	Salmon	Crayfish	Stickleback
9.6	12.5	3.5	0+ 1+ 3+
6.0		3.0	

The upstream section Photo S3-4 did not form part of the 10 minute fishing but casual fishing there revealed no fish.

4.3.1 Fishery Value. This stream has good salmonid substrate but few fish were present. The artificial blockage may be influencing the numbers present as the substrate should support greater numbers. The presence of Crayfish makes this a sensitive tributary.

4.4 Site S4

Photo S4-1 Showing good bank cover

Photo S4-2 Showing area of riffle

Start position:	54.119117	-9.455079
End position:	54.118873	-9.454489
Fishing method:	10 minute timed fishing.	
Length fished:	47m	
Water colour:	Relatively clear.	

The site is in poor agricultural grazing land. Low bushes on the left bank provide cover and overhang, Photo S4-1. There are grasses and sedges on left bank. The landscape is flat but there is a reasonable flow. There is a good clean substrate of cobble and gravel with little peat and silt. It had an even width of 0.75m. Photo S4-2

Table S4-1

Trout	Salmon	Stickleback	Minnow	Crayfish
9.5	12.2	x7	x1	6.0
9.0				4.0
8.3				
8.3				
8.3				
8.3				
8.0				
8.0				
8.0				
8.0				
7.6				
7.5				
7.4				
7.3				
7.3				
7.2				
7.1				
7.1				
7.0				
7.0				
6.7				
6.3				
6.0				
6.0				

There was a good population of trout mainly 0+ fish. One salmon was recovered. There were stickleback , minnow and crayfish. Table S4-1.

Aerial 8, Appendix 2, shows the mixture agricultural land and forestry.

4.4.1 Fishery Value: This is a good salmonid stream producing brown trout. The fish were mainly 0+ and were of good size suggesting adequate feeding. There were stickleback , minnow and crayfish present. Only 1 salmon was found but it would be expected that there would be salmon in areas of riffle. The presence of salmon and crawfish make this a sensitive tributary.

5.0 Assessment

All the tributaries draining this area, even very minor ones have populations of salmonids. They all ultimately feed important salmon angling rivers.

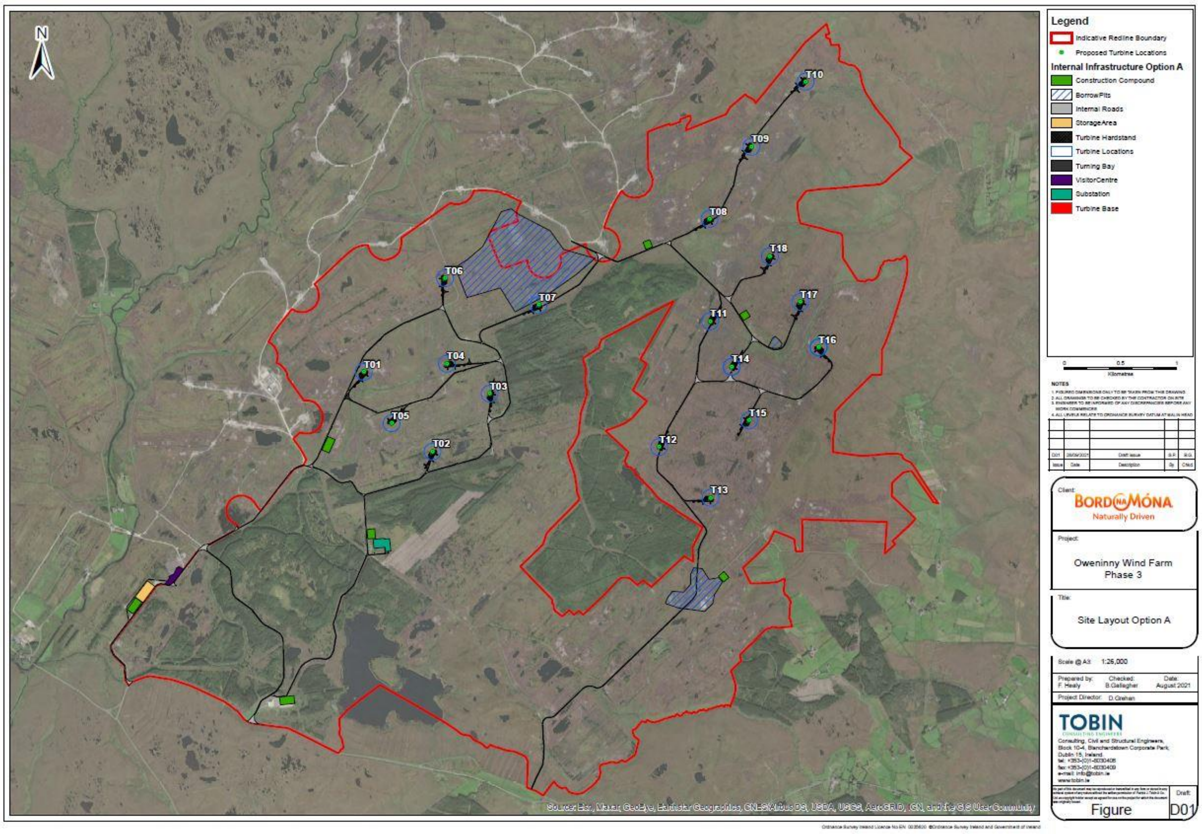
The sites feeding the Cloonaghmore system are at the northern end of the proposed area. C1 is a good producer of trout while C2 is a very productive stream and an important contributor of salmon to the system. The tributaries however are well removed from proposed developments.

The Owenmore system has tributaries contributing to the Owenmore. The sites M1 to M3 are in an area where service roads will provide possible interaction. These tributaries are producing salmon for the Owenmore system and are therefore important to the Catchment.

The Tributaries draining to the Deel, (Sites S1 to S4) and ultimately the Moy, which has a Special Area of Conservation, status, are outside the proposed area of activity however they must be regarded as sensitive as they all produce salmon. Crayfish were found on two of the tributaries and will have to be afforded protection.

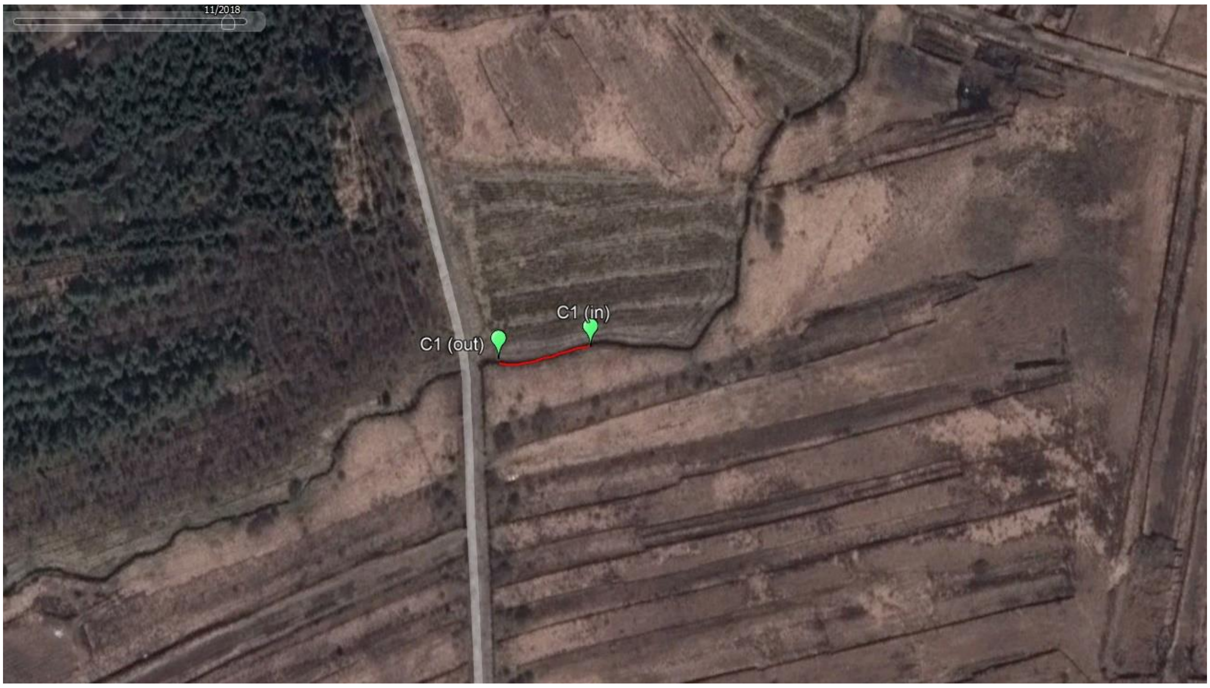
Appendix 1

Proposed location of Turbines and Service roads



Appendix 2

Aerial Views of Electro-fishing Sites



Aerial 1 Site C1

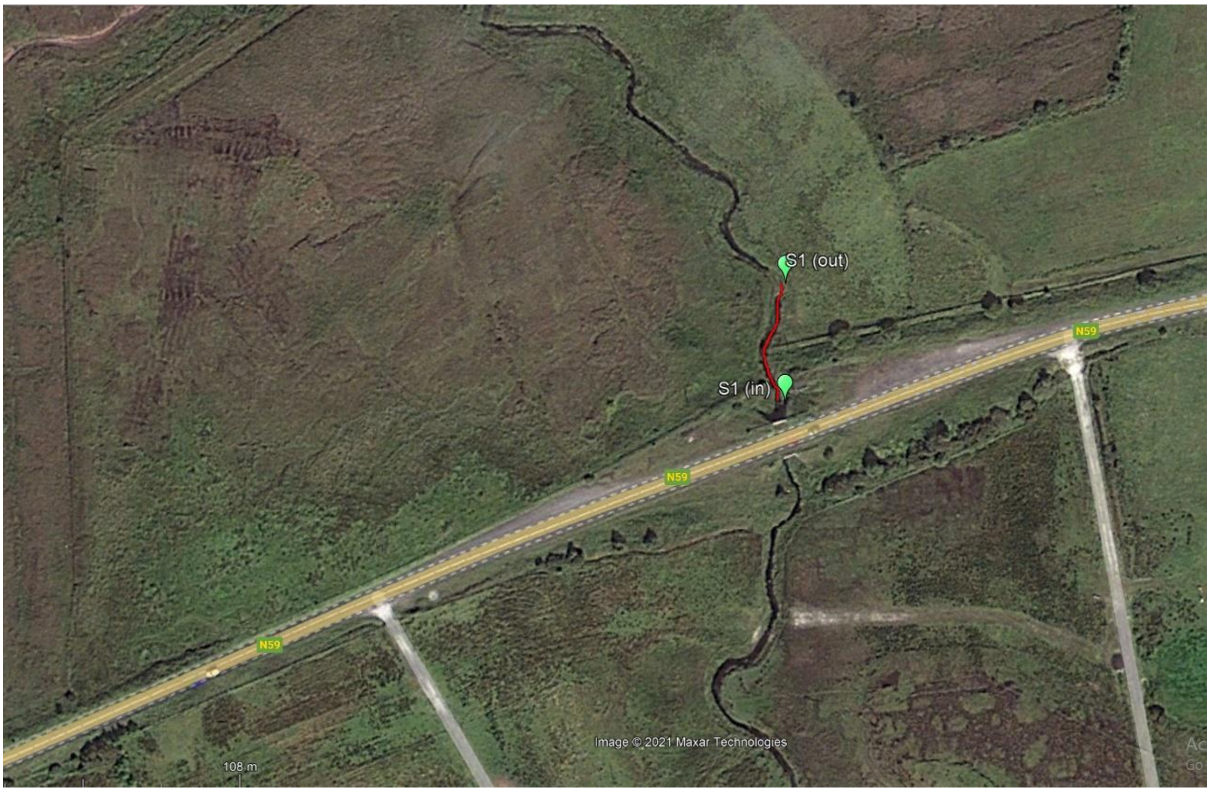
Aerial 2 Site C2

Aerial 3 Site OW1

Aerial 4 Site M1

Aerial 5 Site M2

Aerial 6 Site M3



Aerial 7 Site S1

Aerial 8 Site S2

Aerial 9 Site S3

Aerial 10 Site S4 . The figure also shows Site S2

Appendix B Avi-Fauna Results – Data, Locations and Figures.

APPENDIX B: AVI-FAUNA RESULTS – DATA, LOCATIONS AND FIGURES

TABLE OF CONTENTS

Table 1: Key and Secondary Target Species Recorded Onsite, Including BTO Code.

Species	BTO Codes	Species	BTO Codes
Hen Harrier *(Circus cyaneus)*	**HH**	Egyptian Vulture (*Neophron percnopterus*)	EGYVU
Kestrel *(Falco tinnunculus)*	**K.**	Curlew *(Numenius arquata)*	CU
Merlin *(Falco columbarius)*	**ML**	Whimbrel (*Numenius phaeopus*)	WM
Peregrine *(Falco peregrinus)*	**PE**	Dunlin (*Calidris alpina*)	DN
Golden Plover *(Pluvialis apricaria)*	**GP**	Redshank (*Tringa totanus*)	RK
Snipe *(Gallinago gallinago)*	**SN**	Greenshank *(Tringa nebularia)*	GK
Red Grouse (*Lagopus lagopus*)	**RG**	Lapwing *(Vanellus vanellus)*	L
Whooper Swan (Cygnus cygnus)	**WS**	Ringed Plover (*Charadrius hiaticula*)	RP
Mute Swan *(Cygnus olor)*	MS	Common Sandpiper (*Actitis hypoleucos*)	CS
Mallard *(Anas platyrhynchos)*	MA	Woodcock *(Scolopax rusticola)*	WK
Teal *(Anas crecca)*	T	Black-headed Gull *(Chroicocephalus ridibundus)*	BH
Tufted Duck (*Aythya fuligula*)	TU	Lesser Black-backed Gull *(Larus fuscus)*	LB
Little Grebe (*Tachybaptus ruficollis*)	LG	Herring Gull *(Larus argentatus)*	HG
Cormorant *(Phalacrocorax carbo)*	CA	Common Gull *(Larus canus)*	CM
Grey Heron *(Ardea cinerea)*	H.	Great Black-backed Gull *(Larus marinus)*	GB
Sparrowhawk (*Accipiter nisus)*	SH	Kingfisher (*Alcedo atthis*)	KF
Buzzard *(Buteo buteo)*	BZ	Meadow Pipit *(Anthus pratensis)*	MP
Golden Eagle (*Aquila chrysaetos*)	EA	Grey Wagtail *(Motacilla cinerea)*	GL

Note: **Bold** are Key Target Species.

1.0 Hen Harrier

Vantage Points Surveys											
Ref.	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes
0083	4	28/08/2019	15:31	HH	1	62					Ringtail from Dahybaun quartered and left
0148	5	29/10/2019	17:24	HH	1	12					Male in from east dropped into heather
0149	5	30/10/2019	07:27	HH	1	40					Immature male flew east over bog and dropped into heather for 12mins
0150	5	30/10/2019	07:39	HH	1	45					Same bird rose up and flew east
0151	5	31/10/2019	07:37	HH	1	65					Flew out from roost in a southeast direction
0152	5	12/11/2019	07:41	HH	1	4					Brief view of bird above ridge
0153	5	12/11/2019	07:55	HH	2	360					Two immatures rose from bog interacted one flew south over VP and other flew east
0236	6	28/11/2019	15:55	HH	1	120	600				Male flew in from east along ridge then joined by a ringtail
0237	6	28/11/2019	16:03	HH	1	240	150				Ringtail interacted with male in area of ridge. Not seen to land
0087	4	07/12/2019	13:30	HH	1		45				Flew into site from the south and continued towards ridge
0154	6	09/12/2019	15:31	HH	1	7					Appeared from south dipped out of view quickly

Vantage Points Surveys											
Ref.	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes
0155	6	09/12/2019	16:40	HH	1	5					Rose briefly above ridge line
0238	5	09/12/2019	15:30	HH	1	300					Male flew in from east and flew low along ridge and then dropped into heather to roost
0239	5	09/12/2019	16:26	HH	1	5					Male and female in from east and landed
0156	5	20/01/2020	16:19	HH	1	29					Hunting along ridge before roosting
0092	4	21/01/2020	16:56	HH	3	360					Male seen on ridge of lake, headed east then joined by another male and a ringtail. All three interacted for 5 mins and then went to roost
0094	4	12/02/2020	16:55	HH	1	30					Ringtail flying low into roost
0158	5	13/02/2020	16:40	HH	1	65					Adult male flew low in front of VP hunting. Continued east and went out of view
0159	5	13/02/2020	16:50	HH	1	300					2nd calendar female hunting over ridge.
0260	6	12/11/2020	15:25	HH	1	75					Male flying west past VP
0202	5	09/12/2020	15:10	HH	1	100					Male Hen Harrier flew past VP down to lake edge and then flew west out of view
0052	2	10/12/2020	14:48	HH	1	25					Ringtail Hen Harrier in flight/hunting low to ground, 2-3m above ground
0262	6	12/12/2020	15:55	HH	1	48					Adult male flying east hovering and hunting

Vantage Points Surveys											
Ref.	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes
0121	4	14/01/2021	12:45	HH	1	80	45				Adult male hunting north of VP
0125	4	14/01/2021	16:30	HH	1	35	25				Female flying likely to roost flew southwest
0205	5	10/02/2021	14:55	HH	1	50	20				Male Hen Harrier flew past VP from west and headed east, out of view
0067	3	25/02/2021	08:12	HH	1	80					Hunting over bog in a northerly direction
0068	3	08/03/2021	15:56	HH	1	35					Male Hen Harrier hunting low to ground (5m) over area of cutover bog/scrub
0056	2	11/03/2021	17:52	HH	1	35	20				
W034	7	16/12/2021	14:12	HH	1	35					
W043	5	11/01/2022	15:16	HH	1	30	35				Female Hen Harrier circled over ridge to northeast hunting
W050	1	17/01/2022	16:23	HH	1	30					Male Hen Harrier hunting
W059	3	02/03/2022	15:35	HH	1	95					Male Hen Harrier hunting over cutover bog/blanket bog
W061	1	03/03/2022	15:58	HH	1	15					Male Hen Harrier seen briefly hunting, low to ground
W064	7	09/03/2022	16:37	HH	1	35					Male Hen Harrier hunting low to ground, flying easterly direction
B59	5	12/08/2022	09:09	HH	1		23				Female Hen Harrier flying over heather and across road

Roost Watch Survey Observations

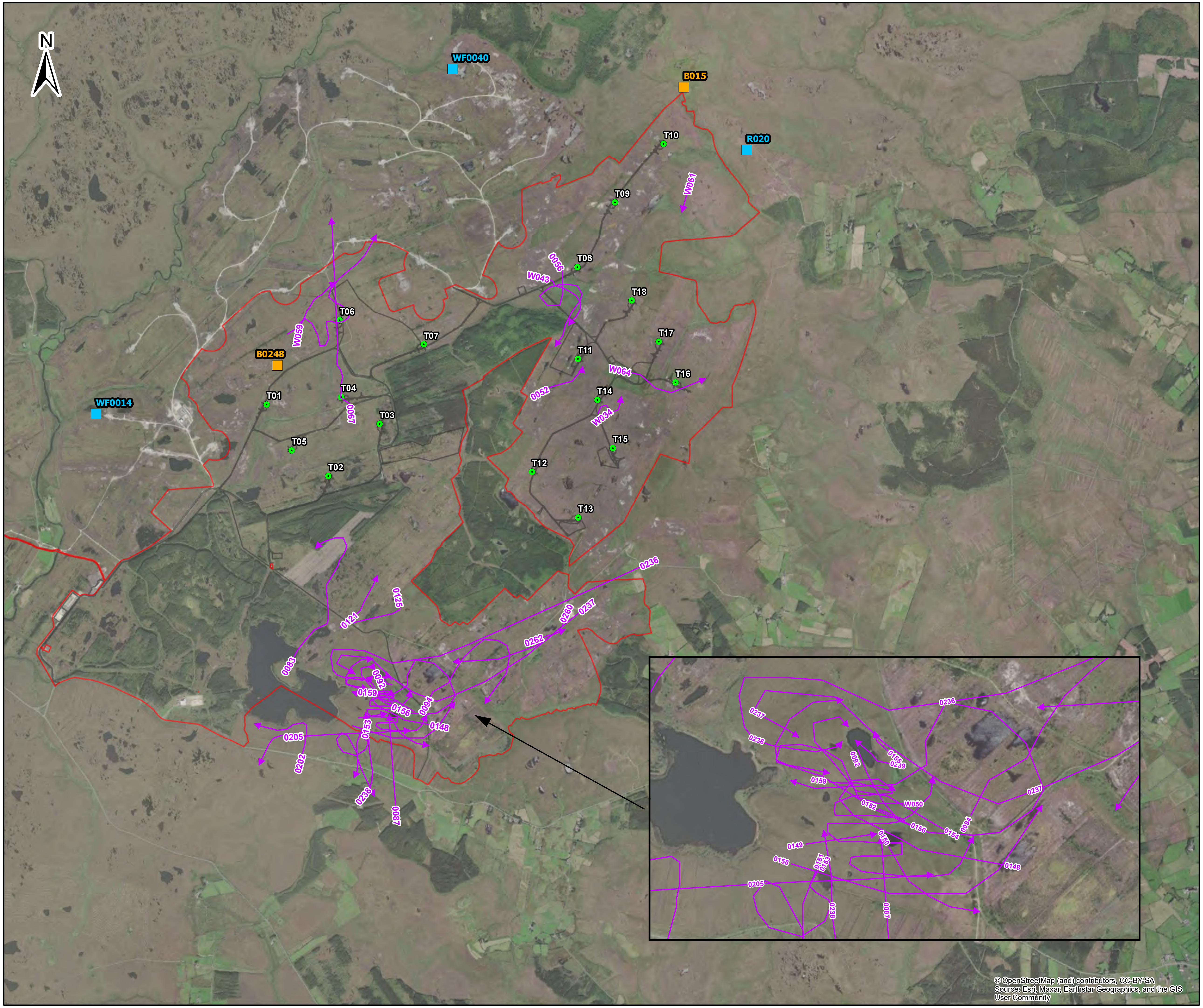
Season	Site	HHVP	Map Reference No.	Date	BTO	No. of Birds	Time of flight	Duration of flight (s)	Habitat Code	Activity	Surveyor
Non-Breeding	Oweninny	1		13/10/2020	HH	1	18:17	12	HD1	Ringtail flying low into roost	JM
Non-Breeding	Oweninny	1		13/10/2020	HH	1	18:48	17	HD1	Ringtail/female flying low in from north; went to roost	JM
Non-Breeding	Oweninny	1		15/01/2021	HH	1	08:55	55	PB3	Female leaving roost area and headed over brow of hill to north	JM
Non-Breeding	Oweninny	1		09/02/2021	HH	1	16:40	120	PB3	Female flew in from south, went to roost	JM
Non-Breeding	Oweninny	1		09/02/2021	HH	1	17:27	45	PB3	Female flying on the hill north, went to roost	JM
Non-Breeding	Oweninny	1		09/02/2021	HH	1	17:36	62	PB3	Female flew in from north, went to roost	JM
Non-Breeding	Oweninny	1		12/03/2021	HH	1	07:30	100	FL1	Female flying east over lake area and bog	JM
Non-Breeding	Oweninny	2	1	13/10/2021	HH	1	18:13	20	PB3	In flight	TK
Non-Breeding	Oweninny	1	1	07/11/2021	HH	2	17:12	20	PB3	Roosting	TK
Non-Breeding	Oweninny	5	3	11/11/2021	HH	1	08:08	45	PB3	Flying low	JM
Non-Breeding	Oweninny	1	1	01/12/2021	HH	1	16:13	555	PB3	Hunting	TK
Non-Breeding	Oweninny	5	3	15/12/2021	HH	3	16:15	315	PB3	Flying/going to roost	JM
Non-Breeding	Oweninny	5	3	14/01/2022	HH	3	09:06	195	PB3	Flying together and interacting close to roost	JM
Non-Breeding	Oweninny	1	1	21/02/2022	HH	1	17:27	265	PB3	Hunting	TK
Non-Breeding	Oweninny	1	2	21/02/2022	HH	1	17:47	90	PB3	Hunting/Roosting	TK
Non-Breeding	Oweninny	2	1	22/02/2022	HH	2	16:52	15	PB3	Roosting- took flight from roost	TK
Non-Breeding	Oweninny	2	2	22/02/2022	HH	1	18:09	35	PB3	Flying over/going to roost	TK
Non-Breeding	Oweninny	1	1	10/03/2022	HH	2	07:14	10	PB3	Leaving roost	TK
Non-Breeding	Oweninny	1	2	10/03/2022	HH	1	07:30	30	PB3	Flying over	TK
Non-Breeding	Oweninny	1	3	10/03/2022	HH	1	07:30	8	PB3	Flying over	TK

Waterfowl surveys							
Season	Ref.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non Breeding	WF0014	11/11/2020	HH	1	FL1	Feeding	TK
Non Breeding	WF0040	17/12/2020	HH	1	PB4	Feeding	TK

Winter Transects								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R020	Non-Breeding	Eastern Transects	24/11/2020	HH	1	PB4	Seen hunting >1km east of north east transect, in north to northwest direction	SC

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Observation Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Raptor	B015	23/04/2020	10:10:00	HH	1	PB3	Female/ringtail hunting in suitable habitat	JM

HEN HARRIER FIGURES



Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Hen Harrier (Circus cyaneus) - Breeding Season 2020-2022
- Hen Harrier (Circus cyaneus) - Non-Breeding Season 2020-2022
- Hen Harrier (Circus cyaneus) - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
Kilometres

NOTES
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 8
All Hen Harrier (Circus cyaneus) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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Draft: D01

10889-025-HH-FLIGHT-TOB-D01

2.0 Kestrel

Vantage Points Surveys												
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0137	Breeding	5	18/04/2019	10:10	K.	1	30	60				Male hunting	BM
0226	Breeding	6	27/04/2019	12:10	K.	1		90				Hunting	JH
0141	Breeding	5	11/07/2019	16:56	K.	1	30	90				Dropped on prey	BM
0003	Breeding	1	23/07/2019	11:15	K.	1	50	100				Hunting	MH
0005	Breeding	1	24/07/2019	11:11	K.	1		160				Female hunting	MH
0145	Breeding	5	23/08/2019	15:19	K.	1	30	90				Hunting	JH
0278	Breeding	7	28/08/2019	11:32	K.	1		30					JH
0007	Breeding	1	20/09/2019	10:45	K.	1		90				Female hunting	MH
0231	Breeding	6	22/09/2019	16:45	K.	1	20					Went to ground	JH
0232	Breeding	6	22/09/2019	19:17	K.	1		220				Hunting	JH
0011	Breeding	5	26/09/2019	07:35	K.	1	450	90				Hunting along ridge	JA
0234	Breeding	7	28/09/2019	13:56	K.	1	200	40					JH
0084	Non-Breeding	1	21/10/2019	14:40	K.	1	60						MH
0015	Non-Breeding	6	25/10/2019	07:53	K.	1	300	60				Actively hunting	JH
0016	Non-Breeding	4	29/10/2019	16:40	K.	1		180				Hunting	MH
0086	Non-Breeding	1	15/11/2019	12:02	K.	1		180				Hunting over bog	MH
0291	Non-Breeding	1	15/11/2019	12:55	K.	1	160					Hunting between turbines in Phase 1	MH
0246	Non-Breeding	4	07/12/2019	16:06	K.	1	8						MH

Vantage Points Surveys													
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0047	Breeding	7	11/05/2020	15:06	K.	1	126					Adult male Kestrel hunting along line of forestry/blanket bog. Hovering and flying on	TK
0251	Breeding	6	14/05/2020	12:15	K.	1	30						JM
0032	Breeding	2	10/06/2020	16:18	K.	1	20	30				Male Kestrel flew from forestry over cutover bog, dropped rapidly towards ground before flying west	TK
0048	Breeding	6	11/06/2020	07:24	K.	1	10	18					JM
0255	Breeding	1	13/07/2020	09:13	K.	1	25					Kestrel seen briefly in flight	TK
0258	Breeding	2	16/07/2020	12:28	K.	1	180	15				Male Kestrel hunting, hovering and flying on	TK
0122	Breeding	6	16/07/2020	17:17	K.	1	15					Adult female hunting near VP	JM
0206	Non-Breeding	6	16/10/2020	13:51	K.	1	25	40				Male Kestrel hunting over bog	JM
0214	Non-Breeding	4	14/01/2021	14:40	K.	1	25	20				Male hunting and hovering flew northeast	JM
0218	Non-Breeding	5	10/02/2021	15:14	K.	1	65	60				Male K hovering in front of VP then flew east	JM
0136	Breeding	5	05/05/2021	19:30	K.	1	25	85				Male hunting over bog area	JM
0304	Breeding	5	07/07/2021	21:43	K.	1	130	65				Male Kestrel hunting	TK

Vantage Points Surveys													
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0221	Breeding	4	06/09/2021	19:56	K.	1	30	125	20			Kestrel hunting over cutover bog	TK
0072	Breeding	7	07/09/2021	14:21	K.	1	130	342	90			Kestrel hunting over cutover bog	TK
0270	Breeding	5	08/09/2021	17:05	K.	1		95				Kestrel hunting over cutover bog	TK
0271	Breeding	6	09/09/2021	17:52	K.	1	20	165				Kestrel hunting over cutover bog	TK
0146	Breeding	6	09/09/2021	18:48	K.	1		118	25			Kestrel hunting over cutover bog	TK
0279	Breeding	3	09/09/2021	16:35	K.	1	10	25				Hunting male	JM
W001	Non-Breeding	5	11/10/2021	08:13	K.	1	25	195				Male Kestrel hunting/hovering	TK
W003	Non-Breeding	4	13/10/2021	09:18	K.	1	25	210				Male Kestrel hunting/hovering	TK
W005	Non-Breeding	2	13/10/2021	11:28	K.	1	35	125				Male Kestrel hunting/hovering	TK
W008	Non-Breeding	6	20/10/2021	10:12	K.	1	10	145	25			Kestrel hunting	TK
W011	Non-Breeding	6	09/11/2021	11:06	K.	1	15	95	30			Kestrel hunting	TK
W012	Non-Breeding	6	09/11/2021	16:32	K.	1	25	170	15			Kestrel hunting	TK
W014	Non-Breeding	4	10/11/2021	11:56	K.	1	110	175				Kestrel hunting	TK
W017	Non-Breeding	4	10/11/2021	16:08	K.	1	25	215				Kestrel hunting	TK
W018	Non-Breeding	7	15/11/2021	15:22	K.	1	15	90				Kestrel hunting	TK
W022	Non-Breeding	7	15/11/2021	15:38	K.	1		115				Kestrel hunting	TK

Vantage Points Surveys												
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
W023	Non-Breeding	6	16/11/2021	16:10	K.	1		70	240			Kestrel hunting	TK
W033	Non-Breeding	5	13/12/2021	14:12	K.	1	10	135				Kestrel hunting	TK
W036	Non-Breeding	4	21/12/2021	09:48	K.	1		192					TK
W044	Non-Breeding	6	12/01/2022	15:20	K.	1	40	80	100			Kestrel male hunting	JM
W048	Non-Breeding	3	19/01/2022	14:48	K.	1	120	35					TK
W054	Non-Breeding	7	20/01/2022	16:22	K.	1	35	315					TK
W055	Non-Breeding	7	08/02/2022	13:04	K.	1	45	212				Kestrel hunting/hovering over cutover bog and forestry	KL
B33	Breeding	7	23/05/2022	14:15	K.	1		10	50	60		Kestrel flew towards edge of forest circled, then flew north west	KL
B56	Breeding	6	13/07/2022	10:15	K.	2	10	200	90			On arrival, two Kestrels seen hovering above VP	KL

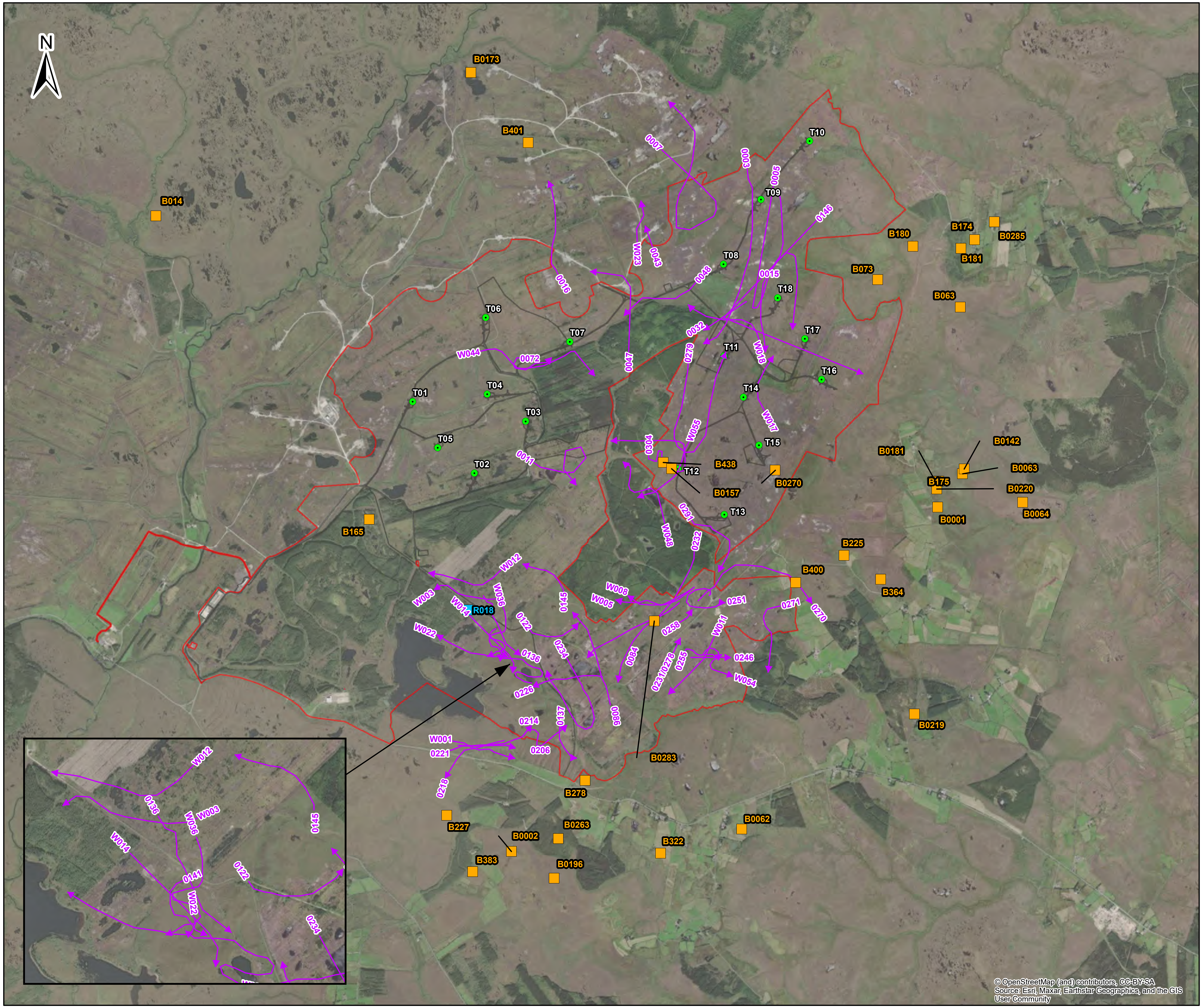
Roost Watch Observations										
Season	Site	HHVP	Date	BTO	No. of Birds	Time of flight	Duration of flight (s)	Habitat Code	Activity	Surveyor
Non-Breeding	Oweninny	5	11/11/2021	K.	1	08:31	70	PB3	Male Kestrel hunting near VP	JM

Winter Transects Surveys									
Ref.	Season	Trans No./Loc.	Date	Time	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R018	Non-Breeding	Western Transect	18/12/2020	13:10	K.	1	WD4	Male Kestrel hunting over area of bog and forestry	TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Observation Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Raptor	B014	23/04/2020	07:50:00	K.	1	PB3	Female Kestrel hunting in suitable habitat	JM
Raptor	B063	21/05/2020	10:13:00	K.	1	PB4	Male Kestrel hunting and hovering	JM
Raptor	B073	18/06/2020	09:05:00	K.	1	PB4		JM
Raptor	B180	23/07/2020	15:40:00	K.	1			JM
Transect	B165	24/08/2020	12:42:00	K.	2	WD4		TK
Raptor	B174	26/08/2020	14:11:00	K.	1	GA1		TK
Raptor	B175	26/08/2020	18:26:00	K.	1	GS4		TK
Raptor	B181	21/09/2020	13:11:00	K.	1	GA1		TK
Raptor	B182	21/09/2020	17:46:00	K.	1	PB2		TK
Transect	B438	16/04/2021		K.	1	PB4		JM
Transect	B225	29/04/2021	10:45:00	K.	1	PB4	Male Kestrel hunting	TK
Transect	B227	29/04/2021	12:12:00	K.	1	PB4	Male Kestrel hunting	JM
Transect	B278	28/05/2021	11:44:00	K.	1	GA1	Male Kestrel hunting and hovering	JM
Transect	B322	18/06/2021	08:02:00	K.	1	PB4	Male Kestrel hunting	JM
Raptor	B364	14/07/2021	08:46:00	K.	1	PB4	Male Kestrel hunting	JM
Raptor	B383	20/08/2021	08:46:00	K.	1	PB4	Male Kestrel hunting	
Raptor	B400	14/09/2021	14:33:00	K.	1	PB4	Female Kestrel hunting	JM

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Observation Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B401	16/09/2021		K.	1	PB4	Kestrel hunting/hovering	TK
Raptor	B0001	04/04/2022	13:26:00	K	1	GS4	Male Kestrel hunting over wet grassland/bog	TK
Raptor	B0002	05/04/2022	14:06:00	K	1	PB4	Kestrel hunting over bog and forestry	TK
Raptor	B0062	09/05/2022	13:48:00	K.	1	PB4	Male Kestrel hunting/hovering	TK
Raptor	B0063	10/05/2022	14:02:00	K.	1	PB4	Kestrel hunting	TK
Raptor	B0064	10/05/2022	14:18:00	K.	1	PB4	kestrel hunting	TK
Raptor	B0142	14/06/2022	14:12:00	K.	2	GS4	Pir of Kestrels hunting over an area of wet grassland/bog	TK
Transect	B0157	20/06/2022	11:00:00	K.	1	PB4	Kestrel hunting	TK
Raptor	B0173	22/06/2022	13:46:00	K.	1	PB4	Male Kestrel hunting	TK
Raptor	B0181	11/07/2022	14:26:00	K.	1	GS4	Kestrel hunting/hovering	TK
Raptor	B0196	14/07/2022	17:31:00	K.	2	PB4	Pair of Kestrel hunting/hovering, possibly juveniles/female	TK
Raptor	B0219	19/07/2022	10:14:00	K.	2	PB4	Pair of juvenile Kestrels hunting, practicing flying skills in area of bog/grassland/forestry	TK
Raptor	B0220	19/07/2022	13:23:00	K.	1	PB4	Male Kestrel hunting/hovering	TK

KESTREL FIGURES



Legend

- Planning Application
- Proposed Infrastructure
- Proposed Turbine Locations
- Kestrel (Falco tinnunculus) - Breeding Season 2020-2022
- Kestrel (Falco tinnunculus) - Non-Breeding Season 2020-2022
- Kestrel (Falco tinnunculus) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
Kilometres

NOTES

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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D01	24/03/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 9
All Kestrel (Falco tinnunculus) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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Draft: D01

10889-026-K.-FLIGHT-TOB-D01

3.0 Merlin

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0046	Breeding	2	14/05/2020	21:02	ML	1	10					Male Merlin in flight low to ground 0-1m. Possible suitable nesting habitat 1-2km to the east/northeast of VP 2	TK
0038	Non-Breeding	1	13/10/2020	11:57	ML	1	46	20				Merlin in flight, chasing a Meadow Pipit	TK
0300	Breeding	7	14/04/2021	06:50	ML	1	30					Female Merlin hunting, chasing a Meadow Pipit	TK
W049	Non-Breeding	5	11/01/2022	14:22	ML	1	45					Male Merlin flew in from east, perched on small tree for 125s then flew east	JM
B15	Breeding	2	08/04/2022	09:01	ML	1		8				Merlin flying north	KL
B36	Breeding	4	15/06/2022	13:32	ML	1		25	10			Merlin flew east over hill	KL

Waterfowl Surveys							
Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non-Breeding	WF0023	25/11/2020	ML	1	PB4	Flying	TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Merlin	B016	21/04/2020	11:35:00	ML	1	PB3	Likely breeding site	JM
Merlin	B017	21/04/2020	13:40:00	ML	1	PB3	Plucking post found in area	JM
Merlin	B018	22/04/2020	09:10:00	ML	1	PB3	Suitable breeding area	JM
Merlin	B059	20/05/2020	08:25:00	ML	1	PB4	Male Merlin flying low over bog	JM
Merlin	B060	20/05/2020	09:20:00	ML	1	PB4	Female Merlin flying low over bog	JM
Transect	B226	27/04/2021	10:05:00	ML	1	PB3	Male Merlin hunting	JM
Transect	B276	26/05/2021	08:42:00	ML	1	PB3	Female hunting	JM
Raptor	B365	16/07/2021	12:15:00	ML	1	PB4	Male Merlin hunting	JM
Raptor	B0065	11/05/2022	13:22:00	ML	1	PB4	Merlin hunting low over cutover bog	TK
Raptor	B0144	15/06/2022	17:43:00	ML	1	PB4	Merlin seen briefly in flight low to ground	TK

MERLIN FIGURES

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Merlin (Falco columbarius) - Breeding Season 2020-2022
- Merlin (Falco columbarius) - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
Kilometres

NOTES
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D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client:
Bord na Móna

Project:
Oweninny Wind Farm
Phase 3

Title:
Appendix 8-1 Figure 10
Merlin (Falco columbarius)
observations over the survey period
(Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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10889-027-ML-FLIGHT-TOB-D01

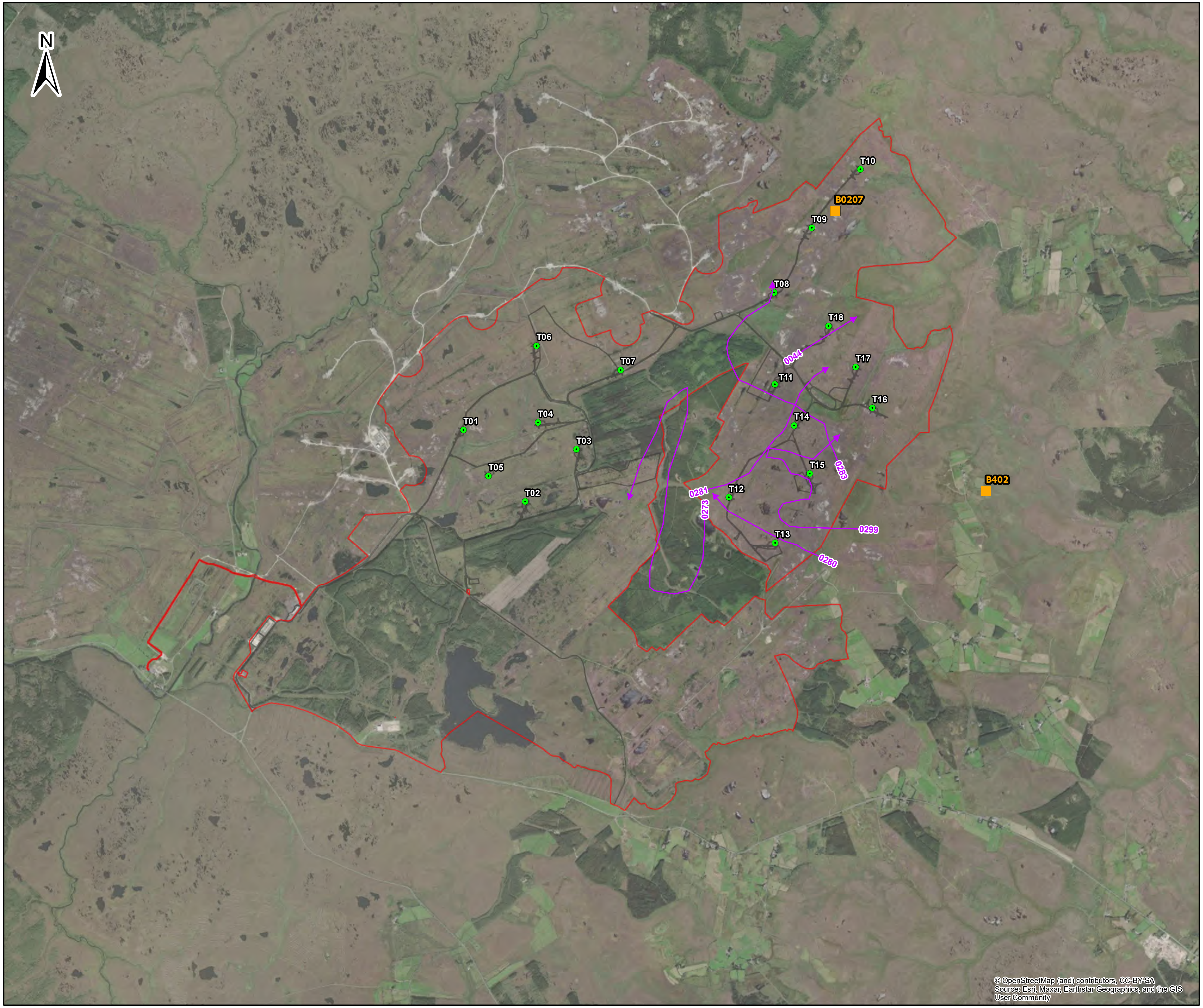
Draft: D01

4.0 Peregrine

Vantage Points Surveys												
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0273	Breeding	7	01/06/2019	11:32	PE	1		360	240			Flying over Corvoderry.	JA
0280	Non-Breeding	7	28/10/2019	12:06	PE	1	12					Flying low and landed	JH
0281	Non-Breeding	7	28/10/2019	12:18	PE	1	15					Hunting low	JH
0283	Non-Breeding	7	31/12/2019	12:02	PE	1	100	50				Female at rest for 22min then flew and landed again	MH
0044	Non-Breeding	2	20/03/2020	14:10	PE	1	10					Adult in fast flight chasing MP	JA
0299	Non-Breeding	7	09/11/2020	12:02	PE	1	75					Peregrine Falcon hunting low to ground	TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Raptor	B402	15/09/2021	10:22:00	PE	1	PB4	Peregrine flying low	JM
Transect	B0207	15/07/2022	11:50:00	PE	1	PB4	Peregrine flying over	TK

PEREGRINE FALCON FIGURES



Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Peregrine (Falco peregrinus) - Breeding Season 2020-2022
- Peregrine (Falco peregrinus) - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
Kilometres

NOTES

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Issue	Date	Description	By	Chkd.
D01	24/03/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 11 Peregrine (Falco peregrinus) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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10889-028-PE-FLIGHT-TOB-D01

Draft: D01

5.0 Golden Plover

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0008	Breeding	1	20/09/2019	11:30	GP	22	30	180	270			Flying over then landed on bog	MH
0009	Breeding	6	28/09/2019	09:00	GP	3	12	60				Landed on bog	JH
0010	Non-Breeding	1	21/10/2019	13:35	GP	80	30	100	50			Continued flying	MH
0013	Non-Breeding	1	21/10/2019	12:21	GP	8	150	100				Flew in and landed	MH
0019	Non-Breeding	1	29/10/2019	12:29	GP	150	30	150				Rose from bog circled and landed again	MH
0020	Non-Breeding	1	21/11/2019	09:50	GP	9	160					Disturbed by vehicle from bog then landed again	MH
0282	Non-Breeding	1	22/11/2019	11:09	GP	5	150					Flew in from VP7 direction	MH
0017	Non-Breeding	7	25/11/2019	10:35	GP	27						Flock on ground	MH
0021	Non-Breeding	1	27/11/2019	13:35	GP	4	40	140				Took off then landed again	MH
0022	Non-Breeding	1	17/12/2019	13:40	GP	22		170				New flock arrived	MH
0023	Non-Breeding	1	21/01/2020	12:13	GP	15	100	600	600			Flock rose from bog flew around for 20 min and landed on bog	MH
0024	Non-Breeding	1	21/01/2020	09:35	GP	11		11				Flock in flight	MH
0026	Non-Breeding	1	23/01/2020	11:09	GP	62	20	460				Flock rose from bog circled around for 8 min then	MH

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
												landed on same area	
0243	Non-Breeding	1	23/01/2020	13:33	GP	19		63				New flock flying in	MH
0027	Non-Breeding	6	14/02/2020	11:51	GP	17		180				Flock in flight	MH
0284	Non-Breeding	7	26/02/2020	10:31	GP	32	20	160				Flock in flight	MH
0285	Non-Breeding	7	26/02/2020	10:15	GP	24		31				Flock in flight	MH
0286	Non-Breeding	1	26/02/2020	12:37	GP	9	160					Flock in flight	MH
0287	Non-Breeding	7	26/02/2020	13:06	GP	3	39					Flock in flight	MH
0028	Non-Breeding	7	18/03/2020	17:40	GP	8	20	480				Flock in flight	MH
0244	Non-Breeding	1	20/03/2020	12:03	GP	14						Flock at roost in regular location	MH
0036	Non-Breeding	6	31/03/2020	16:55	GP	19						Flock on ground in Breeding plumage	MH
0037	Non-Breeding	1	13/10/2020	10:42	GP	13			115			Flock of Golden Plover in flight	TK
0049	Non-Breeding	1	13/10/2020	10:58	GP	8	15					Flock of Golden Plover in flight	TK
0063	Non-Breeding	2	14/10/2020	10:07	GP	24	10	105				Flock of Golden Plover in flight	TK
0120	Non-Breeding	3	15/10/2020	10:28	GP	13			85			Flock of 13 Golden Plover in flight	TK
0297	Non-Breeding	4	15/10/2020	14:48	GP	12		35	70			Flock of 12 Golden Plover in flight	JM

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0039	Non-Breeding	7	16/10/2020	11:09	GP	11	25	50	30			Flock of 11 Golden Plover circled before landing on bog	TK
0040	Non-Breeding	1	10/11/2020	12:48	GP	15	30	50	235			Flock of 15 Golden Plover circling before landing on bog	TK
0053	Non-Breeding	1	10/11/2020	14:06	GP	15	20	25	40			Flock of 15 Golden Plover in flight	TK
0055	Non-Breeding	2	13/01/2021	10:26	GP	15	20	25	10			Four Mallard in flight, land on bog	TK
0233	Non-Breeding	2	11/03/2021	14:23	GP	100	15	50	145	280		Flock of approx. 100 Golden Plover circling over bog and forestry	TK
W026	Non-Breeding	3	15/10/2021	11:28	GP	35		120	80	60		GP flock circling and calling over cutover bog	JM
W007	Non-Breeding	7	21/10/2021	13:20	GP	30			125	440		Flock of 30 Golden Plover circling over site	TK
W030	Non-Breeding	3	12/11/2021	13:45	GP	12		70				GP flock circling and calling over cutover bog	JM
W039	Non-Breeding	2	14/12/2021	10:35	GP	10		350	220			Small flock soaring and went out of view, east	JM
W035	Non-Breeding	7	16/12/2021	14:26	GP	25			50	285			TK
W041	Non-Breeding	1	17/01/2022	13:12	GP	25			385				TK

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
W042	Non-Breeding	1	17/01/2022	12:49	GP	11	10	20	45				TK
W046	Non-Breeding	3	19/01/2022	15:37	GP	60				436			TK
W058	Non-Breeding	1	01/03/2022	09:13	GP	65	10	20	390	70		Flock of 65 Golden Plover circling, landed on area of degraded cutover bog	TK
W060	Non-Breeding	1	03/03/2022	15:58	GP	100	30	20	70	100	410	Flock of 100 Golden Plover circling over site	TK
W062	Non-Breeding	1	03/03/2022	13:38	GP	60	15		100	500	280	Flock of 60 Golden Plover circling over site	TK
W063	Non-Breeding	7	04/03/2022	12:59	GP	60			70			Flock of 60 Golden Plover flying over	TK
B63	Breeding	7	15/09/2022	11:21	GP	9				90	30	9 Golden Plover seen flying from east to west	KL

Winter Transects Surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R004	Non-Breeding	Western Transect	28/10/2020	GP	11	PB4	Roosting flock of 11 Golden Plover roosting on bare peat/cutover bog	TK
R006	Non-Breeding	Eastern Transects	29/10/2020	GP	18	PB4	Roosting, flock of 18 Golden Plover roosting on area of bare peat/cutover bog	TK

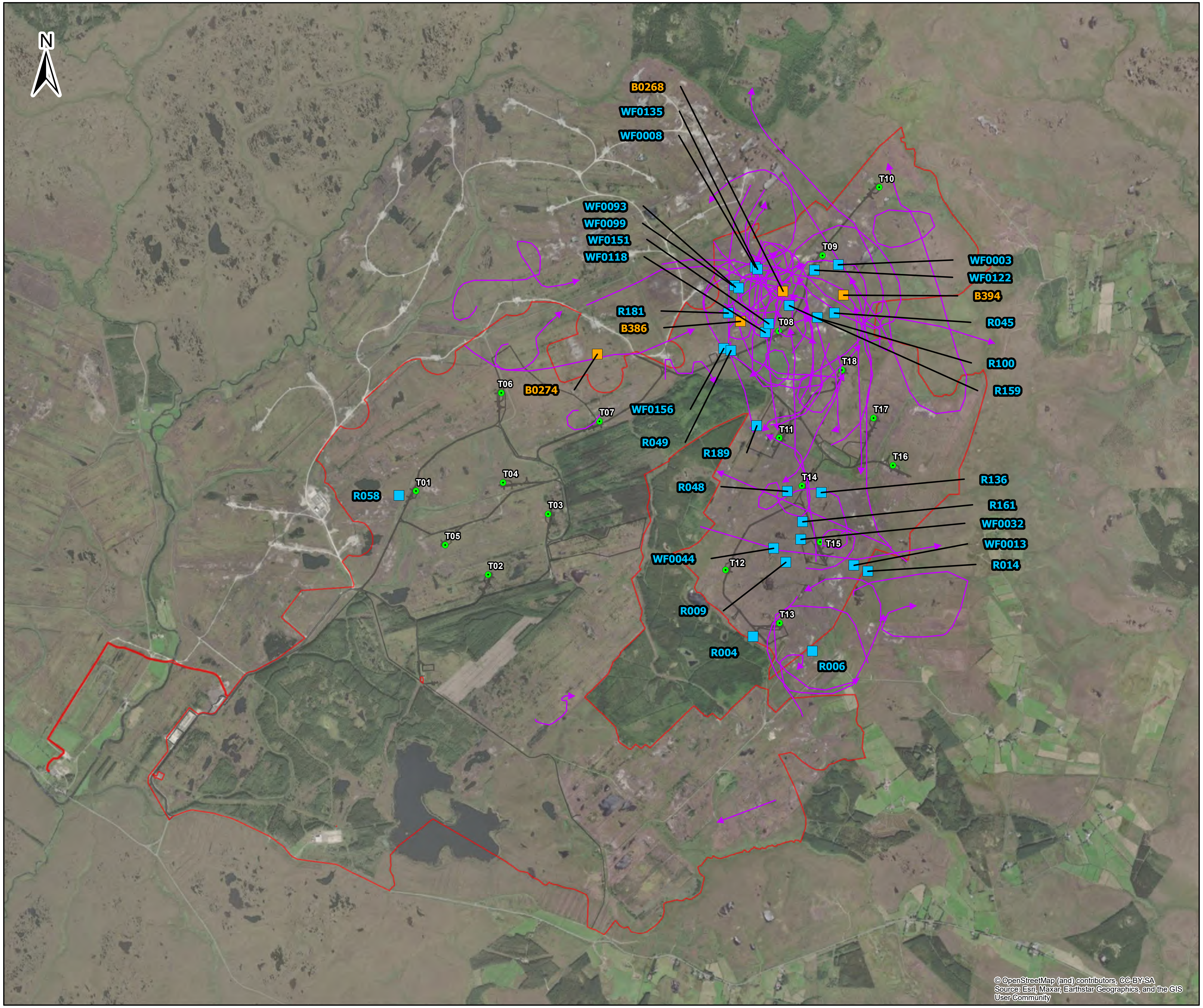
Winter Transects Surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R009	Non-Breeding	Eastern Transects	16/12/2020	GP	5	PB4	Roosting, small flock of five Golden Plover roosting on area of cutover bog	TK
R014	Non-Breeding	Eastern Transects	16/12/2020	GP	12	PB4	Roosting, Small flock of 12 Golden Plover roosting on area of cutover bog	TK
R045	Non-Breeding	Eastern Transects	22/02/2021	GP	400	PB4	Flying and calling, flock of Golden Plover circling and calling approx. 80m above bog	SC
R048	Non-Breeding	Eastern Transects	22/02/2021	GP	8	PB4	Flying and calling, flying northeast calling, approx. 30m high	SC
R049	Non-Breeding	Eastern Transects	22/02/2021	GP	1	PB4	Flying northeast calling, approx. 30m high	SC
R058	Non-Breeding	Western Transect	24/02/2021	GP	50	PB4	Circled bog and then headed west approx. 80m high	SC
R100	Non-Breeding	Eastern Transects	14/10/2021	GP	11	PB4	Roosting	TK
R136	Non-Breeding	Eastern Transects	02/12/2021	GP	8	PB4	Flock of eight Golden Plover roosting on patch of degraded cutover bog	TK
R159	Non-Breeding	Eastern Transect	21/01/2022	GP	8	PB4	Small flock of eight Golden Plover roosting on degraded bog	TK
R161	Non-Breeding	Eastern Transect	21/01/2022	GP	12	PB4	Small flock of 12 Golden Plover roosting on degraded bog	TK
R181	Non-Breeding	Eastern Transects	09/03/2022	GP	25	PB4	Flock of 25 Golden Plover roosting on bog	TK
R189	Non-Breeding	Western Transect	11/03/2022	GP	150	PB4	Flock of 150 Golden Plover circling over bog	TK

Waterfowl Surveys							
Season	Ref.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non-breeding	WF0003	12/10/2020	GP	53	PB4	Roosting	TK
Non-breeding	WF0008	27/10/2020	GP	90	PB4	Roosting	TK

Waterfowl Surveys							
Season	Ref.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non-breeding	WF0013	27/10/2020	GP	16	PB4	Roosting	TK
Non Breeding	WF0032	07/12/2020	GP	8	PB4	Roosting	TK
Non Breeding	WF0044	17/12/2020	GP	11	PB4	Feeding	TK
Non Breeding	WF0093	11/10/2021	GP	12	PB4	Roosting	TK
Non Breeding	WF0099	22/10/2021	GP	15	PB4	Roosting	JM
Non Breeding	WF0118	19/11/2021	GP	18	PB4	Roosting	TK
Non Breeding	WF0122	01/12/2021	GP	70	PB4	Approx. 70 GP roosting, took flight, circling over site	TK
Non Breeding	WF0135	10/01/2022	GP	15	PB4	Roosting	TK
Non Breeding	WF0151	07/02/2022	GP	7	PB4	Roosting	TK
Non Breeding	WF0156	22/02/2022	GP	300	PB4	Flying	TK

Breeding Bird Survey Data							
Survey Type	Ref.	Date	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Wader	B386	15/09/2021	GP	5	PB4	Small flock of Golden Plover roosting on cutover bog	TK
Transect	B394	16/09/2021	GP	5	PB4	Small flock of Golden Plover roosting on cutover bog	TK

GOLDEN PLOVER FIGURES



Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Golden Plover (Pluvialis apricaria) - Breeding Season 2020-2022
- Golden Plover (Pluvialis apricaria) - Non-Breeding Season 2020-2022
- Golden Plover (Pluvialis apricaria) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

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Kilometres

NOTES

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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 12 - Sheet 1 of 3 - Golden Plover (Pluvialis apricaria) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:30,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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Draft: D01

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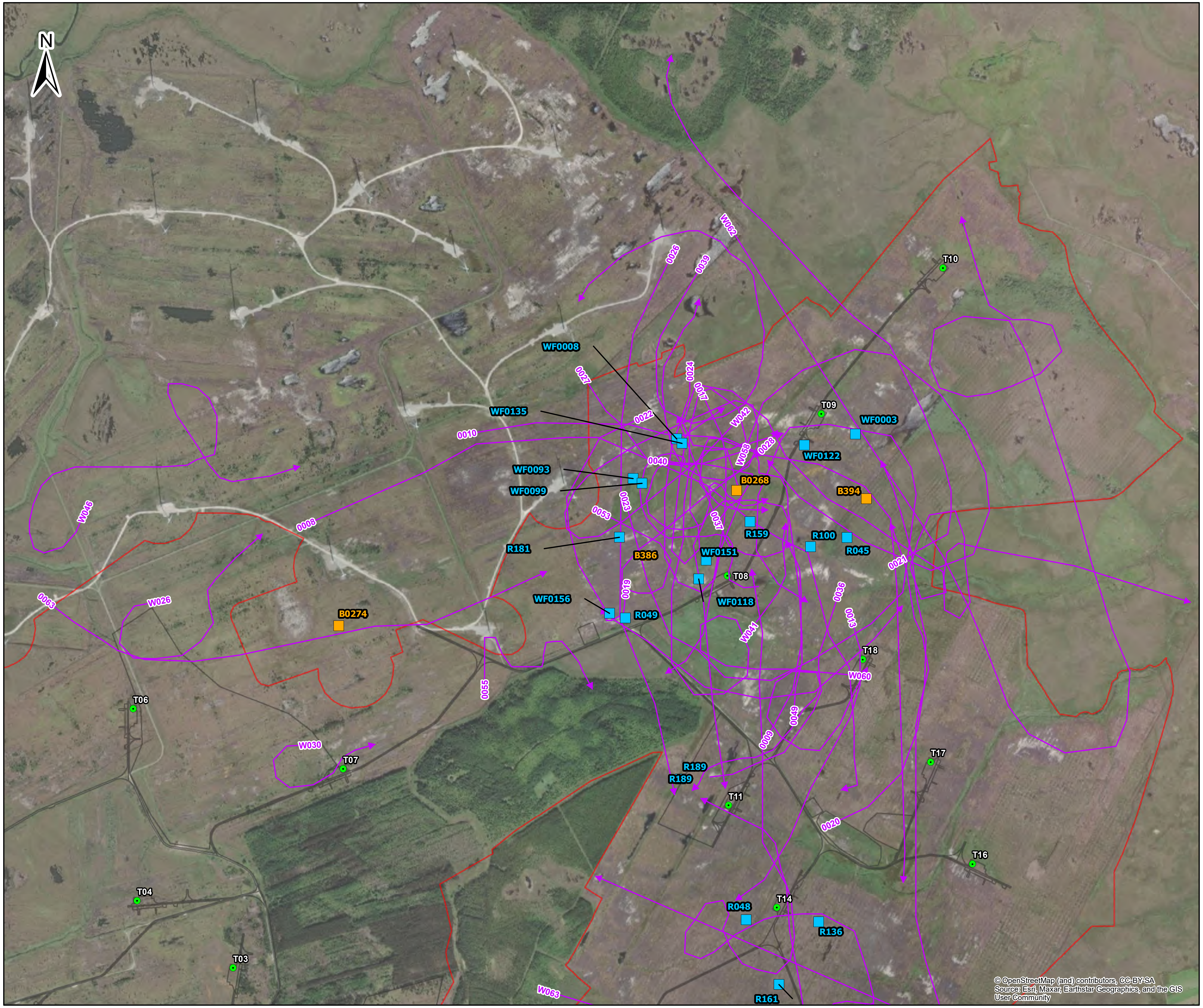

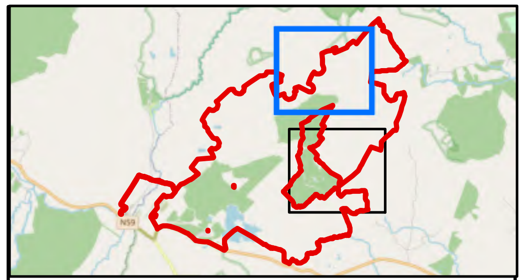

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Golden Plover (Pluvialis apricaria) - Breeding Season 2020-2022
- Golden Plover (Pluvialis apricaria) - Non-Breeding Season 2020-2022
- Golden Plover (Pluvialis apricaria) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

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Meters

NOTES

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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D01	24/03/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 12 - Sheet 2 of 3 - Golden Plover (Pluvialis apricaria) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:14,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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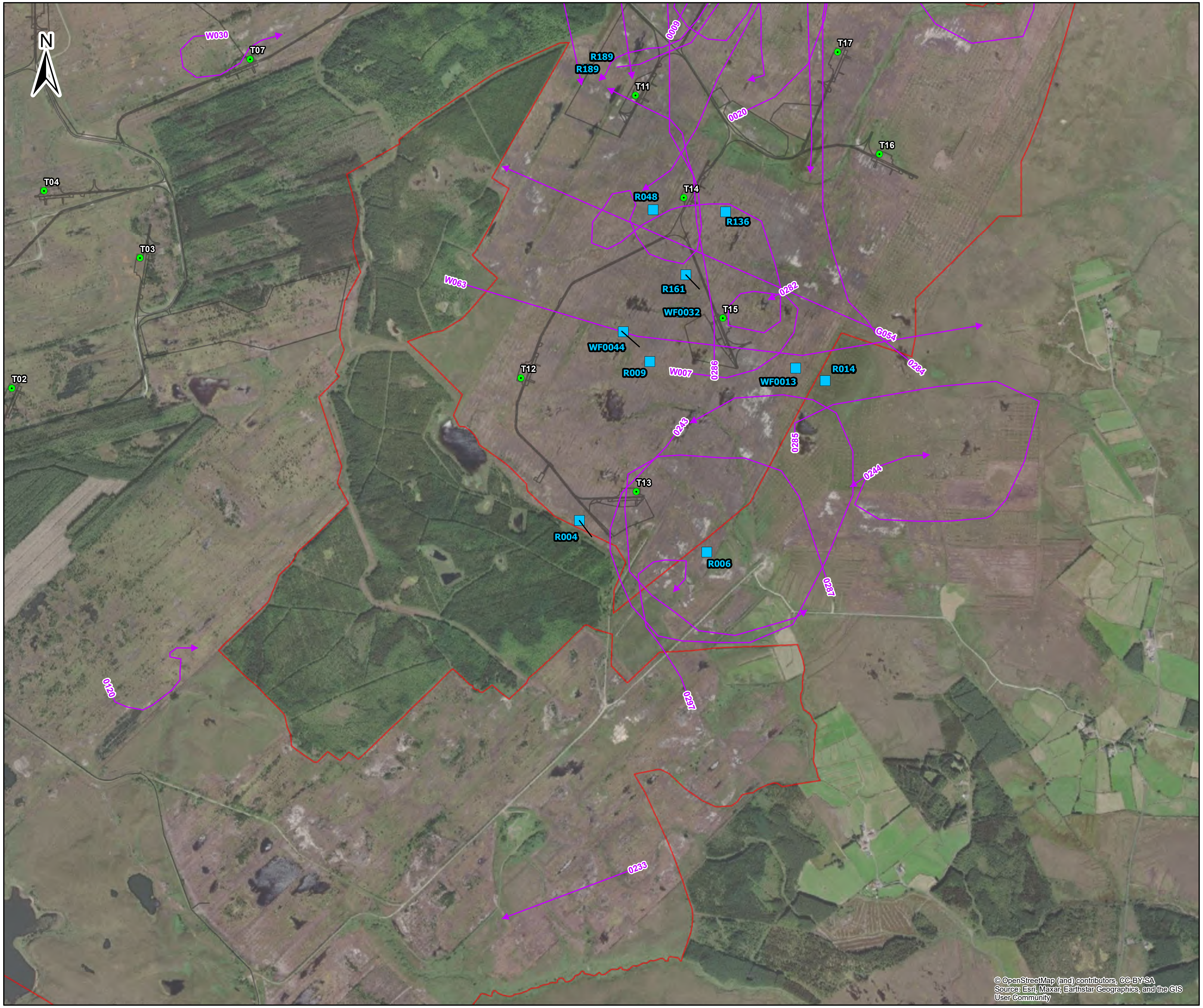
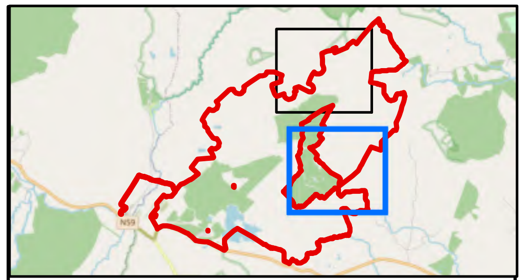
Draft: D01





Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Golden Plover (Pluvialis apricaria) - Breeding Season 2020-2022
- Golden Plover (Pluvialis apricaria) - Non-Breeding Season 2020-2022
- Golden Plover (Pluvialis apricaria) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

0 150 300 450 600
Meters

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 12 - Sheet 3 of 3 - Golden Plover (Pluvialis apricaria) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:14,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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Draft: D01

6.0 Snipe

Vantage Points Surveys													
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0179	Breeding	5	12/05/2020	14:45	SN	2	55						JM
0248	Breeding	6	14/05/2020	15:20	SN	1	25						JM
0184	Breeding	5	09/06/2020	08:35	SN	1	15	5				Likely breeding	JM
0250	Breeding	6	11/06/2020	06:06	SN	2	25	20	15			Suitable breeding habitat	JM
0189	Breeding	5	14/07/2020	12:17	SN	1	60	75	15			Male display flight and chipping	JM
0062	Breeding	3	15/07/2020	19:57	SN	1	28					Snipe circling/displaying overhead before landing on bog	TK
0110	Breeding	4	15/07/2020	12:12	SN	1	15	65				Male drumming in display flight	JM
0196	Non-Breeding	5	14/10/2020	14:41	SN	1	25					Snipe in flight near VP	JM
0200	Non-Breeding	5	09/12/2020	11:21	SN	1	35					Adult flying past VP	JM
0198	Non-Breeding	5	12/01/2021	16:15	SN	1						Adult calling from bog near VP	JM
0124	Non-Breeding	4	14/01/2021	15:24	SN	1		15				Brief view of adult calling and flying west	JM
0213	Breeding	5	05/05/2021	17:12	SN	2	28	40				Males chipping and drumming near VP	JM
0058	Breeding	2	07/07/2021	18:54	SN	1	16					Flew southwest low to ground, landed out of site on bog	JC

Vantage Points Surveys													
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0059	Breeding	2	07/07/2021	19:02	SN	1	5					Same bird as previous, short flight across bog	JC
W051	Non-Breeding	5	11/01/2022	16:05	SN	1						Snipe heard chipping from bog	JM
B64	Breeding	3	16/09/2022	08:45	SN	1	5	5	20			Snipe flushed from near VP, flew in circle and then away	KL

Vantage Point Non-Flight Observations									
Season	Site	VP	Date	Time	BTO Code	Abundance	Habitat Code	Activity	Surveyor
Non-Breeding	Oweninny	7	08/02/2022	10:29	SN	2	PB4	Two Snipe flushed from ground	TK
Breeding	Oweninny	7	26/04/2022	07:13	SN	2	PB4	Two Snipe calling throughout VP	KL
Breeding	Oweninny	1	27/04/2022	08:04	SN	2	PB4	Two Snipe heard calling north west of VP	KL
Breeding	Oweninny	4	11/05/2022	20:00	SN	2	PB4	Two Snipe heard calling during VP	KL
Breeding	Oweninny	7	23/05/2022	14:30	SN	2	PB4	Snipe heard chipping throughout survey.	KL
Breeding	Oweninny	7	14/06/2022	10:30	SN	2	PB4	Two snipe heard chipping throughout VP	KL
Breeding	Oweninny	4	15/06/2022	10:05	SN	3	PB4	Two snipe heard drumming and 1 heard chipping	KL

Vantage Point Non-Flight Observations									
Season	Site	VP	Date	Time	BTO Code	Abundance	Habitat Code	Activity	Surveyor
Breeding	Oweninny	6	16/06/2022	09:52	SN	2	PB4	Two Snipe heard chipping throughout VP	KL

Waterfowl Surveys							
Season	Ref.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non-breeding	WF0004	12/10/2020	SN	1	PB4	Flushed from ground	TK
Non-breeding	WF0009	27/10/2020	SN	1	PB4	Flushed from ground	TK
Non Breeding	WF0031	07/12/2020	SN	2	PB4	Roosting	TK
Non Breeding	WF0033	07/12/2020	SN	1	PB4	Roosting	TK
Non Breeding	WF0034	07/12/2020	SN	1	PB4	Roosting	TK
Non Breeding	WF0041	17/12/2020	SN	2	PB4	Feeding	TK
Non Breeding	WF0045	17/12/2020	SN	1	PB4	Feeding	TK
Non Breeding	WF0046	17/12/2020	SN	1	PB4	Feeding	TK
Non Breeding	WF0049	11/01/2021	SN	3		Roosting- flushed from ground	TK
Non Breeding	WF0051	11/01/2021	SN	2		Roosting- flushed from ground	TK
Non Breeding	WF0052	11/01/2021	SN	1		Roosting- flushed from ground	TK
Non Breeding	WF0053	11/01/2021	SN	1		Roosting- flushed from ground	TK

Waterfowl Surveys							
Season	Ref.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non Breeding	WF0061	08/02/2021	SN	1	PB4	Flushed from ground	TK
Non Breeding	WF0062	08/02/2021	SN	3	PB4	Flushed from ground	TK
Non Breeding	WF0068	08/02/2021	SN	1	PB4	Flushed from ground	TK
Non-breeding	WF0070	24/02/2021	SN	1	PB4	Calling	SC
Non Breeding	WF0075	08/03/2021	SN	1	PB4	Flushed from ground	TK
Non Breeding	WF0076	08/03/2021	SN	2	PB4	Flushed from ground	TK
Non Breeding	WF0107	08/11/2021	SN	1	PB4	Roosting	TK
Non Breeding	WF0108	08/11/2021	SN	1	PB4	Roosting	TK
Non Breeding	WF0109	08/11/2021	SN	1	PB4	Roosting	TK
Non Breeding	WF0111	08/11/2021	SN	2	PB4	Roosting	TK
Non Breeding	WF0130	14/12/2021	SN	2	PB4	Flushed from ground	TK
Non Breeding	WF0153	22/02/2022	SN	1	PB4	Flying	TK

Winter Transects surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R001	Non-Breeding	Western Transect	28/10/2020	SN	1	PB4	Flushed from ground	TK

Winter Transects surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R002	Non-Breeding	Western Transect	28/10/2020	SN	2	PB4	Flushed from ground	TK
R005	Non-Breeding	Western Transect	28/10/2020	SN	1	PB4	Flushed from ground	TK
R007	Non-Breeding	Eastern Transects	29/10/2020	SN	1	PB4	Flushed from ground	TK
R010	Non-Breeding	Eastern Transects	23/11/2020	SN	1	PB4	Flushed by surveyor	SC
R011	Non-Breeding	Eastern Transects	24/11/2020	SN	2	PB4	Flushed by surveyor	SC
R013	Non-Breeding	Eastern Transects	24/11/2020	SN	3	PB4	Flushed by surveyor	SC
R015	Non-Breeding	Eastern Transects	24/11/2020	SN	10	PB4	Flushed by surveyor	SC
R017	Non-Breeding	Eastern Transects	24/11/2020	SN	1	PB4	Flushed by surveyor	SC
R019	Non-Breeding	Eastern Transects	24/11/2020	SN	1	PB4	Flushed by surveyor	SC
R021	Non-Breeding	Eastern Transects	24/11/2020	SN	1	PB4	Flushed by surveyor	SC
R022	Non-Breeding	Eastern Transects	24/11/2020	SN	1	PB4	Flushed by surveyor	SC
R023	Non-Breeding	Eastern Transects	24/11/2020	SN	2	PB4	Flushed by surveyor	SC
R024	Non-Breeding	Western Transect	25/11/2020	SN	1	PB4	Flushed by surveyor	SC
R025	Non-Breeding	Western Transect	25/11/2020	SN	1	PB4	Flushed by surveyor	SC
R026	Non-Breeding	Western Transect	25/11/2020	SN	1	PB4	Flushed by surveyor	SC
R028	Non-Breeding	Western Transect	25/11/2020	SN	3	PB4	Flushed by surveyor	SC

Winter Transects surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R029	Non-Breeding	Eastern Transects	16/12/2020	SN	1	PB4	Flushed from ground	TK
R033	Non-Breeding	Eastern Transects	16/12/2020	SN	1	PB3	Flushed from ground	TK
R037	Non-Breeding	Eastern Transects	16/12/2020	SN	2	PB3	Flushed from ground	TK
R038	Non-Breeding	Western Transect	18/12/2020	SN	1	PB3	Flushed from ground	TK
R039	Non-Breeding	Western Transect	18/12/2020	SN	1	PB4	Flushed from ground	TK
R040	Non-Breeding	Eastern Transects	25/01/2021	SN	1	PB4	Flushed by surveyor	SC
R041	Non-Breeding	Eastern Transects	25/01/2021	SN	1	PB4	Flushed by surveyor	SC
R042	Non-Breeding	Eastern Transects	25/01/2021	SN	1	PB4	Flushed by surveyor	SC
R044	Non-Breeding	Eastern Transects	25/01/2021	SN	1	PB4	Flushed by surveyor	SC
R046	Non-Breeding	Eastern Transects	22/02/2021	SN	1	PB4	Flushed by surveyor	SC
R047	Non-Breeding	Eastern Transects	22/02/2021	SN	1	PB4	Flushed by surveyor	SC
R050	Non-Breeding	Eastern Transects	22/02/2021	SN	1	PB4	Flushed by surveyor	SC
R060	Non-Breeding	Eastern Transects	22/02/2021	SN	1	PB4	Flushed by surveyor	SC
R062	Non-Breeding	Eastern Transects	01/04/2021	SN	1	PB4	Flying	SC
R064	Non-Breeding	Eastern Transects	01/04/2021	SN	1	PB4	Flying	SC
R065	Non-Breeding	Eastern Transects	01/04/2021	SN	2	PB4	Flying	SC

Winter Transects surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R067	Non-Breeding	Eastern Transects	01/04/2021	SN	2	PB4	Flying	SC
R069	Non-Breeding	Eastern Transects	01/04/2021	SN	1	PB4	Flying	SC
R081	Non-Breeding	Eastern Transects	01/04/2021	SN	1	PB4	Flying	SC
R085	Non-Breeding	Western Transect	12/10/2021	SN	2	PB4	In suitable habitat	TK
R088	Non-Breeding	Western Transect	12/10/2021	SN	1	PB4	In suitable habitat	TK
R091	Non-Breeding	Western Transect	12/10/2021	SN	2	PB4	In suitable habitat	TK
R095	Non-Breeding	Western Transect	12/10/2021	SN	1	PB4	In suitable habitat	TK
R098	Non-Breeding	Eastern Transects	14/10/2021	SN	1	PB4	In suitable habitat	TK
R099	Non-Breeding	Eastern Transects	14/10/2021	SN	2	PB4	In suitable habitat	TK
R101	Non-Breeding	Eastern Transects	14/10/2021	SN	1	PB4	In suitable habitat	TK
R104	Non-Breeding	Eastern Transects	14/10/2021	SN	1	PB4	In suitable habitat	TK
R106	Non-Breeding	Eastern Transects	11/11/2021	SN	1	PB4	Flushed from ground	TK
R108	Non-Breeding	Eastern Transects	11/11/2021	SN	1	PB4	Flushed from ground	TK
R112	Non-Breeding	Eastern Transects	11/11/2021	SN	1	PB4	Flushed from ground	TK
R115	Non-Breeding	Eastern Transects	11/11/2021	SN	1	PB4	Flushed from ground	TK

Winter Transects surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R125	Non-Breeding	Eastern Transects	11/11/2021	SN	2	PB4	Flushed from ground	TK
R126	Non-Breeding	Western Transects	17/11/2021	SN	1	PB4	Flushed from ground	TK
R131	Non-Breeding	Western Transects	17/11/2021	SN	1	PB4	Flushed from ground	TK
R134	Non-Breeding	Eastern Transects	02/12/2021	SN	1	PB4	Flushed from ground	TK
R135	Non-Breeding	Eastern Transects	02/12/2021	SN	3	PB4	Flushed from ground	TK
R140	Non-Breeding	Eastern Transects	02/12/2021	SN	2	PB4	Flushed from ground	TK
R142	Non-Breeding	Western Transect	20/12/2021	SN		PB4	Flushed from ground	TK
R144	Non-Breeding	Western Transect	20/12/2021	SN		PB4	Flushed from ground	TK
R146	Non-Breeding	Western Transect	20/12/2021	SN		PB4	Flushed from ground	TK
R148	Non-Breeding	Western Transect	18/01/2022	SN	1	PB4	Flushed from ground	TK
R149	Non-Breeding	Western Transect	18/01/2022	SN	2	PB4	Flushed from ground	TK
R150	Non-Breeding	Western Transect	18/01/2022	SN	1	PB4	Flushed from ground	TK
R156	Non-Breeding	Western Transect	18/01/2022	SN	3	PB4	Flushed from ground	TK

Winter Transects surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R160	Non-Breeding	Eastern Transect	21/01/2022	SN	1	PB4	Flushed from ground	TK
R163	Non-Breeding	Eastern Transect	21/01/2022	SN	1	PB4	Flushed from ground	TK
R164	Non-Breeding	Eastern Transects	11/02/2022	SN	1	PB4	Flushed from ground	TK
R165	Non-Breeding	Eastern Transects	11/02/2022	SN	2	PB4	Flushed from ground	TK
R172	Non-Breeding	Eastern Transects	11/02/2022	SN	1	PB4	Flushed from ground	TK
R174	Non-Breeding	Western Transect	21/02/2022	SN	1	PB4	Flushed from ground	TK
R179	Non-Breeding	Eastern Transects	09/03/2022	SN	2	PB4	In suitable habitat	TK
R180	Non-Breeding	Eastern Transects	09/03/2022	SN	2	PB4	In suitable habitat	TK
R185	Non-Breeding	Eastern Transects	09/03/2022	SN	1	PB4	In suitable habitat	TK
R188	Non-Breeding	Western Transect	11/03/2022	SN	1	PB4	In suitable habitat	TK
R001	Non-Breeding	Western Transect	11/03/2022	SN	1	PB4	In suitable habitat	TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Wader	B019	21/04/2020	07:45:00	SN	1	PB3	Male drumming	JM
Wader	B024	22/04/2020	11:15:00	SN	1	PB3	Chipping male	JM
Wader	B026	22/04/2020	15:15:00	SN	1	PB3	Calling male	JM
Transect	B006	28/04/2020	08:30:00	SN	2		Displaying pair	JM
Transect	B009	29/04/2020	07:50:00	SN	2		Displaying pair	JM
Transect	B031	19/05/2020	09:00:00	SN	3		Calling/chipping and displaying flight and drumming	JS
Transect	B036	19/05/2020	09:32:00	SN	3		Flushed a pair who began drumming and calling then joined by another	JS
Transect	B043	19/05/2020	10:59:00	SN	1	.	Drumming	JS
Transect	B057	19/05/2020	11:20:00	SN	3	WD4		JM
Wader	B044	20/05/2020	11:27:00	SN	1	PB3	Calling/chipping to the south of transect	JS
Wader	B045	20/05/2020	11:30:00	SN	1	PB3	Flushed and flew south	JS
Transect	B067	16/06/2020	07:30-15:30	SN	6	WD4		JM
Transect	B076	16/06/2020	12:09:00	SN	3	PB4		JS
Transect	B086	16/06/2020	10:30:00	SN	1	WD4		JS
Transect	B092	16/06/2020	09:34:00	SN	2	WD4		JS
Transect	B097	16/06/2020	08:43:00	SN	4	PB4		JS
Wader	B105	17/06/2020	08:53:00	SN	2	PB4	In suitable Breeding habitat	JS
Wader	B107	17/06/2020	09:41:00	SN	1	PB4	In suitable Breeding habitat	JS
Wader	B117	17/06/2020	15:01:00	SN	2	PB4	In suitable Breeding habitat	JS
Wader	B118	17/06/2020	15:11:00	SN	1	PB4	In suitable Breeding habitat	JS

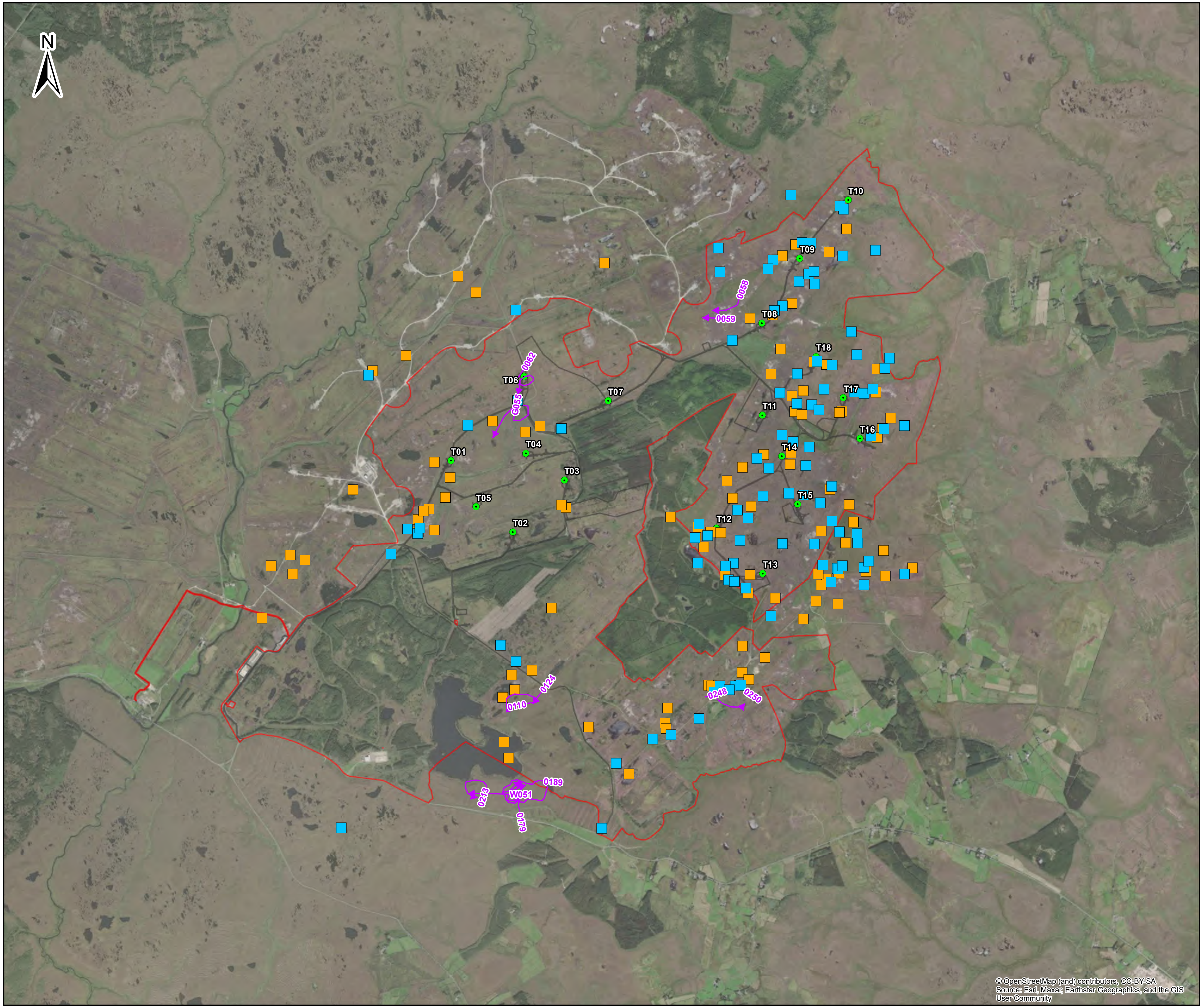
Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Gull	B420	18/06/2020	.	SN	3	PB4	Three Snipe drumming over lake	JS
Gull	B423	18/06/2020		SN	2	PB4	Two Snipe feeding along pond edge	JS
Transect	B127	21/07/2020	08:40:00	SN	1	PB4		JS
Transect	B130	21/07/2020	09:31:00	SN	1	PB4		JS
Transect	B140	21/07/2020	10:56:00	SN	1	PB4		JS
Wader	B146	22/07/2020	10:26:00	SN	1	PB4		JS
Wader	B147	22/07/2020	11:11:00	SN	1	PB4		JS
Gull	B436	23/07/2020	10:20:00	SN	1		Snipe flushed at ING 100557 319893, flew west	JS
Transect	B153	24/08/2020	10:42:00	SN	1	PB4		TK
Transect	B168	24/08/2020		SN	2	PB4		TK
Wader	B172	26/08/2020	08:35:00	SN	1	PB4		TK
Wader	B194	23/09/2020		SN	2	PB4		TK
Wader	B205	23/09/2020	16:24:00	SN	1	PB4		TK
Transect	B444	16/04/2021		SN	1	PB4		JM
Wader	B209	26/04/2021	08:21:00	SN	1	PB4	Snipe drumming	TK
Wader	B212	26/04/2021	09:45:00	SN	1	PB4	Snipe in suitable breeding habitat	TK
Wader	B213	26/04/2021	09:55:00	SN	1	PB4	Snipe chipping	TK
Transect	B235	12/05/2021		SN	1	PB3		TK
Transect	B242	24/05/2021		SN	1			TK
Transect	B244	24/05/2021		SN	1			TK
Transect	B254	24/05/2021		SN	1			TK
Wader	B261	25/05/2021		SN	1			TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Wader	B265	26/05/2021		SN	1			TK
Wader	B266	26/05/2021		SN	1			TK
Transect	B283	02/06/2021	09:06:00	SN	3	PB3	Suitable breeding habitat	TK
Transect	B284	02/06/2021	09:45:00	SN	1	PB3	Suitable breeding habitat	TK
Transect	B291	02/06/2021	12:02:00	SN	1	PB4	Pair of Ringed Plover, agitated behaviour, probable breeding	TK
Wader	B312	16/06/2021		SN	1	PB4	Snipe flushed. Suitable habitat	TK
Wader	B314	16/06/2021		SN	1	PB4	Snipe flushed. Suitable habitat	TK
Wader	B315	16/06/2021		SN	1	PB4	Snipe flushed. Suitable habitat	TK
Wader	B319	17/06/2021		SN	1	PB4	Snipe flushed. Suitable habitat	TK
Transect	B326	09/07/2021		SN	1	PB3		JC
Wader	B338	14/07/2021		SN	2	PB4	Snipe flushed from ground	TK
Wader	B352	15/07/2021		SN	1	PB4	Snipe flushed from ground	TK
Wader	B353	15/07/2021		SN	1	PB4	Snipe flushed from ground	TK
Transect	B359	16/07/2021		SN	1	PB4	Snipe flushed from ground	TK
Transect	B368	16/08/2021		SN	1	PB3	Snipe flushed from ground	TK
Transect	B370	16/08/2021		SN	1	PB3	Snipe flushed from ground	TK
Wader	B380	19/08/2021	08:46:00	SN	1	PB4	Snipe in suitable habitat	

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Wader	B382	19/08/2021	10:50:00	SN	1	PB4	Snipe in suitable habitat	
Wader	B384	15/09/2021		SN	1	PB4	Snipe in suitable habitat	TK
Wader	B385	15/09/2021		SN	1	PB4	Snipe in suitable habitat	TK
Wader	B387	15/09/2021		SN	1	PB4	Snipe in suitable habitat	TK
Wader	B388	15/09/2021		SN	1	PB4	Snipe in suitable habitat	TK
Wader	B389	15/09/2021		SN	1	PB4	Snipe in suitable habitat	TK
Transect	B395	16/09/2021		SN	1	PB4	Snipe in suitable habitat	TK
Transect	B396	16/09/2021		SN	1	PB4	Snipe in suitable habitat	TK
Transect	B399	16/09/2021		SN	1	PB4	Snipe in suitable habitat	TK
Transect	B0016	08/04/2022	09:47:00	SN	1	PB4	Snipe flushed from suitable habitat	TK
Transect	B0017	08/04/2022	10:15:00	SN	2	PB4	Snipe flushed from suitable habitat	TK
Transect	B0044	26/04/2022		SN	1	PB4	Snipe flushed from suitable habitat	TK
Transect	B0045	26/04/2022		SN	2	PB4	Snipe flushed from suitable habitat	TK
Transect	B0101	24/05/2022	10:52:00	SN	1	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0102	24/05/2022	11:45:00	SN	1	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0103	24/05/2022	11:46:00	SN	2	PB4	Snipe in suitable habitat	TK
Wader	B0115	25/05/2022		SN	1	PB4	Snipe in suitable breeding habitat	TK
Wader	B0116	25/05/2022		SN	1	PB4	Snipe in suitable breeding habitat	TK
Transect	B0137	27/05/2022		SN	1	PB4	Snipe in suitable breeding habitat	TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B0138	27/05/2022		SN	1	PB4	Snipe in suitable breeding habitat	TK
Transect	B0151	15/06/2022	11:26:00	SN	1	PB4	Snipe flushed from ground	TK
Transect	B0166	20/06/2022	11:54:00	SN	1	PB4	Snipe flushed from ground	TK
Wader	B0172	21/06/2022	13:21:00	SN	1	PB4	Snipe flushed from ground	TK
Wader	B0194	13/07/2022	11:26:00	SN	1	PB4	Snipe in suitable habitat	TK
Transect	B0215	15/07/2022	10:45:00	SN	1	PB4	Snipe in suitable habitat	TK
Transect	B0239	20/07/2022		SN	1	PB4	Snipe in suitable habitat	TK

SNIPE FIGURES



Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Snipe (Gallinago gallinago)- Breeding Season 2020-2022
- Snipe (Gallinago gallinago) - Non-Breeding Season 2020-2022
- Snipe (Gallinago gallinago) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

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Kilometres

NOTES

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2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 6 - Sheet 1 of 6 - Snipe (Gallinago gallinago) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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Draft: D01

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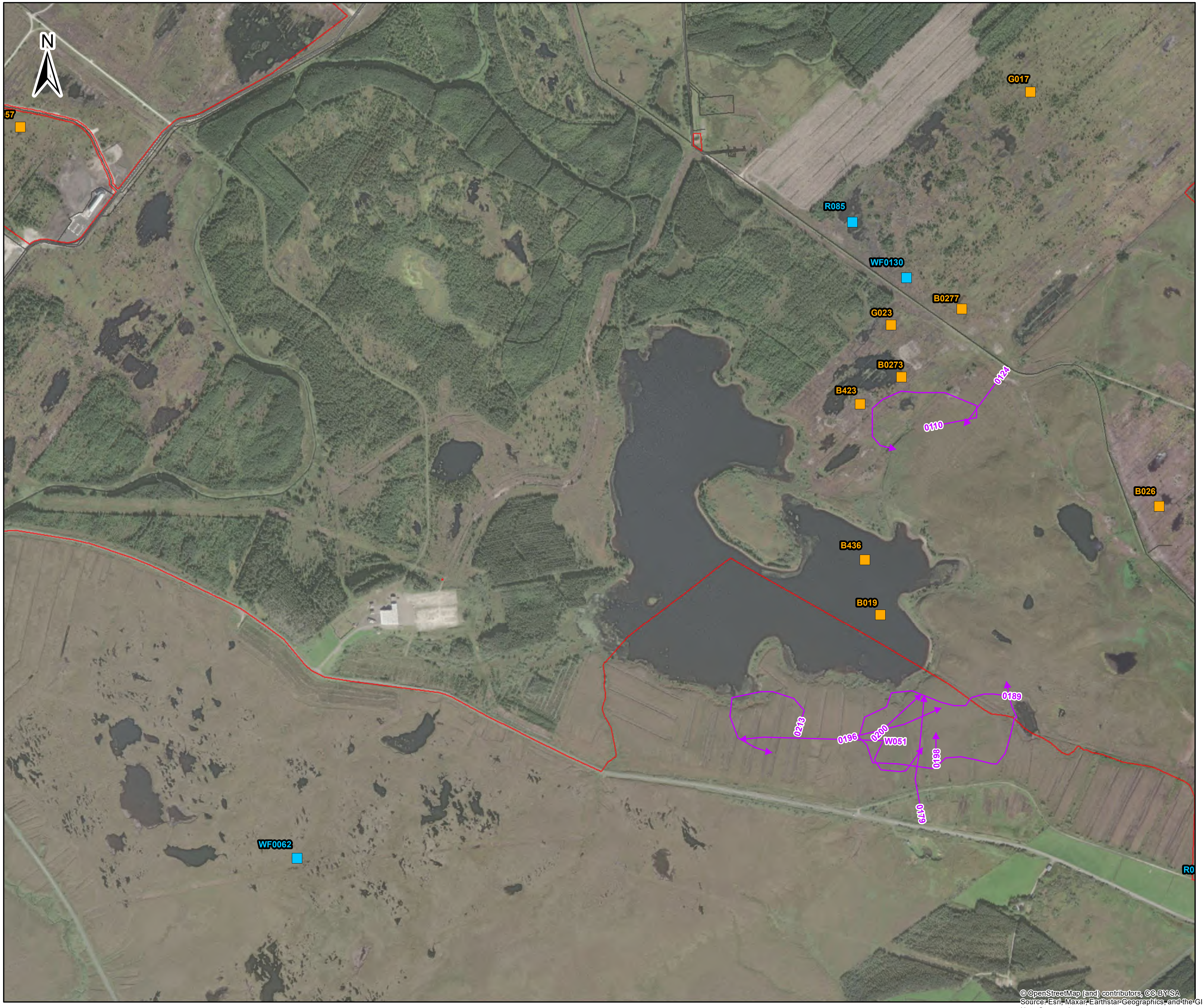

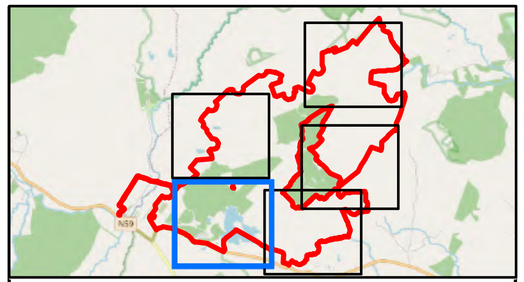

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Snipe (Gallinago gallinago)- Breeding Season 2020-2022
- Snipe (Gallinago gallinago) - Non-Breeding Season 2020-2022
- Snipe (Gallinago gallinago) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

0 100 200 300 400
Meters

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Issue	Date	Description	By	Chkd.
D01	27/03/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 6 - Sheet 2 of 6 - Snipe (Gallinago gallinago) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:10,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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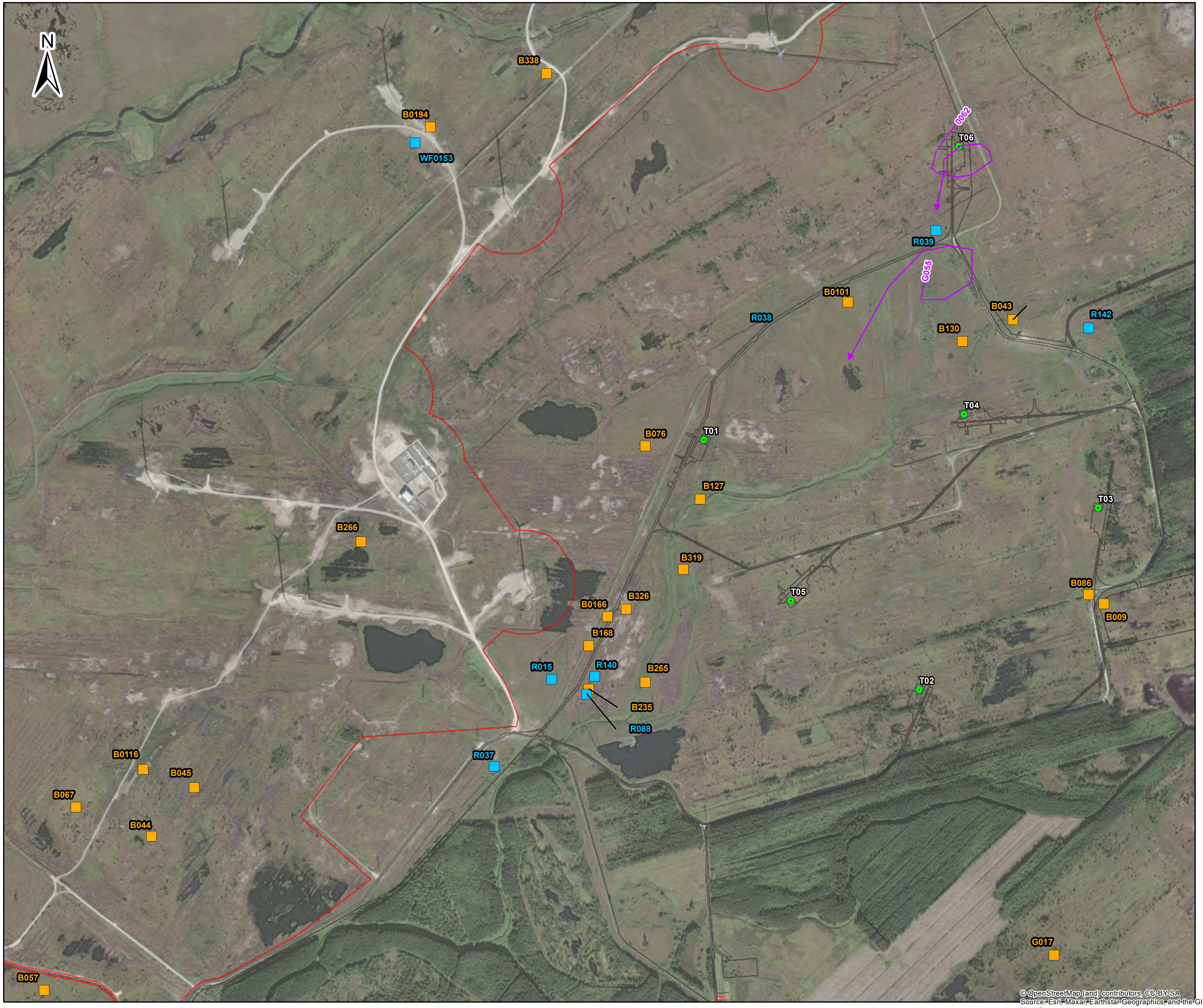

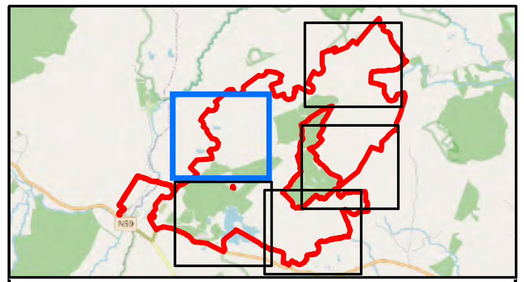

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Snipe (Gallinago gallinago)- Breeding Season 2020-2022
- Snipe (Gallinago gallinago) - Non-Breeding Season 2020-2022
- Snipe (Gallinago gallinago) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

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Meters

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D01	27/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 6 - Sheet 3 of 6 - Snipe (Gallinago gallinago) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:10,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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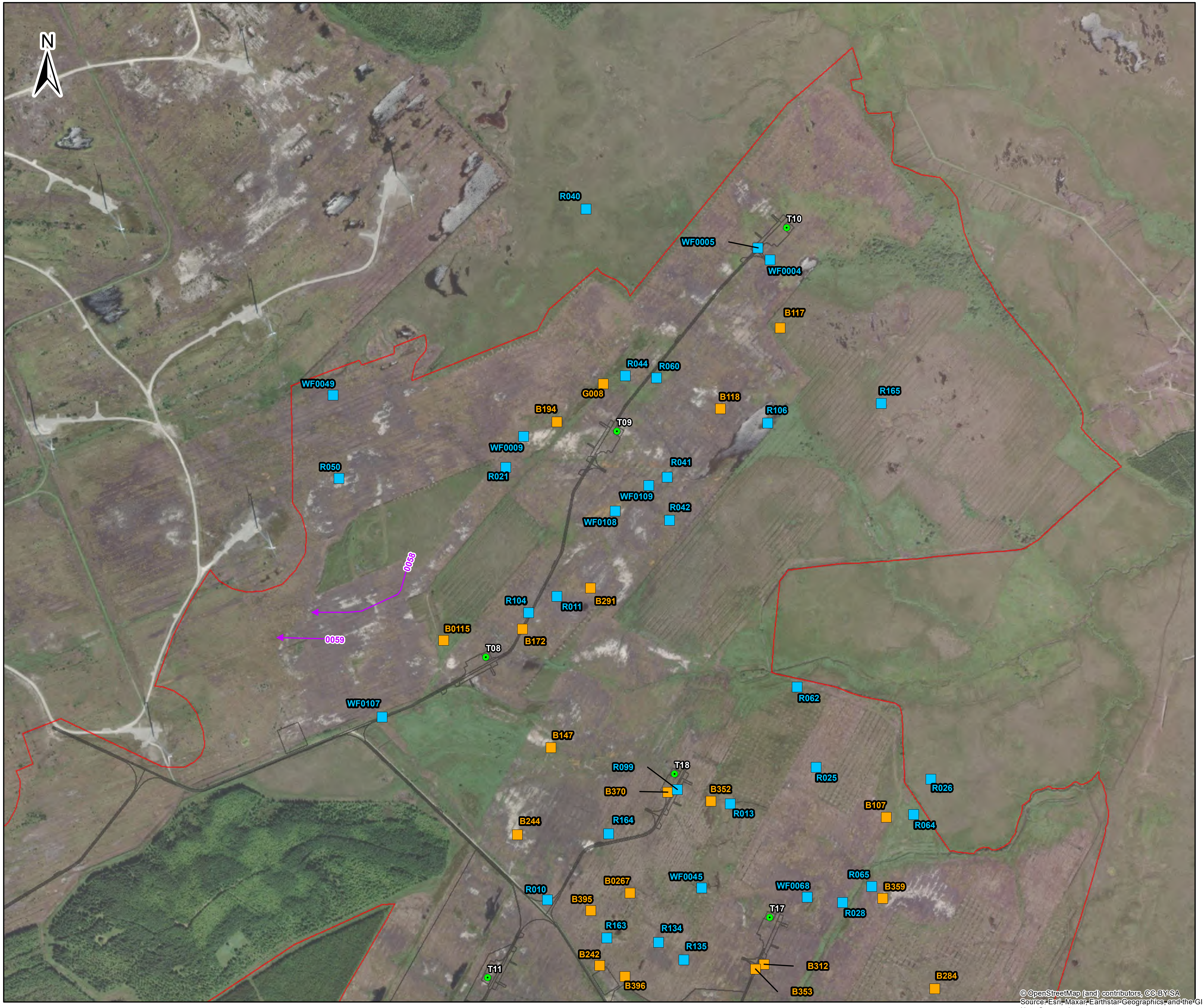

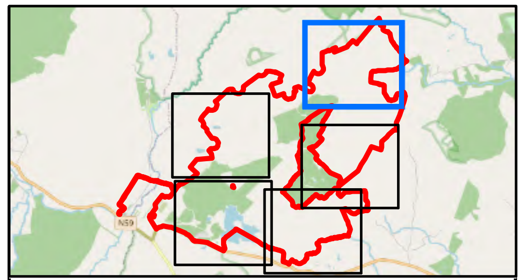

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Snipe (Gallinago gallinago)- Breeding Season 2020-2022
- Snipe (Gallinago gallinago) - Non-Breeding Season 2020-2022
- Snipe (Gallinago gallinago) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

0 100 200 300 400
Meters

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D01	27/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 6 - Sheet 4 of 6 - Snipe (Gallinago gallinago) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:10,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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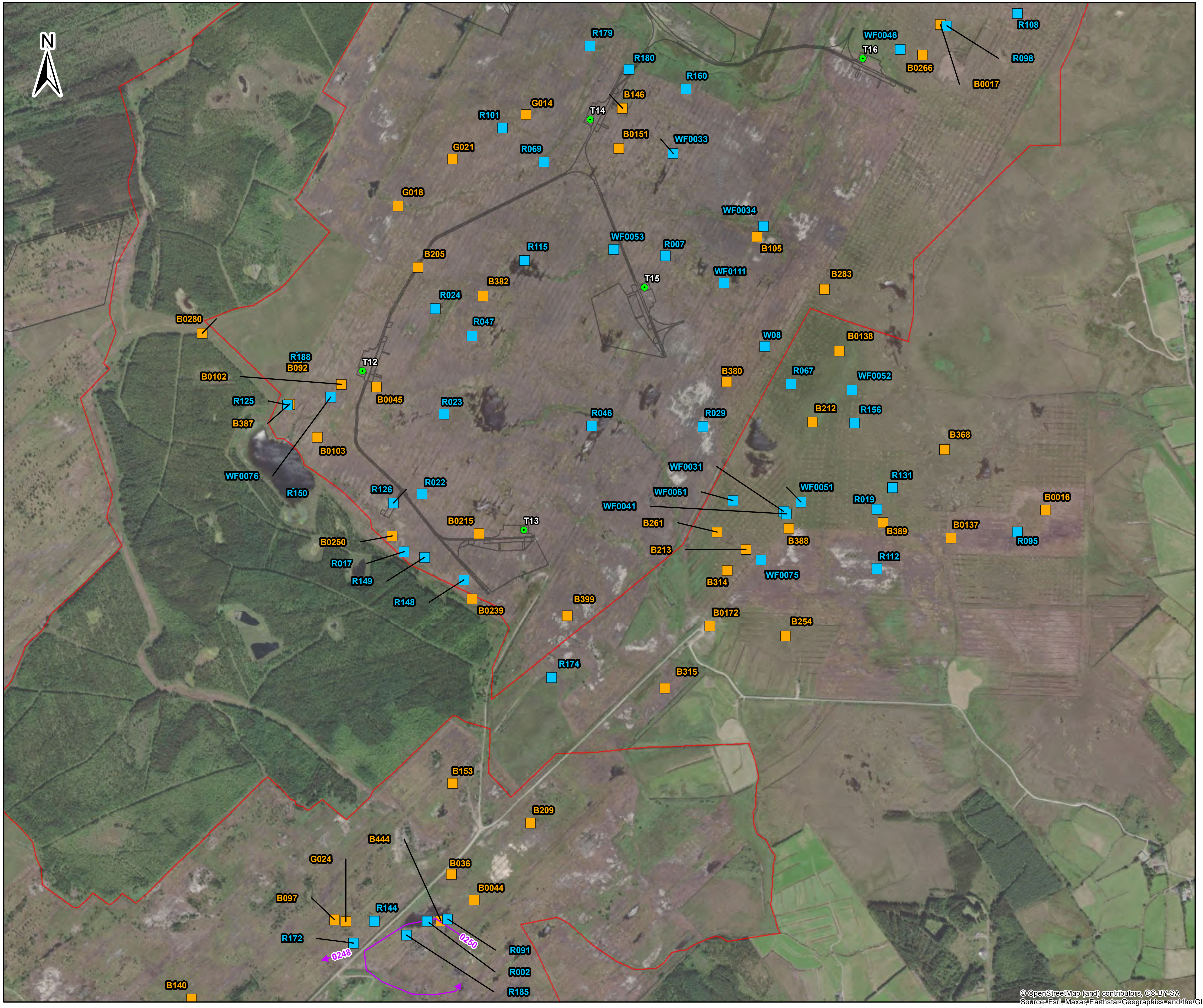

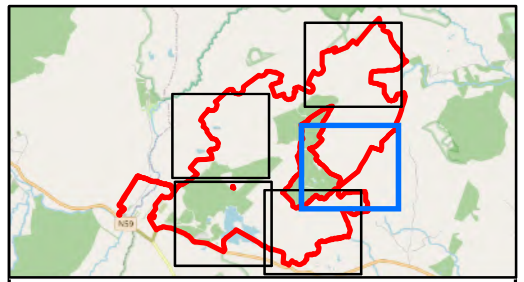

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Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Snipe (Gallinago gallinago)- Breeding Season 2020-2022
- Snipe (Gallinago gallinago) - Non-Breeding Season 2020-2022
- Snipe (Gallinago gallinago) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

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Issue	Date	Description	By	Chkd.
D01	27/03/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 6 - Sheet 5 of 6 - Snipe (Gallinago gallinago) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:10,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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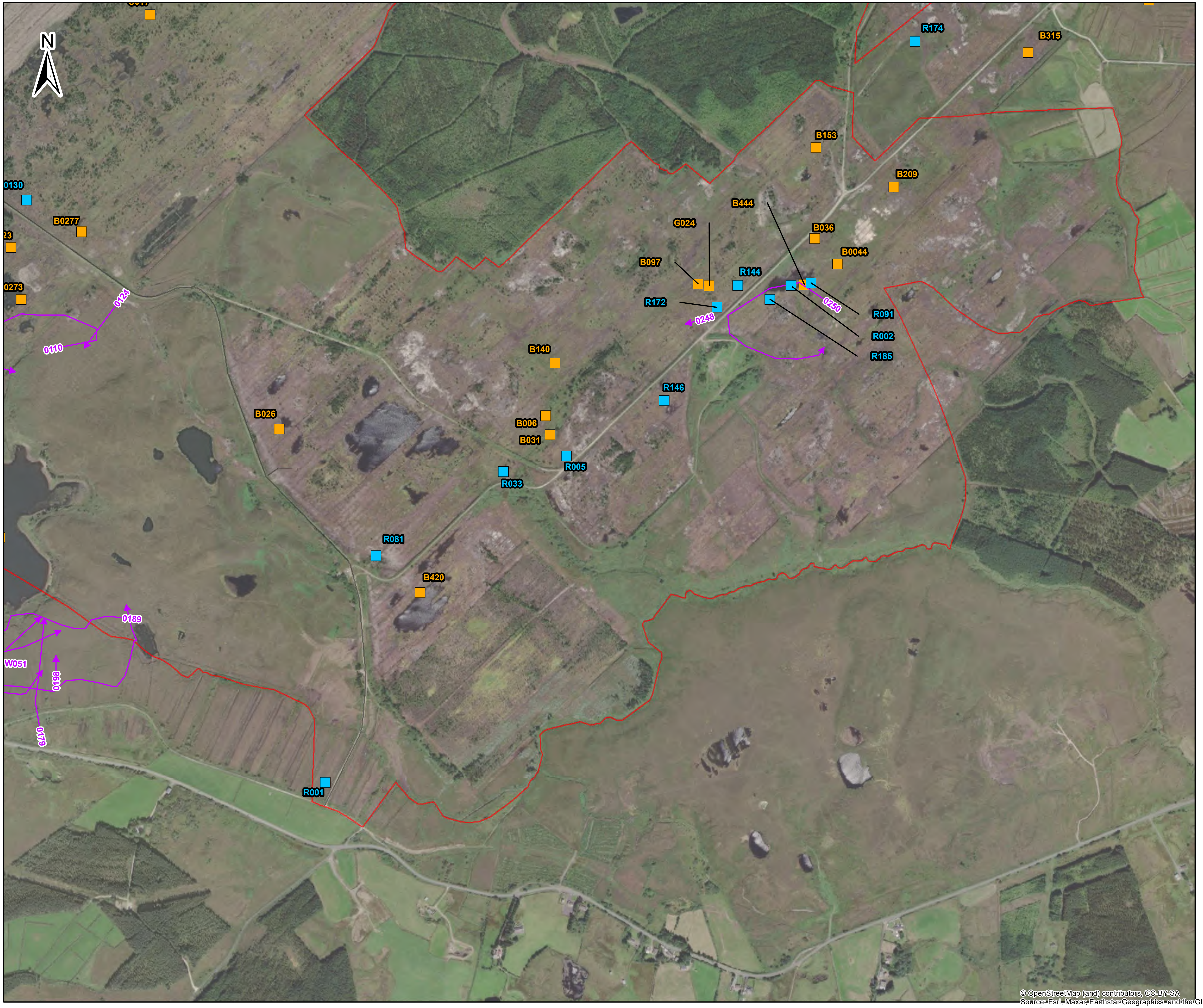

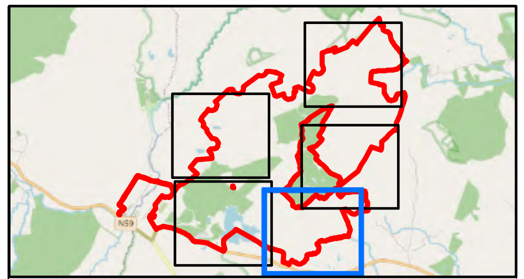

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Snipe (Gallinago gallinago)- Breeding Season 2020-2022
- Snipe (Gallinago gallinago) - Non-Breeding Season 2020-2022
- Snipe (Gallinago gallinago) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

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Meters

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Issue	Date	Description	By	Chkd.
D01	27/03/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 6 - Sheet 6 of 6 - Snipe (Gallinago gallinago) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:10,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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10889-030-SN-FLIGHT-TOB-D01

Draft: D01

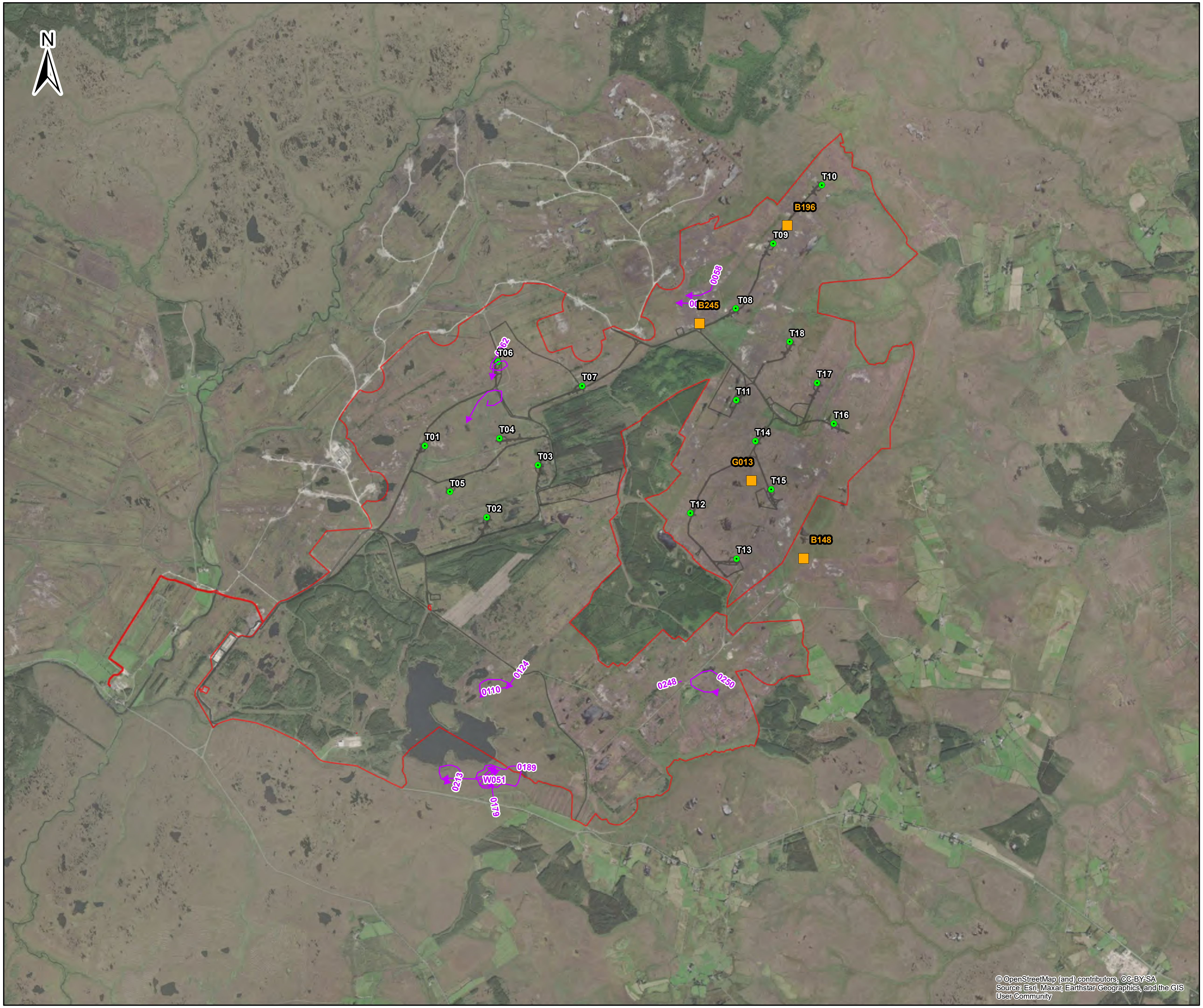
7.0 Red Grouse

Vantage Points Surveys												
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0225	Breeding	5	04/04/2022	17:40	RG	1	10					Red Grouse flying low from heather towards lake	KL

Vantage Point Non-Flight Observations									
Season	Site	VP	Date	Observation Time	BTO Code	Abundance	Habitat Code	Activity	Surveyor
Breeding	Oweninny	7	26/04/2022	07:01	RG	1	PB4	Calling	KL

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Observation Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Wader	B148	22/07/2020	11:52:00	RG	2	PB4	Flushed	JS
Wader	B196	23/09/2020	09:25:00	RG	1	PB4		TK
Transect	B245	24/05/2021		RG	1	PB3		TK

RED GROUSE FIGURES



Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Red Grouse (Lagopus lagopus) - Breeding Season 2020-2022
- Red Grouse (Lagopus lagopus) - Non-Breeding Season 2020-2022
- Red Grouse (Lagopus lagopus) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
Kilometres

NOTES

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D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 7
Red Grouse (Lagopus lagopus) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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Draft: D01

10889-031-RG-FLIGHT-TOB-D01

8.0 Whooper Swan

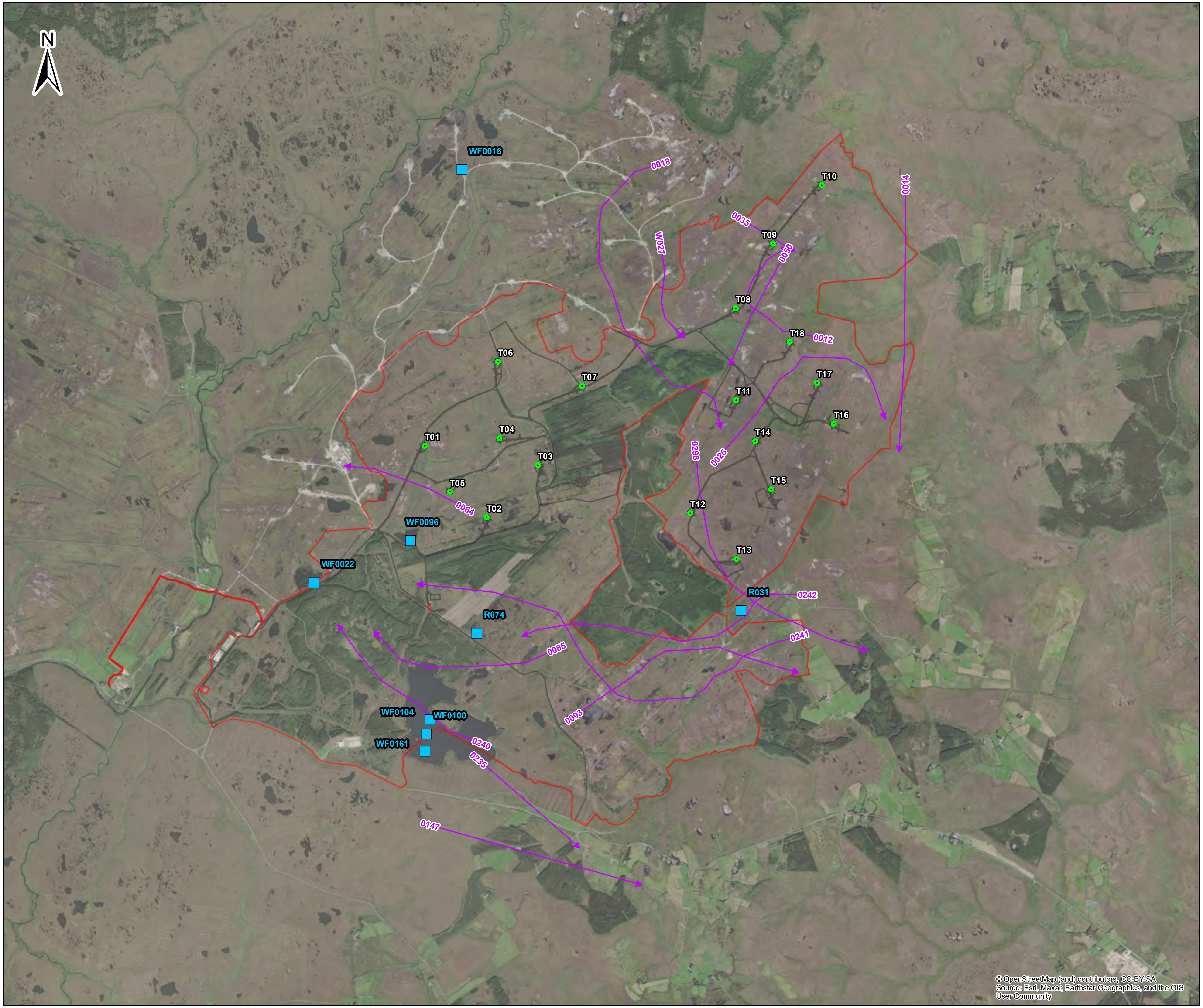
Vantage Points Surveys												
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0235	Non-Breeding	6	26/10/2019	08:45	WS	1		30				Flying east	JH
0147	Non-Breeding	5	27/10/2019	07:20	WS	1	45					Flew low southeast from Lake Dahybaun	JA
0012	Non-Breeding	1	29/10/2019	11:20	WS	3	10	150				Flew into pond and stayed for duration	MH
0014	Non-Breeding	1	29/10/2019	13:17	WS	5		8				Flying	MH
0085	Non-Breeding	4	27/11/2019	08:30	WS	2	30					Two roosting on nearby pod then took off	MH
0240	Non-Breeding	6	11/12/2019	08:43	WS	1	18					Flew across Dahybaun westwards	MH
0018	Non-Breeding	1	17/12/2019	09:04	WS	8	20	17				Took off from overnight roost	MH
0241	Non-Breeding	6	22/01/2020	10:17	WS	5	180					Flew in from northeast and landed on bog pool near VP. Then took flight again	MH
0242	Non-Breeding	6	22/01/2020	16:36	WS	2	20	140				Two adults landed on bog pool near VP	MH
0025	Non-Breeding	1	23/01/2020	13:13	WS	2		47				In flight	MH
0093	Non-Breeding	4	12/02/2020	15:00	WS	3	160					2 adults and juveniles flew between bog pools	MH

Vantage Points Surveys													
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0035	Non-Breeding	1	13/10/2020	08:31	WS	2	30					Two Whooper Swans in flight, landed on small lake	TK
0050	Non-Breeding	2	14/10/2020	10:58	WS	1	45					Whooper Swan took flight from small lake	TK
0298	Non-Breeding	7	09/11/2020	10:53	WS	8	122	20				Eight Whooper Swans in flight	TK
0064	Non-Breeding	3	11/12/2020	14:17	WS	4	15	10				Four Whooper Swans in flight within site	TK
W027	Non-Breeding	3	15/10/2021	12:40	WS	6	50	100				Small flock of WS flying S through site with four juveniles	JM

Waterfowl Surveys							
Season	Ref.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non-Breeding	WF0016	11/11/2020	WS	5	FL1	Feeding	TK
Non-Breeding	WF0022	24/11/2020	WS	6	FL1	Foraging	JM
Non-Breeding	WF0096	22/10/2021	WS	1	FL1	Feeding	TK
Non-Breeding	WF0100	22/10/2021	WS	7	FL1	Feeding	TK
Non-Breeding	WF0104	08/11/2021	WS	3	FL1	Feeding	TK
Non-Breeding	WF0161	01/03/2022	WS	6	FL1	Two feeding, four roosting	TK

Winter Transects								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R031	Non-Breeding	Western Transect	25/11/2020	WS	4	FL1	Flying southwest over bog	SC
R074	Non-Breeding	Western Transect	30/03/2021	WS	2	PB4	Took off from small lake to north of track and flew southeast	SC

WHOOPER SWAN FIGURE



Legend
- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Whooper Swan (Cygnus cygnus) - Non-Breeding Season 2020-2022
- Whooper Swan (Cygnus cygnus) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
Kilometres

NOTES
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D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 8 Whooper Swan (Cygnus cygnus) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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Draft: D01

10889-032-WS-FLIGHT-TOB-D01

9.0 Mute Swan

Vantage Points Surveys												
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0144	Breeding	5	23/08/2019	10:29	MS	3	25	35					BM
0181	Breeding	5	12/05/2020	18:30	MS	2							TK
0185	Breeding	5	09/06/2020	09:42	MS	2						Likely breeding	JM
0190	Breeding	5	14/07/2020	12:42	MS	2						Pair swimming on lake	JM

Vantage Points Surveys Non-Flight Observations									
Season	Site	VP	Date	Observation Time	BTO Code	Abundance	Sex/Age	Habitat Code	Activity	Surveyor
Non-Breeding	Oweninny	5	13/12/2021	10:21	MS	2	Adult	FL1	Feeding	TK
Breeding	Oweninny	5	25/04/2022	14:20	MS	1	Adult	FL2	Swimming	KL
Breeding	Oweninny	5	15/07/2022	06:47	MS	2	Adult	FL2	Feeding and swimming	KL
Breeding	Oweninny	5	15/07/2022	09:47	MS	4	Adult and juvenile	FL2	Feeding and swimming	KL
Breeding	Oweninny	5	12/08/2022	09:23	MS	4	Adult and juvenile	FL2	Feeding and swimming	KL
Breeding	Oweninny	4	14/09/2022	07:27	MS	1	Adult	PB4	Swimming	KL

Waterfowl Surveys							
Season	Ref.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non-breeding	WF0001	12/10/2020	MS	6	FL2	Feeding	TK
Non Breeding	WF0035	17/12/2020	MS	2	FL1	Feeding	TK
Non Breeding	WF0055	11/01/2021	MS	2		Feeding	TK
Non Breeding	WF0065	08/02/2021	MS	4	FL1	Feeding	TK
Non-breeding	WF0080	31/03/2021	MS	4	PB4	Flying. Flew in and landed on lake	TK
Non Breeding	WF0113	19/11/2021	MS	2	FL1	Feeding	TK
Non Breeding	WF0124	01/12/2021	MS	2	FL1	Feeding	TK
Non Breeding	WF0137	22/01/2022	MS	2	FL1	Feeding	TK
Non Breeding	WF0148	07/02/2022	MS	4	FL1	Feeding	TK
Non Breeding	WF0152	22/02/2022	MS	2	FL1	Feeding	TK
Non Breeding	WF0170	14/03/2022	MS	2	FL1	Feeding	TK

Winter Transects									
Ref.	Season	Trans No./Loc.	Date	Time	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R197	Non-Breeding	Western Transect	11/03/2022	12:37	MS	1	FLQ	Feeding	TK

Winter Transects									
Ref.	Season	Trans No./Loc.	Date	Time	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R198	Non-Breeding	Western Transect	11/03/2022	13:18	MS	2	FL1	Feeding	TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Gull	B409	24/04/2020	13:02:00	MS	1			JS
Gull	B425	18/06/2020		MS	6	PB4	Six Mute Swans, 2 adult and 4 cygnets	JS
Gull	B435	23/07/2020	10:02:00	MS	3		Three Mute Swan in reeds on small island, 2 adults and 1 cygnet (possibly more in reeds)	JS
Transect	B0095	24/05/2022	09:41:00	MS	1	FL1	Mute Swan feeding on small lake	TK
Transect	B0164	20/06/2022	13:10:00	MS	1	PB4	Mute Swan feeding on small wetland area	TK
Transect	B0234	20/07/2022		MS	1	FL1	Mute Swan on lake edge	TK

MUTE SWAN FIGURES

Legend

- Proposed Turbine Locations
- Planning Application Boundary
- Proposed Infrastructure
- Mute Swan (Cygnus olor) - Breeding Season 2020-2022
- Mute Swan (Cygnus olor) - Non-Breeding Season 2020-2022
- Mute Swan (Cygnus olor) - Flightlines Breeding and Non-Breeding 2019-2022

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Kilometres

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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 9
Mute Swan (Cygnus olor) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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10889-033-MS-FLIGHT-TOB-D01

Draft: D01

10.0 Mallard

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0209	Breeding	4	22/04/2020	12:44	MA	1	17					Flew from south, low over ground ~10m, flew behind forestry	TK
0210	Breeding	4	22/04/2020	07:21	MA	2	12					Male and female, flying fast and low over ground traveling to Lough Dahybaun	TK
0211	Breeding	5	12/05/2020	11:26	MA	2	0						TK
0212	Breeding	1	13/05/2020	11:26	MA	2	48					Two Mallard in flight, landed on small lake	TK
0213	Breeding	4	13/05/2020	11:15	MA	2	25						TK
0214	Breeding	4	10/06/2020	05:40	MA	3	60					Suitable breeding habitat	TK
0215	Breeding	4	15/07/2020	12:44	MA	2	20					Adults flying between lakes	TK
0216	Breeding	4	15/07/2020	21:45	MA	5						Adult with four juveniles on lake	TK
0217	Non-Breeding	7	16/10/2020	09:38	MA	2	30					Two Mallard in flight, landed on small lake	TK
0218	Non-Breeding	6	16/10/2020	12:40	MA	2	50					Two Mallard in flight	JM
0219	Non-Breeding	6	12/11/2020	14:36	MA	2		45				Two Mallard in flight flying west	JM
0220	Non-Breeding	2	13/01/2021	12:40	MA	4	20						TK
0221	Non-Breeding	4	14/01/2021	15:15	MA	2	40					Pair flew west to northwest of VP	JM

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0222	Non-Breeding	5	10/02/2021	10:41	MA	5						Small flock of males and females on lake most of day	JM
0223	Non-Breeding	5	09/03/2021	16:15	MA	2						Adult flying west in strong wind	JM
0224	Breeding	6	15/04/2021	10:31	MA	2	12	18	30			Pair flying west past VP	JM
0225	Breeding	5	05/05/2021	17:06	MA	2	45	52				Pair flew from east into lake	JM
0226	Breeding	4	06/05/2021	20:05	MA	2	40	20				Pair flying west past VP	JM
0227	Breeding	5	08/09/2021	19:48	MA	4	10	30				Mallards in flight, landed on large lake	TK
0228	Breeding	3	09/09/2021	18:30	MA	2		35				Pair flying between ponds	JM
W046	Non-Breeding	6	09/11/2021	14:39	MA	4	10	40				Four Mallards flying over	TK
W047	Non-Breeding	1	09/11/2021	16:05	MA	4	35	55				Mallard flying over VP	JM
W048	Non-Breeding	4	10/11/2021	15:17	MA	2	10	20				Two Mallards flying over	TK
W049	Non-Breeding	7	15/11/2021	14:40	MA	2	10	23				Two Mallard flying over.	TK
W050	Non-Breeding	5	16/11/2021	13:23	MA	4	20					Four Mallard in flight over lake, landed on lake	TK
W051	Non-Breeding	5	16/11/2021	14:12	MA	6	20					Six Mallard in flight over lake.	TK
W052	Non-Breeding	1	13/12/2021	09:14	MA	2	70	52				Mallard pair in flight	JM
W053	Non-Breeding	6	12/01/2022	13:45	MA	4	36	75				Four Mallards flying over	JM
W054	Non-Breeding	3	19/01/2022	15:02	MA	2	20	0					TK

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
B01	Breeding	4	05/04/2022	13:14	MA	1		10				Male Mallard flew west over hill	KL
B13	Breeding	3	06/04/2022	09:42	MA	1			10			Male Mallard flew south over road	KL
B14	Breeding	3	06/04/2022	12:45	MA	1	5	10				Female Mallard flying south	KL
B18	Breeding	5	25/04/2022	15:15	MA	1			20	20		Male mallard flew east then turned and flew west	KL
B19	Breeding	7	26/04/2022	06:48	MA	1			30			Male Mallard flew east	KL
B21	Breeding	6	10/05/2022	19:02	MA	2	5	10				Two male Mallard flew from west and landed on pool in front of VP	KL
B22	Breeding	6	10/05/2022	19:59	MA	1		10	10			Male Mallard flew from pool west over woods	KL
B39	Breeding	6	16/06/2022	12:04	MA	1	2	20				Male Mallard flew southeast	KL
B41	Breeding	6	16/06/2022	13:37	MA	3	25					Male Mallard flew east	KL
B53	Breeding	4	12/07/2022	10:32	MA	1	3					Mallards flew up to mob a Heron and returned to pool	KL
B54	Breeding	4	12/07/2022	12:22	MA	1	10	25				Mallard flew up from pool over trees	KL

Waterfowl Surveys							
Season	Ref.	Date	BTO code	No. of birds	Habitat Code	Activity	Surveyor
Non-breeding	WF0006	12/10/2020	MA	6	FL2	Feeding	TK
Non-breeding	WF0010	27/10/2020	MA	1	FL2	Feeding	TK
Non-breeding	WF0012	27/10/2020	MA	6	FL2	Feeding	TK
Non Breeding	WF0017	11/11/2020	MA	11	FL1	Feeding	TK
Non Breeding	WF0018	11/11/2020	MA	2	FL1	Feeding	TK
Non Breeding	WF0027	07/12/2020	MA	2	FL1	Feeding	TK
Non Breeding	WF0029	07/12/2020	MA	5	FL1	Feeding	TK
Non Breeding	WF0038	17/12/2020	MA	2	FL1	Feeding	TK
Non Breeding	WF0043	17/12/2020	MA	2	FL1	Feeding	TK
Non Breeding	WF0047	11/01/2021	MA	2		Feeding	TK
Non Breeding	WF0048	11/01/2021	MA	2		Feeding	TK
Non Breeding	WF0050	11/01/2021	MA	4		Feeding - took flight	TK
Non Breeding	WF0056	11/01/2021	MA	2		Feeding - took flight	TK
Non-breeding	WF0058	26/01/2021	MA	1	FL1	Foraging	SC
Non-breeding	WF0059	26/01/2021	MA	2	PB4	Foraging	SC
Non Breeding	WF0063	08/02/2021	MA	4	FL1	Feeding	TK

Waterfowl Surveys							
Season	Ref.	Date	BTO code	No. of birds	Habitat Code	Activity	Surveyor
Non-breeding	WF0072	24/02/2021	MA	2	FW4	Flying	SC
Non Breeding	WF0074	08/03/2021	MA	2	FL1	Flying	TK
Non Breeding	WF0078	08/03/2021	MA	2	PB4	Flying	TK
Non Breeding	WF0079	08/03/2021	MA	2	PB4	Flying	TK
Non-breeding	WF0084	31/03/2021	MA	2	FL2	Foraging	SC
Non Breeding	WF0086	11/10/2021	MA	2	FL1	Feeding	TK
Non Breeding	WF0089	11/10/2021	MA	3	FL1	Feeding	TK
Non Breeding	WF0091	11/10/2021	MA	2	FL1	Feeding	TK
Non Breeding	WF0097	22/10/2021	MA	3	FL1	Feeding	TK
Non Breeding	WF0098	22/10/2021	MA	3	PB4	Roosting	TK
Non Breeding	WF0101	22/10/2021	MA	4	FL1	Feeding	TK
Non Breeding	WF0103	08/11/2021	MA	2	FL1	Feeding	TK
Non Breeding	WF0105	08/11/2021	MA	2	FL1	Feeding	TK
Non Breeding	WF0106	08/11/2021	MA	4	FL1	Feeding	TK
Non Breeding	WF0110	08/11/2021	MA	2	FL1	Feeding	TK
Non Breeding	WF0112	19/11/2021	MA	2	FL1	Feeding	TK

Waterfowl Surveys							
Season	Ref.	Date	BTO code	No. of birds	Habitat Code	Activity	**Surveyor**
Non Breeding	WF0117	19/11/2021	MA	2	FL1	Feeding	TK
Non Breeding	WF0119	19/11/2021	MA	2	FL1	Feeding	TK
Non Breeding	WF0121	01/12/2021	MA	2	FL1	Feeding	TK
Non Breeding	WF0123	01/12/2021	MA	6	PB4	Took flight from river	TK
Non Breeding	WF0125	14/12/2021	MA	2	FL1	Feeding	TK
Non Breeding	WF0127	14/12/2021	MA	8	FL1	Feeding	TK
Non Breeding	WF0128	14/12/2021	MA	2	PB4	In flight	TK
Non Breeding	WF0132	10/01/2022	MA	2	FL1	Flying	TK
Non Breeding	WF0136	10/01/2022	MA	4	FL1	Feeding	TK
Non Breeding	WF0140	22/01/2022	MA	2	FL1	Feeding	TK
Non Breeding	WF0141	22/01/2022	MA	2	FL1	Feeding	TK
Non Breeding	WF0143	22/01/2022	MA	4	FL1	Feeding	TK
Non Breeding	WF0144	07/02/2022	MA	2	FL1	Feeding	TK
Non Breeding	WF0150	07/02/2022	MA	3	FL1	Feeding	TK
Non Breeding	WF0154	22/02/2022	MA	2	FL1	Feeding	TK
Non Breeding	WF0155	22/02/2022	MA	2	FL1	Feeding	TK

Waterfowl Surveys							
Season	Ref.	Date	BTO code	No. of birds	Habitat Code	Activity	**Surveyor**
Non Breeding	WF0165	01/03/2022	MA	1	FL1	Feeding	TK
Non Breeding	WF0166	01/03/2022	MA	2	FL1	Feeding	TK
Non Breeding	WF0167	01/03/2022	MA	2	FL1	Feeding	TK
Non Breeding	WF0175	14/03/2022	MA	2	FL1	Feeding	TK
Non Breeding	WF0177	14/03/2022	MA	2	FL1	Feeding	TK

Winter Transects								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R003	Non-Breeding	Western Transect	28/10/2020	MA	2	FL2	In flight	TK
R012	Non-Breeding	Eastern Transects	24/11/2020	MA	2	FW2	Pair flushed from river by surveyor	SC
R027	Non-Breeding	Western Transect	25/11/2020	MA	2	PB4	Flushed from wetted area and flew northwest and out of view	SC
R032	Non-Breeding	Western Transect	25/11/2020	MA	1	PB4		SC
R035	Non-Breeding	Eastern Transects	16/12/2020	MA	4	PB3	Flushed from ground	TK
R052	Non-Breeding	Western Transect	24/02/2021	MA	2	PB4	Circling above lake	SC
R053	Non-Breeding	Western Transect	24/02/2021	MA	2	PB4	Flushed from wetland, circled and headed northeast	SC
R055	Non-Breeding	Western Transect	24/02/2021	MA	2	PB4	Flushed from wetland, circled and headed northeast	SC

Winter Transects								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R057	Non-Breeding	Western Transect	24/02/2021	MA	2	FL2	Circled lake and headed west	SC
R063	Non-Breeding	Western Transect	30/03/2021	MA	2	FL2	On lake to north of track	SC
R071	Non-Breeding	Western Transect	30/03/2021	MA	5	FL2	A pair on lake	SC
R073	Non-Breeding	Western Transect	30/03/2021	MA	2	PB4	Pair flew out of ditch, flushed by surveyor	SC
R075	Non-Breeding	Eastern Transects	01/04/2021	MA	1	PB4	Flying south	SC
R076	Non-Breeding	Eastern Transects	01/04/2021	MA	3	PB4	Flushed by surveyor off wet area	SC
R082	Non-Breeding	Western Transect	12/10/2021	MA	4	PB4	In suitable habitat	TK
R107	Non-Breeding	Eastern Transects	11/11/2021	MA	2	PB4	Took flight from small lake	TK
R116	Non-Breeding	Eastern Transects	11/11/2021	MA	2	FL1	Took flight from small lake	TK
R119	Non-Breeding	Western Transects	17/11/2021	MA	2	FL1	Feeding	TK
R121	Non-Breeding	Western Transects	17/11/2021	MA	2	FL1	Feeding	TK
R138	Non-Breeding	Eastern Transects	02/12/2021	MA	4	FL1	Four Mallard took flight from small lake	TK
R167	Non-Breeding	Eastern Transects	11/02/2022	MA	4	FL1	Flushed from ground	TK

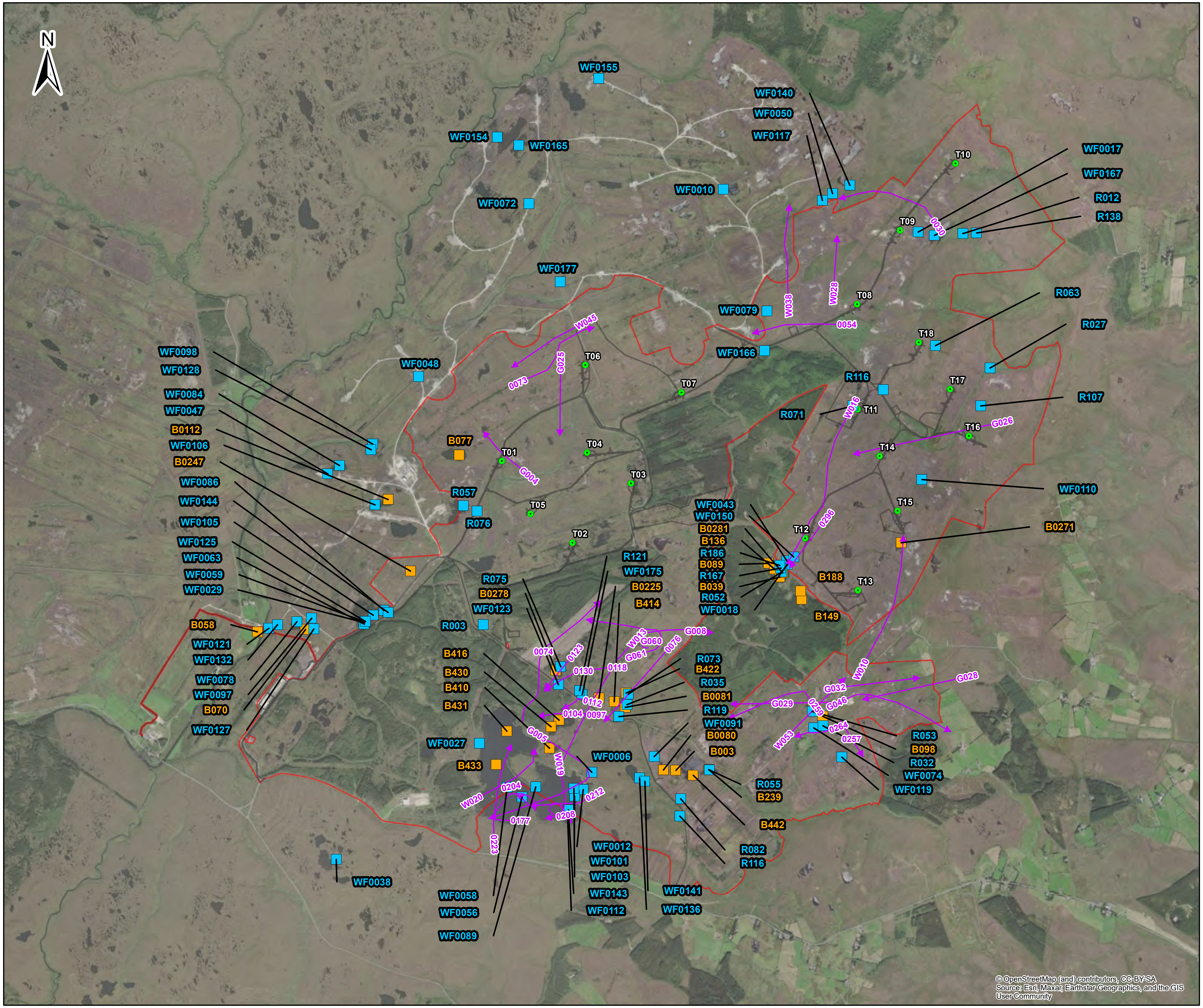
Winter Transects								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R186	Non-Breeding	Western Transect	11/03/2022	MA	2	FL1	Feeding	TK

Roost Watch Observations										
Season	Site	HHVP	Date	BTO	No. of Birds	Time of flight	Duration of flight (s)	Habitat Code	Activity	Surveyor
Non-Breeding	Oweninny	1	15/01/2021	MA	4	None		FL1	2 Pairs of MA on lake	JM
Non-Breeding	Oweninny	1	09/02/2021	MA	5	16:01	NA	FL1	Small flock on lake	JM

Breeding Bird Survey Data							
Survey Type	Ref.	Date	Observation Time	BTO Code	Abundance	Key Observations	Surveyor
Gull	B410	24/04/2020	13:13:00	MA	1		JS
Transect	B003	28/04/2020	07:45:00	MA	3	Males and one female on lake	JM
Transect	B039	19/05/2020	10:12:00	MA	3	Female with two ducklings	JS
Transect	B058	19/05/2020	11:40:00	MA	2		JM
Gull	B414	21/05/2020	08:45:00	MA	1		JS
Gull	B416	21/05/2020	09:00:00	MA	1		JS
Transect	B070	16/06/2020	07:30-15:30	MA	2		JM
Transect	B077	16/06/2020	12:09:00	MA	1		JS
Transect	B089	16/06/2020	09:34:00	MA	1		JS
Transect	B098	16/06/2020	08:43:00	MA	2		JS

Breeding Bird Survey Data							
Survey Type	Ref.	Date	Observation Time	BTO Code	Abundance	Key Observations	Surveyor
Gull	B422	18/06/2020		MA	1	One Mallard	JS
Transect	B136	21/07/2020	10:15:00	MA	4		JS
Gull	B430	23/07/2020	09:35:00	MA	1	Flushed Mallard female on small pond at ING 100437 320466	JS
Gull	B431	23/07/2020	09:53:00	MA	1	Male Mallard flushed at ING 100121 320121	JS
Gull	B433	23/07/2020	10:02:00	MA	2	Two Mallards on lake	JS
Transect	B149	24/08/2020		MA	1		TK
Transect	B149	22/09/2020		MA	3		TK
Transect	B442	16/04/2021		MA	1		JM
Transect	B239	12/05/2021		MA			TK
Transect	B0080	24/05/2022	09:30:00	MA	2	Two Mallards flying over	TK
Transect	B0081	24/05/2022	09:42:00	MA	4	Four Mallards on small lake, suitable habitat	TK
Wader	B0112	25/05/2022		MA	3	Three Mallards in wetland area	TK
Transect	B0225	20/07/2022		MA	2	Two Mallards in flight	TK

MALLARD FIGURE



Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Mallard (Anas platyrhynchos) - Breeding Season 2020-2022
- Mallard (Anas platyrhynchos) - Non-Breeding Season 2020-2022
- Mallard (Anas platyrhynchos) - Flightlines Breeding and Non-Breeding 2019-2022

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Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D01	24/03/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 10 Mallard (Anas platyrhynchos) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:30,631

Prepared by:	Checked:	Date:
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Project Director: D.Grehan

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10889-034-MA-FLIGHT-TOB-D01

11.0 Teal

Vantage Points Surveys													
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0178	Breeding	5	12/05/2020	12:25	T.	2					218		JM
0099	Breeding	4	13/05/2020	12:10	T.	2							JM
0186	Breeding	5	09/06/2020	11:12	T.	2	30					Two Teals in flight and swimming on large lake, likely breeding	JM
0106	Breeding	4	10/06/2020	06:13	T.	5	35					Breeding Teal	JM
0115	Breeding	4	15/07/2020	15:43	T.	2	43					Adult pair flying low between lakes	JM
0117	Breeding	4	15/07/2020	20:31	T.	4						Adult with three young on lake	JM
0065	Non-Breeding	3	14/01/2021	11:58	T.	2	10	15				Two Teal in flight, landed on bog	JM
0127	Breeding	4	14/04/2021	09:42	T.	2	85	35				Pair flying between waterbodies	JM
0128	Breeding	4	06/05/2021	15:42	T.	2	15	35				Pair flying between waterbodies and back	JM
0069	Breeding	3	03/06/2021	11:28	T.	1	20					Male Teal in flight, landed on small lake	TK
0266	Breeding	6	04/06/2021	09:25	T.	2	65					Pair flying together between ponds	JM

Vantage Points Surveys													
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0219	Breeding	5	10/08/2021	06:24	T.	3	15					Three Teal in flight across lake, landed on lake	TK
0042	Breeding	1	07/09/2021	15:23	T.	2	45	50				Pair flying between ponds	JM
W004	Non-Breeding	4	13/10/2021	11:40	T	2	5	30				2 Teal in flight, landed on Lough Dahybaun	TK
W024	Non-Breeding	2	13/10/2021	12:40	T	4	20	70				Four Teal in flight, Two pairs flying between ponds	JM
W029	Non-Breeding	3	12/11/2021	12:15	T	2	25	20				Pair in flight between ponds	JM
W040	Non-Breeding	3	16/12/2021	11:42	T	2	40	25				Pair in flight between ponds	JM
W056	Non-Breeding	3	09/02/2022	08:26	T	1	15	20				Two Teals in flight, landed on bog	TK
B05	Breeding	5	04/04/2022	18:26	T.	2	4					Pair of teal flying low over lake and landing near west shore	KL
B08	Breeding	5	04/04/2022	19:09	T.	2	12					Same as ref 4	KL
B12	Breeding	3	06/04/2022	07:16	T.	2	15					Pair of Teal took off from small pool and flew north	KL

Vantage Points Surveys													
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
B20	Breeding	6	10/05/2022	13:02	T.	1	5	5				Two Teal flew up from one pool to another	KL
B23	Breeding	4	11/05/2022	12:45	T.	2	2	10	5			Two Teal flew in from south west and landed on pool	KL
B24	Breeding	4	11/05/2022	13:02	T.	3	10	10				Two males chased 1 female in circle over pool	KL
B25	Breeding	4	11/05/2022	13:06	T.	1		10	20			One male Teal flew W away from pool	KL
B26	Breeding	4	11/05/2022	13:13	T.	2		20	5			Pair of teal flew up from pool to the north	KL
B37	Breeding	4	15/06/2022	11:47	T.	1	10	20	10			Teal flew from pool west over trees	KL
B38	Breeding	6	16/06/2022	11:32	T.	2	5					Short flight from one pool to another	KL
B40	Breeding	6	16/06/2022	13:23	T.	5						Two Teal flew from one pool to another	KL

Vantage Points Surveys Non-Flight Observations									
Season	Site	VP	Date	Observation Time	BTO Code	Abundance	Habitat Code	Activity	Surveyor
Breeding	Oweninny	6	16/06/2022	08:01	T.	2	PB4, FL2	Two Teal seen swimming on pool	KL

Waterfowl surveys							
Season	Ref.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non-breeding	WF0126	12/10/2020	T.	1	FW4	Feeding	TK
Non-breeding	WF0133	27/10/2020	T.	5	FL2	Feeding	TK
Non Breeding	WF0139	07/12/2020	T.	4	FL1	Feeding	TK
Non Breeding	WF0145	17/12/2020	T.	4	FL1	Feeding	TK
Non Breeding	WF0147	11/01/2021	T.	2		Feeding	TK
Non Breeding	WF0149	08/02/2021	T.	7	FL1	Feeding	TK
Non Breeding	WF0158	08/03/2021	T.	4	FL1	Feeding	TK
Non Breeding	WF0159	11/10/2021	T.	2	FL1	Feeding	TK
Non Breeding	WF0162	11/10/2021	T.	2	FL1	Feeding	TK
Non Breeding	WF0168	22/10/2021	T.	2	FL1	Feeding	TK

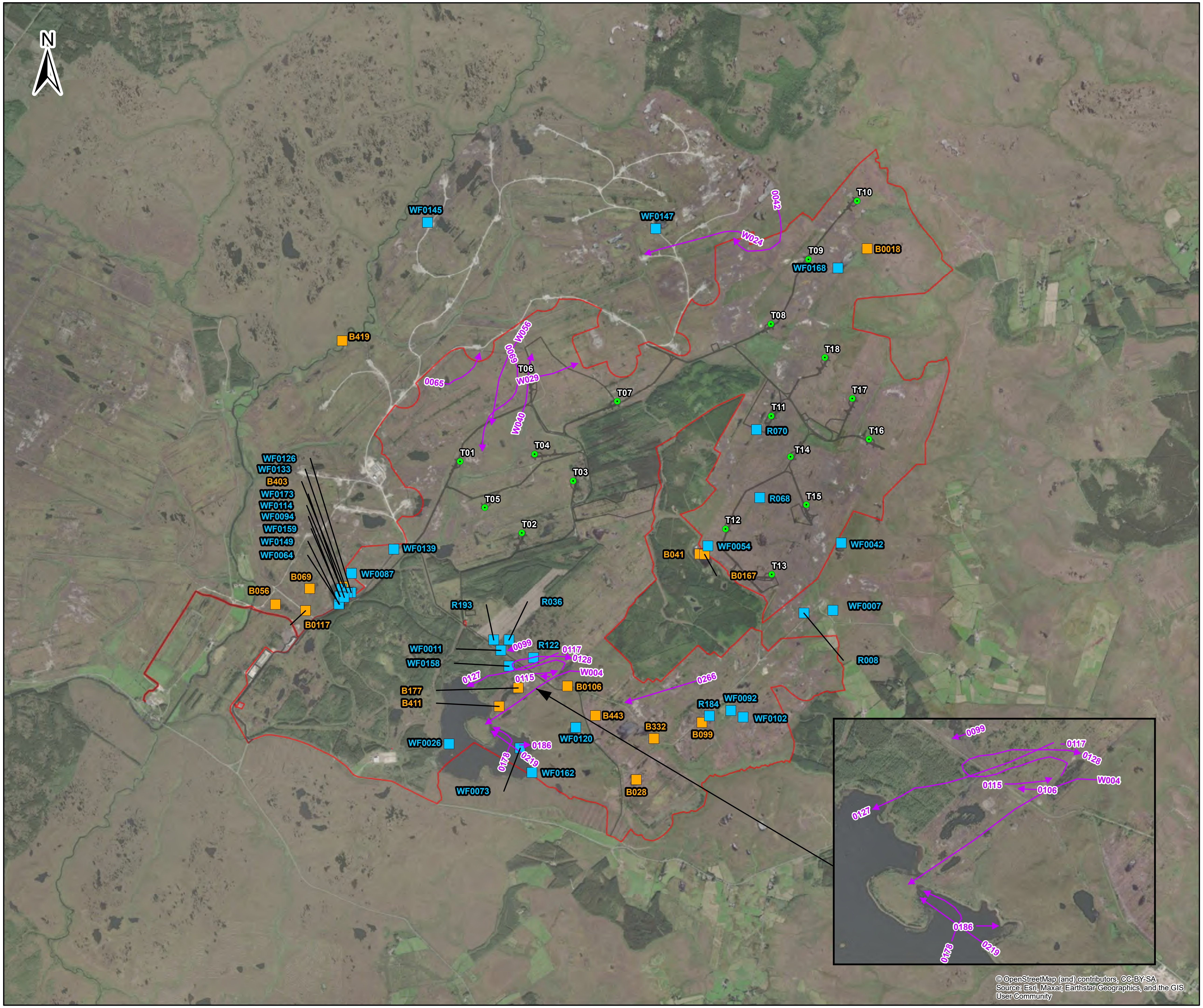
Waterfowl surveys							
Season	Ref.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non Breeding	WF0173	22/10/2021	T.	2	FL1	Feeding	TK
Non Breeding	WF0007	19/11/2021	T.	3	FL1, PB4	Feeding	TK
Non Breeding	WF0011	19/11/2021	T.	4	FL1, PB4	Feeding	TK
Non Breeding	WF0026	14/12/2021	T.	11	FL1	Feeding	TK
Non Breeding	WF0042	10/01/2022	T.	6	FL1, PB4	Roosting	TK
Non Breeding	WF0054	22/01/2022	T.	4	FL1	Feeding	TK
Non Breeding	WF0064	07/02/2022	T.	2	FL1	Feeding	TK
Non Breeding	WF0073	07/02/2022	T.	5	FL1	Feeding	TK
Non Breeding	WF0087	07/02/2022	T.	9	FL1	Feeding	TK
Non Breeding	WF0092	22/02/2022	T.	2	FL1	Feeding	TK
Non Breeding	WF0094	22/02/2022	T.	6	FL1	Feeding	TK
Non Breeding	WF0102	01/03/2022	T.	2	FL1	Feeding	TK
Non Breeding	WF0114	01/03/2022	T.	2	FL1, PB4	Feeding	TK
Non Breeding	WF0120	14/03/2022	T.	3	FL1	Feeding	TK

Winter Transects								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R008	Non-Breeding	Western Transect	25/11/2020	T.	2	PB4	Foraging	SC
R036	Non-Breeding	Eastern Transects	16/12/2020	T.	2	FW1, PB3	Flushed from ground	TK
R068	Non-Breeding	Eastern Transects	01/04/2021	T.	2	PB4	Foraging	SC
R070	Non-Breeding	Eastern Transects	01/04/2021	T.	2	PB4	Flying	SC
R122	Non-Breeding	Western Transects	17/11/2021	T.	3	FL1	Feeding	TK
R184	Non-Breeding	Western Transect	11/03/2022	T.	4	FL1, PB4	Feeding	TK
R193	Non-Breeding	Western Transect	11/03/2022	T.	3	FL1	Feeding	TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Gull	B403	24/04/2020	08:23:00	T.	1			JS
Gull	B411	24/04/2020	13:13:00	T.	1			JS
Transect	B056	19/05/2020	11:00:00	T.	2	WD4		JM
Transect	B028	19/05/2020	08:40:00	T.	2		Pair feeding on lake	JS
Transect	B041	19/05/2020	10:12:00	T.	1		Male on water	JS
Gull	B419	21/05/2020	13:00:00	T.	1		One male Teal	JS

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B069	16/06/2020	07:30-15:30	T.	4	WD4		JM
Transect	B099	16/06/2020	08:43:00	T.	3	PB4		JS
Transect	B177	21/07/2020		T.	1			JM
Transect	B443	16/04/2021		T.	1	PB4		JM
Transect	B332	09/07/2021		T.	2	FL1		JC
Transect	B0018	08/04/2022	13:10:00	T.	2	PB4	Pair of Teal on small lake	TK
Transect	B0106	24/05/2022	09:42:00	T.	2	FL1	Two Teal on small lake, suitable breeding habitat	TK
Wader	B0117	25/05/2022		T.	3	PB4	Three Teal in suitable breeding habitat, wetland area of bog.	TK
Transect	B0167	20/06/2022	10:58:00	T.	2	FL1	Pair of Teal in suitable breeding habitat	TK

TEAL FIGURES



Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Teal (Anas crecca) - Breeding Season 2020-2022
- Teal (Anas crecca) - Non-Breeding Season 2020-2022
- Teal (Anas crecca) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
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NOTES

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2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D01	24/03/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 11
Teal (Anas crecca)
observations over the survey period
(Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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Draft: D01

10889-035-T.-FLIGHT-TOB-D01

12.0 Tufted Duck

Vantage Points Surveys													
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0195	Non-Breeding	5	14/10/2020	11:02	TU	20						Flock feeding on lake	JM
0197	Non-Breeding	5	10/11/2020	13:00	TU	25						Flock feeding on lake	JM
0199	Non-Breeding	5	09/12/2020	10:33	TU	8						Small flock on lake	JM
0217	Breeding	5	07/07/2021	19:40	TU	2	20					Pair of Tufted Ducks landed on lake	TK
W021	Non-Breeding	5	16/11/2021	15:01	TU	20	25					20 Tufted Ducks flew in, landed on lake	TK

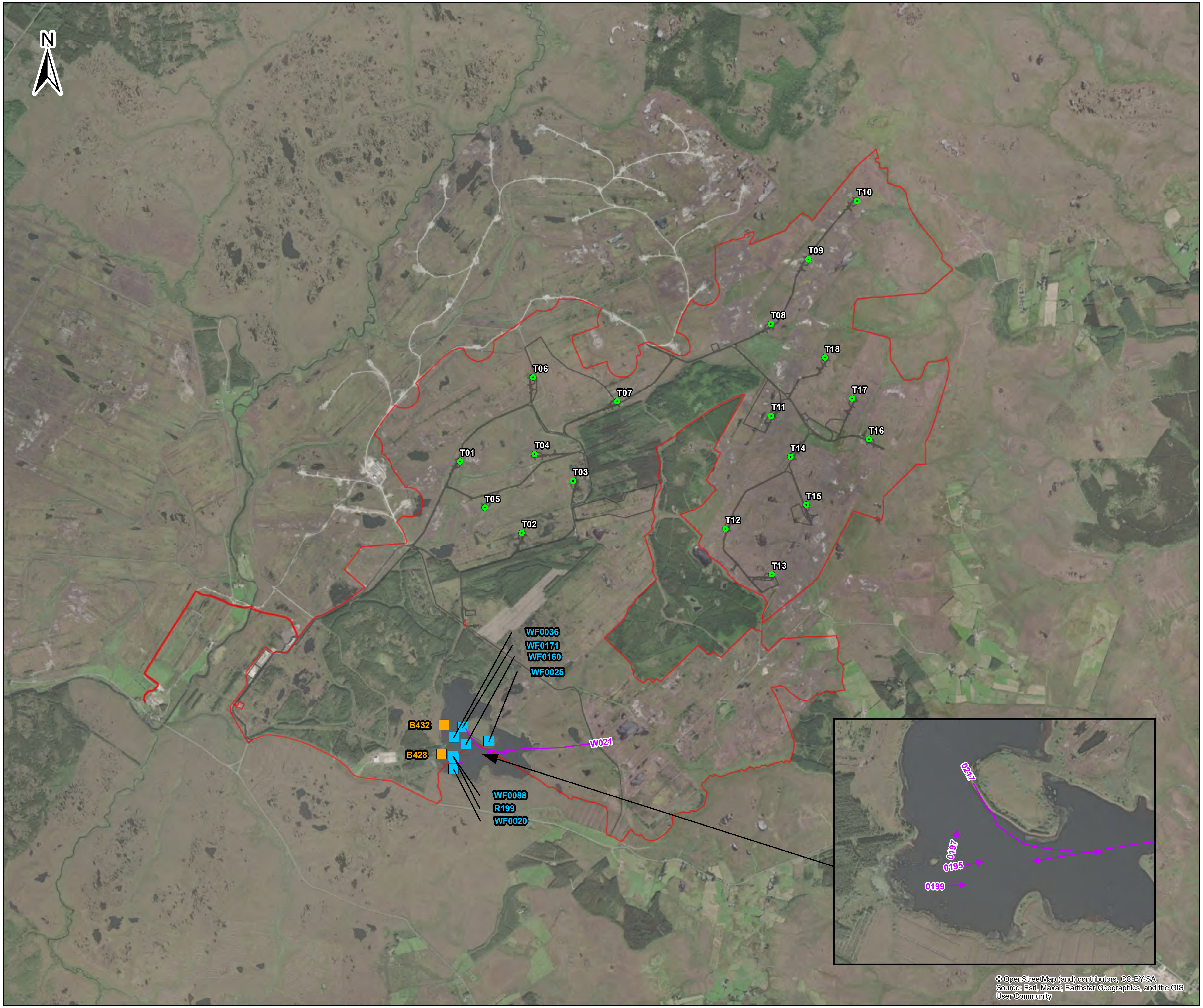
Waterfowl surveys							
Season	Ref.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non-breeding	WF0020	24/11/2020	TU	22	FL1	Foraging on Lough Dahybawn in southwest corner	TK
Non Breeding	WF0025	07/12/2020	TU	5	FL1	Roosting	TK
Non Breeding	WF0036	17/12/2020	TU	12	FL1	Feeding	TK

Waterfowl surveys							
Season	Ref.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non Breeding	WF0088	11/10/2021	TU	24	FL1	Feeding/roosting	TK
Non Breeding	WF0160	22/02/2022	TU	2	FL1	Feeding	TK
Non Breeding	WF0171	14/03/2022	TU	2	FL1	Feeding	TK

Winter Transects									
Ref.	Season	Trans No./Loc.	Date	Time	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R119	Non-Breeding	Western Transect	11/03/2022	13:20	TU	2	FL1	Feeding	TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Observation Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Gull	B428	18/06/2020		TU	1	PB4	Tufted Duck male near southeast shore of Lough Daybaun	JS
Gull	B432	23/07/2020	10:02:00	TU	2		Two Tufted Duck on lake	JS

TUFTED DUCK FIGURES



Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Tufted Duck (Aythya fuligula) - Breeding Season 2020-2022
- Tufted Duck (Aythya fuligula) - Non-Breeding Season 2020-2022
- Tufted Duck (Aythya fuligula) - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
Kilometres

NOTES

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D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client:
Bord na Móna

Project:
Oweninny Wind Farm
Phase 3

Title:
Appendix 8-1 Figure 12
Tufted Duck (Aythya fuligula)
observations over the survey period
(Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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Draft: D01

10889-036-TU-FLIGHT-TOB-D01

13.0 Little Grebe

Vantage Points Surveys													
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0100	Breeding	4	13/05/2020	13:15	LG	1							JM
0105	Breeding	4	10/06/2020	05:55	LG	1						Likely breeding	JM
0114	Breeding	5	14/07/2020	13:12	LG	1						Single bird diving on lake	JM
0191	Breeding	4	15/07/2020	14:18	LG	1						Adult swimming on lake	JM

Vantage Points Surveys Non-Flight Observations									
Season	Site	VP	Date	Observation Time	BTO Code	Abundance	Habitat Code	Activity	Surveyor
Breeding	Oweninny	4	05/04/2022	08:15	LG	1	PB4, HH3, PB3	Calling and swimming in pond	KL
Breeding	Oweninny	4	15/06/2022	10:02	LG	1	PB4	Little Grebe heard Calling from pond	KL
Breeding	Oweninny	5	15/07/2022	06:28	LG	1	FI2	Little Grebe heard calling from lake	KL
Breeding	Oweninny	5	12/08/2022	09:29	LG	2	FI2	Two Little Grebe seen feeding on lake	KL

Vantage Points Surveys Non-Flight Observations									
Season	Site	VP	Date	Observation Time	BTO Code	Abundance	Habitat Code	Activity	Surveyor
Breeding	Oweninny	6	16/06/2022	08:04	LG	1	PB4, FL2	Little Grebe seen swimming on pool	KL

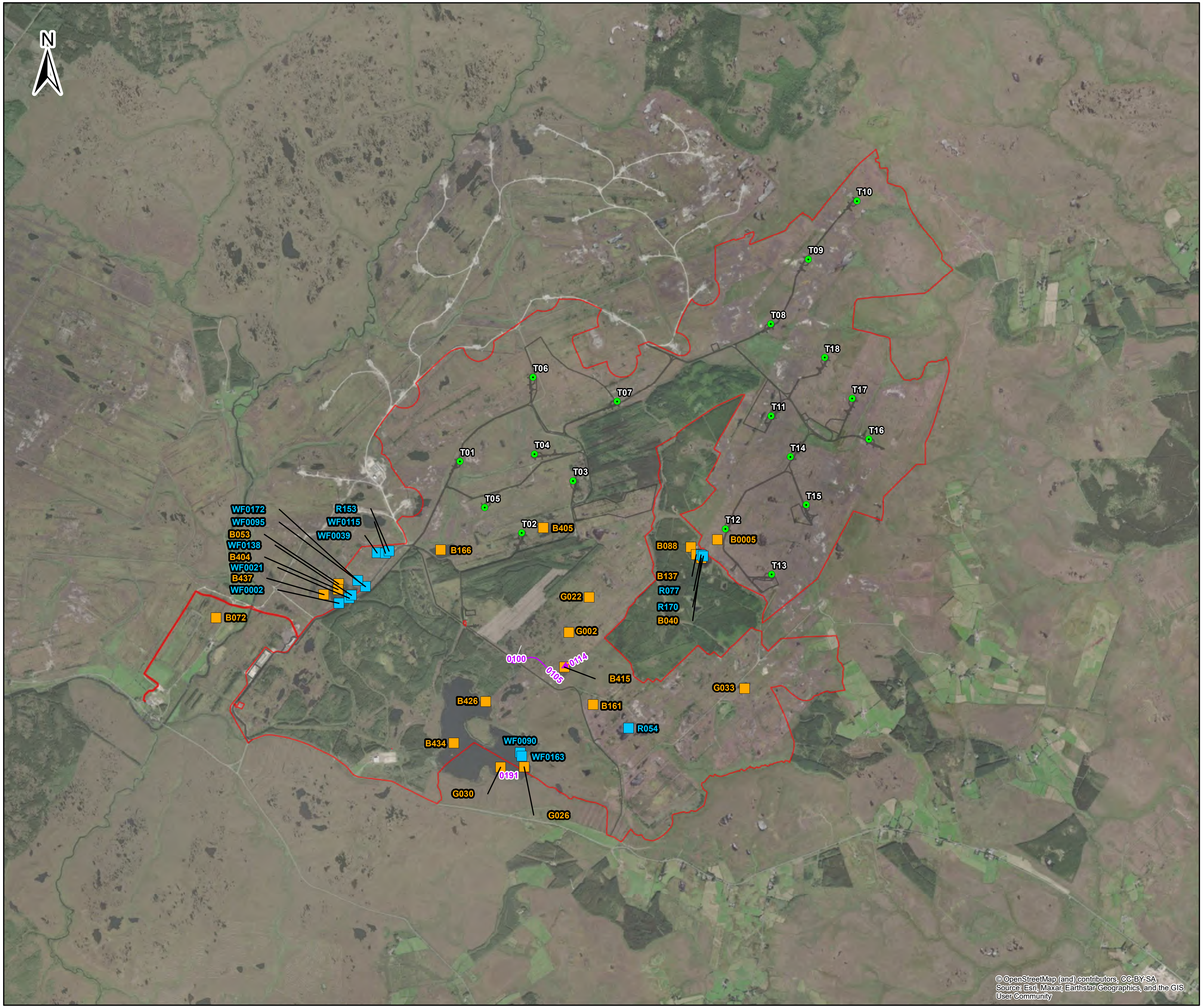
Waterfowl surveys							
Season	Ref.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non-breeding	WF0002	12/10/2020	LG	1	FL2	Feeding	TK
Non Breeding	WF0019	11/11/2020	LG	2	FL1	Feeding	TK
Non Breeding	WF0021	24/11/2020	LG	1	PB4	Foraging	TK
Non Breeding	WF0039	17/12/2020	LG	1	FL1	Feeding	TK
Non Breeding	WF0090	11/10/2021	LG	5	FL1	Feeding	TK
Non Breeding	WF0095	22/10/2021	LG	1	FL1	Feeding	TK
Non Breeding	WF0115	19/11/2021	LG	2	FL1	Feeding	TK
Non Breeding	WF0138	22/01/2022	LG	2	FL1	Feeding	TK
Non Breeding	WF0163	01/03/2022	LG	3	FL1	Feeding	TK
Non Breeding	WF0172	14/03/2022	LG	2	FL1	Feeding	TK

Winter Transects								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R054	Non-Breeding	Western Transect	24/02/2021	LG		FL2	Calling	SC
R077	Non-Breeding	Western Transect	30/03/2021	LG	2	FL2	Foraging	SC
R153	Non-Breeding	Western Transect	18/01/2022	LG	2	FL1	Feeding on lake	TK
R170	Non-Breeding	Western	21/02/2022	LG	1	FL1	Feeding	TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Observation Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Gull	B404	24/04/2020	08:23:00	LG	1			JS
Gull	B405	24/04/2020	08:57:00	LG	1			JS
Transect	B040	19/05/2020	10:12:00	LG	2		Calling	JS
Transect	B053	19/05/2020	09:15:00	LG	2	WD4		JM
Gull	B415	21/05/2020	08:45:00	LG	1			JS
Transect	B072	16/06/2020	07:30-15:30	LG	2	WD4		JM
Transect	B088	16/06/2020	09:34:00	LG	2	WD4		JS
Gull	B426	18/06/2020		LG	2	PB4	Two Little Grebe fishing	JS
Transect	B137	21/07/2020	10:15:00	LG	1	PB4		JS
Gull	B434	23/07/2020	10:02:00	LG	2		Two Little Grebe on lake	JS
Gull	B437	23/07/2020	11:43:00	LG	1		Little Grebe on water	JS
Transect	B161	24/08/2020		LG	1	PB4		TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Observation Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B166	24/08/2020		LG	2	PB4		TK
Transect	B0005	08/04/2022	11:34:00	LG	1	PB4	Little Grebe on small lake, suitable nesting habitat	TK

LITTLE GREBE FIGURE



Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Little Grebe (Tachybaptus ruficollis) - Breeding Season 2020-2022
- Little Grebe (Tachybaptus ruficollis) - Non-Breeding Season 2020-2022
- Little Grebe (Tachybaptus ruficollis) - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
Kilometres

NOTES

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Issue	Date	Description	By	Chkd.
D01	24/03/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 13
Little Grebe (Tachybaptus ruficollis) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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Draft: D01

10889-037-LG-FLIGHT-TOB-D01

14.0 Cormorant

Vantage Points Surveys													
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0272	Breeding	VP 7	16/04/2019	12:10	CA	4		100		320		Flying south - Dahybaun	JH
0139	Breeding	VP 5	23/05/2019	08:49	CA	2	30	60				Flew north from Lake	BM
0157	Non-Breeding	VP 5	13/02/2020	16:35	CA	1	40						JA
0060	Breeding	VP 3	12/05/2020	10:51	CA	1	20	108				Cormorant in flight, possibly heading towards large lake at southern boundaries of site	TK
0176	Breeding	VP 5	12/05/2020	11:00	CA	1							JM
0188	Breeding	VP 5	14/07/2020	12:05	CA	1						Present all day, roosting and swimming	JM
0207	Non-Breeding	VP 5	09/03/2021	11:45	CA	1	30	40				Pair swimming on lake	JM
0210	Breeding	VP 5	13/04/2021	13:50	CA	1	25					Adult flying from perch across lake	JM
0220	Breeding	VP 5	10/08/2021	08:19	CA	2	15	40				Two Cormorant flying over	TK
W002	Non-Breeding	VP 5	11/10/2021	08:55	CA	1		25	80			Cormorant flying over	TK

Vantage Points Surveys													
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
W032	Non-Breeding	VP 5	13/12/2021	12:32	CA	1	15	30	20			Cormorant flight, landed on Lough Dahybaun	TK
B10	Breeding	VP5	04/04/2022	19:16	CA	1	20					Cormorant flew west and landed on lake similar to Ref 2	KL
B55	Breeding	VP4	12/07/2022	12:31	CA	1		20	40			Cormorant flew over hill towards big lake	KL

Vantage Points Surveys Non-Flight Observations									
Season	Site	VP	Date	Time	BTO Code	Abundance	Habitat Code	Activity	Surveyor
Non-Breeding	Oweninny	5	13/12/2021	12:33	CA	1	FL1	Feeding	TK

Waterfowl surveys							
Season	Ref.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non Breeding	WF0030	07/12/2020	CA	1	FL1	Feeding	
Non Breeding	WF0037	17/12/2020	CA	1	FL1	Feeding	

Waterfowl surveys							
Season	Ref.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non Breeding	WF0131	10/01/2022	CA	1	FL1	Feeding	TK

Breeding Bird Survey Data							
Survey Type	Ref.	Date	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Gull	B424	18/06/2020	CA	1	PB4	One Cormorant flew along north shore going west to east.	JS

CORMORANT FIGURES

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Cormorant (Phalacrocorax carbo) - Breeding Season 2020-2022
- Cormorant (Phalacrocorax carbo) - Non-Breeding Season 2020-2022
- Cormorant (Phalacrocorax carbo) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

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NOTES

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D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client:

Bord na Móna

Project:

Oweninny Wind Farm
Phase 3

Title:

Appendix 8-1 Figure 14
Cormorant (Phalacrocorax carbo) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:25,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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Draft: D01

10889-038-CA-FLIGHT-TOB-D01

15.0 Heron

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0225	Breeding	6	27/04/2019	12:19	H.	1	12	60					JH
0138	Breeding	5	23/05/2019	08:26	H.	1	30					Flew to lake edge	BM
0182	Breeding	5	12/05/2020	19:05	H.	1	20	120					JM
0253	Breeding	6	11/06/2020	10:34	H.	1		55					JM
0034	Breeding	1	13/07/2020	18:06	H.	1	10	130				Heron in flight	TK
0254	Breeding	6	16/07/2020	13:15	H.	1		45				Adult bird flying north	JM
0261	Non-Breeding	6	12/12/2020	14:15	H.	1	30	25				Adult flying north	JM
0066	Non-Breeding	3	14/01/2021	16:04	H.	1	35					Grey Heron in flight, landed on bog	TK
0265	Breeding	6	15/04/2021	13:03	H.	1		74				Single bird in transit flying north	JM
0043	Breeding	1	07/09/2021	17:55	H.	1	50	65				Adult flying west of VP	JM
0222	Breeding	5	08/09/2021	19:32	H.	1		20	70			Heron flying over	TK
W006	Non-Breeding	2	13/10/2021	15:35	H	2	25	80				Two Heron in flight across site	JM
W009	Non-Breeding	6	20/10/2021	13:08	H	1		35				Heron flying over	TK
W025	Non-Breeding	6	09/11/2021	13:12	H	1		15	28			Heron flying over	JM
W037	Non-Breeding	4	21/12/2021	13:20	H	1	10	25					TK
W052	Non-Breeding	6	12/01/2022	11:03	H	1		29	48			Heron flying over	JM
W057	Non-Breeding	3	09/02/2022	11:55	H	2	5	45				Heron flying over	TK

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
B34	Breeding	1	24/05/2022	15:23	H.	1		25	3			Heron flew east along edge of forestry	KL
B52	Breeding	4	12/07/2022	10:32	H.	1	10	30	20			Heron flew from side of pool, was mobbed by Ma and then flew north	KL
B57	Breeding	6	13/07/2022	12:49	H.	1	10	20				Heron flew down and landed on the edge of pool	KL
B58	Breeding	6	13/07/2022	13:49	H.	1	70	10				Heron seen flying low in front of VP	KL
B60	Breeding	5	12/08/2022	10:03	H.	1	5	60	10			Heron seen flying across lake and landing on far bank	KL

Waterfowl surveys							
Season	Ref.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non Breeding	WF0015	11/11/2020	H.	1	FL1	Feeding	
Non-breeding	WF0024	25/11/2020	H.	1	PB4	Foraging	
Non Breeding	WF0066	08/02/2021	H.	1	FW1	Standing in stream	
Non Breeding	WF0067	08/02/2021	H.	1	FW1	Standing in stream	
Non-breeding	WF0071	24/02/2021	H.	1	FW4	Foraging and flying	
Non-breeding	WF0081	31/03/2021	H.	1	PB4	Flying	

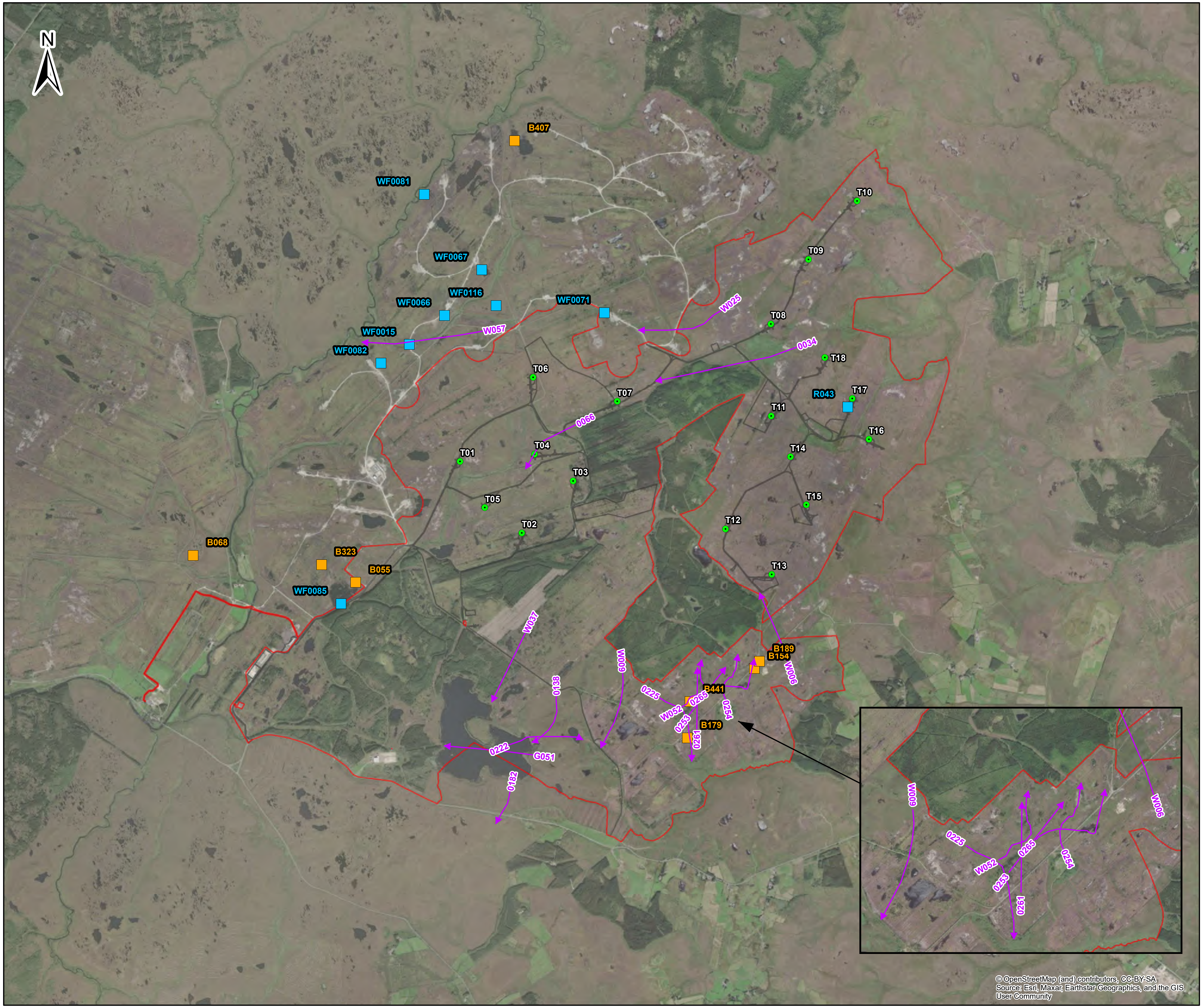
Waterfowl surveys							
Season	Ref.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non-breeding	WF0082	31/03/2021	H.	1	PB4	Flying	
Non Breeding	WF0085	11/10/2021	H.	1	FL1	Feeding at lake edge	TK
Non Breeding	WF0116	19/11/2021	H.	1	FL1	Feeding	TK
Non Breeding	WF0134	10/01/2022	H	1	FL1	Feeding	TK
Non Breeding	WF0176	14/03/2022	H	1	PB4	Feeding	TK

Winter Transects								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R043	Non-Breeding	Eastern Transects	25/01/2021	H.	1	PB4	Flying Flying SSW along river	SC
NA	Non-Breeding	Western Transect	27/01/2021	H.	1	PB4	Foraging. Flew northeast due to surveyor	SC

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Gull	B407	24/04/2020	11:29:00	H.	1			JS
Transect	B055	19/05/2020	09:50:00	H.	1	WD4	Moorland/Scrub/Lake/FW and Woodland Birds	JM
Transect	B068	16/06/2020	07:30-15:30	H.	1	WD4	Moorland/Scrub/Lake/FW and Woodland Birds	JM
Transect	B179	21/07/2020		H.	1			JM

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B154	24/08/2020	10:48:00	H.	1	PB4		TK
Transect	B189	22/09/2020		H.	1	PB4		TK
Transect	B441	16/04/2021		H.	1	PB4		JM
Transect	B323	09/07/2021		H.	1	PB3	Heron flying southwest	JC

GREY HERON FIGURES



Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Grey Heron (Ardea cinerea) - Breeding Season 2020-2022
- Grey Heron (Ardea cinerea)- Non-Breeding Season 2020-2022
- Grey Heron (Ardea cinerea) - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
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NOTES

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D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client:
Bord na Móna

Project:
Oweninny Wind Farm Phase 3

Title:
Appendix 8-1 Figure 15
Grey Heron (Ardea cinerea) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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Draft:
10889-039-H.-FLIGHT-TOB-D01
D01

16.0 Sparrowhawk

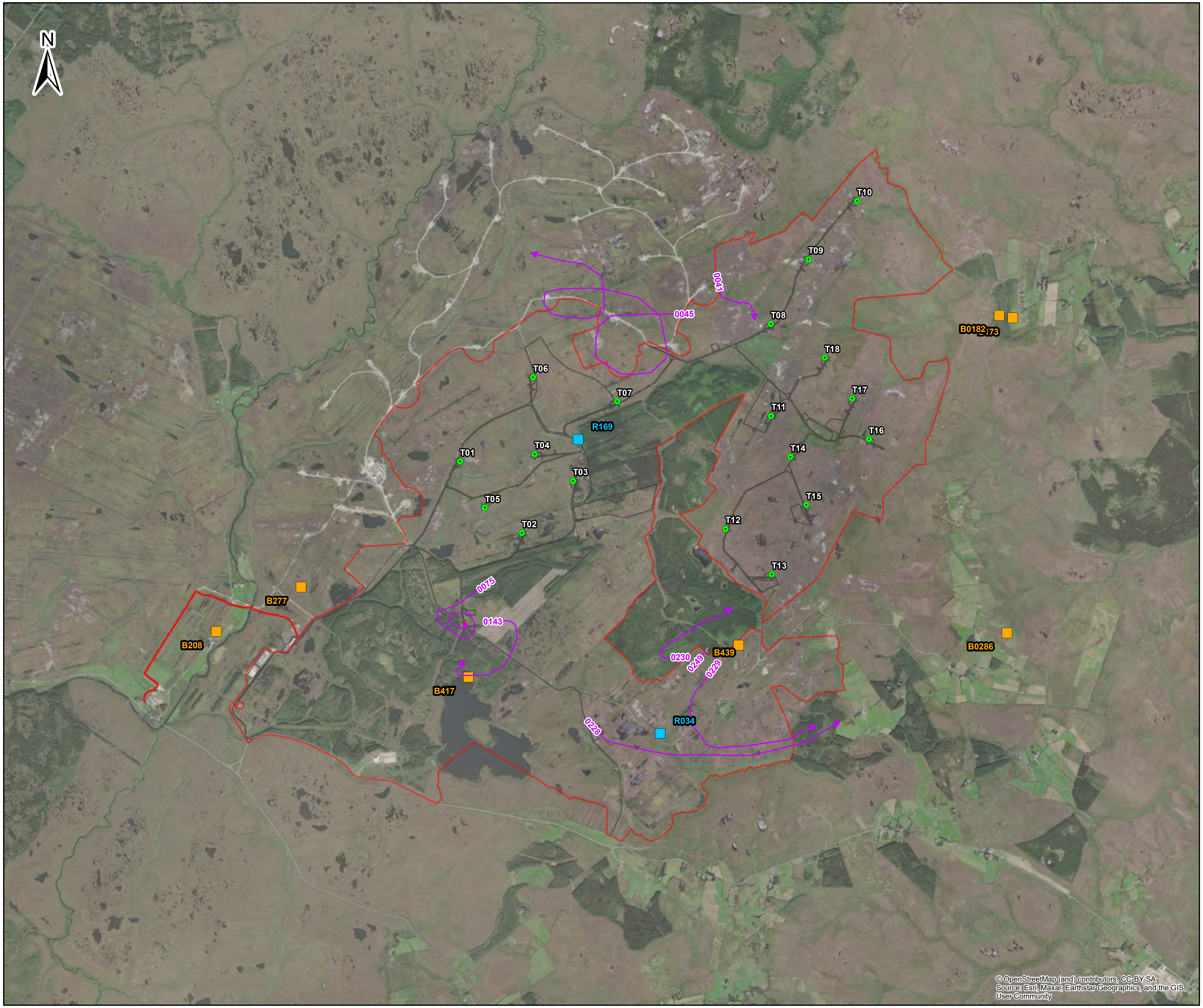
Vantage Points Surveys													
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0228	Breeding	6	29/07/2019	15:59	SH	1	70	10		60		Female carrying prey dropped into forest for nest	JH
0229	Breeding	6	29/07/2019	16:23	SH	1	158					Taking prey westward then flying to nest	JH
0143	Breeding	5	23/08/2019	09:56	SH	1	30	60				Circling	BM
0230	Breeding	6	28/08/2019	11:32	SH	1	9					Hunting	JH
0075	Breeding	4	21/04/2020	17:47	SH	1			22			Flying high/circling over forestry/track, lost visual over forest in background	JS
0045	Breeding	2	22/04/2020	17:47	SH	1			98	190		Sparrowhawk soaring, being mobbed by Hooded Crow, soared higher to avoid	TK
0249	Breeding	6	14/05/2020	18:40	SH	1	15						JM
0041	Breeding	1	15/04/2021	12	SH	1	15						TK

Winter Transects Surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R034	Non-Breeding	Western Transect	25/11/2020	SH	1	PB4	Hunting	SC

Winter Transects Surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R169	Non-Breeding	Western Transect	21/02/2022	SH	1	PB4	In flight, Sparrowhawk took flight from bush, seen briefly	TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Observation Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Gull	B417	21/05/2020	09:10:00	SH	1		Sparrowhawk flew over lake heading north	JS
Raptor	B173	26/08/2020	13:52:00	SH	1	GS4		TK
Raptor	B208	24/09/2020		SH	1	GS4		TK
Transect	B439	16/04/2021		SH	1	PB4		JM
Transect	B277	27/05/2021	09:13:00	SH	1	WD4	Male hunting	JM
Raptor	B0182	11/07/2022	12:09:00	SH	1	GA1	Female Sparrowhawk soaring over farmland/bog/forestry	TK

SPARROWHAWK FIGURES



Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Sparrowhawk (Accipiter nisus) - Breeding Season 2020-2022
- Sparrowhawk (Accipiter nisus) - Non-Breeding Season 2020-2022
- Sparrowhawk (Accipiter nisus) - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
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NOTES

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D01	24/03/2023	Draft issue	S.P	J.S
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Client:

Bord na Móna

Project:

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Phase 3

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Appendix 8-1 Figure 16
Sparrowhawk (Accipiter nisus)
observations over the survey period
(Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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Draft: D01

10889-040-SH-FLIGHT-TOB-D01

17.0 Buzzard

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0051	Non-Breeding	2	14/10/2020	13:52	BZ	1	40					Buzzard in flight low to ground, hunting.	TK
0119	Non-Breeding	4	15/10/2020	13:22	BZ	1		40				Buzzard in flight	TK
B16	Breeding	7	26/04/2022	12:08	BZ	1				30	60	Buzzard circled over edge of forestry then flew south	KL

BUZZARD FIGURES

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Buzzard (Buteo buteo) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

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Issue	Date	Description	By	Chkd.
D01	24/03/2023	Draft issue	S.P	J.S

Client: [redacted]

Project:
Oweninny Wind Farm
Phase 3

Title:
Appendix 8-1 Figure 17
Buzzard (Buteo buteo)
observations over the survey period
(Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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10889-041-BZ-FLIGHT-TOB-D01

18.0 Golden Eagle

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0006	Breeding	1	28/08/2019	12:25	EA	1			420			Adult circling on thermal	

GOLDEN EAGLE FIGURES

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Golden Eagle (Aquila chrysaetos) - Flightlines Breeding and Non-Breeding 2019-2022

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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client:

Bord na Móna

Project:

Oweninny Wind Farm
Phase 3

Title:

Appendix 8-1 Figure 18
Golden Eagle (Aquila chrysaetos) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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Draft: D01

10889-042-EA-FLIGHT-TOB-D01

19.0 Egyptian Vulture

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0134	Breeding	4	11/08/2021	14:21	EGYVU	1	10	25	218			Egyptian Vulture soaring to the east of VP 4	TK

EGYTIAN VULTURE FIGURES

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Egyptian Vulture (Neophron percnopterus) - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
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Issue	Date	Description	By	Chkd.
D01	24/03/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 19 Egyptian Vulture (Neophron percnopterus) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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10889-043-EGYVU-FLIGHT-TOB-D01

20.0 Curlew

Breeding Bird Survey Data							
Survey Type	**Ref.**	**Date**	**BTO Code**	**Abundance**	**Habitat Code**	**Key Observations**	**Surveyor**
Gull	B429	18/06/2020	CU	1	PB4	Curlew left south shore of Lough Daybaun, flew west then circled and flew east out of view	JS

CURLEW FIGURES

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Curlew (Numenius arquata) - Breeding Season 2020-2022

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NOTES

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Issue	Date	Description	By	Chkd.

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Phase 3

Title:

Appendix 8-1 Figure 20
Curlew (Numenius arquata)
observations over the survey period
(Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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Draft: D01

10889-044-CU-FLIGHT-TOB-D01

21.0 Whimbrel

Vantage Points Surveys													
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0277	Breeding	7	28/08/2019	11:19	WM	1	38					Flew across bog, landed then went over forestry	JH

WHIMBREL FIGURES

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Whimbrel (Numenius phaeopus) - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D01	24/03/2023	Draft issue	S.P	J.S

Client:
Bord na Móna

Project:
Oweninny Wind Farm
Phase 3

Title:
Appendix 8-1 Figure 21
Whimbrel (Numenius phaeopus)
observations over the survey period
(Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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10889-045-WM-FLIGHT-TOB-D01

22.0 Dunlin

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Wader	B344	14/07/2021		DN	1	PB4	Dunlin in suitable habitat	TK
Wader	B0188	13/07/2022	10:20:00	DN	2	PB4	Pair Of Dunlin roosting/feeding at edge of lake	TK

DUNLIN FIGURES

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Dunlin (Calidris alpina) - Breeding Season 2020-2022

0 0.5 1 1.5 2
Kilometres

NOTES

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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D01	27/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client:

Bord na Móna

Project:

Oweninny Wind Farm
Phase 3

Title:

Appendix 8-1 Figure 22
Dunlin (Calidris alpina)
observations over the survey period
(Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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Draft: D01

10889-046-DN-FLIGHT-TOB-D01

23.0 Redshank

Breeding Bird Survey Data							
Survey Type	Ref.	Date	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Wader	B408	19/08/2021	RK	1	PB4	Taken from species list on Gull survey	JM
Gull	B025	24/04/2021	RK	1	PB3	Lone bird at edge of bog pool. Possible breeder or migrant	TK

REDSHANK FIGURES

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Redshank (Tringa totanus) - Breeding Season 2020-2022

0 0.5 1 1.5 2
Kilometres

NOTES

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D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client:

Bord na Móna

Project:

Oweninny Wind Farm Phase 3

Title:

Appendix 8-1 Figure 23 Redshank (Tringa totanus) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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Draft: D01

10889-047-RK-FLIGHT-TOB-D01

24.0 Greenshank

Vantage Points Surveys Non-Flight Observations								
Season	VP	Date	Time	BTO Code	Abundance	Habitat Code	Field Notes	Surveyor
Non-Breeding	5	10/02/2021	09:33	GK	1	FL1	Single bird feeding along lakeshore all day	JM

Waterfowl Surveys							
Season	Ref	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non-Breeding	WF0057	11/01/2021	GK	1		Feeding	TK
Non-Breeding	WF0060	08/02/2021	GK	1	PB4	Flying	TK
Non-Breeding	WF0129	14/12/2021	GK	1	PB4	Roosting	TK
Non-Breeding	WF0142	22/01/2022	GK	1	FL1	Flying	TK
Non-Breeding	WF0146	07/02/2022	GK	1	PB4	Feeding	TK
Non-Breeding	WF0157	22/02/2022	GK	2	PB4	Flying	TK
Non-Breeding	WF0164	01/03/2022	GK	1	FL1	Feeding	TK
Non-Breeding	WF0174	14/03/2022	GK	1	PB4	Feeding	TK

Winter Transects Surveys									
Ref.	Season	Trans No./Loc.	Date	Time	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R139	Non-Breeding	Western Transect	20/12/2021	10:45	GK	2	PB4	In flight, landed at small lake edge two Greenshank in flight, landed at edge of small lake	TK
R194	Non-Breeding	Western Transect	11/03/2022	12:16	GK	1	FL1	Feeding	TK

Roost Watch Survey Observations									
Season	Site	HHVP	Date	BTO	No. of Birds	Time of flight	Habitat Code	Activity	Surveyor
Non-Breeding	Oweninny	1	09/02/2021	GK	1	16:00	FL1	Single bird foraging on edge of lake	JM

Breeding Bird Survey Data							
Survey Type	Ref.	Date	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Wader	B215	27/04/2021	GK	1	PB4	Greenshank present in possibly suitable breeding habitat	TK
Wader	B268	26/05/2021	GK	1	FL1		TK
Wader	B0051	27/04/2022	GK	2	PB4	Pair of Greenshank in suitable nesting habitat	TK
Wader	B0111	25/05/2022	GK	1	PB4	Greenshank in suitable breeding habitat	TK
Wader	B0176	23/06/2022	GK	1	PB4	Greenshank flushed from wetland area, probably breeding	TK

GREENSHANK FIGURES

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Greenshank (Tringa nebularia) - Breeding Season 2020-2022
- Greenshank (Tringa nebularia) - Non-Breeding Season 2020-2022
- Greenshank (Tringa nebularia) - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5

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NOTES

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D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client:

Bord na Móna

Project:

Oweninny Wind Farm Phase 3

Title:

Appendix 8-1 Figure 24 Greenshank (Tringa nebularia) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:26,781

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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10889-048-GK-FLIGHT-TOB-D01

Draft: D01

25.0 Lapwing

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0269	Breeding	6	15/07/2021	21.37	L.	2			85			Pair of Lapwing flying over	TK

LAPWING FIGURES

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Lapwing (Vanellus vanellus) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
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NOTES

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Issue	Date	Description	By	Chkd.
D01	24/03/2023	Draft issue	S.P	J.S

Client:

Bord na Móna

Project:

Oweninny Wind Farm
Phase 3

Title:

Appendix 8-1 Figure 25
Lapwing (Vanellus vanellus)
observations over the survey period
(Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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Draft:
D01

10889-049-L.-FLIGHT-TOB-D01

26.0 Ringed-Plover

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0289	Breeding	7	21/04/2020	08:57	RP	1	10					Ringed Plover seen briefly in flight before land on area of bare peat with stony patches and wet areas	TK
0098	Breeding	4	13/05/2020	11:55	RP	1	30						JM
0109	Breeding	4	10/06/2020	14:05	RP	2	25					Likely breeding	JM
0033	Breeding	1	13/07/2020	16:11	RP	1	15					Ringed Plover seen in flight , landed on bare patch of cutover bog	TK
0111	Breeding	4	15/07/2020	12:25	RP	2	10					Adults calling in flight	JM
W015	Non-Breeding	7	15/11/2021	12:58	RP	1	5	20				Ringed Plover in flight, landed on bog	TK

Winter Transects surveys									
Ref.	Season	Trans No./Loc.	Date	Time	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R051	Non-Breeding	Eastern Transects	22/02/2021		RP	2	PB4	Flew in and landed by car, near turbine no. 10. Agitated pair	SC
R059	Non-Breeding	Eastern Transects	01/04/2021		RP	4	PB4	Two pairs	SC
R061	Non-Breeding	Eastern Transects	01/04/2021		RP	3	PB4	Heard alarm calling	SC
R066	Non-Breeding	Eastern Transects	01/04/2021		RP	1	PB4	Heard calling	SC

Winter Transects surveys									
Ref.	Season	Trans No./Loc.	Date	Time	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R176	Non-Breeding	Eastern Transects	09/03/2022	12:49	RP	2	PB4	Pair of Ringed Plover back on breeding grounds, in suitable habitat	TK
R177	Non-Breeding	Eastern Transects	09/03/2022	12:50	RP	2	PB4	Pair of Ringed Plover back on breeding grounds, In suitable habitat	TK

Breeding Bird Survey Data								
Survey Type	Ref	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Wader	B021	21/04/2020	09:50:00	RP	1	PB3	Displaying pair	JM
Wader	B023	22/04/2020	09:55:00	RP	1	PB3	Displaying male	JM
Wader	B027	22/04/2020	15:20:00	RP	2	PB3	Displaying pair	JM
Transect	B005	28/04/2020	08:10:00	RP	2		Displaying pair	JM
Transect	B012	29/04/2020	08:40:00	RP	2		Displaying pair	JM
Wader	B061	20/05/2020	08:35:00	RP	1	PB4	Male displaying near lake	JM
Gull	B413	21/05/2020	08:25:00	RP	2		Two Ringed Plover flushed at ING 101233 319951	JS
Transect	B078	16/06/2020	12:09:00	RP	1	PB4		JS
Wader	B106	17/06/2020	09:07:00	RP	1	PB4	In suitable breeding habitat	JS
Wader	B108	17/06/2020	10:10:00	RP	2	PB4	In suitable breeding habitat	JS
Wader	B109	17/06/2020	10:45:00	RP	2	PB4	In suitable breeding habitat	JS
Wader	B110	17/06/2020	11:14:00	RP	1	PB4	In suitable breeding habitat	JS

Breeding Bird Survey Data								
Survey Type	Ref	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Wader	B111	17/06/2020	11:31:00	RP	1	PB4	In suitable breeding habitat	JS
Wader	B112	17/06/2020	11:49:00	RP	1	PB4	In suitable breeding habitat	JS
Wader	B113	17/06/2020	11:52:00	RP	1	PB4	In suitable breeding habitat	JS
Wader	B114	17/06/2020	12:07:00	RP	1	PB4	In suitable breeding habitat	JS
Wader	B116	17/06/2020	15:01:00	RP	1	PB4	In suitable breeding habitat	JS
Wader	B119	17/06/2020	15:21:00	RP	2	PB4	In suitable breeding habitat	JS
Gull	B421	18/06/2020		RP	2	PB4	Two Ringed Plover feeding along pond edge	JS
Wader	B143	22/07/2020	09:20:00	RP	2	PB4		JS
Wader	B144	22/07/2020	09:38:00	RP	1	PB4		JS
Wader	B145	22/07/2020	10:15:00	RP	2	PB4		JS
Transect	B440	16/04/2021		RP	1	PB4		JM
Wader	B210	26/04/2021	08:56:00	RP	2	PB4	Pair of Ringed Plover in suitable breeding habitat	TK
Wader	B211	26/04/2021	09:11:00	RP	2	PB4	Pair of Ringed Plover in suitable breeding habitat	TK
Transect	B236	12/05/2021		RP	2	PB4		TK
Transect	B246	24/05/2021		RP	2	PB3		TK
Wader	B257	25/05/2021		RP	2	PB3		TK
Wader	B258	25/05/2021		RP	2	PB3		TK

Breeding Bird Survey Data								
Survey Type	Ref	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Wader	B260	25/05/2021		RP	2	PB3		TK
Wader	B263	26/05/2021		RP	2	PB4		TK
Wader	B271	26/05/2021		RP	1	PB4		TK
Transect	B286	02/06/2021	10:12:00	RP	3	PB4	Pair of Ringed Plover, one chick seen with adult	TK
Transect	B287	02/06/2021	10:20:00	RP	2	PB4	Pair Of Ringed Plover, agitated behaviour, probable breeding	TK
Transect	B289	02/06/2021	11:56:00	RP	2	PB4	Suitable breeding habitat.	TK
Transect	B307	09/06/2021		RP		PB3	Suitable breeding habitat.	TK
Wader	B310	16/06/2021		RP	2	PB4	Pair of Ringed Plover, agitated behaviour	TK
Wader	B311	16/06/2021		RP	2	PB4	Pair of Ringed Plover, agitated behaviour	TK
Wader	B317	17/06/2021		RP	2	PB4	Ringed Plover with chick	TK
Wader	B339	14/07/2021		RP	1	PB4	Ringed Plover in suitable habitat	TK
Wader	B341	14/07/2021		RP	2	PB4	Pair of Ringed Plover, agitated behaviour	TK
Wader	B342	14/07/2021		RP	1	PB4	Ringed Plover in suitable habitat	TK
Wader	B343	14/07/2021		RP	2	PB4	Pair of Ringed Plover, agitated behaviour	TK
Wader	B345	14/07/2021		RP	1	PB4	Ringed Plover in suitable habitat	TK

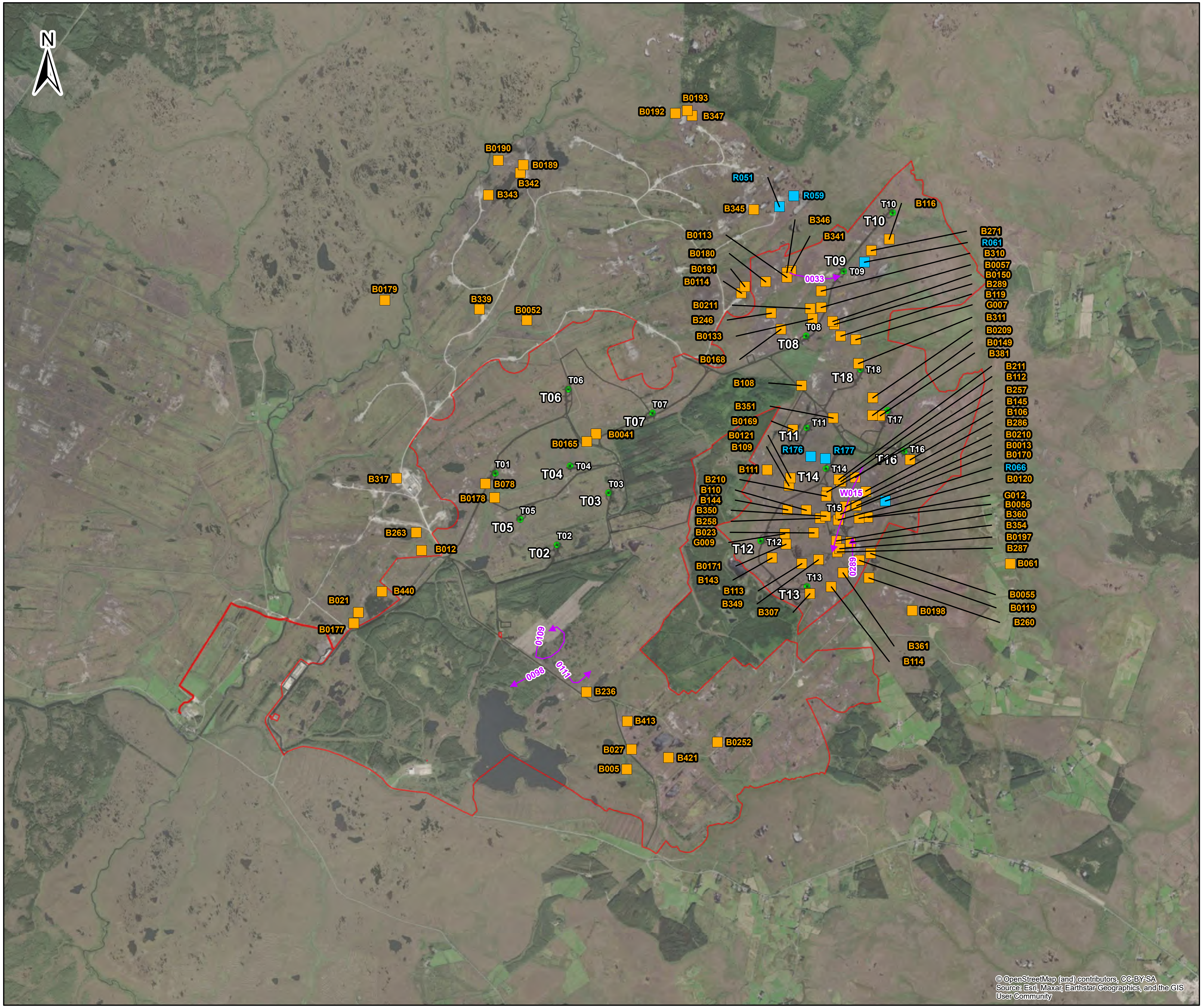
Breeding Bird Survey Data								
Survey Type	Ref	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Wader	B346	14/07/2021		RP	2	PB4	Pair of Ringed Plover, agitated behaviour	TK
Wader	B347	14/07/2021		RP	2	PB4	Pair of Ringed Plover, agitated behaviour	TK
Wader	B349	15/07/2021		RP	2	PB4	Pair of Ringed Plover, agitated behaviour	TK
Wader	B350	15/07/2021		RP	2	PB4	Pair of Ringed Plover, agitated behaviour	TK
Wader	B351	15/07/2021		RP	2	PB4	Pair of Ringed Plover, agitated behaviour	TK
Wader	B354	15/07/2021		RP	1	PB4	Ringed Plover in suitable habitat	TK
Transect	B360	16/07/2021		RP	2	PB4	Pair of Ringed Plover, agitated behaviour	TK
Transect	B361	16/07/2021		RP	2	PB4	Pair of Ringed Plover, agitated behaviour	TK
Wader	B381	19/08/2021	09:48:00	RP	1	PB4	Ringed Plover in suitable habitat	
Transect	B0013	08/04/2022	11:06:00	RP	4	PB4	Two pairs of Ringed Plover seen in flight over area of degraded bog, suitable breeding habitat	TK
Transect	B0041	26/04/2022		RP	2	PB4	Pair of Ringed Plover in suitable nesting habitat	TK
Wader	B0052	27/04/2022		RP	2	PB4	Pair of Ringed Plover in suitable nesting habitat	TK
Wader	B0055	28/04/2022		RP	2	PB4	Pair of Ringed Plover in suitable nesting habitat	TK
Wader	B0056	28/04/2022		RP	2	PB4	Pair of Ringed Plover in suitable nesting habitat	TK
Wader	B0057	28/04/2022		RP	2	PB4	Pair of Ringed Plover in suitable nesting habitat	TK

Breeding Bird Survey Data								
Survey Type	Ref	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Wader	B0113	25/05/2022		RP	2	PB4	Pair of Ringed Plover in suitable breeding habitat	TK
Wader	B0114	25/05/2022		RP	1	PB4	Ringed Plover in suitable breeding habitat	TK
Wader	B0119	26/05/2022		RP	2	PB4	Pair of Ringed Plover in suitable breeding habitat	TK
Wader	B0120	26/05/2022		RP	1	PB4	Ringed Plover in suitable breeding habitat	TK
Wader	B0121	26/05/2022		RP	2	PB4	Pair of Ringed Plover in suitable breeding habitat	TK
Transect	B0133	27/05/2022		RP	2	PB4	Pair of Ringed Plover in suitable breeding habitat	TK
Transect	B0149	15/06/2022	09:50:00	RP	2	PB4	Pair of Ringed Plover in suitable Breeding habitat. Alarm calling	TK
Transect	B0150	15/06/2022	10:40:00	RP	2	PB4	Pair of Ringed Plover in suitable Breeding habitat. Alarm calling	TK
Transect	B0165	20/06/2022	11:32:00	RP	1	PB4	Ringed Plover in suitable breeding habitat	TK
Wader	B0168	21/06/2022	10:56:00	RP	2	PB4	Pair of Ringed Plover on degraded bog, agitated behaviour	TK
Wader	B0169	21/06/2022	11:33:00	RP	2	PB4	Pair of Ringed Plover on degraded bog, agitated behaviour	TK

Breeding Bird Survey Data								
Survey Type	Ref	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Wader	B0170	21/06/2022	11:50:00	RP	2	PB4	Pair of Ringed Plover on degraded bog, agitated behaviour	TK
Wader	B0171	21/06/2022	12:10:00	RP	2	PB4	Pair of Ringed Plover took flight, landed again on bog	TK
Wader	B0177	23/06/2022		RP	2	PB4	Pair of Ringed Plover on bog, agitated behaviour	TK
Wader	B0178	23/06/2022		RP	1	PB4	Ringed Plover in suitable habitat	TK
Wader	B0179	23/06/2022		RP	1	PB4	Ringed Plover in suitable habitat	TK
Wader	B0180	23/06/2022		RP	1	PB4	Ringed Plover in suitable habitat	TK
Wader	B0189	13/07/2022	10:11:00	RP	2	PB4	Pair of Ringed Plover at edge of small lake, agitated behaviour.	TK
Wader	B0190	13/07/2022	12:02:00	RP	1	PB4	Ringed Plover in suitable habitat	TK
Wader	B0191	13/07/2022	12:21:00	RP	2	PB4	Pair of Ringed Plover in suitable habitat	TK
Wader	B0192	13/07/2022	12:30:00	RP	1	PB4	Ringed Plover in suitable habitat	TK
Wader	B0193	13/07/2022	12:35:00	RP	1	PB4	Ringed Plover in suitable habitat	TK
Wader	B0197	14/07/2022	10:23:00	RP	3	PB4	One adult and two juvenile Ringed Plovers in suitable breeding habitat	TK
Wader	B0198	14/07/2022	12:08:00	RP	2	PB4	Pair of Ringed Plover in suitable habitat	TK

Breeding Bird Survey Data								
Survey Type	Ref	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B0209	15/07/2022	09:24:00	RP	1	PB4	Ringed Plover in suitable habitat	TK
Transect	B0210	15/07/2022	10:11:00	RP	2	PB4	Ringed Plovers in suitable habitat	TK
Transect	B0211	15/07/2022	11:45:00	RP	1	PB4	Ringed Plover in suitable habitat	TK

RINGED PLOVER FIGURES



Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Ringed Plover (Charadrius hiaticula) - Breeding Season 2020-2022
- Ringed Plover (Charadrius hiaticula) - Non-Breeding Season 2020-2022
- Ringed Plover (Charadrius hiaticula) - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D01	24/03/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 26 Ringed Plover (Charadrius hiaticula) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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Draft:

10889-050-RP-FLIGHT-TOB-D01

D01

27.0 Common Sandpiper

Vantage Points Surveys													
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0102	Breeding	4	13/05/2020	17:00	CS	2	15						JM
0107	Breeding	4	10/06/2020	08:23	CS	2	10					Likely Breeding	JM
0252	Breeding	6	11/06/2020	08:16	CS	2	25						JM
0116	Breeding	4	15/07/2020	18:05	CS	2	15					Adults briefly in flight	JM
0126	Breeding	4	14/04/2021	08:12	CS	1	10	15				Adult calling and flying	JM
0129	Breeding	4	06/05/2021	18:12	CS	1	25					Male in brief song flight	JM
0267	Breeding	6	04/06/2021	10:12	CS	2	35					Pair in song flight near VP	JM

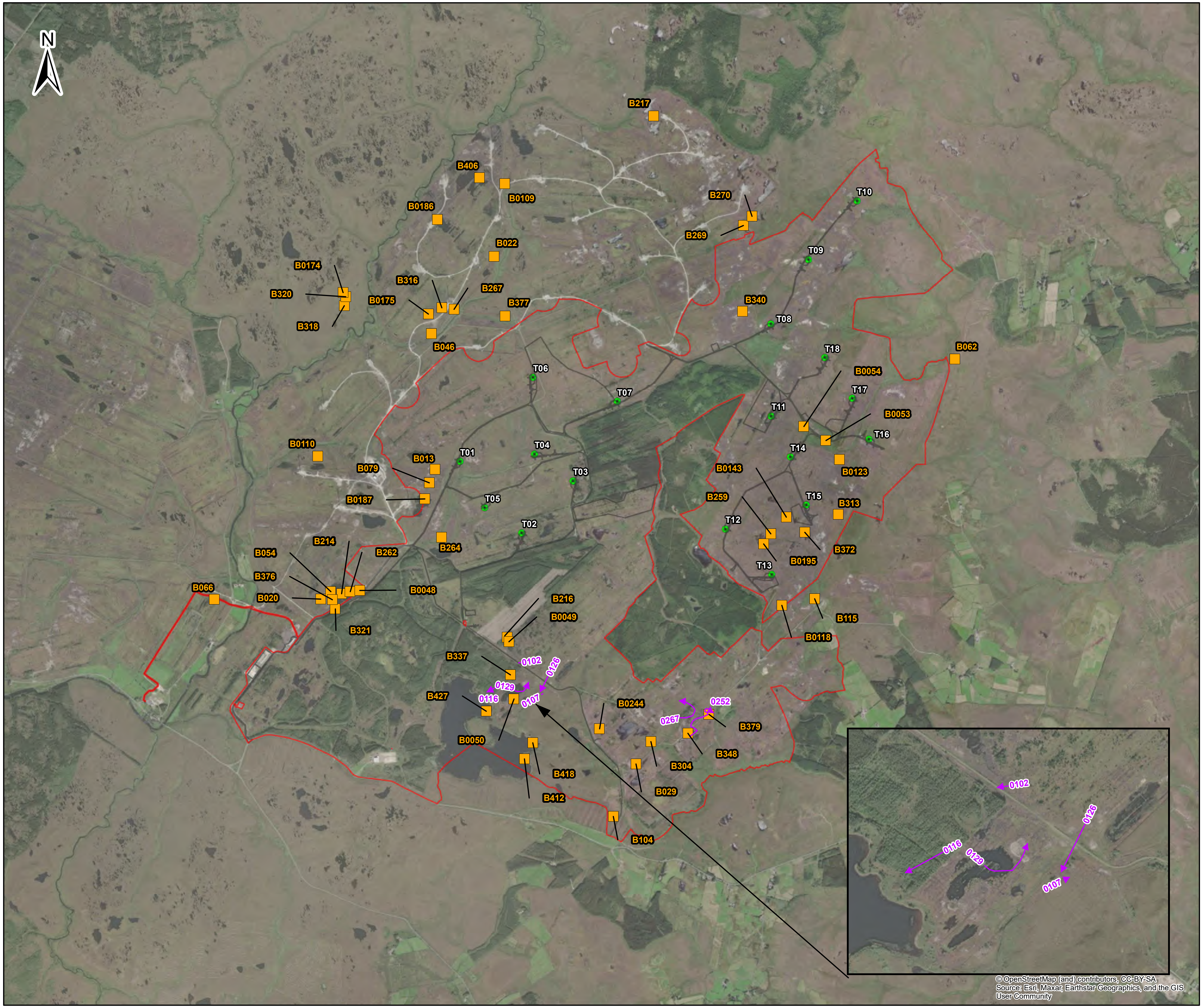
Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Wader	B020	21/04/2020	09:40:00	CS	1	PB3	Displaying pair	JM
Wader	B022	22/04/2020	07:50:00	CS	1	PB3	Calling male	JM
Gull	B406	24/04/2020	11:25:00	CS	1			JS
Gull	B412	24/04/2020	13:16:00	CS	1			JS
Transect	B013	29/04/2020	09:00:00	CS	2		Displaying pair	JM

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B029	19/05/2020	08:49:00	CS	1		Flew from road to pond	JS
Transect	B054	19/05/2020	09:40:00	CS	2	WD4		JM
Wader	B046	20/05/2020	13:17:00	CS	1	PB3	Flushed and flew southwest down river/stream	JS
Wader	B062	20/05/2020	11:45:00	CS	2	PB4	Pair in flight near small lake	JM
Gull	B418	21/05/2020	09:37:00	CS	1		Common Sandpiper at ING 100296 319915, flew from shore S over water and turned east	JS
Transect	B066	16/06/2020	07:30-15:30	CS	2	WD4		JM
Transect	B079	16/06/2020	12:09:00	CS	1	PB4		JS
Transect	B104	16/06/2020	08:19:00	CS	1	PB4		JS
Wader	B115	17/06/2020	12:13:00	CS	1	PB4	In suitable breeding habitat	JS
Gull	B427	18/06/2020		CS	1	PB4	One Common Sandpiper flushed from lake shore of tombola	JS
Wader	B214	27/04/2021		CS	2	PB4	Pair of Common Sandpipers in suitable breeding habitat	TK
Wader	B216	27/04/2021		CS	2	PB4	Pair of Common Sandpipers in suitable breeding habitat	TK
Wader	B217	27/04/2021		CS	2	PB4	Pair of Common Sandpipers in suitable breeding habitat	TK
Wader	B259	25/05/2021		CS	1	PB3		TK
Wader	B262	26/05/2021		CS	1	FL1		TK
Wader	B264	26/05/2021		CS	1	PB4		TK
Wader	B267	26/05/2021		CS	1	PB4		TK
Wader	B269	26/05/2021		CS	1	PB4		TK
Wader	B270	26/05/2021		CS	1	PB4		TK
Transect	B304	09/06/2021		CS	2	PB4	Agitated behaviour	TK

Breeding Bird Survey Data								
Survey Type	**Ref.**	**Date**	**Time**	**BTO Code**	**Abundance**	**Habitat Code**	**Key Observations**	**Surveyor**
Wader	B313	16/06/2021		CS	1	PB4	Common Sandpiper alarm calling	TK
Wader	B316	17/06/2021		CS	2	PB4	Pair of Common Sandpipers	TK
Wader	B318	17/06/2021		CS	1	PB4	Common Sandpiper agitated behaviour	TK
Wader	B320	17/06/2021		CS	1	PB4	Common Sandpiper agitated behaviour	TK
Wader	B321	17/06/2021		CS	2	PB4	Pair of Common Sandpipers	TK
Wader	B337	14/07/2021		CS	1	PB4	Common Sandpiper. Agitated Behaviour.	TK
Wader	B340	14/07/2021		CS	1	PB4	Common Sandpiper. Agitated Behaviour.	TK
Wader	B348	15/07/2021		CS	1	PB4	Common Sandpiper. Agitated Behaviour.	TK
Transect	B372	16/08/2021		CS	1	PB3	Common Sandpiper. Alarm calling	TK
Wader	B376	17/08/2021		CS	1	PB4	Common Sandpiper. Alarm calling	TK
Wader	B377	17/08/2021		CS	1	PB4	Common Sandpiper. Alarm calling	TK
Wader	B379	19/08/2021	08:12:00	CS	1	PB4	Common Sandpiper in suitable habitat	
Wader	B0048	27/04/2022		CS	2	PB4	Pair of Common Sandpiper in suitable breeding habitat.	TK
Wader	B0049	27/04/2022		CS	1	PB4	Common Sandpiper in suitable breeding habitat.	TK
Wader	B0050	27/04/2022		CS	1	PB4	Common Sandpiper in suitable breeding habitat.	TK
Wader	B0053	28/04/2022		CS	1	PB4	One Common Sandpiper in suitable nesting habitat.	TK
Wader	B0054	28/04/2022		CS	2	PB4	Pair of Common Sandpiper in suitable breeding habitat.	TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Wader	B0109	25/05/2022		CS	1	PB4	Common Sandpiper in suitable breeding habitat	TK
Wader	B0110	25/05/2022		CS	1	PB4	Common Sandpiper in suitable breeding habitat	TK
Wader	B0118	26/05/2022		CS	1	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0123	27/05/2022		CS	1	PB4	Common Sandpiper in suitable breeding habitat	TK
Transect	B0143	15/06/2022	11:50:00	CS	1	PB4	Common Sandpiper at edge of small pond, suitable breeding habitat.	TK
Wader	B0174	23/06/2022		CS	1	PB4	Pair of Common Sandpipers in suitable habitat	TK
Wader	B0175	23/06/2022		CS	2	PB4	Pair of Common Sandpipers at edge of lake, agitated behaviour	TK
Wader	B0186	13/07/2022	10:32:00	CS	1	PB4	Common Sandpiper in suitable habitat	TK
Wader	B0187	13/07/2022	11:05:00	CS	1	PB4	Common Sandpiper circling over small lake, alarm calling	TK
Wader	B0195	14/07/2022	10:34:00	CS	1	PB4	One Common Sandpiper in suitable breeding habitat.	TK

COMMON SANDPIPER FIGURES



Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Common Sandpiper (Actitis hypoleucos) - Breeding Season 2020-2022
- Common Sandpiper (Actitis hypoleucos) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

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Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D01	24/03/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 27 Common Sandpiper (Actitis hypoleucos) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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Draft: D01

10889-051-CS-FLIGHT-TOB-D01

28.0 Woodcock

Winter Transects Surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R016	Non-Breeding	Western Transect	18/12/2020	WK	1	WS	Woodcock flushed from ground in area of scrub and blanket bog	TK
R056	Non-Breeding	Western Transect	24/02/2021	WK	1	PB4	Flushed from undergrowth. Flew south into conifer forestry	SC

WOODCOCK FIGURES

Legend

- Planning Application
- Proposed Infrastructure
- Proposed Turbine Locations
- Woodcock (Scolopax rusticola) - Non-Breeding Season 2020-2022

0 0.5 1 1.5 2
Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client:

Bord na Móna

Project:

Oweninny Wind Farm
Phase 3

Title:

Appendix 8-1 Figure 28
Woodcock (Scolopax rusticola)
observations over the survey period
(Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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Draft: D01

10889-052-WK-FLIGHT-TOB-D01

29.0 Black-Headed Gull

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
W047	Non-Breeding	7	20/01/2022	11:16	BH	2		15	45				TK

BLACK-HEADED GULL FIGURES

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Black-headed Gull (Chroicocephalus ridibundus) - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client:
Bord na Móna

Project:
Oweninny Wind Farm
Phase 3

Title: Appendix 8-1 Figure 29
Black-headed Gull
(Chroicocephalus ridibundus)
observations over the survey period
(Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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10889-053-BH-FLIGHT-TOB-D01

Draft: D01

30.0 Lesser Black-Backed Gull

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0002	Breeding	1	26/06/2019	13:09	LB	1		37		120		2nd year bird	MH
0276	Breeding	7	23/08/2019	12:53	LB	1		70				Immature	JH
0091	Non-Breeding	4	20/01/2020	12:15	LB	1		150					MH
0095	Non-Breeding	4	20/03/2020	09:12	LB	1		27					MH
0288	Breeding	7	20/04/2020	16:18	LB	2	145					Two Lesser Black-backed Gulls in flight, travelling.	TK
0029	Breeding	5	21/04/2020	06:25	LB	7		27				Commuting from west to east	JS
0160	Breeding	5	21/04/2020	08:38	LB	2		17				Flew from south to north over VP continued north, out of view	JS
0165	Breeding	5	21/04/2020	11.4	LB	1	14					Seen flying briefly, landed in water and began to wash/preen. Drifting towards spit to east of lake	JS
0171	Breeding	7	21/04/2020	12:18	LB	2		132				Two Lesser Black-backed Gulls circling briefly over small lake before flying East.	JS
0290	Breeding	1	21/04/2020	16:48	LB	1			168			Lesser Black-backed Gull in flight	TK
0180	Breeding	5	12/05/2020	17:05	LB	3		40					JM
0031	Breeding	1	13/05/2020	19:39	LB	3					218	Three Lesser Black-backed Gulls in flight	JM
0096	Breeding	4	13/05/2020	11:05	LB	2	40						JM

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0294	Breeding	7	06/07/2020	11:40	LB	1	41					Lesser Black-backed Gulls in flight, landed near small lake	TK
0295	Breeding	7	06/07/2020	12:18	LB	1	70					Lesser Black-backed Gull in flight, took flight from near small lake	TK
0194	Breeding	5	14/07/2020	19:11	LB	1		100				Adult bird flying west to lake	JM
0061	Breeding	3	15/07/2020	13:12	LB	1	35	20				Lesser Black-backed Gull in flight across site	TK
0209	Breeding	5	13/04/2021	12:41	LB	2		30	48			Two Adults flying west over lake and bog	TK
0057	Breeding	2	05/05/2021	19:52	LB	2			130			Two Lesser Black-backed Gulls flying south over site	TK
0070	Breeding	3	03/06/2021	12:52	LB	3				85		Three Lesser Black-backed Gulls in flight over site	TK
0131	Breeding	4	06/07/2021	18:36	LB	2	45	30				Two Lesser Black-backed Gulls flying over site/lough Dahybaun	TK
0132	Breeding	4	06/07/2021	19:02	LB	2		68				Two Lesser Black-backed Gulls flying over site	TK
0133	Breeding	4	06/07/2021	19:21	LB	2	35	70				Lesser Black-backed Gulls flying over site/lough Dahybaun	TK
0216	Breeding	5	07/07/2021	18:21	LB	1		35				Lesser Black-backed Gull flying over lake.	TK
0303	Breeding	7	13/07/2021	19:48	LB	1		20	95			Lesser Black-backed Gull flying over	TK
0071	Breeding	3	09/09/2021	14:17	LB	2	40	66				Pair flying south along ridge	JM

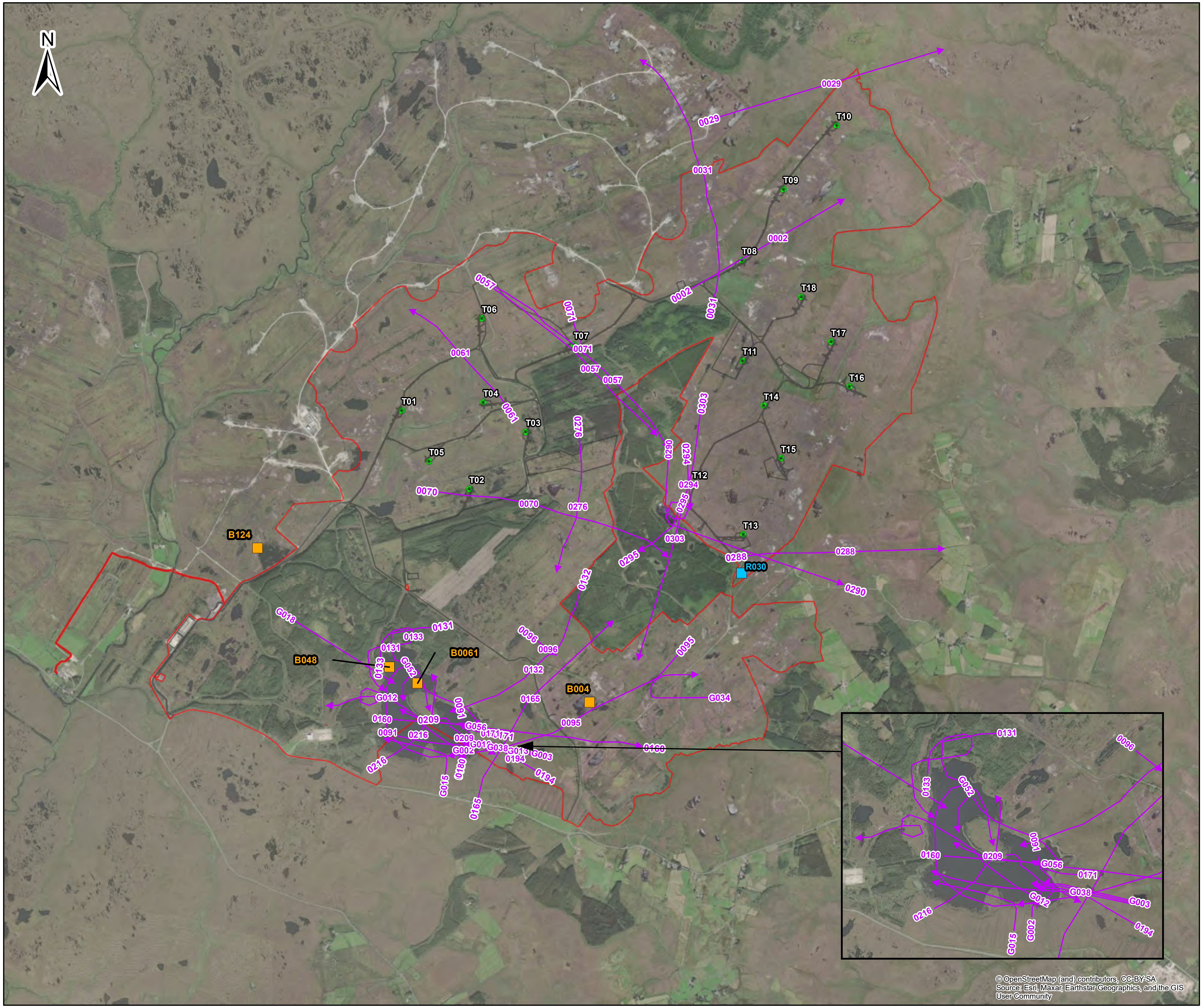
Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
B03	Breeding	5	04/04/2022	17:55	LB	2	5	5				Pair of Lesser Black-backed Gulls flying west and landing on lake	KL
B04	Breeding	5	04/04/2022	18:25	LB	2	7					Pair of Lesser Black-backed Gulls flying low and landing on lake similar to flightline 2	KL
B06	Breeding	5	04/04/2022	18:35	LB	2	30	20	10			Pair of LB took off from lake and flew to E shore, circled and then flew off	KL
B07	Breeding	5	04/04/2022	18:53	LB	2	5	30	20			Same as ref 2	KL
B09	Breeding	5	04/04/2022	19:13	LB	1	10	10				Lesser Black-backed Gull flew slowly along edge of lake and landed	KL
B11	Breeding	5	04/04/2022	19:30	LB	2	5	30				Pair of Lesser Black-backed Gulls flew in from in front of VP over lake to west of shore.	KL
B27	Breeding	4	11/05/2022	13:44	LB	1				15		Single Lesser Black-backed Gull flying east	KL
B43	Breeding	6	16/06/2022	15:53	LB	2		60				Two Lesser Black-backed Gulls flew west and then turned and headed back east	KL
B47	Breeding	5	23/06/2022	11:15	LB	1	80					Flying west over lake	JC
B49	Breeding	5	23/06/2022	12:37	LB	1	100					Flying west over lake	JC
B61	Breeding	5	12/08/2022	10:47	LB	1	2	40				LB seen flying over lake and landing on east bank	KL

Winter Transects Surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R030	Non-Breeding	Western Transect	25/11/2020	LB	1	PB4	Flying; Commuting southwest from bog and over conifer plantation	SC

Roost Watch Survey Observations									
Season	Site	HHVP	Date	BTO	No. of Birds	Time of flight	Habitat Code	Activity	Surveyor
Non-Breeding	Oweninny	HHVP 1	09/02/2021	LB	1	16:42	FL1, PB3	Single bird flying over lake flew east	JM

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B004	28/04/2020	08:00:00	LB	1		Bird on lake	JM
Gull	B048	21/05/2020	09:37:00	LB	1		One Lesser Black-backed Gull flew over lake from east to west	JS
Gull	B124	23/07/2020	11:43:00	LB	1			JS
Gull	B0061	29/04/2022		LB	1	FL1	One Lesser Black-backed Gull circling over Lough Dahybaun	TK

LESSER BLACK-BACKED GULL FIGURES



Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Lesser Black-backed Gull (Larus fuscus) - Breeding Season 2020-2022
- Lesser Black-backed Gull (Larus fuscus) - Non-Breeding Season 2020-2022
- Lesser Black-backed Gull (Larus fuscus) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
Kilometres

NOTES

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D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 29
Lesser Black-backed Gull (Larus fuscus) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:31,960

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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Draft: D01

10889-054-LB-FLIGHT-TOB-D01

31.0 Herring Gull

Vantage Points Surveys													
Ref.	Season	VP	Date	Observation Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
W031	Non-Breeding	5	13/12/2021	11:06	HG	1			95			Herring Gull flying north over site	TK

HERRING GULL

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Herring Gull (Larus argentatus) - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
Kilometres

NOTES

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D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client:

Bord na Móna

Project:

Oweninny Wind Farm
Phase 3

Title:

Appendix 8-1 Figure 30
Herring Gull (Larus argentatus)
observations over the survey period
(Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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Draft: D01

10889-055-HG-FLIGHT-TOB-D01

32.0 Common Gull

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0081	Breeding	4	24/07/2019	14:30	CM	1		260				Circling over lake	MH
0161	Breeding	5	21/04/2020	07:37	CM	3	7					Flew from southeast, calling and circling over Lough Nagrumpaun before landing	JS
0162	Breeding	5	21/04/2020	07:50	CM	3	14					Left L. Nagrumpaun over L. Dayhbaun and landed on small spit on lake shore	JS
0163	Breeding	5	21/04/2020	08:15	CM	2	13					Flew from spit back to L. Nagrumpaun	JS
0164	Breeding	5	21/04/2020	08:37	CM	2	10					Flew back to spit, same flight as flight ref. 3	JS
0166	Breeding	5	21/04/2020	08:49	CM	2	24					Left spit and flew south past VP	JS
0167	Breeding	5	21/04/2020	08:51	CM	2	22					Same pair as flight ref 7, flew from south, low over bog and landed on L. Nagrumpaun	JS
0168	Breeding	5	21/04/2020	10:43	CM	3	40					Three bird flying/circling over water and land	JS
0169	Breeding	5	21/04/2020	11:16	CM	2		17				Flew from north to south calling	JS
0170	Breeding	5	21/04/2020	11:25	CM	6		22				Flock has similar flightlines as flightline ref. 2	JS
0175	Breeding	5	12/05/2020	11:00	CM	2		35					JM
0103	Breeding	4	13/05/2020	20:05	CM	2		100					JM
0245	Breeding	6	14/05/2020	11:45	CM	2	45						JM

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0292	Breeding	7	08/06/2020	05:31	CM	1	135					Flew towards VP alarm calling, flew back towards small lake. Could possibly be breeding near lake, although initial impressions are that it is too small.	TK
0293	Breeding	7	08/06/2020	06:11	CM	1	45					Flew from ground near small lake	TK
0183	Breeding	5	09/06/2020	07:45	CM	2	60					Common Gulls present on both lakes throughout the day	JM
0187	Breeding	5	09/06/2020	11:50	CM	1	55					Flew over bog	JM
0192	Breeding	5	14/07/2020	14:36	CM	2						Adult and juvenile present at lake	JM
0193	Breeding	5	14/07/2020	16:41	CM	3	50	45				Three adults flew from large lake east to small lake	JM
0256	Breeding	6	16/07/2020	21:04	CM	2		30				Adult flying west past VP	JM
0263	Breeding	6	15/04/2021	08:15	CM	1		55				Single bird flying SW	JM
0211	Breeding	5	05/05/2021	15:40	CM	2	18	43	50			Territorial pair chasing each other around lake and over bog	JM
0301	Breeding	7	11/05/2021	09:16	CM	2		35	90				JM
0268	Breeding	6	04/06/2021	14:14	CM	2		105				Pair of Common Gulls flying over VP to southwest	JM
0302	Breeding	7	18/06/2021	09:16	CM	2	20	25				Pair of Common Gulls flying over	TK
0215	Breeding	5	07/07/2021	16:18	CM	1	25	45				Common Gulls flying over lake	TK
0135	Breeding	4	11/08/2021	15:33	CM	1	30	20	20				TK
B17	Breeding	5	25/04/2022	14:38	CM	2	20	10				Two Common Gulls took off from edge of lake, circled and the flew east to smaller pool	KL

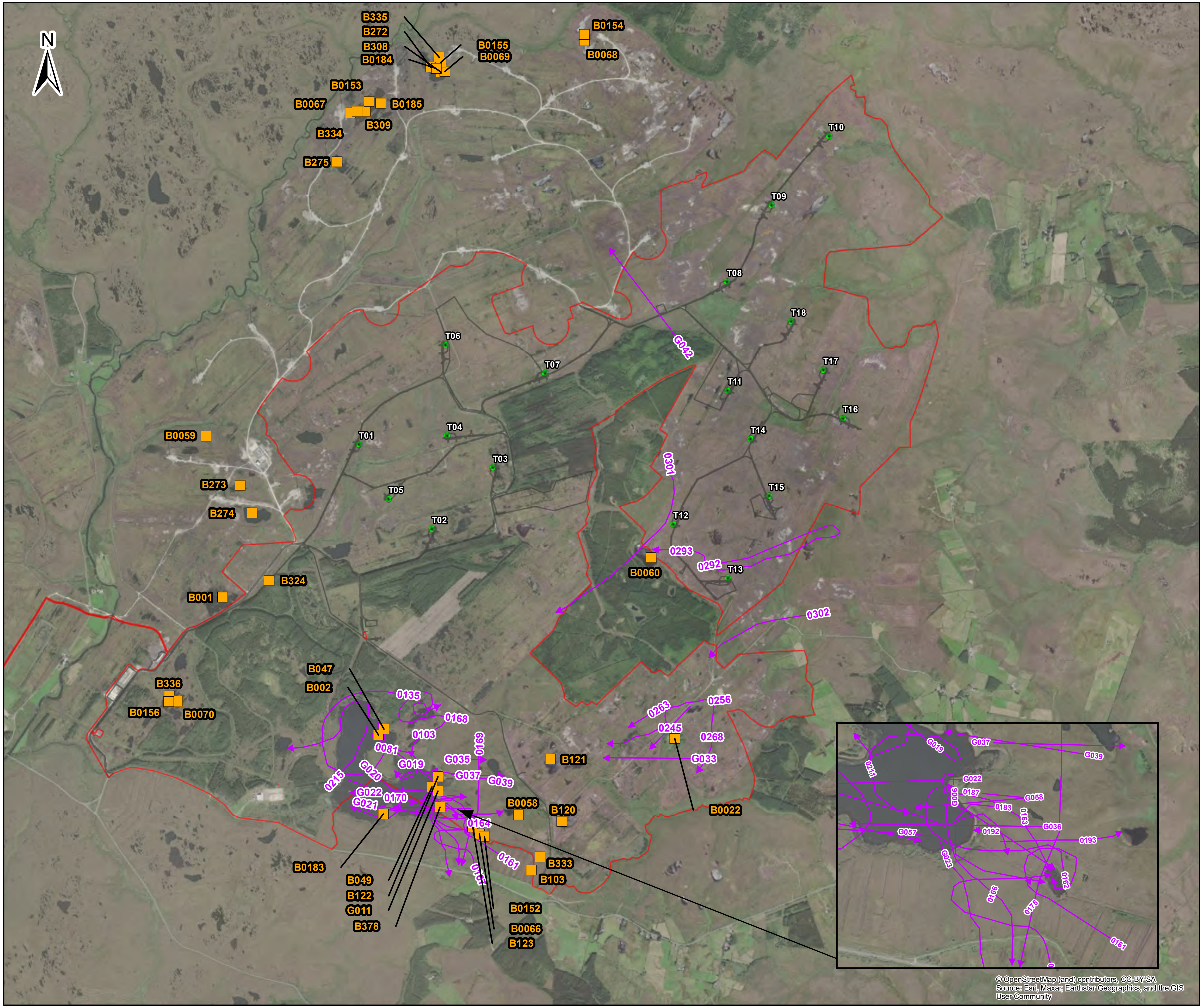
Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
B28	Breeding	5	13/05/2022	06:23	CM	1	30	90				Common Gull flew slowly along far bank and then disappeared behind island	KL
B29	Breeding	5	13/05/2022	06:33	CM	2		45	10			Two Common Gulls flew from island towards VP then turned and headed west	KL
B30	Breeding	5	13/05/2022	07:15	CM	1	10	20				Common Gull flew along bank and disappeared behind ridge	KL
B31	Breeding	5	13/05/2022	07:21	CM	2	70	60				Two Common Gulls flew west across lake	KL
B32	Breeding	5	13/05/2022	10:26	CM	2	10	50	50			Two Common Gulls flew over VP towards fields behind	KL
B42	Breeding	6	16/06/2022	15:53	CM			40				Four Common Gulls flew west behind VP	KL
B35	Breeding	2	17/06/2022	08:29	CM	3		25	30			Three Common Gulls flew over woodland heading northwest	KL
B44	Breeding	5	23/06/2022	14:10	CM	1	30					Flew east	JC
B45	Breeding	5	23/06/2022	14:53	CM	2	50					Flew west over lake	JC
B46	Breeding	5	23/06/2022	15:00	CM	2		40				Flying east	JC
B48	Breeding	5	23/06/2022	11;24	CM	1	70					Flying west over lake	JC
B50	Breeding	5	23/06/2022	12:41	CM	2	80					Flying west over lake	JC
B51	Breeding	5	23/06/2022	13:02	CM	1	50					landed on lake	JC

Vantage Point Non-Flight Observations									
Season	Site	VP	Date	Time	BTO Code	Abundance	Habitat Code	Activity	Surveyor
Breeding	Oweninny	5	25/04/2022	14:23	CM	2	FI2	Foraging; Two Common Gulls foraging on the edge of the lake	KL

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Gull	B001	24/04/2020	08:23:00	CM	2		Common Gull pair, circled over water and landed on lake	JS
Gull	B002	24/04/2020	13:16:00	CM	2			JS
Gull	B047	21/05/2020	09:10:00	CM	2		Two Common Gulls flew over lake heading south. Sparrowhawk flew over lake heading north	JS
Gull	B049	21/05/2020	10:40:00	CM	1		Common Gull was sitting on stump in lake and began to mob	JS
Transect	B103	16/06/2020	08:19:00	CM	1	PB4		JS
Gull	B120	18/06/2020		CM	1	PB4	Flying over	JS
Gull	B121	18/06/2020		CM	3	PB4	Flying over	JS
Gull	B122	18/06/2020		CM	7	PB4	Flying over/mobbing	JS
Gull	B123	18/06/2020		CM	1	PB4	Flying over/mobbing	JS
Gull	B272	27/05/2021		CM	1	FL1	Common Gull sitting on nest on small tussock in middle of small lake	TK
Gull	B275	27/05/2021		CM	1	FL1		TK
Gull	B274	27/05/2021		CM	5	FL1		TK
Gull	B273	27/05/2021		CM	2	FL1		TK
Gull	B308	15/06/2021		CM	1	FL1	Adult seen sitting on nest	TK
Gull	B309	15/06/2021		CM	1	FL1	Adult seen sitting on nest	TK
Transect	B324	09/07/2021		CM	3	PB3		JC
Transect	B333	09/07/2021		CM	2	PB3		JC
Gull	B334	13/07/2021	08:50:00	CM	2	FL1	Pair of Common Gulls, agitated behaviour over probable nest site	TK
Gull	B335	13/07/2021	10:05:00	CM	4	FL1	Adults and two well developed chicks/juveniles.	TK
Gull	B336	13/07/2021	10:25:00	CM	2	FL1	Pair of Common Gulls, agitated behaviour over probable nest site	TK
Gull	B378	18/08/2021		CM	1	FL1	Adult Common Gull resting at edge of Lough Dahybaun	TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B0022	26/04/2022		CM	2	FL1	Pair of Common Gulls on small lake, possibly breeding	TK
Gull	B0058	29/04/2022		CM	1	FL1	One Common Gull on small lake, took flight, possible suitable nesting site.	TK
Gull	B0059	29/04/2022		CM	4	PB4	Four Common Gulls circling in the air together	TK
Gull	B0060	29/04/2022		CM	1	FL1	One Common Gull circling over Lough Nacrom, possible nesting site	TK
Gull	B0066	23/05/2022	11:40:00	CM	6	FL1	Adult on nest	TK
Gull	B0067	23/05/2022	13:05:00	CM	1	FL1	Adult on nest	TK
Gull	B0068	23/05/2022	14:26:00	CM	1	FL1	Adult on nest	TK
Gull	B0069	23/05/2022	15:00:00	CM	1	FL1	Adult on nest	TK
Gull	B0070	23/05/2022	16:12:00	CM	6	FL1	Three Pairs of Common Gulls on Small Lake, three adults on nests	TK
Gull	B0152	16/06/2022	11:10:00	CM	2	FL1	Three nests, Common Gull adults on two nests	TK
Gull	B0153	16/06/2022	11:50:00	CM	1	FL1	Adult Common Gull on nest	TK
Gull	B0154	16/06/2022	12:05:00	CM	1	FL1	Adult Common Gull on nest	TK
Gull	B0155	16/06/2022	12:18:00	CM	1	FL1	Adult Common Gull on nest	TK
Gull	B0156	16/06/2022	13:46:00	CM	3	FL1	2 chicks in nest	TK
Gull	B0183	12/07/2022	12:56:00	CM	1	FL1	Adult flying over lake	TK
Gull	B0184	12/07/2022	13:48:00	CM	3	FL1	One Adult on lake with two fully developed fledglings	TK
Gull	B0185	12/07/2022	14:07:00	CM	4	FL1	One adult on lake with three fully developed fledglings	TK

COMMON GULL FIGURES



Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Common Gull (Larus canus) Flightlines - Breeding Season 2020-2022
- Common Gull (Larus canus) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
Kilometres

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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D01	24/03/2023	Draft issue	S.P	J.S

Client:
Bord na Móna

Project:
Oweninny Wind Farm Phase 3

Title:
Appendix 8-1 Figure 31
Common Gull (Larus canus) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:29,575

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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Draft:
D01
10889-056-CM-FLIGHT-TOB-D01

33.0 Great Black-Backed Gull

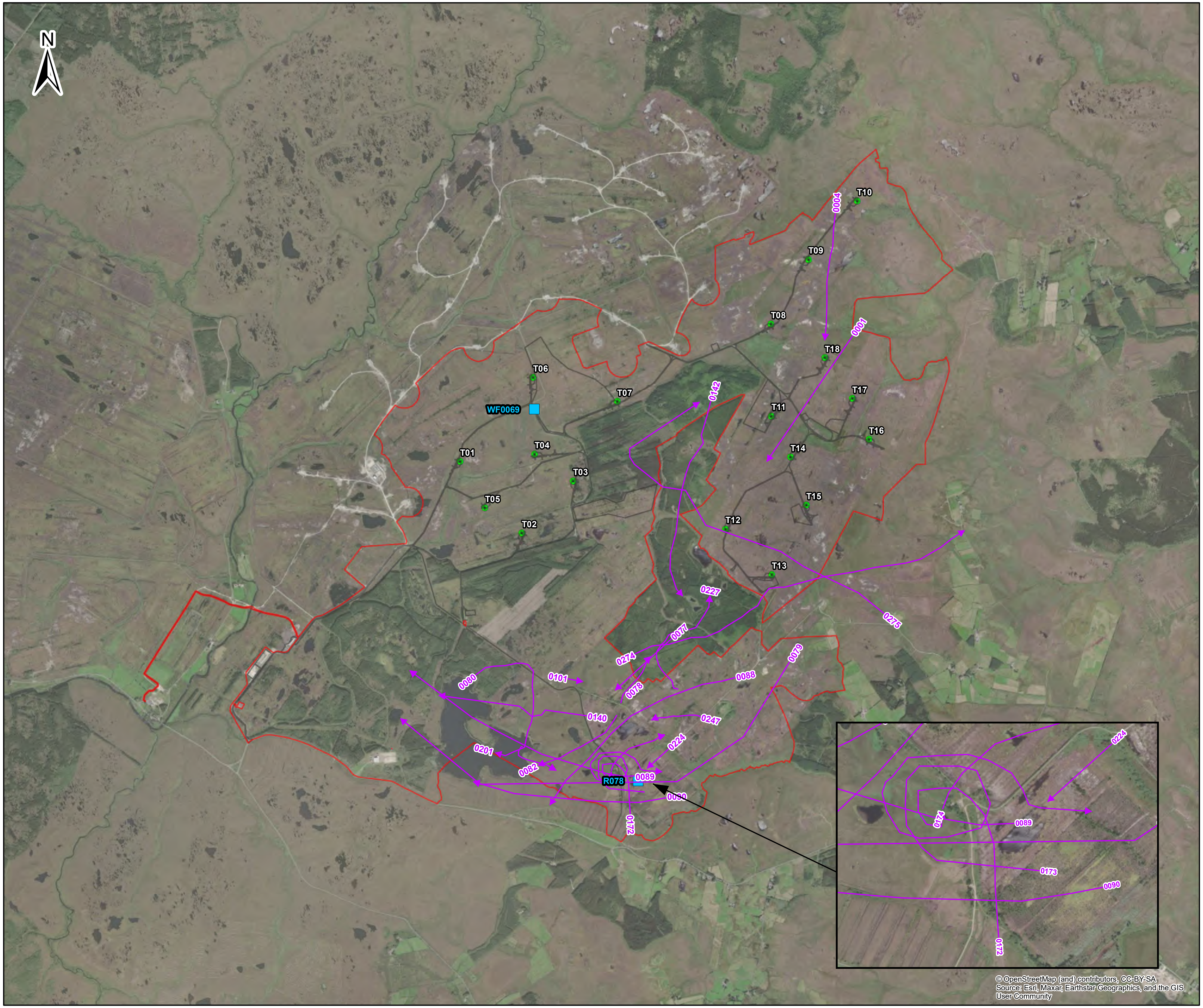
Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0224	Breeding	6	27/04/2019	08:50	GB	1	12					Flying south	MH
0227	Breeding	6	27/04/2019	14:38	GB	1		66				Over Corvoderry	MH
0274	Breeding	7	01/06/2019	11:32	GB	1	70	48					JA
0082	Breeding	5	14/06/2019	11:19	GB	1	30	150				Circling and dropped to lake	BM
0140	Breeding	4	14/06/2019	11:19	GB	1	100					Over forest and bog	MH
0142	Breeding	5	14/06/2019	11:19	GB	1	20	160					BM
0001	Breeding	1	19/06/2019	13:30	GB	1		26					MH
0004	Breeding	1	23/07/2019	10:00	GB	1		45					MH
0078	Breeding	4	23/07/2019	13:07	GB	1		45				2nd winter bird	MH
0079	Breeding	4	23/07/2019	15:34	GB	1		150				Adult	MH
0080	Breeding	4	24/07/2019	13:59	GB	1		70				Hunting	MH
0275	Breeding	7	29/07/2019	18:39	GB	1	24	300					JH
0088	Non-Breeding	4	07/12/2019	14:50	GB	1		65					MH
0089	Non-Breeding	4	13/12/2019	15:35	GB	1		150					MH
0090	Non-Breeding	4	13/12/2019	15:56	GB	1		30					MH

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
0172	Breeding	5	21/04/2020	11:54	GB	2	10	0	0	0	0	Pair flying low over ground/quartering and landed	JS
0173	Breeding	5	21/04/2020	11:56	GB	1	55	15	0	0	0	Individual began circling pair on ground then drifted east gaining height	JS
0174	Breeding	5	21/04/2020	11:56	GB	2	10	0	0	0	0	Pair form flight ref. 5, rose when bird from flight ref. 6 circled, both drifted east	JS
0077	Breeding	4	22/04/2020	09:13	GB	2	0	17	0	0	0	Pair flew from northeast and travelled south	JS
0101	Breeding	4	13/05/2020	13:45	GB	1	10	30	45	0	0		JM
0247	Breeding	6	14/05/2020	14:35	GB	2	20	40	0	0	0		JM
0201	Non-Breeding	5	09/12/2020	14:45	GB	1	80	30				Single bird in flight heading east	JM

Waterfowl Surveys							
Season	Ref.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
Non-Breeding	WF0069	24/02/2021	GB	1	PB4	Commuting southwest, heading southwest at 10m high	SC

Winter Transects Surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R078	Non-Breeding	Western Transect	30/03/2021	GB	2	PB4	Standing on side of lake	SC

GREAT BLACK-BACKED GULL FIGURE



Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Great Black-backed Gull (Larus marinus) - Non-Breeding Season 2020-2022
- Great Black-backed Gull (Larus marinus) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 33
Great Black-backed Gull (Larus marinus) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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10889-057-GB-FLIGHT-TOB-D01

Draft: D01

34.0 Meadow Pipit

Vantage Points Surveys													
Ref.	Season	VP	Date	Time	BTO Code	Abundance	Seconds in Band 1 (0-25m)	Seconds in Band 2 (26-50m)	Seconds in Band 3 (51-150m)	Seconds in Band 4 (151-200m)	Seconds in Band 5 (201+m)	Field Notes	Surveyor
B62	Breeding	7	24/08/2022	07:02	MP	6	-	30				Small flock of Meadow Pipits seen flying over bog	KL

Vantage Point Non-Flight Observations									
Season	Site	VP	Date	Time	BTO Code	Abundance	Habitat Code	Activity	Surveyor
Non-Breeding	Oweninny	4	13/10/2021		MP	5	PB3	Five Meadow Pipits seen around VP in suitable habitat	TK
Non-Breeding	Oweninny	5	13/12/2021		MP	2	PB4	Two Meadow Pipits around VP	TK
Non-Breeding	Oweninny	7	16/12/2021	12:18	MP	2	PB4	Three Meadow Pipits around VP	TK
Non-Breeding	Oweninny	4	21/12/2021		MP	2	PB4	Two Meadow Pipits around VP	TK
Non-Breeding	Oweninny	7	20/01/2022	16:55	MP	8	PB3	A total of eight Meadow Pipits seen going to roost near VP 7	TK
Non-Breeding	Oweninny	7	08/02/2022		MP	4	PB4	Four Meadow Pipits around VP during survey	JM
Non-Breeding	Oweninny	7	09/03/2022	18:20	MP	8	PB3	A total of 10 meadow pipits seen going to roost on hill around VP 7	TK
Non-Breeding	Oweninny	2	10/03/2022		MP	2	PB4	Two Meadow Pipits around VP during survey	TK
Breeding	Oweninny	3	06/04/2022	07:00	MP	6	PB4	Six Meadow Pipits around VP, some displaying	KL

Vantage Point Non-Flight Observations									
Season	Site	VP	Date	Time	BTO Code	Abundance	Habitat Code	Activity	Surveyor
Breeding	Oweninny	2	08/04/2022	07:00	MP	4	PB4	Four Meadow Pipits near VP, some displaying	KL
Breeding	Oweninny	2	08/04/2022	10:30	MP	6	PB4	Six Meadow Pipits around VP, some displaying	KL
Breeding	Oweninny	1	27/04/2022	06:45	MP	2	PB4	Two Meadow Pipits calling and displaying near VP	KL
Breeding	Oweninny	4	11/05/2022	18:45	MP	5	PB4	Five Meadow Pipits seen and heard during VP, some displaying	KL
Breeding	Oweninny	3	13/06/2022	17:00	MP	4	PB4	Four Meadow Pipits seen displaying around VP	KL
Breeding	Oweninny	7	14/06/2022	10:20	MP	3	PB4	Three Meadow Pipits seen displaying throughout VP	KL
Breeding	Oweninny	6	16/06/2022	10:05	MP	2	PB4	Two Meadow Pipits calling and displaying	KL

Winter Transects Surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R079	Non-Breeding	Western Transect	28/10/2020	MP	3	PB4		TK
R080	Non-Breeding	Western Transect	28/10/2020	MP	2	PB4		TK
R083	Non-Breeding	Eastern Transects	29/10/2020	MP	1	PB4	Flushed from ground	TK
R084	Non-Breeding	Western Transect	18/12/2020	MP	4	PB3		TK
R086	Non-Breeding	Western Transect	18/12/2020	MP	3	PB3		TK
R087	Non-Breeding	Western Transect	18/12/2020	MP	1	PB3		TK

Winter Transects Surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R089	Non-Breeding	Western Transect	12/10/2021	MP	2	PB4	In suitable habitat	TK
R090	Non-Breeding	Western Transect	12/10/2021	MP	1	PB4	In suitable habitat	TK
R092	Non-Breeding	Western Transect	12/10/2021	MP	2	PB4	In suitable habitat	TK
R093	Non-Breeding	Western Transect	12/10/2021	MP	2	PB4	In suitable habitat	TK
R094	Non-Breeding	Western Transect	12/10/2021	MP	3	PB4	In suitable habitat	TK
R096	Non-Breeding	Western Transect	12/10/2021	MP	9	PB4	In suitable habitat	TK
R097	Non-Breeding	Western Transect	12/10/2021	MP	3	PB4	In suitable habitat	TK
R102	Non-Breeding	Western Transect	12/10/2021	MP	2	PB4	In suitable habitat	TK
R103	Non-Breeding	Western Transect	12/10/2021	MP	3	PB4	In suitable habitat	TK
R105	Non-Breeding	Eastern Transects	14/10/2021	MP	2	PB4	In suitable habitat	TK
R109	Non-Breeding	Eastern Transects	14/10/2021	MP	2	PB4	In suitable habitat	TK
R110	Non-Breeding	Eastern Transects	14/10/2021	MP	4	PB4	In suitable habitat	TK
R111	Non-Breeding	Eastern Transects	14/10/2021	MP	3	PB4	In suitable habitat	TK
R114	Non-Breeding	Eastern Transects	14/10/2021	MP	2	PB4	In suitable habitat	TK
R117	Non-Breeding	Eastern Transects	14/10/2021	MP	3	PB4	In suitable habitat	TK
R118	Non-Breeding	Eastern Transects	11/11/2021	MP	1	PB4	Flushed from ground	TK

Winter Transects Surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R120	Non-Breeding	Eastern Transects	11/11/2021	MP	1	PB4	Flushed from ground	TK
R123	Non-Breeding	Eastern Transects	11/11/2021	MP	1	PB4	Flushed from ground	TK
R124	Non-Breeding	Eastern Transects	11/11/2021	MP	2	PB4	Flushed from ground	TK
R127	Non-Breeding	Eastern Transects	11/11/2021	MP	1	PB4	Flushed from ground	TK
R128	Non-Breeding	Western Transects	17/11/2021	MP	1	PB4	Flushed from ground	TK
R129	Non-Breeding	Western Transects	17/11/2021	MP	1	PB4	Flushed from ground	TK
R130	Non-Breeding	Western Transects	17/11/2021	MP	1	PB4	Flushed from ground	TK
R132	Non-Breeding	Western Transects	17/11/2021	MP	1	PB4	Flushed from ground	TK
R133	Non-Breeding	Western Transects	17/11/2021	MP	1	PB4	Flushed from ground	TK
R137	Non-Breeding	Western Transects	17/11/2021	MP	2	PB4	Flushed from ground	TK
R141	Non-Breeding	Western Transects	17/11/2021	MP	1	PB4	Flushed from ground	TK
R143	Non-Breeding	Western Transects	17/11/2021	MP	1	PB4	Flushed from ground	TK
R145	Non-Breeding	Western Transects	17/11/2021	MP	3	PB4	Flushed from ground	TK
R147	Non-Breeding	Eastern Transects	02/12/2021	MP	2	PB4	Flushed from ground	TK
R151	Non-Breeding	Eastern Transects	02/12/2021	MP	1	PB4	Flushed from ground	TK
R152	Non-Breeding	Eastern Transects	02/12/2021	MP	4	PB4	Flushed from ground	TK

Winter Transects Surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R154	Non-Breeding	Western Transect	20/12/2021	MP		PB4	Flushed from ground	TK
R157	Non-Breeding	Western Transect	20/12/2021	MP		PB4	Flushed from ground.	TK
R158	Non-Breeding	Western Transect	18/01/2022	MP	1	PB4	flushed from ground	TK
R162	Non-Breeding	Western Transect	18/01/2022	MP	1	PB4	flushed from ground	TK
R166	Non-Breeding	Western Transect	18/01/2022	MP	1	PB4	flushed from ground	TK
R168	Non-Breeding	Western Transect	18/01/2022	MP	1	PB4	flushed from ground	TK
R171	Non-Breeding	Western Transect	18/01/2022	MP	1	PB4	flushed from ground	TK
R173	Non-Breeding	Eastern Transect	21/01/2022	MP	2	PB4	flushed from ground	TK
R175	Non-Breeding	Eastern Transect	21/01/2022	MP	1	PB4	flushed from ground	TK
R178	Non-Breeding	Eastern Transects	11/02/2022	MP	2	PB4	Flushed from ground	TK
R182	Non-Breeding	Eastern Transects	11/02/2022	MP	1	PB4	Flushed from ground	TK
R183	Non-Breeding	Western Transect	21/02/2022	MP	1	PB4	Flushed from ground	TK
R187	Non-Breeding	Western Transect	21/02/2022	MP	2	PB4	Flushed from ground	TK
R190	Non-Breeding	Western Transect	21/02/2022	MP	2	PB4	Flushed from ground	TK
R191	Non-Breeding	Eastern Transects	09/03/2022	MP	1	PB4	In suitable habitat	TK

Winter Transects Surveys								
Ref.	Season	Trans No./Loc.	Date	BTO code	Number of birds	Habitat Code	Activity	Surveyor
R195	Non-Breeding	Eastern Transects	09/03/2022	MP	2	PB4	In suitable habitat	TK
R196	Non-Breeding	Western Transect	11/03/2022	MP	2	PB4	In suitable habitat	TK
R079	Non-Breeding	Western Transect	11/03/2022	MP	2	PB4	In suitable habitat	TK
R080	Non-Breeding	Western Transect	11/03/2022	MP	3	PB4	In suitable habitat	TK
R083	Non-Breeding	Western Transect	11/03/2022	MP	1	PB4	In suitable habitat	TK
R084	Non-Breeding	Western Transect	11/03/2022	MP	2	PB4	In suitable habitat	TK
R086	Non-Breeding	Western Transect	11/03/2022	MP	1	PB4	In suitable habitat	TK
R087	Non-Breeding	Western Transect	11/03/2022	MP	2	PB4	In suitable habitat	TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B007	28/04/2020	12:15:00	MP	14		Singing males, flying and perched	JM
Transect	B010	29/04/2020	07:55:00	MP	18		Singing males, flying and perched	JM
Transect	B030	19/05/2020	08:51:00	MP	3		All calling to north of transect	JS
Transect	B034	19/05/2020	09:13:00	MP	3		Flying from south to north	JS
Transect	B033	19/05/2020	09:22:00	MP	2		Meadow Pipits displaying	JS

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B037	19/05/2020	09:34:00	MP	2		Meadow Pipits mobbing Cuckoo, flew south	JS
Transect	B042	19/05/2020	10:21:00	MP	2		Pair with food	JS
Transect	B052	19/05/2020	08:30:00	MP	12	WD4		JM
Transect	B064	16/06/2020	07:30-15:30	MP	10	WD4		JM
Transect	B075	16/06/2020	12:09:00	MP	9	PB4		JS
Transect	B080	16/06/2020	12:02:00	MP	4	PB3		JS
Transect	B082	16/06/2020	11:57:00	MP	1	PB3		JS
Transect	B084	16/06/2020	11:55:00	MP	1	PB3		JS
Transect	B085	16/06/2020	11:05:00	MP	4	PB3		JS
Transect	B087	16/06/2020	09:34:00	MP	7	WD4		JS
Transect	B094	16/06/2020	09:18:00	MP	5	WD4		JS
Transect	B095	16/06/2020	08:43:00	MP	10	PB4		JS
Transect	B100	16/06/2020	08:34:00	MP	5	PB4		JS
Transect	B101	16/06/2020	08:19:00	MP	2	PB4		JS
Transect	B125	21/07/2020	08:40:00	MP	7	PB4		JS
Transect	B128	21/07/2020	09:01:00	MP	7	PB4		JS
Transect	B131	21/07/2020	09:31:00	MP	4	PB4		JS
Transect	B133	21/07/2020	09:30:00	MP	1	PB4		JS
Transect	B134	21/07/2020	09:43:00	MP	4	PB4		JS
Transect	B135	21/07/2020	10:15:00	MP	5	PB4		JS
Transect	B138	21/07/2020	10:56:00	MP	4	PB4		JS
Transect	B141	21/07/2020	11:18:00	MP	5	PB4		JS
Transect	B142	21/07/2020	11:26:00	MP	4	PB4		JS
Transect	B176	21/07/2020		MP	1			JM
Transect	B151	24/08/2020		MP	2	PB3		TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B152	24/08/2020		MP	4	PB4		TK
Transect	B150	24/08/2020		MP	3	PB4		TK
Transect	B155	24/08/2020		MP	1	PB4		TK
Transect	B156	24/08/2020		MP	8	PB4		TK
Transect	B157	24/08/2020		MP	5	PB4		TK
Transect	B158	24/08/2020		MP	4	PB4		TK
Transect	B160	24/08/2020		MP	1	PB4		TK
Transect	B162	24/08/2020		MP	2	PB4		TK
Transect	B163	24/08/2020		MP	1	PB4		TK
Transect	B164	24/08/2020		MP	1	PB4		TK
Transect	B167	24/08/2020		MP	1	PB4		TK
Transect	B170	24/08/2020		MP	2	PB4		TK
Transect	B169	24/08/2020		MP	2	PB4		TK
Transect	B171	24/08/2020		MP	2	PB4		TK
Transect	B183	22/09/2020		MP	2	PB4		TK
Transect	B184	22/09/2020		MP	1	PB4		TK
Transect	B185	22/09/2020		MP	1	PB4		TK
Transect	B186	22/09/2020		MP	1	PB4		TK
Transect	B187	22/09/2020		MP	2	wd4		TK
Transect	B190	22/09/2020		MP	11	PB4		TK
Transect	B191	22/09/2020		MP	4	PB4		TK
Transect	B192	22/09/2020		MP	2	PB4		TK
Transect	B193	22/09/2020		MP	2	PB4		TK
Wader	B195	23/09/2020	09:12:00	MP	2	PB4		TK
Wader	B197	23/09/2020		MP	3	PB4		TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Wader	B198	23/09/2020		MP	2	PB4		TK
Wader	B199	23/09/2020		MP	2	PB4		TK
Wader	B200	23/09/2020		MP	1	PB4		TK
Wader	B201	23/09/2020		MP	3	PB4		TK
Wader	B202	23/09/2020		MP	2	PB4		TK
Wader	B203	23/09/2020		MP	1	PB4		TK
Wader	B204	23/09/2020		MP	1	PB4		TK
Wader	B206	23/09/2020		MP	1	PB4		TK
Transect	B218	29/04/2021		MP	2	PB4	Suitable breeding habitat	TK
Transect	B219	29/04/2021		MP	3	PB4	Suitable breeding habitat	TK
Transect	B220	29/04/2021		MP	1	PB4	Suitable breeding habitat	TK
Transect	B222	29/04/2021		MP	4	PB4	Suitable breeding habitat	TK
Transect	B223	29/04/2021		MP	2	PB4	Suitable breeding habitat	TK
Transect	B224	29/04/2021		MP	8	PB4	Suitable breeding habitat	TK
Transect	B228	12/05/2021		MP	2	PB3		TK
Transect	B229	12/05/2021		MP	4	PB3		TK
Transect	B230	12/05/2021		MP	2	PB3		TK
Transect	B231	12/05/2021		MP	1	PB3		TK
Transect	B232	12/05/2021		MP	3	PB3		TK
Transect	B233	12/05/2021		MP	2	PB3		TK
Transect	B234	12/05/2021		MP	2	PB3		TK
Transect	B240	24/05/2021		MP	4			TK
Transect	B241	24/05/2021		MP	4			TK
Transect	B243	24/05/2021		MP	2			TK
Transect	B247	24/05/2021		MP	4			TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B248	24/05/2021		MP	2			TK
Transect	B249	24/05/2021		MP	2			TK
Transect	B250	24/05/2021		MP	2			TK
Transect	B251	24/05/2021		MP	2			TK
Transect	B252	24/05/2021		MP	2			TK
Transect	B253	24/05/2021		MP	2			TK
Transect	B279	02/06/2021	08:22:00	MP	2	PB3	Suitable breeding habitat, adults carrying food	TK
Transect	B280	02/06/2021	08:35:00	MP	4	PB3	Suitable breeding habitat	TK
Transect	B281	02/06/2021	08:45:00	MP	6	PB3	Suitable breeding habitat	TK
Transect	B282	02/06/2021	08:50:00	MP	2	PB3	Suitable breeding habitat	TK
Transect	B285	02/06/2021	09:52:00	MP	4	PB3	Suitable breeding habitat	TK
Transect	B288	02/06/2021	10:41:00	MP	2	PB4	Suitable breeding habitat	TK
Transect	B292	09/06/2021		MP	2	PB3	Suitable breeding habitat	TK
Transect	B293	09/06/2021		MP	1	PB3	Suitable breeding habitat	TK
Transect	B294	09/06/2021		MP	3	PB3	Suitable breeding habitat	TK
Transect	B295	09/06/2021		MP	2	PB3	Suitable breeding habitat	TK
Transect	B296	09/06/2021		MP	3	PB3	Suitable breeding habitat	TK
Transect	B297	09/06/2021		MP	5	PB3	Suitable breeding habitat	TK
Transect	B298	09/06/2021		MP	4	PB3	Suitable breeding habitat	TK
Transect	B299	09/06/2021		MP	4	PB3	Suitable breeding habitat	TK
Transect	B300	09/06/2021		MP	3	PB3	Suitable breeding habitat	TK
Transect	B301	09/06/2021		MP	4	PB3	Suitable breeding habitat	TK
Transect	B302	09/06/2021		MP	2	PB3	Suitable breeding habitat	TK
Transect	B303	09/06/2021		MP	4	PB3	Suitable breeding habitat	TK
Transect	B325	09/07/2021		MP	5	PB3		JC

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B327	09/07/2021		MP	3	PB3		JC
Transect	B328	09/07/2021		MP	3	PB3		JC
Transect	B329	09/07/2021		MP	9	PB3		JC
Transect	B330	09/07/2021		MP	4	PB3		JC
Transect	B331	09/07/2021		MP	3	PB3		JC
Transect	B355	16/07/2021		MP	4	PB4	Meadow Pipits in suitable habitat	TK
Transect	B356	16/07/2021		MP	6	PB4	Meadow Pipits in suitable habitat	TK
Transect	B357	16/07/2021		MP	8	PB4	Meadow Pipits in suitable habitat	TK
Transect	B358	16/07/2021		MP	4	PB4	Meadow Pipits in suitable habitat	TK
Transect	B362	16/07/2021		MP	5	PB4	Meadow Pipits in suitable habitat	TK
Transect	B363	16/07/2021		MP	3	PB4	Meadow Pipits in suitable habitat	TK
Transect	B366	16/08/2021		MP	2	PB3	Meadow Pipits in suitable breeding habitat	TK
Transect	B367	16/08/2021		MP	4	PB3	Meadow Pipits in suitable breeding habitat	TK
Transect	B369	16/08/2021		MP	8	PB3	Meadow Pipits in suitable breeding habitat	TK
Transect	B371	16/08/2021		MP	2	PB3	Meadow Pipits in suitable breeding habitat	TK
Transect	B373	16/08/2021		MP	4	PB3	Meadow Pipits in suitable breeding habitat	TK
Transect		10/09/2021		MP	1			JM
Transect	B390	16/09/2021		MP	4	PB4	Meadow Pipits in suitable habitat	TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B391	16/09/2021		MP	6	PB4	Meadow Pipits in suitable habitat	TK
Transect	B392	16/09/2021		MP	8	PB4	Meadow Pipits in suitable habitat	TK
Transect	B393	16/09/2021		MP	4	PB4	Meadow Pipits in suitable habitat	TK
Transect	B397	16/09/2021		MP	3	PB4	Meadow Pipits in suitable habitat	TK
Transect	B398	16/09/2021		MP	4	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0006	08/04/2022	09:38:00	MP	2	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0007	08/04/2022	09:45:00	MP	2	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0008	08/04/2022	09:56:00	MP	3	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0009	08/04/2022	09:58:00	MP	2	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0010	08/04/2022	13:22:00	MP	2	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0027	26/04/2022		MP	3	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0028	26/04/2022		MP	2	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0029	26/04/2022		MP	4	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0030	26/04/2022		MP	2	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0031	26/04/2022		MP	4	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0032	26/04/2022		MP	4	PB4	Meadow Pipits in suitable habitat	TK

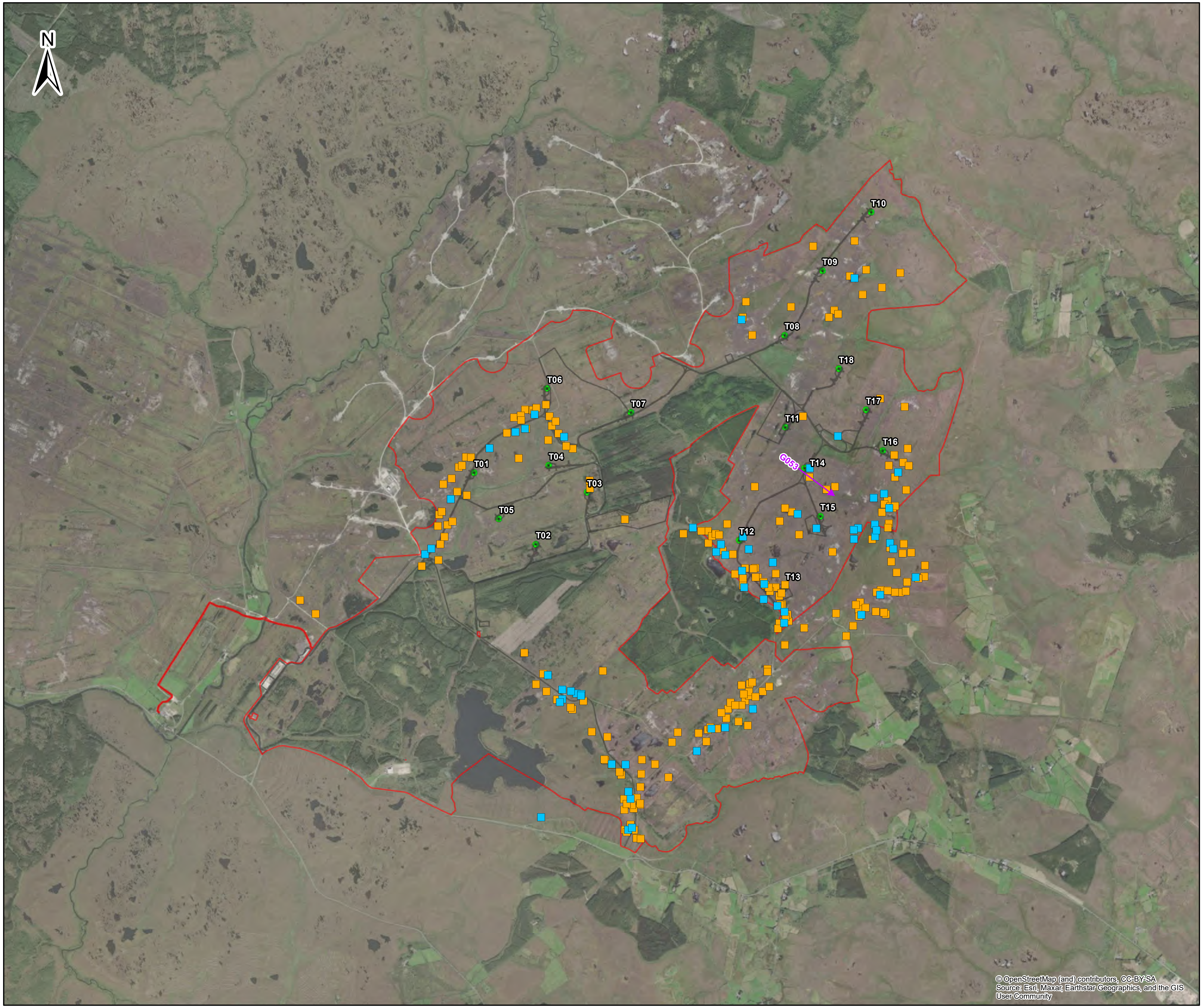
Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B0033	26/04/2022		MP	1	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0034	26/04/2022		MP	2	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0035	26/04/2022		MP	1	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0036	26/04/2022		MP	2	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0037	26/04/2022		MP	2	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0083	24/05/2022	09:05:00	MP	2	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0084	24/05/2022	09:10:00	MP	2	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0085	24/05/2022	09:18:00	MP	3	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0086	24/05/2022	09:20:00	MP	3	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0087	24/05/2022	09:55:00	MP	2	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0088	24/05/2022	10:32:00	MP	4	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0089	24/05/2022	10:40:00	MP	2	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0090	24/05/2022	11:38:00	MP	4	PB4	Snipe in suitable habitat	TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B0091	24/05/2022	11:58:00	MP	2	PB4	Snipe in suitable habitat	TK
Transect	B0092	24/05/2022	12:35:00	MP	2	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0093	24/05/2022	12:38:00	MP	4	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0094	24/05/2022	12:40:00	MP	2	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0125	27/05/2022		MP	4	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0126	27/05/2022		MP	2	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0127	27/05/2022		MP	5	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0128	27/05/2022		MP	2	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0129	27/05/2022		MP	1	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0130	27/05/2022		MP	1	PB4	Meadow Pipits in suitable habitat, some carrying food for young	TK
Transect	B0145	15/06/2022	09:15:00	MP	3	PB4	Meadow Pipits in suitable Breeding habitat	TK
Transect	B0146	15/06/2022	09:20:00	MP	4	PB4	Meadow Pipits in suitable Breeding habitat	TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B0147	15/06/2022	09:32:00	MP	2	PB4	Meadow Pipits in suitable Breeding habitat	TK
Transect	B0148	15/06/2022	12:16:00	MP	4	PB4	Meadow Pipits in suitable Breeding habitat	TK
Transect	B0158	20/06/2022	09:52:00	MP	3	PB4	Meadow Pipits in suitable Breeding habitat	TK
Transect	B0159	20/06/2022	10:00:00	MP	4	PB4	Meadow Pipits in suitable Breeding habitat	TK
Transect	B0160	20/06/2022	10:07:00	MP	2	PB4	Meadow Pipits in suitable Breeding habitat	TK
Transect	B0161	20/06/2022	10:20:00	MP	5	PB4	Meadow Pipits in suitable Breeding habitat	TK
Transect	B0162	20/06/2022	10:45:00	MP	2	PB4	Meadow Pipits in suitable Breeding habitat	TK
Transect	B0163	20/06/2022	11:41:00	MP	2	PB4	Meadow Pipits in suitable Breeding habitat	TK
Transect	B0200	15/07/2022	08:20:00	MP	2	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0201	15/07/2022	08:38:00	MP	2	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0202	15/07/2022	08:45:00	MP	3	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0203	15/07/2022	08:52:00	MP	4	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0204	15/07/2022	10:20:00	MP	2	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0205	15/07/2022	10:50:00	MP	5	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0206	15/07/2022	12:12:00	MP	4	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0226	20/07/2022		MP	3	PB4	Meadow Pipits in suitable habitat	TK

Breeding Bird Survey Data								
Survey Type	Ref.	Date	Time	BTO Code	Abundance	Habitat Code	Key Observations	Surveyor
Transect	B0227	20/07/2022		MP	2	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0228	20/07/2022		MP	2	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0229	20/07/2022		MP	4	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0230	20/07/2022		MP	2	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0231	20/07/2022		MP	4	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0232	20/07/2022		MP	4	PB4	Meadow Pipits in suitable habitat	TK
Transect	B0233	20/07/2022		MP	4	PB4	Meadow Pipits in suitable habitat	TK

MEADOW PIPIT FIGURES



Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Meadow Pipit (Anthus pratensis) - Breeding Season 2020-2022
- Meadow Pipit (Anthus pratensis) - Non-Breeding Season 2020-2022
- Meadow Pipit (Anthus pratensis) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

0 0.5 1 1.5 2
Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D01	24/03/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 34 - Sheet 1 of 6 - Meadow Pipit (Anthus pratensis) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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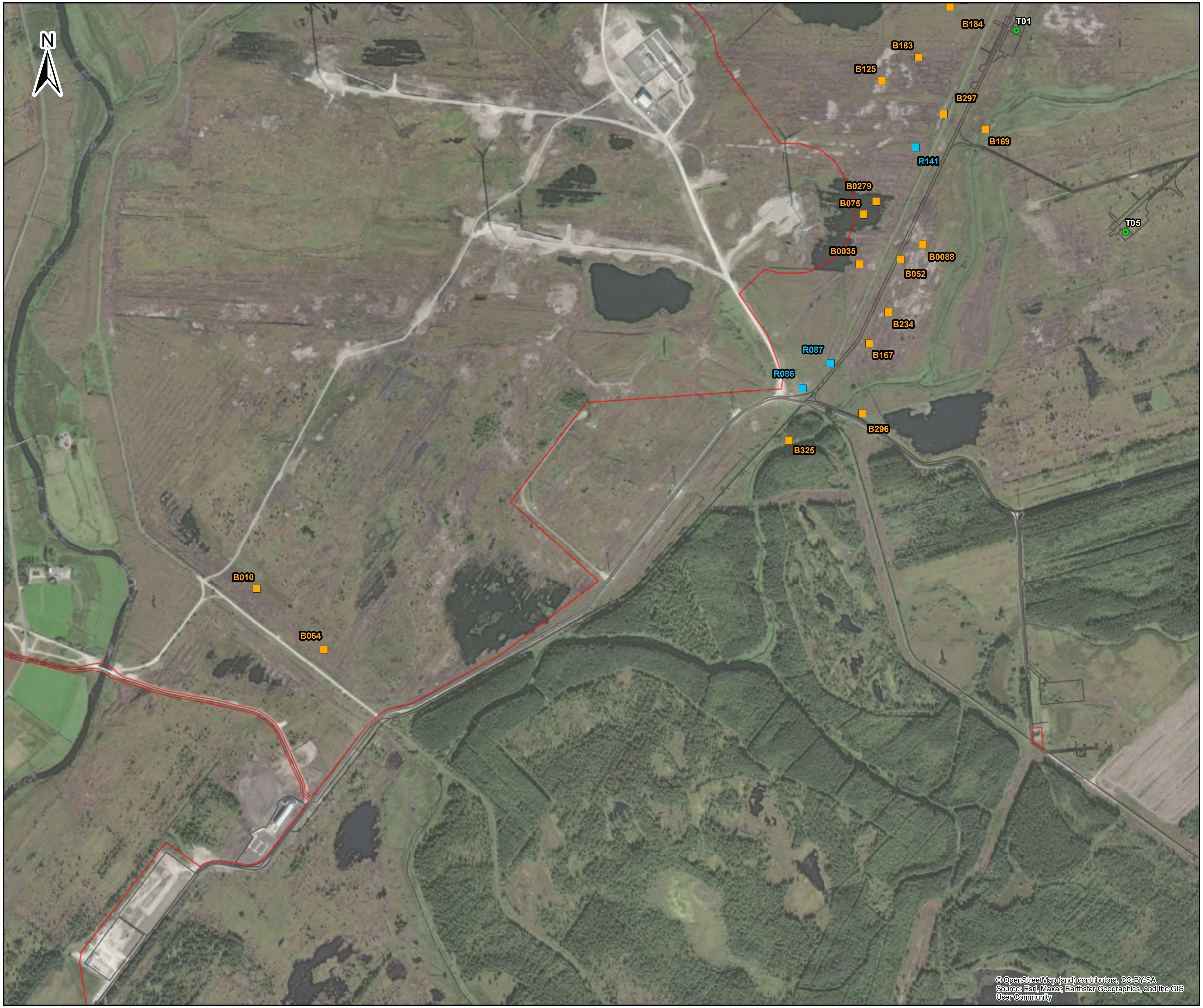

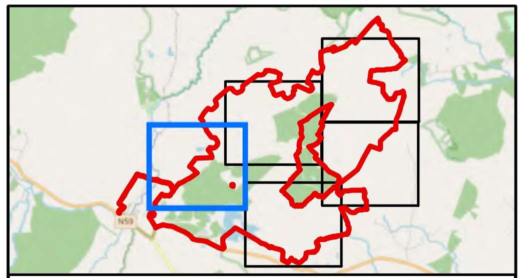

Legend
- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Meadow Pipit (Anthus pratensis) - Breeding Season 2020-2022
- Meadow Pipit (Anthus pratensis) - Non-Breeding Season 2020-2022
- Meadow Pipit (Anthus pratensis) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

0 100 200 300 400
Meters

NOTES
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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D01	24/03/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 34 - Sheet 2 of 6 - Meadow Pipit (Anthus pratensis) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:8,000

Prepared by: S.Pezzetta
Checked: J.Sherry
Date: March 2023

Project Director: D.Grehan

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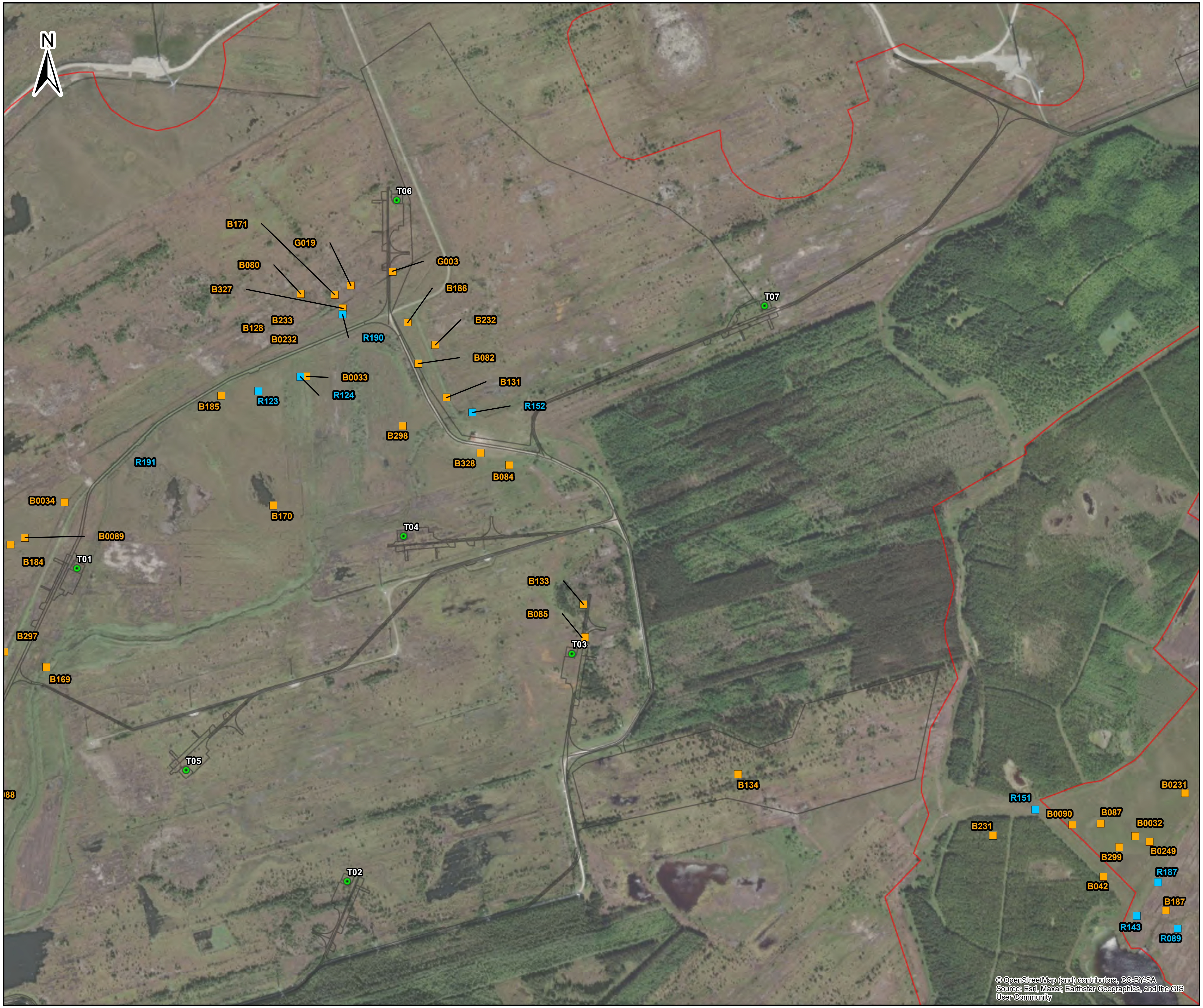

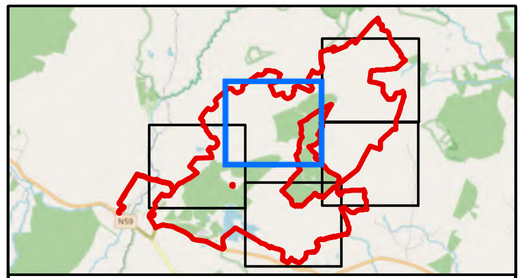

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Meadow Pipit (Anthus pratensis) - Breeding Season 2020-2022
- Meadow Pipit (Anthus pratensis) - Non-Breeding Season 2020-2022
- Meadow Pipit (Anthus pratensis) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

0 100 200 300 400
Meters

NOTES

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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 34 - Sheet 3 of 6 - Meadow Pipit (Anthus pratensis) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:8,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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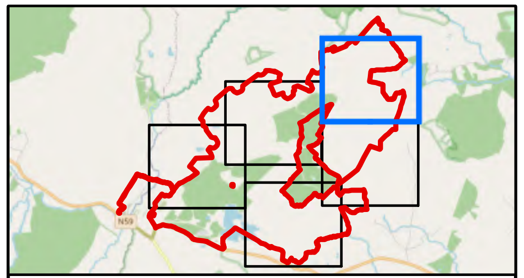

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Meadow Pipit (Anthus pratensis) - Breeding Season 2020-2022
- Meadow Pipit (Anthus pratensis) - Non-Breeding Season 2020-2022
- Meadow Pipit (Anthus pratensis) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

0 100 200 300 400
Meters

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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 34 - Sheet 4 of 6 - Meadow Pipit (Anthus pratensis) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:8,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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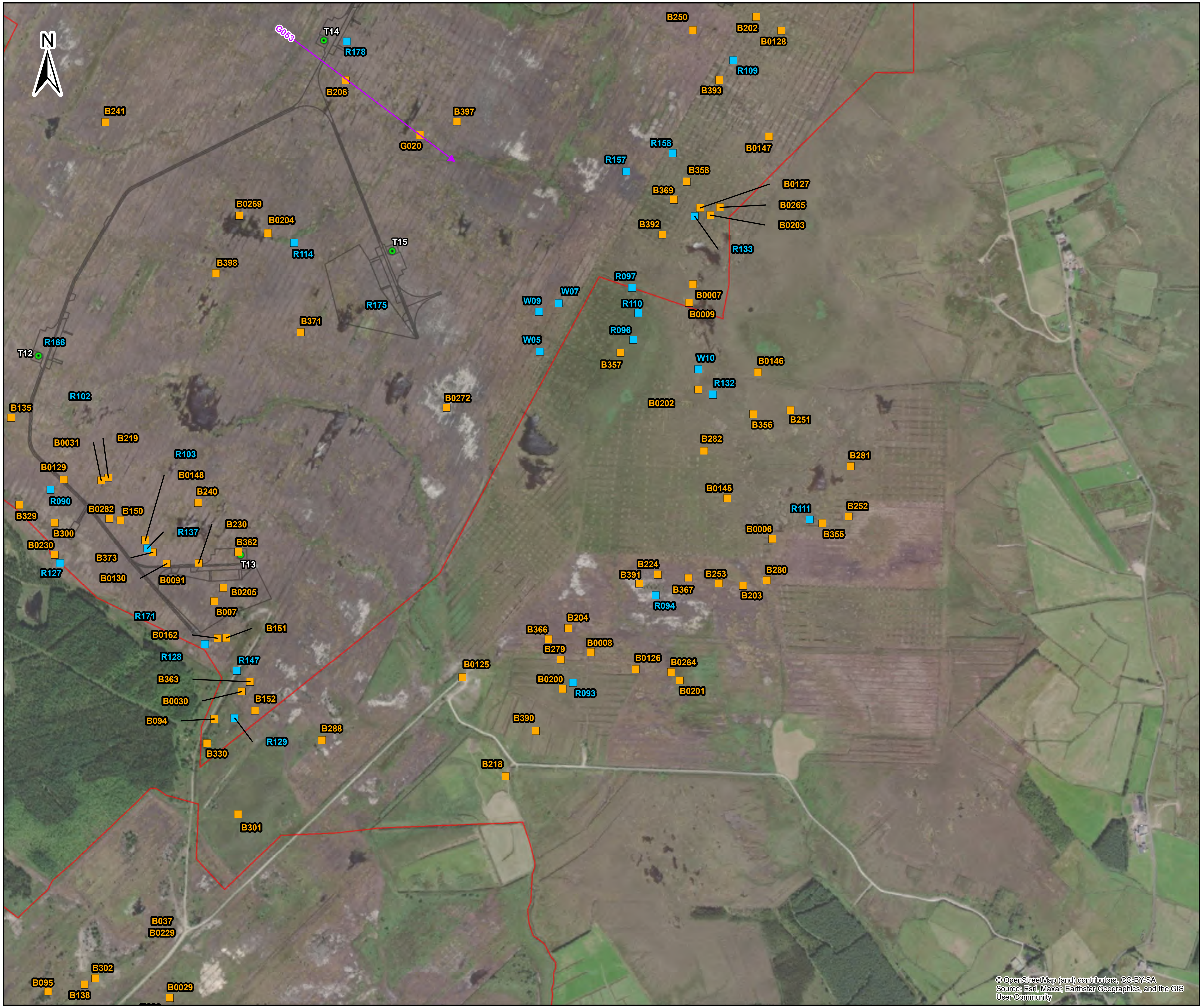

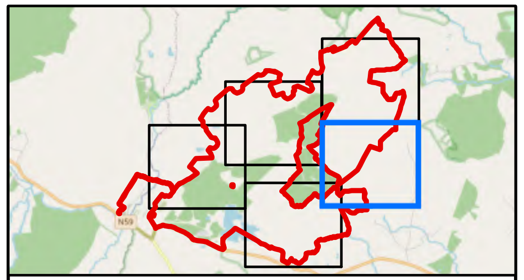

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Meadow Pipit (Anthus pratensis) - Breeding Season 2020-2022
- Meadow Pipit (Anthus pratensis) - Non-Breeding Season 2020-2022
- Meadow Pipit (Anthus pratensis) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

0 100 200 300 400
Meters

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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 34 - Sheet 5 of 6 - Meadow Pipit (Anthus pratensis) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:8,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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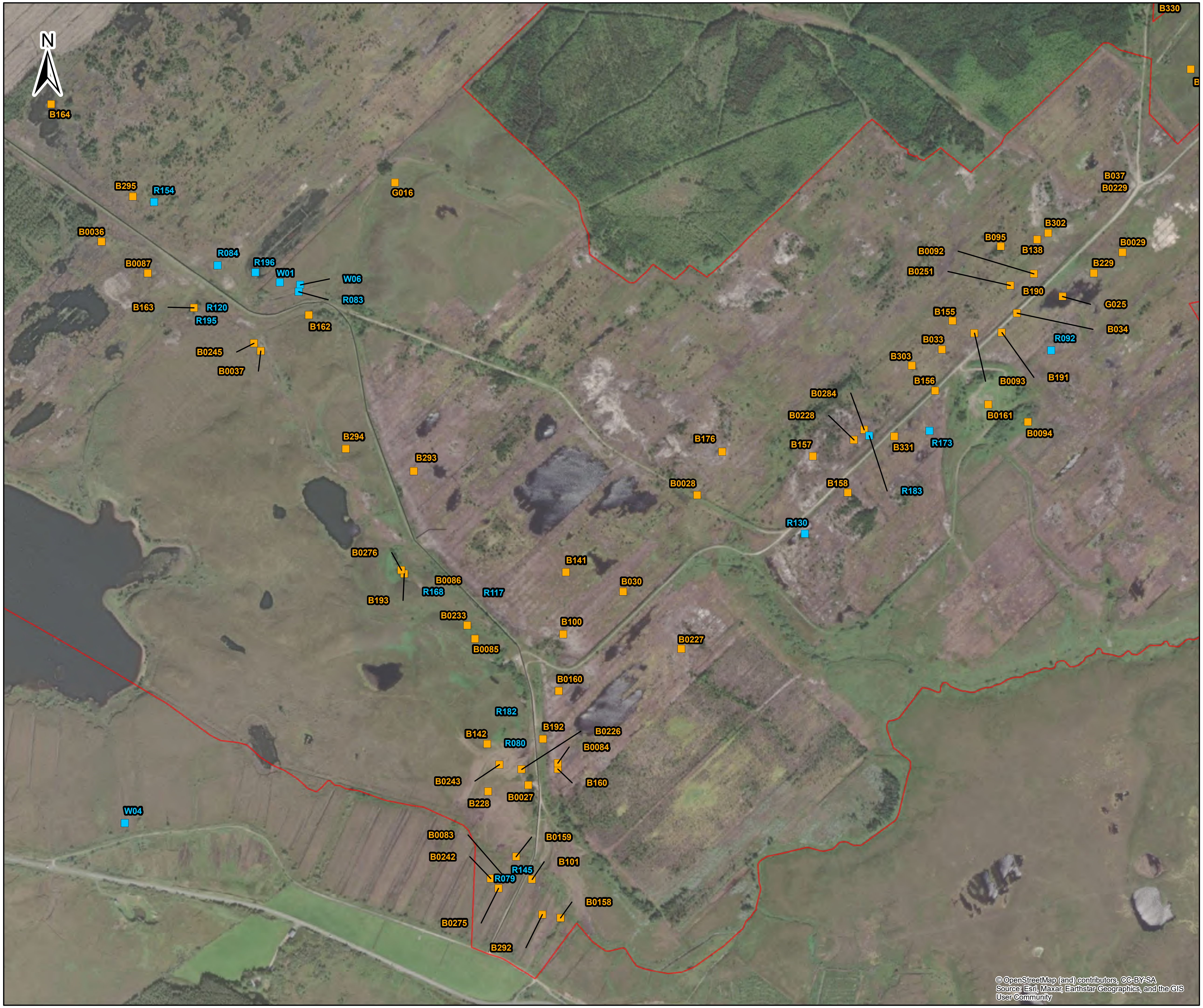

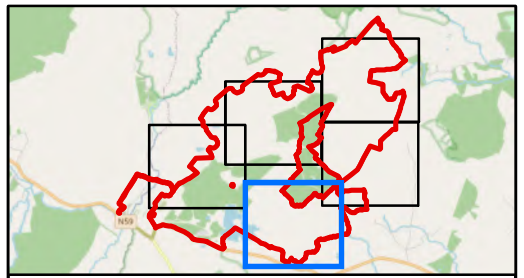

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Meadow Pipit (Anthus pratensis) - Breeding Season 2020-2022
- Meadow Pipit (Anthus pratensis) - Non-Breeding Season 2020-2022
- Meadow Pipit (Anthus pratensis) Flightlines - Flightlines Breeding and Non-Breeding 2019-2022

0 100 200 300 400
Meters

NOTES

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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Appendix 8-1 Figure 34 - Sheet 6 of 6 - Meadow Pipit (Anthus pratensis) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:8,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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Draft: D01

35.0 Grey Wagtail

Winter Transects Surveys									
Ref.	**Season**	**Trans No./Loc.**	**Date**	**Time**	**BTO code**	**Number of birds**	**Habitat Code**	**Activity**	**Surveyor**
R113	Non-Breeding	Eastern Transects	11/11/2021		GL	1	FW1	Feeding	GL
R155	Non-Breeding	Eastern Transect	21/01/2022		GL	1	PB4	In small stream	GL
R192	Non-Breeding	Western Transect	11/03/2022	12:04	GL	1	WD4	In suitable habitat	GL

Breeding Bird Survey Data							
Survey Type	**Ref.**	**Date**	**BTO Code**	**Abundance**	**Habitat Code**	**Key Observations**	**Surveyor**
Transect	B159	24/08/2020	GL	2	PB4		TK

GREY WAGTAIL FIGURES

Legend

- Planning Application Boundary
- Proposed Infrastructure
- Proposed Turbine Locations
- Grey Wagtail (Motacilla cinerea) - Breeding Season 2020-2022

0 0.5 1 1.5 2
Kilometres

NOTES

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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D01	24/03/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client:
Bord na Móna

Project:
Oweninny Wind Farm
Phase 3

Title:
Appendix 8-1 Figure 35
Grey Wagtail (Motacilla cinerea) observations over the survey period (Apr 2019 - Sept 2022)

Scale @ A3: 1:35,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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Appendix 2 – Collision Risk Model Results

Oweninny Wind Farm Phase 3 CRM

Collision Risk Modelling
Updated Results: January 2023

2 February 2023

1308431 A

Tobin Consulting Engineers

Document history

Author	Gillian Vallejo and Graeme Garner	30 January 2023
Checked	James Robbins and Estée Farrar	31 January 2023
Approved	Laura Turner	31 January 2023

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Issue	Date	Revision Details
A	02/02/2023	First Issue

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Contents

1. Introduction

Collision risk modelling (CRM) has previously been carried out for the proposed Oweninny Wind Farm, Phase 3 Project, using vantage point (VP) data collected between April 2019 and September 2021. The results of this CRM were presented in a short report issued in June 2022. At this time, two scenarios were modelled, representing a ‘maximum’ scenario (a 158 m diameter turbine model) and a ‘minimum’ scenario (a 117 m diameter turbine model).

The CRM has now been updated and the results of this new analysis are presented within this report. The rerun of the CRM was undertaken for two reasons.

Firstly, the CRM now includes the full dataset collected during baseline VP surveys. The data used in the model now covers the period April 2019 to September 2022 (inclusive), and so it includes an additional year’s worth of baseline data compared to the previous CRM; and therefore, utilises a more comprehensive dataset.

Secondly, this report only presents the results of the CRM undertaken for one project design scenario (using maximum turbine dimensions).

2. Methods

Collision risk modelling was carried out according to the Band *et al.* (2007) Collision Risk Model[1]. Data collected during flight activity VP surveys were used to predict the number of individuals per species expected to collide with the turbine rotors per season.

The data used in the model were collected during four breeding seasons (April to September 2019, 2020, 2021 and 2022) and three non-breeding seasons (October 2019 to March 2020, October 2020 to March 2021 and October 2021 to March 2022). The survey effort of each season is provided in Appendix A. Seven VP locations were used during the flight activity surveys, however the data was excluded from ‘VP5’ for the CRM, as the viewshed covered from this location did not overlap with the collision risk area of the currently proposed development.

Data was examined for those species for which flight activity was recorded in detail during the baseline surveys: i.e. those recorded as ‘target species’. Bird flights considered to represent a potential collision risk were those flight lines that passed within the collision risk zone (CRZ) at potential collision height (PCH). The CRZ incorporated a 279 m buffer of the proposed turbine locations, representing half the rotor diameter of the maximum turbine specification proposed at the site (158/2 = 79 m) plus a precautionary surrounding buffer zone of 200 m.

Flightlines recorded passing through the CRZ were examined to determine whether they occurred within PCH: the height range within which the proposed turbine blades will rotate. As flight heights were recorded in height bands during the surveys, any flight within a height band that overlapped with PCH was considered to have passed within PCH. The height bands used during flight activity surveys were:

- Height band 1: 0-25 m
- Height band 2: 26-50 m
- Height band 3: 51-150 m
- Height band 4: 151-200 m
- Height band 5: 201 m+

The proposed rotor swept height covers the range 42 m to 200 m. Thus, all flights within height bands 2, 3 and 4 were considered as being at potential collision risk. Note that the actual height range covered by height bands 2, 3

[1] Band, W., Madders, M. & Whitfield, D.P. (2007) *Developing field and analytical methods to assess avian collision risk at wind farms*. In de Lucas, M., Janss, G. & Ferrer, M. (eds.) Birds and Wind Power. Quercus, Madrid.

and 4 is 25 m to 200 m altitude. Thus, this represents a precautionary approach as any bird flights at a height of 25 m to 41 m would be below PCH but will have been included within the model as being at risk.

A proportionate approach to CRM was followed, whereby it was only run for species that met a specified threshold of flight activity. The threshold used was of three flights, or at least 10 individuals, recorded within the CRZ at PCH within either season, over the course of all survey years. Thus any species which was recorded using the site only very occasionally, and for which a nil or negligible collision impact could therefore be predicted, were excluded. This approach has been revised and an addendum included to calculate these species, which can be found in Appendix C of this report

For species that usually fly in approximately straight lines (commuting flights) the flights observed were extrapolated up in order to estimate the number of individuals likely to pass through the CRZ at PCH per season. A species-specific two-dimensional risk window was constructed based on the mean direction of passage through the site and used to predict the number of passages through the rotor-swept area in each season[1]. This type of analysis was carried out for great black-backed gull, lesser black-backed gull, whooper swan and mallard.

For species that are expected to fly ‘randomly’ within the site (non-directional) the observed time spent flying within the CRZ at PCH is calculated and extrapolated. Average flight activity per unit effort (measured in minutes of survey time and hectares of area surveyed) is calculated. This metric is then used to extrapolate flight activity across time and across the entirety of the CRZ to estimate the total flight activity across the site per season[1]. This type of analysis was used to estimate collisions for golden plover and kestrel.

The risk of collision for an individual was estimated based on the characteristics of the bird species and of the turbines. The bird parameters and wind farm specifications used in the model are provided in Table 2.1 and Table 2.2.

A range of collision estimates were produced for each species, based on a range of avoidance rates. This parameter takes into account the fact that birds take avoiding action when approaching turbines. A species-specific avoidance rate is stated in guidance[2] for many target species, and the estimates produced using these stated avoidance rates are those that should be used in any subsequent impact assessment.

Table 2.1: Wind farm attributes used in the collision risk analysis

Attribute	Value
Number of turbines	18
Number of blades	3
Maximum chord length (metres)	4.2
Pitch (degrees)	6.0
Rotor diameter (metres)	158
Rotation period (seconds)	6.19

[2] SNH (2017) Avoidance rates for the onshore SNH wind farm collision risk model. SNH Guidance Note, July 2017

Table 2.2: Bird attributes used in the collision risk analysis

Attribute	Great black-backed gull	Golden plover	Kestrel	Lesser black-backed gull	Mallard	Whooper swan
Bird length (metres)*	0.71	0.29	0.34	0.58	0.58	1.60
Wingspan (metres) *	1.58	0.76	0.76	1.43	0.90	2.43
Bird speed (metres/second)**	13.7	17.9	8.3	13.1	18.5	17.3
Estimated nocturnal activity (as proportion of diurnal activity)	0	0.25	0	0	0	0.25
Calculated individual collision risk	0.062	0.042	0.065	0.059	0.048	0.080

*Sources: *Snow and Perrins (1998)[3]; **Alerstam et al.(2007)[4]*

[3] Snow, D.W. and Perrins, (1998) The birds of the Western Palearctic – concise edition. Volume 1 – Non-passerines. Oxford University Press, UK.

[4] Alerstam, T., Rosén, M., Bäckman, J., Ericson, P.G.P., and Hellgren, O. (2007) Flight speeds among bird species: allometric and phylogenetic effects. PLoS Biology, 5, e197.

3. Results

The total number of target species flight lines recorded across all breeding seasons and non-breeding seasons are shown in Table 3.1 and Table 3.2 respectively. The number of flights and individuals observed passing through the CRZ at PCH are also shown. Those species which met the CRM criteria are highlighted in bold.

Table 3.1: Number of flights and individuals observed passing through the risk area at risk height during breeding season flight activity surveys (April to September inclusive, 2019, 2020, 2021 and 2022)

Species	Total Flights*	Risk flights	Risk individuals	CRM carried out
Buzzard	1	1	1	**Yes****
Cormorant	3	1	1	**Yes****
Common gull	13	1	2	**Yes****
Common sandpiper	7	0	0	No
Egyptian vulture	1	0	0	No
Golden eagle	1	1	1	**Yes****
Golden plover	**3**	**2**	**31**	**Yes**
Great black-backed gull	**13**	**4**	**4**	**Yes**
Grey heron	9	1	1	**Yes****
Hen harrier	1	0	0	No
Kestrel	**23**	**6**	**6**	**Yes**
Lapwing	1	0	0	No
Lesser black-backed gull	**20**	**8**	**14**	**Yes**
Little grebe	3	0	0	No
Mallard	**20**	**4**	**5**	**Yes**
Meadow pipit	1	1	6	No
Merlin	3	1	1	**Yes****
Moorhen	2	0	0	No
Peregrine	1	0	0	No
Ringed plover	5	0	0	No
Sparrowhawk	7	1	1	**Yes****
Snipe	7	0	0	No
Teal	18	0	0	No
Whimbrel	1	0	0	No

** Excludes flights recorded from VP5 (see methods)*
*** Included in Appendix C*

Table 3.2: **Number of flights and individuals observed passing through the risk area at risk height during non-breeding season flight activity surveys (October 2019 to March 2020 inclusive, October 2020 to March 2021 inclusive and October 2021 to March 2022 inclusive)**

Species	Total Flights	Risk flights	Risk individuals	CRM carried out
Black-headed gull	1	0	0	No
Buzzard	2	0	0	No
Great black-backed gull	3	0	0	No
Grey heron	8	1	1	**Yes****
Golden plover	**42**	**27**	**911**	**Yes**
Hen harrier	20	1	1	**Yes****
Kestrel	**22**	**4**	**4**	**Yes**
Lesser black-backed gull	2	0	0	No
Mallard	**12**	**3**	**10**	**Yes**
Merlin	1	1	1	**Yes****
Peregrine	5	1	1	**Yes****
Ringed plover	1	1	1	**Yes****
Snipe	1	0	0	No
Teal	6	2	4	**Yes****
Whooper swan	**15**	**5**	**25**	**Yes**

** Excludes flights recorded from VP5 (see methods)*
*** Included in Appendix C*

Six species fulfilled the criteria for undertaking CRM: great black-backed gull, lesser black-backed gull, whooper swan, mallard, golden plover and kestrel.

The risk of collision for each of these six species, calculated with avoidance factors of 95%, 98%, 99%, 99.2% and 99.8%, are presented in Table 3.3. Values shown in bold represent species-specific avoidance levels recommended for collision risk analysis by NatureScot[2,5,6]. For those species for which a species-specific avoidance rate is not available (mallard and golden plover) the recommended default avoidance rate of 98% has been used. In the case of mallard this can be considered precautionary as this duck species can be expected to have a similar level of avoidance as geese and swans (99.8% and 99.5% respectively)[7].

Details of the calculations used to produce these estimates are provided in Appendix B.

[5] Furness, R.W (2019) Avoidance rates of herring gull, great black-backed gull and common gull for use in the assessment of terrestrial wind farms in Scotland. Scottish Natural Heritage Research Report No. 1019.

[6] In 2020 SNH was re-branded as **NatureScot**

[7] Graeme Garner (Natural Power) personal comment (2023)

Table 3.3: **Estimated number of collisions during the breeding/summer season (April to September) and non-breeding/wintering season (October to March) – bold, shaded cells represent avoidance rates recommended by NatureScot (SNH, 2017[2]; Furness, 2019[5]). Annual estimates are sums of breeding and non-breeding estimates.**

Species	Model type	Season	Estimated mortality assuming avoidance of: 95%	98%	99%	99.5%	99.8%
Great black-backed gull	Commuting	Breeding	0.10	0.04	0.02	**0.01**	0.00
		Non-breeding	0.00	0.00	0.00	**0.00**	0.00
		Annual	0.10	0.04	0.02	**0.01**	0.00
Lesser black-backed gull	Commuting	Breeding	0.30	0.12	0.06	**0.03**	0.01
		Non-breeding	0.00	0.00	0.00	**0.00**	0.00
		Annual	0.30	0.12	0.06	**0.03**	0.01
Whooper swan	Commuting	Breeding	0.00	0.00	0.00	**0.00**	0.00
		Non-breeding	0.74	0.30	0.15	**0.07**	0.03
		Annual	0.74	0.30	0.15	**0.07**	0.03
Mallard	Commuting	Breeding	0.10	**0.04**	0.02	0.01	0.00
		Non-breeding	0.16	**0.07**	0.03	0.02	0.01
		Annual	0.26	**0.11**	0.05	0.03	0.01
Golden plover	Non-directional	Breeding	0.68	**0.27**	0.14	0.07	0.03
		Non-breeding	16.26	**6.50**	3.25	1.63	0.65
		Annual	16.94	**6.77**	3.39	1.70	0.68
Kestrel	Non-directional	Breeding	**0.06**	0.03	0.01	0.01	0.00
		Non-breeding	**0.03**	0.01	0.01	0.00	0.00
		Annual	**0.09**	0.04	0.02	0.01	0.00

4. Discussion

The more comprehensive dataset upon which the new CRM has been based (longer survey period) has resulted in collision estimates that are very similar to the previous CRM (within 0.01) for great black-backed gull, lesser black-backed gull and kestrel. For whooper swan the new estimate is lower than that calculated previously (0.07 birds per annum compared to a previous estimate of 0.11). Golden plover now has a higher collision estimate (6.77 birds per annum) than that previously presented (5.29). A collision estimate has not been calculated previously for mallard.

For mallard, golden plover and kestrel, the annual collision estimate is the sum of estimates for both the breeding and non-breeding seasons. For great black-backed gull and lesser black-backed gull the breeding season accounts for all flight activity, whilst for whooper swan all flight activity is restricted to the non-breeding season. It is against the appropriate source population (breeding or non-breeding) that impacts will need to be assessed.

This report aims only to present the results of the CRM and an assessment of the potential impacts is not included here. However, the results suggest that for great black-backed gull and lesser black-backed gull the level of collision mortality predicted will be imperceptible against the background level of mortality for these species.

The species of greatest potential concern is golden plover, with an estimated annual mortality of 6.77 individuals at 98% avoidance (of which 6.50 is accounted for by the non-breeding season). This equates to 169.25 birds over a 25-year period. It should be noted that a 98% avoidance rate has been presented for golden plover, but this is likely to be precautionary. There are examples in the UK, where a 99% avoidance rate has been used for golden plover (and considered acceptable by Natural England). Furthermore, studies in North America have estimated avoidance rates for American golden plover (a suitable proxy for the Eurasian golden plover that is found in Ireland) as being in the region of 99.5%[8]. At 99% avoidance, the collision mortality estimate for golden plover falls to 3.39 per annum (and to 1.7 with 99.5% avoidance). The wintering population of golden plover in the Republic of Ireland is estimated at 80,707 birds[9], and so it is considered likely that an assessment of collision impacts will determine a negligible impact upon the wintering population of this species. However, a full ecological impact is recommended, for all the species for which CRM was undertaken.

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[8] Whitfield, D.P. (2007) The effects of wind farms on shorebirds (waders: *Charadrii*), especially with regards to wintering golden plover. Natural Research Limited.

[9] Lewis, L., Burke, B., Fitzgerald, N., Tierney, D. & Kelly, S. (2019) Irish Wetland Bird Survey: waterbird status and distribution 2009/10-2015/16. Irish Wildlife Manuals, No. 116. National Parks & Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

Appendices

A: Vantage Point Survey Effort

The effort carried out during vantage point surveys is presented in Table 4.1.

Table 4.1: Survey effort carried out across VPs

	Hours of effort						
Month and year	**VP1**	**VP2**	**VP3**	**VP4**	**VP5***	**VP6**	**VP7**
Apr-19	6.0	6.0	6.0	6.0	6.0	6.0	6.0
May-19	6.0	6.0	6.0	6.0	6.0	3.0	3.0
Jun-19	6.0	6.0	6.0	6.0	6.0	9.0	9.0
Jul-19	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Aug-19	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Sep-19	6.0	6.0	6.0	6.0	6.2	6.0	6.0
Breeding 2019	**36.0**	**36.0**	**36.0**	**36.0**	**36.2**	**36.0**	**36.0**
Oct-19	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Nov-19	6.0	6.0	6.0	6.0	6.3	6.0	6.0
Dec-19	6.0	6.0	7.0	6.0	5.8	6.0	6.0
Jan-20	6.0	6.0	6.0	6.0	6.3	6.0	6.0
Feb-20	6.0	6.0	6.0	6.0	6.3	6.0	6.0
Mar-20	6.0	6.0	6.0	6.0	9.0	6.0	6.0
Winter 2019/2020	**36.0**	**36.0**	**37.0**	**36.0**	**39.6**	**36.0**	**36.0**
Apr-20	9.0	9.0	9.0	9.0	9.0	9.0	9.0
May-20	9.0	9.0	9.0	9.0	12.0	9.0	9.0
Jun-20	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Jul-20	8.7	9.0	9.0	9.0	9.0	9.0	9.0
Breeding 2020	**35.7**	**36.0**	**36.0**	**36.0**	**39.0**	**36.0**	**36.0**
Oct-20	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Nov-20	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Dec-20	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Jan-21	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Feb-21	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Mar-21	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Winter 2020/2021	**36.0**	**36.0**	**36.0**	**36.0**	**36.0**	**36.0**	**36.0**
Apr-21	6.0	6.0	6.0	6.0	6.0	6.0	6.0
May-21	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Jun-21	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Jul-21	0.0	6.0	12.0	6.0	6.0	6.0	6.0
Aug-21	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Sep-21	6.0	6.0	6.0	6.0	6.0	6.0	6.0

	Hours of effort						
Month and year	**VP1**	**VP2**	**VP3**	**VP4**	**VP5***	**VP6**	**VP7**
Breeding 2021	**30.0**	**36.0**	**42.0**	**36.0**	**36.0**	**36.0**	**36.0**
Oct-21	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Nov-21	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Dec-21	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Jan-22	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Feb-22	3.0	6.0	6.0	6.0	6.0	6.0	6.0
Mar-22	9.0	6.0	6.0	6.0	6.0	6.0	6.0
Winter 2020/2021	**36.0**	**36.0**	**36.0**	**36.0**	**36.0**	**36.0**	**36.0**
Apr-22	6.0	6.0	6.0	6.0	6.0	6.0	6.0
May-22	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Jun-22	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Jul-22	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Aug-22	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Sep-22	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Breeding 2022	**36.0**	**36.0**	**36.0**	**36.0**	**36.0**	**36.0**	**36.0**

**Data collected from VP 5 were excluded from the analysis as the viewshed did not overlap with the risk zone.*

B: Details of CRM Parameters

The parameters used in the models of each species are presented in the following tables.

Table B.1: Collision Risk Model run for Great black-backed gull (Commuting)*

Parameter	Unit	Breeding	Non-breeding
Total number of birds flying through wind farm polygon (a)	birds	4	0
Mean survey effort (b)	minutes	8637	6490
Daylight during survey period, based on civil twilight (c)	minutes	167194	102202
Estimate of nocturnal activity as a proportion of daytime activity (d)		0	0
Time of potential activity during survey period (e = c * (1+d))	minutes	167194	102202
Rate of birds recorded during survey period (f = a/b)	birds per minute	0.0005	0.0000
Estimate of number of birds during season (g = e * f)	birds	77.43	0.00
Risk window length (h)	metres	4411	4411
Turbine blade length (i)	metres	79	79
Number of turbines (j)		18	18
Risk window (k = h * i * 2)	square metres	696988	696988
Rotor-swept area (l = pi * i^2 * j)	square metres	352920	352920
Proportion of risk area that is rotor-swept (m = l/k)		0.506	0.506
Estimate of number of birds flying through rotor-swept area during season (n = g * m)	birds	39.2	0.0
Probability of collision for a bird flying through rotors (estimated using SNH spreadsheet) (o)		0.062	0.062
Predicted mortality with no avoidance - turbines operational 85% of the time (p = n * o * 0.85)	collisions per season	2.06	0.00

** Figures have been rounded for presentation purposes. Following the calculations using rounded figures may yield slightly different results.*

Table B.2: Collision Risk Model run for Lesser black-backed gull (Commuting)

Parameter	Unit	Breeding	Non-breeding
Total number of birds flying through wind farm polygon (a)	birds	14	0
Mean survey effort (b)	minutes	8637	6490
Daylight during survey period, based on civil twilight (c)	minutes	167194	102202
Estimate of nocturnal activity as a proportion of daytime activity (d)		0	0
Time of potential activity during survey period (e = c * (1+d))	minutes	167194	102202
Rate of birds recorded during survey period (f = a/b)	birds per minute	0.0016	0.0000
Estimate of number of birds during season (g = e * f)	birds	271.02	0.00
Risk window length (h)	metres	5025	5025
Turbine blade length (i)	metres	79	79
Number of turbines (j)		18	18
Risk window (k = h * i * 2)	square metres	793928	793928
Rotor-swept area (l = pi * i^2 * j)	square metres	352920	352920
Proportion of risk area that is rotor-swept (m = l/k)		0.445	0.445
Estimate of number of birds flying through rotor-swept area during season (n = g * m)	birds	120.5	0
Probability of collision for a bird flying through rotors (estimated using SNH spreadsheet) (o)		0.059	0.059
Predicted mortality with no avoidance - turbines operational 85% of the time (p = n * o * 0.85)	collisions per season	6.00	0.00

** Figures have been rounded for presentation purposes. Following the calculations using rounded figures may yield slightly different results.*

Table B.3: Collision Risk Model run for Whooper swan (Commuting)

Parameter	Unit	Breeding	Non-breeding
Total number of birds flying through wind farm polygon (a)	birds	0	25
Mean survey effort (b)	minutes	8637	6490
Daylight during survey period, based on civil twilight (c)	minutes	167194	102202
Estimate of nocturnal activity as a proportion of daytime activity (d)		0.25	0.25
Time of potential activity during survey period (e = c * (1+d))	minutes	208993	127752
Rate of birds recorded during survey period (f = a/b)	birds per minute	0.0000	0.0039
Estimate of number of birds during season (g = e * f)	birds	0.0	492.1
Risk window length (h)	metres	5043	5043
Turbine blade length (i)	metres	79	79
Number of turbines (j)		18	18
Risk window (k = h * i * 2)	square metres	796831	796831
Rotor-swept area (l = pi * i^2 * j)	square metres	352920	352920
Proportion of risk area that is rotor-swept (m = l/k)		0.443	0.443
Estimate of number of birds flying through rotor-swept area during season (n = g * m)	birds	0	218
Probability of collision for a bird flying through rotors (estimated using SNH spreadsheet) (o)		0.08	0.08
Predicted mortality with no avoidance - turbines operational 85% of the time (p = n * o * 0.85)	collisions per season	0.00	14.86

** Figures have been rounded for presentation purposes. Following the calculations using rounded figures may yield slightly different results.*

Table B.4: Collision Risk Model run for Mallard (Commuting)

Parameter	Unit	Breeding	Non-breeding
Total number of birds flying through wind farm polygon (a)	birds	5	10
Mean survey effort (b)	minutes	8637	6490
Daylight during survey period, based on civil twilight (c)	minutes	167194	102202
Estimate of nocturnal activity as a proportion of daytime activity (d)		0	0
Time of potential activity during survey period (e = c * (1+d))	minutes	167194	102202
Rate of birds recorded during survey period (f = a/b)	birds per minute	0.0006	0.0015
Estimate of number of birds during season (g = e * f)	birds	96.79	157.47
Risk window length (h)	metres	4408	4408
Turbine blade length (i)	metres	79	79
Number of turbines (j)		18	18
Risk window (k = h * i * 2)	square metres	696386	696386
Rotor-swept area (l = pi * i^2 * j)	square metres	352920	352920
Proportion of risk area that is rotor-swept (m = l/k)		0.507	0.507
Estimate of number of birds flying through rotor-swept area during season (n = g * m)	birds	49.1	79.8
Probability of collision for a bird flying through rotors (estimated using SNH spreadsheet) (o)		0.048	0.048
Predicted mortality with no avoidance - turbines operational 85% of the time (p = n * o * 0.85)	collisions per season	2.00	3.26

** Figures have been rounded for presentation purposes. Following the calculations using rounded figures may yield slightly different results.*

Table B.5: Collision Risk Model run for Golden plover (Non-directional)

Parameter	Unit	Breeding	Non-breeding
Occupancy of risk volume (a)	seconds	2865	84393
Survey effort (b)	hectare-minutes	6224644	4689249
Observed occupancy rate for site (c = a / b)	seconds per hectare-minute	0.0005	0.0180
Daylight minutes (d)	minutes	167194	102202
Potentially active period (e = d*1.25)	minutes	208993	127752
Area of the wind farm polygon (f)	hectares	427.78	427.78
Total occupancy of risk volume during period of interest (g = c * e * f)	seconds	41153	983528
Rotor diameter (h)	metres	158	158
Risk volume (i = f * h * 10,000)	cubic metres	675886843	675886843
Number of turbines (j)	turbines	18	18
Rotor blade width (k)	metres	4.2	4.2
Length of bird of interest (l)	metres	0.29	0.29
Rotor-swept volume (m = j * pi * (h/2)^2 * (k + l))	cubic metres	1584612	1584612
Bird occupancy of rotor-swept volume (n = g * m / i)	seconds	96.5	2305.9
Bird flight speed (o)	metres per second	17.9	17.9
Time taken for bird to transit rotor (p = (k + l) / o)	seconds	0.25	0.25
Number of rotor transits (q = n / p)	rotor transits	385	9193
Probability of collision for a bird flying through rotors (estimated using SNH spreadsheet) (r)		0.042	0.042
Predicted mortality with no avoidance - turbines operational 85% of the time (y = q * r * 0.85)	collisions per season	13.61	325.17

** Figures have been rounded for presentation purposes. Following the calculations using rounded figures may yield slightly different results.*

Table B.6: Collision Risk Model run for Kestrel (Non-directional)

Parameter	Unit	Breeding	Non-breeding
Occupancy of risk volume (a)	seconds	472	295
Survey effort (b)	hectare-minutes	6224644	4689249
Observed occupancy rate for site (c = a / b)	seconds per hectare-minute	0.0001	0.0001
Daylight minutes (d)	minutes	167194	102202
Potentially active period (e = d*1)	minutes	167194	102202
Area of the wind farm polygon (f)	hectares	427.78	427.78
Total occupancy of risk volume during period of interest (g = c * e * f)	seconds	5425	2753
Rotor diameter (h)	metres	158	158
Risk volume (i = f * h * 10,000)	cubic metres	675886843	675886843
Number of turbines (j)	turbines	18	18
Rotor blade width (k)	metres	4.2	4.2
Length of bird of interest (l)	metres	0.34	0.34
Rotor-swept volume (m = j * pi * (h/2)^2 * (k + l))	cubic metres	1602258	1602258
Bird occupancy of rotor-swept volume (n = g * m / i)	seconds	12.9	6.5
Bird flight speed (o)	metres per second	8.3	8.3
Time taken for bird to transit rotor (p = (k + l) / o)	seconds	0.55	0.55
Number of rotor transits (q = n / p)	rotor transits	24	12
Probability of collision for a bird flying through rotors (estimated using SNH spreadsheet) (r)		0.065	0.065
Predicted mortality with no avoidance - turbines operational 85% of the time (y = q * r * 0.85)	collisions per season	1.29	0.65

** Figures have been rounded for presentation purposes. Following the calculations using rounded figures may yield slightly different results.*

C: (Addendum) Modelling for species rarely observed within collision risk airspace

C.1. Introduction

The following has been included as an amendment to the previously prepared CRM report following the observations and comments from the Developments Applications Unit (DAU) and An Bord Pleanála (ABP) in relation to the use of thresholds for determining collision risk.

Natural Power generally use a standard threshold of 3 flights or 10 individuals observed passing through the collision risk zone (CRZ) at potential collision height (PCH) to determine which species to take forward for collision risk modelling (see Section 2). This threshold is implemented to help keep assessments concise, because species observed less often that this are considered not to be common users of the airspace and because modelling of these species will invariably result in very low predicted mortality rates.

This threshold approach has been used by Natural Power and other consultancies in the UK and Ireland for a large number of projects (e.g. Infinenergy (2022) [11]; MacArthur Green (2020) [12]; and Arcus projects (2021/2022) [13,14]), including several consented sites (e.g. Pauls Hill II[15,], Golticlay[16], Seven Hills[17]). However, due to the precedent in Ireland to run collision risk modelling for all species observed within the CRZ at PCH and based observations from the DAU and ABP, results of collision risk modelling for those species that occurred within the collision risk airspace but were observed below this threshold are presented within this appendix.

C.2. Methods

Collision risk modelling was carried out according to the methods presented in Section 2 of this report.

Additional species analysed were all those for which fewer than 3 flights and 10 individuals were observed within the CRZ at PCH (see Tables 3.1 and 3.2), with the exception of meadow pipit. These species were:

- buzzard
- cormorant
- common gull
- golden eagle
- grey heron
- merlin
- sparrowhawk
- peregrine falcon
- ringed plover, and,
- teal

Bird attributes used in the modelling are presented in Table C1.

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[11] Infinenergy Report (2022) - *Appendix 11.3: Collision Risk Modelling Torrance Wind Farm Extension II*: TA11.3-Collision-Risk-Modelling.pdf (torrancewindfarmextension2.co.uk)

[12] MacArthur Green Report (2020) - *Cumberhead West Wind Farm Ornithology Appendix 8.1*: Appendix 8.1 Ornithology.pdf (scottishpowerrenewables.com)

[13] Arcus Report (2022) - *Appendix A8.5: Collision Risk Modelling Armadale Wind Farm* - https://armadalewindfarm.co.uk/wp-content/uploads/2022/04/3262_A8.5_Collision-Risk-Modelling_v2-0_MR_20220324.pdf

[14] Arcus Report (2021) – *Appendix 8.5: Collision Risk Modelling Carrick Wind Farm* - Appendix_8-5_Collision_Risk_Modelling.pdf (scottishpowerrenewables.com)

[15] Natural Power Report (2017) - *Paul's Hill II Wind Farm Environmental Statement Chapter 8: Ornithology Assessment*: https://fredolsenrenewables.com/windfarm-collection/united-kingdom/paul-s-hill-ii/?dl=0

[16] Natural Power Report (2023) - *Golticlay Wind Farm s.36 Variation - Environmental Impact Assessment Report 0.1: Ornithology Technical Appendix* - ES_A3_TMPL_NP (golticlaywindfarm.com)

[17] SLR Report (2022) - *SEVEN HILLS WIND FARM Avian Collision Risk Modelling Report*: SLR Report Template_Blank (pleanala.ie)

Table C.1: Bird attributes used in the collision risk analysis

Species	Bird length (metres)*	Wingspan (metres)*	Bird speed (metres/ second)**	Estimated nocturnal activity	Calculated individual collision risk
Buzzard	0.54	1.21	11.60	0	0.060
Cormorant	1.00	1.60	15.20	0	0.067
Common gull	0.41	1.20	13.40	0	0.052
Golden eagle	0.88	2.20	11.90	0	0.075
Grey heron	0.98	1.95	12.50	0	0.076
Merlin	0.30	0.62	10.10	0	0.054
Sparrowhawk	0.38	0.70	11.30	0	0.054
Hen harrier	0.52	1.20	9.10	0	0.07
Peregrine	0.48	1.10	12.10	0	0.056
Ringed plover	0.19	0.52	19.50	0.25	0.038
Teal	0.38	0.64	19.70	0	0.042

*Sources: *Snow and Perrins (1998)[4]; **Alerstam et al.(2007)[5]*

C.3. Results

The total number of target species flight lines recorded across all breeding seasons and non-breeding seasons are shown in Table 3.1 and Table 3.2 respectively. The number of flights and individuals observed passing through the CRZ at PCH are also shown.

Eleven species did not fulfil the criteria generally used by Natural Power to determine which species to take forward for CRM, but were observed within the CRZ at PCH. These species are summarised in Section C.2 above.

The risk of collision for each of these eleven species, calculated with avoidance factors of 95%, 98%, 99%, 99.2% and 99.8%, are presented in Table C.2. Values shown in bold represent species-specific avoidance levels recommended for collision risk analysis by NatureScot[3,6]. For those species for which a species-specific avoidance rate is not available (cormorant, grey heron, teal, buzzard, merlin, sparrow hawk, peregrine and ringed plover) the recommended default avoidance rate of 98% has been used.

Details of the calculations used to produce these estimates are provided in Tables C.3 – C.14.

The estimated number of collisions provided in table C.2 demonstrates that collision mortality will be less than one for all the modelled species over the 30-year life span of the Proposed Development. Based on this, the outcomes and impacts examined in chapter 8 (Ornithology) of the EIAR remain unchanged for all the species discussed and no collision risk impacts are anticipated.

Table C.2: Estimated number of collisions during the breeding season (Apr to Sept) and non-breeding season (Oct to Mar). Bold, shaded cells represent avoidance rates recommended by NatureScot (SNH, 2017[3]; Furness, 2019[6]). Annual estimates are sums of breeding and non-breeding estimates.

Species	Model type	Season	Estimated mortality assuming avoidance of:				
			95%	98%	99%	99.2%*	99.8%
Cormorant	Commuting	Breeding	0.02296	**0.00919**	0.00459	0.00367	0.00092
		Non-breeding	0	**0**	0	0	0
		Annual	0.02296	**0.00919**	0.00459	0.00367	0.00092
Common gull	Commuting	Breeding	0.04314	0.01726	0.00863	**0.00690**	0.00173
		Non-breeding	0	0	0	**0**	0
		Annual	0.04314	0.01726	0.00863	**0.00690**	0.00173
Grey heron	Commuting	Breeding	0.02717	**0.01087**	0.00543	0.00435	0.00109
		Non-breeding	0.02210	**0.00884**	0.00442	0.00354	0.00088
		Annual	0.04927	**0.01971**	0.00985	0.00789	0.00197
Teal	Commuting	Breeding	0	**0**	0	0	0
		Non-breeding	0.06449	**0.02580**	0.01290	0.01032	0.00258
		Annual	0.06449	**0.02580**	0.01290	0.01032	0.00258
Buzzard	Non-directional	Breeding	0.00179	**0.00072**	0.00036	0.00029	0.00007
		Non-breeding	0	**0**	0	0	0
		Annual	0.00179	**0.00072**	0.00036	0.00029	0.00007
Golden eagle	Non-directional	Breeding	0.00480	0.00192	**0.00096**	0.00077	0.00019
		Non-breeding	0	0	**0**	0	0
		Annual	0.00480	0.00192	**0.00096**	0.00077	0.00019
Merlin	Non-directional	Commuting	0.00055	**0.00022**	0.00011	0.00009	0.00002
		Non-breeding	0.00112	**0.00045**	0.00022	0.00018	0.00004
		Annual	0.00167	**0.00067**	0.00033	0.00027	0.00006
Sparrowhawk	Non-directional	Breeding	0.00016	**0.00007**	0.00003	0.00003	0.00001
		Non-breeding	0	**0**	0	0	0
		Annual	0.00016	**0.00007**	0.00003	0.00003	0.00001
Hen harrier	Non-directional	Breeding	0	0	**0**	0	0
		Non-breeding	0.00087	0.00035	**0.00017**	0.00014	0.00003
		Annual	0.00087	0.00035	**0.00017**	0.00014	0.00003
Peregrine	Non-directional	Breeding	0	**0**	0	0	0
		Non-breeding	0.00267	**0.00107**	0.00053	0.00043	0.00011
		Annual	0.00267	**0.00107**	0.00053	0.00043	0.00011
Ringed plover	Non-directional	Breeding	0	**0**	0	0	0
		Non-breeding	0.00180	**0.00072**	0.00036	0.00029	0.00007
		Annual	0.00180	**0.00072**	0.00036	0.00029	0.00007

**Note that this is different to the rate used in Table 3.3 due to the requirement to include the correct avoidance rate for common gull.*

Table C.3: Collision Risk Model run for cormorant (Commuting)*

Parameter	Unit	Breeding	Non-breeding
Total number of birds flying through wind farm polygon (a)	birds	1	0
Mean survey effort (b)	minutes	8637	6490
Daylight during survey period, based on civil twilight (c)	minutes	167194	102202
Estimate of nocturnal activity as a proportion of daytime activity (d)		0	0
Time of potential activity during survey period (e = c * (1+d))	minutes	167194	102202
Rate of birds recorded during survey period (f = a/b)	birds per minute	0.0001	0
Estimate of number of birds during season (g = e * f)	birds	19.36	0
Risk window length (h)	metres	5343.22	5343.22
Turbine blade length (i)	metres	79	79
Number of turbines (j)		18	18
Risk window (k = h * i * 2)	square metres	844228	844228
Rotor-swept area (l = pi * i^2 * j)	square metres	352920	352920
Proportion of risk area that is rotor-swept (m = l/k)		0.418	0.418
Estimate of number of birds flying through rotor-swept area during season (n = g * m)	birds	8.1	0
Probability of collision for a bird flying through rotors (estimated using SNH spreadsheet) (o)		0.067	0.067
Predicted mortality with no avoidance - turbines operational 85% of the time (p = n * o * 0.85)	collisions per season	0.46	0

** Figures have been rounded for presentation purposes. Following the calculations using rounded figures may yield slightly different results.*

Table C.4: Collision Risk Model run for common gull (Commuting)*

Parameter	Unit	Breeding	Non-breeding
Total number of birds flying through wind farm polygon (a)	birds	2	0
Mean survey effort (b)	minutes	8637	6490
Daylight during survey period, based on civil twilight (c)	minutes	167194	102202
Estimate of nocturnal activity as a proportion of daytime activity (d)		0	0
Time of potential activity during survey period (e = c * (1+d))	minutes	167194	102202
Rate of birds recorded during survey period (f = a/b)	birds per minute	0.0002	0
Estimate of number of birds during season (g = e * f)	birds	38.72	0
Risk window length (h)	metres	4409.34	4409.34
Turbine blade length (i)	metres	79	79
Number of turbines (j)		18	18
Risk window (k = h * i * 2)	square metres	696676	696676
Rotor-swept area (l = pi * i^2 * j)	square metres	352920	352920
Proportion of risk area that is rotor-swept (m = l/k)		0.507	0.507
Estimate of number of birds flying through rotor-swept area during season (n = g * m)	birds	19.6	0
Probability of collision for a bird flying through rotors (estimated using SNH spreadsheet) (o)		0.052	0.052
Predicted mortality with no avoidance – turbines operational 85% of the time (p = n * o * 0.85)	collisions per season	0.86	0

** Figures have been rounded for presentation purposes. Following the calculations using rounded figures may yield slightly different results.*

Table C.5: Collision Risk Model run for grey heron (Commuting)*

Parameter	Unit	Breeding	Non-breeding
Total number of birds flying through wind farm polygon (a)	birds	1	1
Mean survey effort (b)	minutes	8637	6490
Daylight during survey period, based on civil twilight (c)	minutes	167194	102202
Estimate of nocturnal activity as a proportion of daytime activity (d)		0	0
Time of potential activity during survey period (e = c * (1+d))	minutes	167194	102202
Rate of birds recorded during survey period (f = a/b)	birds per minute	0.0001	0.0002
Estimate of number of birds during season (g = e * f)	birds	19.36	15.75
Risk window length (h)	metres	5122.81	5122.81
Turbine blade length (i)	metres	79	79
Number of turbines (j)		18	18
Risk window (k = h * i * 2)	square metres	809403	809403
Rotor-swept area (l = pi * i^2 * j)	square metres	352920	352920
Proportion of risk area that is rotor-swept (m = l/k)		0.436	0.436
Estimate of number of birds flying through rotor-swept area during season (n = g * m)	birds	8.4	6.9
Probability of collision for a bird flying through rotors (estimated using SNH spreadsheet) (o)		0.076	0.076
Predicted mortality with no avoidance - turbines operational 85% of the time (p = n * o * 0.85)	collisions per season	0.54	0.44

** Figures have been rounded for presentation purposes. Following the calculations using rounded figures may yield slightly different results.*

Table C.6: Collision Risk Model run for teal (Commuting)*

Parameter	Unit	Breeding	Non-breeding
Total number of birds flying through wind farm polygon (a)	birds	0	4
Mean survey effort (b)	minutes	8637	6490
Daylight during survey period, based on civil twilight (c)	minutes	167194	102202
Estimate of nocturnal activity as a proportion of daytime activity (d)		0	0
Time of potential activity during survey period (e = c * (1+d))	minutes	167194	102202
Rate of birds recorded during survey period (f = a/b)	birds per minute	0	0.0006
Estimate of number of birds during season (g = e * f)	birds	0	62.99
Risk window length (h)	metres	3867.42	3867.42
Turbine blade length (i)	metres	79	79
Number of turbines (j)		18	18
Risk window (k = h * i * 2)	square metres	611052	611052
Rotor-swept area (l = pi * i^2 * j)	square metres	352920	352920
Proportion of risk area that is rotor-swept (m = l/k)		0.578	0.578
Estimate of number of birds flying through rotor-swept area during season (n = g * m)	birds	0	36.4
Probability of collision for a bird flying through rotors (estimated using SNH spreadsheet) (o)		0.042	0.042
Predicted mortality with no avoidance - turbines operational 85% of the time (p = n * o * 0.85)	collisions per season	0	1.29

** Figures have been rounded for presentation purposes. Following the calculations using rounded figures may yield slightly different results.*

Table C.7: Collision Risk Model run for buzzard (Non-directional)

Parameter	Unit	Breeding	Non-breeding
Occupancy of risk volume (a)	seconds	13	0
Survey effort (b)	hectare-minutes	7997242	6020217
Observed occupancy rate for site (c = a / b)	seconds per hectare-minute	0	0
Daylight minutes (d)	minutes	167194	102202
Potentially active period (e = d*1)	minutes	167194	102202
Area of the wind farm polygon (f)	hectares	427.78	427.78
Total occupancy of risk volume during period of interest (g = c * e * f)	seconds	115	0
Rotor diameter (h)	metres	158	158
Risk volume (i = f * h * 10,000)	cubic metres	675886843	675886843
Number of turbines (j)	turbines	18	18
Rotor blade width (k)	metres	4.2	4.2
Length of bird of interest (l)	metres	0.54	0.54
Rotor-swept volume (m = j * pi * (h/2)^2 * (k + l))	cubic metres	1672842	1672842
Bird occupancy of rotor-swept volume (n = g * m / i)	seconds	0.3	0
Bird flight speed (o)	metres per second	11.6	11.6
Time taken for bird to transit rotor (p = (k + l) / o)	seconds	0.41	0.41
Number of rotor transits (q = n / p)	rotor transits	1	0
Probability of collision for a bird flying through rotors (estimated using SNH spreadsheet) (r)		0.06	0.06
Predicted mortality with no avoidance - turbines operational 85% of the time (y = q * r * 0.85)	collisions per season	0.04	0

** Figures have been rounded for presentation purposes. Following the calculations using rounded figures may yield slightly different results.*

Table C.8: Collision Risk Model run for golden eagle (Non-directional)

Parameter	Unit	Breeding	Non-breeding
Occupancy of risk volume (a)	seconds	27	0
Survey effort (b)	hectare-minutes	7997242	6020217
Observed occupancy rate for site (c = a / b)	seconds per hectare-minute	0	0
Daylight minutes (d)	minutes	167194	102202
Potentially active period (e = d*1)	minutes	167194	102202
Area of the wind farm polygon (f)	hectares	427.78	427.78
Total occupancy of risk volume during period of interest (g = c * e * f)	seconds	241	0
Rotor diameter (h)	metres	158	158
Risk volume (i = f * h * 10,000)	cubic metres	675886843	675886843
Number of turbines (j)	turbines	18	18
Rotor blade width (k)	metres	4.2	4.2
Length of bird of interest (l)	metres	0.88	0.88
Rotor-swept volume (m = j * pi * (h/2)^2 * (k + l))	cubic metres	1792835	1792835
Bird occupancy of rotor-swept volume (n = g * m / i)	seconds	0.6	0
Bird flight speed (o)	metres per second	11.9	11.9
Time taken for bird to transit rotor (p = (k + l) / o)	seconds	0.43	0.43
Number of rotor transits (q = n / p)	rotor transits	1	0
Probability of collision for a bird flying through rotors (estimated using SNH spreadsheet) (r)		0.075	0.075
Predicted mortality with no avoidance - turbines operational 85% of the time (y = q * r * 0.85)	collisions per season	0.1	0

** Figures have been rounded for presentation purposes. Following the calculations using rounded figures may yield slightly different results.*

Table C.9: Collision Risk Model run for merlin (Non-directional)

Parameter	Unit	Breeding	Non-breeding
Occupancy of risk volume (a)	seconds	5	13
Survey effort (b)	hectare-minutes	7997242	6020217
Observed occupancy rate for site (c = a / b)	seconds per hectare-minute	0	0
Daylight minutes (d)	minutes	167194	102202
Potentially active period (e = d*1)	minutes	167194	102202
Area of the wind farm polygon (f)	hectares	427.78	427.78
Total occupancy of risk volume during period of interest (g = c * e * f)	seconds	46	93
Rotor diameter (h)	metres	158	158
Risk volume (i = f * h * 10,000)	cubic metres	675886843	675886843
Number of turbines (j)	turbines	18	18
Rotor blade width (k)	metres	4.2	4.2
Length of bird of interest (l)	metres	0.3	0.3
Rotor-swept volume (m = j * pi * (h/2)^2 * (k + l))	cubic metres	1588141	1588141
Bird occupancy of rotor-swept volume (n = g * m / i)	seconds	0.1	0.2
Bird flight speed (o)	metres per second	10.1	10.1
Time taken for bird to transit rotor (p = (k + l) / o)	seconds	0.45	0.45
Number of rotor transits (q = n / p)	rotor transits	0	0
Probability of collision for a bird flying through rotors (estimated using SNH spreadsheet) ®		0.054	0.054
Predicted mortality with no avoidan–e - turbines operational 85% of the time (y = q * r * 0.85)	collisions per season	0.01	0.02

** Figures have been rounded for presentation purposes. Following the calculations using rounded figures may yield slightly different results.*

Table C.10: Collision Risk Model run for sparrowhawk (Non-directional)

Parameter	Unit	Breeding	Non-breeding
Occupancy of risk volume (a)	seconds	1	0
Survey effort (b)	hectare-minutes	7997242	6020217
Observed occupancy rate for site (c = a / b)	seconds per hectare-minute	0	0
Daylight minutes (d)	minutes	167194	102202
Potentially active period (e = d*1)	minutes	167194	102202
Area of the wind farm polygon (f)	hectares	427.78	427.78
Total occupancy of risk volume during period of interest (g = c * e * f)	seconds	12	0
Rotor diameter (h)	metres	158	158
Risk volume (i = f * h * 10,000)	cubic metres	675886843	675886843
Number of turbines (j)	turbines	18	18
Rotor blade width (k)	metres	4.2	4.2
Length of bird of interest (l)	metres	0.38	0.38
Rotor-swept volume (m = j * pi * (h/2)^2 * (k + l))	cubic metres	1616375	1616375
Bird occupancy of rotor-swept volume (n = g * m / i)	seconds	0	0
Bird flight speed (o)	metres per second	11.3	11.3
Time taken for bird to transit rotor (p = (k + l) / o)	seconds	0.41	0.41
Number of rotor transits (q = n / p)	rotor transits	0	0
Probability of collision for a bird flying through rotors (estimated using SNH spreadsheet) (r)		0.054	0.054
Predicted mortality with no avoidance - turbines operational 85% of the time (y = q * r * 0.85)	collisions per season	<0.01	0

** Figures have been rounded for presentation purposes. Following the calculations using rounded figures may yield slightly different results.*

Table C.11: Collision Risk Model run for hen harrier (Non-directional)

Parameter	Unit	Breeding	Non-breeding
Occupancy of risk volume (a)	seconds	0	8
Survey effort (b)	hectare-minutes	7997242	6020217
Observed occupancy rate for site (c = a / b)	seconds per hectare-minute	0	0
Daylight minutes (d)	minutes	167194	102202
Potentially active period (e = d*1)	minutes	167194	102202
Area of the wind farm polygon (f)	hectares	427.78	427.78
Total occupancy of risk volume during period of interest (g = c * e * f)	seconds	0	61
Rotor diameter (h)	metres	158	158
Risk volume (i = f * h * 10,000)	cubic metres	675886843	675886843
Number of turbines (j)	turbines	18	18
Rotor blade width (k)	metres	4.2	4.2
Length of bird of interest (l)	metres	0.52	0.52
Rotor-swept volume (m = j * pi * (h/2)^2 * (k + l))	cubic metres	1665784	1665784
Bird occupancy of rotor-swept volume (n = g * m / i)	seconds	0	0.2
Bird flight speed (o)	metres per second	9.1	9.1
Time taken for bird to transit rotor (p = (k + l) / o)	seconds	0.52	0.52
Number of rotor transits (q = n / p)	rotor transits	0	0
Probability of collision for a bird flying through rotors (estimated using SNH spreadsheet) (r)		0.07	0.07
Predicted mortality with no avoidance - turbines operational 85% of the time (y = q * r * 0.85)	collisions per season	0	0.02

** Figures have been rounded for presentation purposes. Following the calculations using rounded figures may yield slightly different results.*

Table C.12: Collision Risk Model run for peregrine (Non-directional)

Parameter	Unit	Breeding	Non-breeding
Occupancy of risk volume (a)	seconds	0	24
Survey effort (b)	hectare-minutes	7997242	6020217
Observed occupancy rate for site (c = a / b)	seconds per hectare-minute	0	0
Daylight minutes (d)	minutes	167194	102202
Potentially active period (e = d*1)	minutes	167194	102202
Area of the wind farm polygon (f)	hectares	427.78	427.78
Total occupancy of risk volume during period of interest (g = c * e * f)	seconds	0	177
Rotor diameter (h)	metres	158	158
Risk volume (i = f * h * 10,000)	cubic metres	675886843	675886843
Number of turbines (j)	turbines	18	18
Rotor blade width (k)	metres	4.2	4.2
Length of bird of interest (l)	metres	0.48	0.48
Rotor-swept volume (m = j * pi * (h/2)^2 * (k + l))	cubic metres	1651667	1651667
Bird occupancy of rotor-swept volume (n = g * m / i)	seconds	0	0.4
Bird flight speed (o)	metres per second	12.1	12.1
Time taken for bird to transit rotor (p = (k + l) / o)	seconds	0.39	0.39
Number of rotor transits (q = n / p)	rotor transits	0	1
Probability of collision for a bird flying through rotors (estimated using SNH spreadsheet) (r)		0.056	0.056
Predicted mortality with no avoidance - turbines operational 85% of the time (y = q * r * 0.85)	collisions per season	0	0.05

** Figures have been rounded for presentation purposes. Following the calculations using rounded figures may yield slightly different results.*

Table C.13: Collision Risk Model run for ringed plover (Non-directional)

Parameter	Unit	Breeding	Non-breeding
Occupancy of risk volume (a)	seconds	0	12
Survey effort (b)	hectare-minutes	7997242	6020217
Observed occupancy rate for site (c = a / b)	seconds per hectare-minute	0	0
Daylight minutes (d)	minutes	167194	102202
Potentially active period (e = d*1.25)	minutes	208993	127752
Area of the wind farm polygon (f)	hectares	427.78	427.78
Total occupancy of risk volume during period of interest (g = c * e * f)	seconds	0	111
Rotor diameter (h)	metres	158	158
Risk volume (i = f * h * 10,000)	cubic metres	675886843	675886843
Number of turbines (j)	turbines	18	18
Rotor blade width (k)	metres	4.2	4.2
Length of bird of interest (l)	metres	0.19	0.19
Rotor-swept volume (m = j * pi * (h/2)^2 * (k + l))	cubic metres	1549320	1549320
Bird occupancy of rotor-swept volume (n = g * m / i)	seconds	0	0.3
Bird flight speed (o)	metres per second	19.5	19.5
Time taken for bird to transit rotor (p = (k + l) / o)	seconds	0.23	0.23
Number of rotor transits (q = n / p)	rotor transits	0	1
Probability of collision for a bird flying through rotors (estimated using SNH spreadsheet) (r)		0.038	0.038
Predicted mortality with no avoidance - turbines operational 85% of the time (y = q * r * 0.85)	collisions per season	0	0.04

** Figures have been rounded for presentation purposes. Following the calculations using rounded figures may yield slightly different results.*

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Appendix 3 - CEMP

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BORD NA MÓNA POWERGEN LTD.

OWENINNY WIND FARM PHASE 3

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

MARCH 2023

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OWENINNY WIND FARM PHASE 3

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

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A	First Issue	ROT	24/03/2023	RH	24/03/2023	BG	29/03/2023

TOBIN Consulting Engineers

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Abbreviations

ABP – An Bord Pleanála

BCA – Building Control Authority

BCMS – Building Control Management System

C&D – Construction & Demolition

CEMP – Construction Environmental Management Plan

CER – Commission for Energy Regulation

DHPLG – Department of Housing, Planning and Local Government

DMP – Dust Management Plan

ECoW – Ecological Clerk of Works

EIA – Environmental Impact Assessment

EIAR – Environmental Impact Assessment Report

EMP – Environmental Management Plan

EPA – Environmental Protection Agency

ERP – Emergency Response Plan

ESBN – ESB Networks

GHG – Greenhouse Gas

GSI – Geological Society of Ireland

GWB – Groundwater Body

Ha - Hectares

HSA – Health and Safety Authority

HV – High Voltage

IAA – Irish Aviation Authority

IAQM – Institute of Air Quality Management

IFI – Inland Fisheries Ireland

IPP – Independent Power Producer

MCC – Mayo County Council

LV – Low Voltage

MV – Medium Voltage

MW – Megawatts

NBDC – National Biodiversity Data Centre

NHA – National Heritage Areas

pNHA – proposed National Heritage Areas

NIS – Natura Impact Statement

NPWS – National Parks and Wildlife Service

NRA – National Roads Authority

OPW – Office of Public Works

PMP – Peat Management Plan

PSCS – Project Supervisor Construction Stage

PSDP – Project Supervisor Design Process

SAC – Special Area of Conservation

SEPA – Scottish Environmental Protection Agency

SHEQ – Safety, Health, Environment and Quality Officer

SPA – Special Protection Area

SuDS – Sustainable Drainage System

TDR – Turbine Delivery Route

TIA – Traffic Impact Assessment

TII – Transport Infrastructure Ireland

TMP – Traffic Management Plan

ZoI – Zone of Influence

1.0 INTRODUCTION

Bord na Móna Powergen Ltd. is a subsidiary of Bord na Móna Plc, a publicly owned company. Bord na Móna was originally established in 1946 to develop and manage some of Ireland's extensive peat resources on an industrial scale, in accordance with government policy at the time. Bord na Móna's lands extend to approximately 80,000 hectares (ha) in total and are located mainly in the Irish midlands. Oweninny Bog is located in north County Mayo. The associated lands comprise primarily of cutaway bog, partly developed bog, yards, railway lines and areas of upland and undeveloped bog. The Oweninny Bog forms part of the 'Oweninny Group' which includes Bangor, Ballycroy and Loughnahelly Bogs (often referred to as the Bangor Bogs). These bogs are located further west of Oweninny Bog heading towards the Mayo coastline. The 'Oweninny Group' encompasses a total of 7,230 Ha of which 5,190 Ha comprise Oweninny Bog, Appendix 1.2 Drawing No. 10889-2000 of the EIAR.

Bord na Móna Powergen Ltd. currently manage and operate a portfolio of thermal and renewable assets that supply energy to the National Grid. These assets include; Edenderry Power Plant, a peat/biomass generating unit, Cushaling peaking plant, the Drehid landfill gas facility, Bellacorick Wind Farm, Bruckana Wind Farm situated on the borders of counties Tipperary, Kilkenny and Laois, Mountlucas wind farm in Co. Offaly and Oweninny Wind Farm Phase 1 (a joint venture with ESB) commissioned in 2019. Cloncreen Wind Farm in County Offaly, and Oweninny Phase 2 in County Mayo have recently completed construction. In addition, Timahoe North solar farm located in Co. Kildare commenced construction in 2022. Derrinlough Wind Farm in County Offaly was granted planning permission in 2021 and construction works commenced in 2022.

The Oweninny Bog illustrated in Drawing No. 10889-2000 is situated approximately 12km west of Crossmolina, 15km east of Bangor Erris, and just north of the N59 National Road. The closest settlement to the site is Bellacorick village which is located approximately 2km southwest of the proposed development extent. The land surrounding the Oweninny Bog is relatively sparsely populated. There are several sensitive receptors located within 2km of the redline boundary including residential and commercial properties, Special Protected Areas (SPA), Special Areas of Conservation (SAC), Natural Heritage Areas (NHA), proposed National Heritage Areas (pNHA) and recorded architectural heritage sites. The closest SACs are Lough Dahybaun SAC, which is located on the southern boundary of the site, and Bellacorick Iron Flush SAC, which is located within the bog boundary to the north of the site and outside the Oweninny Phase 3 wind farm boundary.

Bord na Móna Powergen Ltd. (hereafter referred to as the Developer) intend to apply for planning permission to develop Oweninny Wind Farm Phase 3 and all associated infrastructure at this approximately 2282 Ha site in North County Mayo. The proposed grid connection infrastructure is located within the townlands of Bellacorick and Moneynierna, in County Mayo. To the east of the site a local road (L5292) runs northwards from the N59 to the townlands of Shanvolahan and Formoyle. Other townlands within the are Laghtanvack, Croaghaun (also known as Croaghaun West), Corvoderry, Dooleeg More and Shanvodinnaun, Co. Mayo.

The planning application for the proposed development will be submitted to An Bord Pleanála (ABP) under Section 37E of the *Planning and Development Act 2000* (as amended). An Environmental Impact Assessment Report (EIAR) and Natura Impact statement (NIS) have been prepared to accompany the planning application and incorporate all elements of the proposed project works including the main wind farm site, the electrical grid connection, the road/junction accommodation works to facilitate the abnormal load deliveries. Collectively this is referred to as the Oweninny Wind Farm Phase 3.

This Construction Environmental Management Plan (CEMP) has been prepared to outline the proposed management and administration of site activities for the Construction Phase of the proposed development, to ensure that all construction activities are undertaken in an environmentally responsible manner. This CEMP summarises the environmental commitments of the construction project, and the measures to ensure compliance with legislation and the requirements of statutory bodies, all as detailed in the EIAR and NIS.

This CEMP will be a live document and will be reviewed and updated, as necessary. Upon appointment, the Main Contractor for construction of the proposed development shall update this document to produce a Final CEMP which will account for any additional requirements set out in Planning Conditions.

The following relevant guidance has been referenced in the preparation of this CEMP:

- Environmental Protection Agency (EPA), *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (2022)
- Department of Housing, Planning and Local Government (DHPLG), *Draft Revised Wind Energy Development Guidelines* (2019)
- Department of Housing, Planning and Local Government (DHPLG), *Wind Energy Development Guidelines* (2006)

1.1 PROPOSED DEVELOPMENT

Permission is sought for wind turbines within a defined range with specific characteristics. The turbines will have a tip height of 200m above the top of foundation level and will be accessible from internal access routes within the Bord na Móna Site.

The rotor diameter will be 158m. These rotor diameters correspond to a maximum blade length of 77.5m. The hub height will be 121m.

The proposed development will comprise the following:

- 18 no. wind turbines (including tower sections, nacelle, hub, and rotor blades) and all associated foundations and hard-standing areas in respect of each turbine;
- Decommissioning and removal of 21 no. existing Bellacorick Wind Farm wind turbines (including tower sections, nacelle, hub, and rotor blades);
- New internal site access roads (permanent and temporary), passing bays, car parking and associated drainage.
- An amenity route through the site from the N59 at the main site entrance to the existing Visitors Centre, and access from a local road off the N59 near Dooleeg.
- 2 no. borrow pits.
- 5 no. peat deposition areas.
- 1 No. permanent Meteorological Mast 120m high, and the decommissioning and removal of an existing 100m Meteorological Mast on site.
- 4 no. temporary construction compounds, including material storage, site welfare facilities, and site offices.
- 1 no. 110kV electrical substation compound. The electrical substation will have 2 No. control buildings, a 36m high telecommunications tower, associated electrical plant and equipment and a wastewater holding tank.
- All associated underground electrical and communications cabling connecting the wind turbines to the proposed substation;

- All works associated with the connection of the proposed wind farm to the national electricity grid, including a 110kV underground electrical cable from the proposed on-site electrical sub-station to the existing sub-station at Bellacorick;
- All related site works and ancillary development including (but not limited to):
    - Earthworks;
    - Peat management works;
    - Site security;
    - Groundwater and surface water management;
    - Overburden (soils/peat) storage and management; and
    - Site reinstatement, landscaping and erosion control.
- A 10-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm.

The proposed development layout is shown in Appendix 1-2 Drawing No. 10889-2000 which shows the proposed development boundary including the proposed turbine locations and grid connection route. All elements of the proposed project as listed above, including grid connection and any works required on public roads to accommodate turbine delivery, have been considered and are addressed in detail as part of the EIAR.

1.2 SCOPE OF THIS CEMP

This CEMP addresses all relevant environmental aspects of the management of site preparation and construction work within the proposed development works area as set out in Section 1.1. The scope of this CEMP includes:

- All construction elements of the proposed development.
- The decommissioning and appropriate disposal of the existing 21 Bellacorick Wind Farm wind turbines.
- The proposed implementation and management of environmental controls and mitigation measures during each phase of construction works; and
- A documented process to ensure measures identified through the planning phase of the proposed development will be applied in practice.

This CEMP contains:

- A statement of the environmental aims and policy objectives of the proposed development.
- Roles and responsibilities of key individuals.
- Environmental management and reporting structure.
- Site management and construction activity details.
- Environmental mitigation measures.
- Environmental awareness training programmes.
- Environmental monitoring programmes and requirements.
- Inspection and auditing programmes; and
- Emergency response plans and procedures for any environmental incidents.

This CEMP should be read in conjunction with the EIAR, NIS and supporting documentation. In the unlikely event of any contradiction between this CEMP and the EIAR/NIS, the EIAR/NIS shall take precedence.

1.3 IMPLEMENTATION OF THE CEMP

Key to the implementation of this CEMP is the delegation of responsibility for the CEMP to the Construction Environmental Manager/Safety, Health, Environmental and Quality (SHEQ)

Officer, or other suitably qualified appointed person on behalf of the Contractor, who will regularly liaise with and update the Developer on all environmental issues relating to the project during the construction phase. As part of the appointment of a Contractor and agreement of Contracts, the Developer will determine the lines of communication for environmental compliance with the local authorities and relevant stakeholders.

In terms of overall environmental responsibility, everyone on-site is responsible for ensuring that their actions constitute good environmental practice and will be provided with site specific information to ensure compliance as part of the site induction. All site personnel tasked with adhering to best practice and encouraged to provide feedback and suggestions for improvements. All site personnel are also required to ensure compliance with the requirements of this CEMP and subsequent revisions thereof.

1.4 AIMS AND OBJECTIVES

The key project aims are:

- To ensure the project is undertaken in accordance with best practice guidance for the management of the environment during construction works.
- To ensure that mitigation measures to protect designated sites as set out in the NIS are put in place.
- To ensure that mitigation measures to protect all aspects of the environment as set out in the EIAR are put in place.
- To ensure that construction activities are carried out in accordance with all planning conditions for the proposed development; and
- To carry out the proposed works with minimal impact on the environment.

The primary objectives to ensure the above aims are achieved during the construction phase are:

- Appointment and delegation of responsibility to an individual for monitoring environmental compliance and adherence to this CEMP.
- Updating the CEMP on a continuous basis in accordance with regular environmental auditing and site inspections.
- Providing adequate environmental training and awareness to all project personnel.
- Establishing documented schedules and records for monitoring and inspections.
- Establishing reporting procedures for any incidents on site with potential to impact on the environment.
- Providing opportunities for site staff, operatives and community feedback and submission of complaints; and
- Adopting a sustainable and socially responsible approach to construction.

1.5 REVISIONS OF THE CEMP

All the elements of this CEMP will be included in the final CEMP, which will be produced prior to construction by the contractor. In addition, the final CEMP will implement conditions attached to any planning permission granted. The CEMP will be subject to ongoing review (throughout the construction phase of the proposed development), through regular environmental auditing and site inspections.

The appointed Contractor is required to include further details and/or confirmation in the final CEMP which will include:

- Details of emergency plan including personnel and contact numbers.
- Details of fuel storage areas (including location and bunding).

- Temporary Construction lighting details.
- Site and traffic signage; and
- Method statements.

1.6 ENVIRONMENTAL TRAINING AND AWARENESS

To ensure that environmental awareness and compliance is communicated effectively at the start and throughout the construction works, this CEMP and its contents will be communicated to all site personnel, including management staff, operatives and sub-contractors. The key elements of this CEMP will form part of the site induction which will be mandatory for all employees, contractors and visitors attending the site.

Environmental toolbox talks will be provided to all site personnel and sub-consultants on a regular basis. These will be targeted at particularly sensitive environmental issues such as:

- Protection of sensitive ecological habitats and key ecological receptors.
- Works close to water bodies.
- Water pollution and silt control.
- Water pollution in relation to cement and concrete handling.
- Spill prevention and control.
- Dust management.
- Sensitive archaeological sites; and
- Waste management.

2.0 OVERVIEW OF THE EXISTING SITE

2.1 SITE LOCATION

The proposed wind farm site is in north County Mayo and its lands comprise primarily of cutaway bog, partly developed bog, yards, railway lines and areas of upland and undeveloped bog. The proposed wind farm site is approximately 8.5km long in the north/south direction and is approximately 5.9km wide in the east/west direction at its widest point. As mentioned elsewhere, Bellacorick village is the closest settlement to the site, situated approximately 2km from the southwestern extents of the proposed development. To the east of the site a local road (L5292) runs northwards from the N59 to the townlands of Shanvolahan and Formoyle. Other townlands within the proposed wind farm site are Laghtanvack, Croaghaun (also known as Croaghaun West), Moneynieran, Corvoderry, Dooleeg More and Shanvodinnaun, Co. Mayo. The River Owenmore is located approximately 350m to the west of the proposed wind farm site at its nearest point.

The proposed grid connection will be connected to the national grid at the existing 110kV Bellacorick substation via underground medium voltage (MV) cables and will export power via the existing 110 kV overhead line infrastructure from Bellacorick substation.

It is proposed to construct one 110 kV substation compound within the site to house the Transmission System Operator (TSO) substation and the Independent Power Producer (IPP) substation, at the location shown on Planning Drawing 10889-2003. The layout of the proposed substation is shown on Planning Drawing 10889-2015. The construction and electrical components of the substations will be to EirGrid specifications, see Drawing No. 10889-2015.The substation footprint will include two control buildings and electrical apparatus necessary to facilitate the generated power from the wind turbines to export onto the transmission system.

Two substation control buildings will be located within the substation compound. Control Building 1 (Asset Owner Control Building) will measure approximately 25 metres by 18 metres and approximately 9.7 metres in height. Control Building 2 (IPP Control Building) will measure approximately 19 metres by 12 metres and approximately 7 metres in height. Layout drawings of the control buildings are shown on Planning Drawings 10889-2017 and 10889-2018.

2.2 EXISTING LAND, SOILS AND GEOLOGICAL ENVIRONMENT

The project site is relatively flat lying, with cutover blanket peat overlying glacial till that in turn overly sedimentary bedrock of mixed lithology. Information on the bedrock geology was obtained from the Geology of North Mayo, Sheet No. 6 (1:100,000) and accompanying booklet published by the Geological Survey of Ireland (GSI).

The proposed site is underlain by the Downpatrick Formation which is comprised of Carboniferous cross-bedded sandstone and siltstone. The underlying bedrock geology is composed of a sequence of interbedded rock types comprising near shore marine mudstones and siltstones; alluvial and deltaic sandstones and siltstones; and fully marine bioclastic limestones interbedded with calcareous shales.

No significant groundwater resources are present at the site, although localised perched groundwater may be associated with areas of granular overburden. No significant geological resources are known at the site and geological heritage is limited to the banks of the Bellacorick River.

Due to the relatively flat, drained and cutaway nature of the site, Peat stability risk is limited to discrete areas of the site. The outline design of the proposed development has sought to minimise peat stability risks and these risks will be further investigated and considered at the detail design stage. Further details on the Land, Soils and Geological Environment are provided in Chapter 9 of the EIAR.

2.3 EXISTING HYDROLOGICAL AND HYDROGEOLOGICAL ENVIRONMENT

The proposed development site is located in North Mayo, west of Crossmolina and east of Bangor Erris, just north of the N59 road. According to the GSI/EPA Source Protection Zone Map (www.gsi.ie), there are no Source Protection Zones within the study area or in the surrounding region. Crossmolina Eskeragh Group Scheme source protection zone is c. 7 km south-east of the proposed site at Ballinlabaun (IE_WE_34A350930).

Five no. boreholes for water abstraction were identified within 1km of the proposed development. These are associated with the former Bellacorick Power Station, with 3 no. wells drilled in 1989 and 2 no. drilled in 1998. Only 1 no. well appears to have generated a 'Good' yield and was drilled to a depth of 160 m (GSI Well ID 0831SEW005). This well is identified as being for industrial use, with the use for the 4 no. unproductive wells being described as 'Other'.

The Water Framework Directive (www.wfdireland.ie) describes the groundwater quality status of the proposed development in the area. The Muing River and Cloonaghmore River are of 'Good'' status. The Owenmore River has 'High' status and the Shanvolahan River is at 'moderate' status in the 2013-2018 WFD assessment.

The groundwater body (GWB) is the management unit under the WFD. Groundwater bodies are subdivisions of large geographical areas of aquifers so that they can be effectively managed in order to protect the groundwater and linked surface waters. The GWB is defined as a distinct volume of groundwater, including recharge and discharge areas with little flow across the boundaries. The proposed development is underlain by the Belmullet GWB and the Bellacorick -Killala GWB. The groundwater body descriptions are available from the GSI website and the 'status' is obtained from the WFD website and the EPA website. The GWBs underlying the site are classified as being at good status. The site is underlain by the Belmullet groundwater body. The Belmullet groundwater body and Bellacorick-Killala GWB is comprised of generally low transmissivity and storativity rocks.

Much of the site consists of blanket peat subsoil which contributes to moderate groundwater vulnerability. Some areas within the site e.g., east of Lough Dahybaun are characterised by highly permeable glaciofluvial sand and gravels making up the subsoil which are overlain by poorly drained soil/ peat. These areas where peat overlays highly permeable sand and gravels results in high groundwater vulnerability.

The groundwater vulnerability map for the region is dominated by 'Moderate' vulnerability in the study area, correlating with areas of blanket peat cover. However, areas where alluvial deposits are found along the Bellacorick River and areas where gravels derived from sandstones and limestone are located are described as having 'High' vulnerability. In addition, there are some lesser areas along the site boundaries that are described as having 'Low' groundwater vulnerability.

Three sub catchments are located across the proposed development site. These are the Cloonaghmore_SC_010 sub catchment located to the northeast of the site. This sub catchment is around the Moy and Killala Bay catchment. The west of the site lies within the Owenmore [Mayo]_SC_020 sub catchment which falls under the Blacksod-Broadhaven catchment. The southeast of the site is within the Deel [Crossmolina]_SC_010 sub catchment which is a part of the Moy and Killala Bay hydrometric area.

Local groundwater flows are likely to be varied reflecting the local drainage patterns. Across much of the site, it is assumed that the groundwater flow is towards local drains and streams, reflecting the general flow direction of the various catchments. Limited recharge and discharge is likely to occur due to the extensive peat deposits and deep subsoils.

The above detail is further discussed in Chapter 10 (Hydrogeology) of the EIAR.

2.4 EXISTING ECOLOGICAL ENVIRONMENT

This section presents a high-level summary of the existing ecological environment at the proposed development site. A more detailed description of desktop studies, field studies and species encountered is provided in Chapter 7 (Biodiversity) and Chapter 8 (Ornithology) of the EIAR.

2.4.1 Designated Areas

The Habitats Directive (92/42/EEC) put an obligation on EU Member States to establish the Natura 2000 network. The potential impacts of the proposed development on European sites (sites designated as Special Areas of Conservation [SACs] or Special Protection Areas [SPAs] that form part of the Natura 2000 network) in the Zone of Influence (ZoI) have been evaluated. This appraisal is presented separately in the form of a Natura Impact Statement (NIS) (which accompanies the Planning Application documentation as a standalone document however, for the purposes of this CEMP a brief overview of the Biodiversity and Ornithology chapters and their associated elements are present below:

There are five NHAs and ten pNHAs located within the 15km buffer of the proposed development site or those over 15km away but where a potential pathway for effect was identified, such as surface water connectivity. All NHAs and pNHAs are illustrated in Chapter 7 Biodiversity Table 7-5. Other sites of nature conservation within the ZoI or within 15km of the proposed development site are discussed hereunder:

- There is one National Park (Ballcroy National Park) located within 15km of the proposed development site.
- Three Nature Reserves; Owenduff Catchment Nature Reserve, Owenboy, Nephin Mor Forest Nature Reserve and Knockmoyle, Sheskin Nature Reserve occur within 15km of the proposed development site.
- Three RAMSAR sites; Owenduff Catchment, Owenboy, and Knockmoyle/Sheskin occur within 15km of the proposed development site.

Several watercourses occur within the proposed development site boundary. The Oweninny River (Waterbody Code: IE_WE_33O040050) flows to the west of the proposed development site and the Owenmore River (Waterbody Code: IE_WE_33M010100) flows through the southwest corner of the site. The Cloonaghmore river (Waterbody Code: IE_WE_34C030100) crosses the north of the proposed development site and the Shanvolahan river (Waterbody Code: IE_WE_34S010400) flows through the southeast of the proposed development site. Lough Dahybaun (Waterbody Code: IE_WE_34C030100) is also found within the proposed development site.

The Mayo County Development Plan 2022-2028 identifies sites of ecological importance at the county level in or near the proposed wind farm.

2.4.2 Habitats

As mentioned previously, the proposed development site is dominated by cutover blanket bog which was harvested commercially between the 1950s and the early 2000s. There are many remnant bog areas which lie scattered throughout the site. Although these remnant areas are dominated by lowland blanket bog, they also contain areas of dry heath and wet heath and patches of transition mires and quaking bog. Various lakes and ponds, some of recent origin, occur scattered through the proposed development site. In the western and central areas of the site there are several areas dominated by commercial conifer plantation on peat.

A multi-disciplinary walkover survey following the methodology outlined by 'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes' (NRA, 2009b) was undertaken at the proposed turbine locations including all hardstand areas, proposed met mast locations, substation location, grid connection routes and internal haul roads. Multi-disciplinary walkover surveys were undertaken during August 2020. These visual surveys were deemed to be adequate to assess habitats of low ecological interest (following methodology outlined in Smith et al., 2011). These surveys aimed to record the habitats, and flora and fauna present within the survey area, a comprehensive description of the existing habitats encountered at the site is provided in Section 7.7.2 of Chapter 7 (Biodiversity) of the EIAR.

2.4.3 Flora

A vegetation survey was carried out at key infrastructure elements, the results of which are detailed in Section 7.7.1.2.1 of Chapter 7 (Biodiversity) of the EIAR.

Protected Flora

No botanical species listed under Annex II of the EU Habitats Directive or listed under the Flora Protection Order (FPO), or red list of vascular plant species were recorded within the footprint of the proposed development site.

2.4.4 Bats

The bat reports detailing all the surveys undertaken by Bat Eco Services at the proposed development site in 2020, 2021 and 2022, see Appendix 7-2 of the EIAR and a summary of the main findings of the reports are provided in Chapter 7 of the EIAR. The survey design followed the following methodologies: desktop study, deployment of static detectors, walked transects, point counts and driven transects, roost surveys, as well as monitoring of climatic conditions as per SNH guidance document. A total of eight bat species were recorded utilising the proposed development site during the transect and static detector surveys. Further details of the survey results are provided in the EIAR.

2.4.5 Other Fauna

Records of terrestrial mammals within the vicinity of the wind farm site, obtained from the National Biodiversity Data Centre (NBDC) and National Parks and Wildlife Service (NPWS), are presented in Table 6-4 of Chapter 6 (Biodiversity) of the EIAR. These include badger, bank vole, brown rat, fallow deer, fox, Irish hare, Irish stoat, pine marten, rabbit, red squirrel, and wild boar.

2.4.6 Aquatic Ecology

The existing aquatic environment is further discussed Chapter 7 (Biodiversity) of the EIAR.

2.4.7 Ornithology

A detailed description of the findings of the bird surveys is presented in Section 8.3 of Chapter 8 (Ornithology) of the EIAR.

3.0 OVERVIEW OF THE CONSTRUCTION WORKS

3.1 DURATION AND PHASING OF THE PROPOSED DEVELOPMENT

It is anticipated that the overall construction phase of the development will take approximately 24 - 30 months from starting on-site to completion of the commissioning of the turbines. Pending planning approval, an arbitrary start date of January 2025 has been selected for commencement of construction. All vegetation clearance that is required during construction works will commence outside the breeding birds' season, which runs from the 1st of March to the 31st of August.

The construction phase can be broken down into six main phases as follows:

- Bellacorick Decommissioning – 3 months
- Civil engineering works – 18 months
- Electrical works – 18 months (will commence shortly after civil works and will then run in parallel); and
- Turbine delivery – 8 months
- Turbine installation – 8 months (will commence shortly after delivery and will then run in parallel); and
- Substation and turbine commissioning – 4 months

Figure 3-1 presents an indicative schedule for the construction works.

Ref	Task Name	Task Description	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25	Sep-25	Oct-25	Nov-25	Dec-25	Jan-26	Feb-26	Mar-26	Apr-26	May-26	Jun-26	Jul-26	Aug-26	Sep-26	Oct-26	Nov-26	Dec-26
1	Site Health & Safety																									
2	Site Compounds	Site compounds, site access, fencing, gates																								
3	Site Roads	Construct roads, install drainage measures, install culverts, install water protection measures																								
4	Bellacorick decommissioning	Decommission Bellacorick turbines and remove turbine components from site, decommission existing meteorological mast																								
5	Turbine Hardstands	Excavate base, construct hardstand areas																								
6	Turbine Foundations	Fix steel, erect shuttering, concrete pouring																								
7	Substation Construction & Electrical Works	Construction substation, underground cabling between turbines, cabling from new substation to Bellacorick substation																								
8	Backfilling and Landscaping																									
9	Turbine Delivery and Erection																									
10	Substation Commissioning																									
11	Turbine Commissioning																									

Figure 3.1 Construction Schedule

The main tasks to be completed in line with the above phases are:

Bellacorick Wind Farm Decommissioning Works:

- Disconnect turbines from the grid.
- Dismantle and removal by competent contractor
- Cranes will be erected on hardstand areas left after the construction phase.
- Turbine to be dismantled fully from blade tip to top of foundation.
- Firstly the rotor blades and hub will be taken down and then the nacelle (incl. generator) will be taken down.
- Depending on Original Equipment Manufacturer (OEM) requirements the generator may need to come down first and temporary works are sometimes utilised to hold hub and blades in place whilst it comes down.
- Sequence above might alter slightly from above depending on OEMs requirements and crane company's lift plan.
- The tower sections will be removed section by section and lowered to the ground.
- Finally all parts will be transported by road to its final destination either wholly intact or in more transportable components and will be either properly disposed or reused.
- The turbines will be removed from site by articulated trucks as part of the proposed Traffic Management Plan and Transport Management Plan which will be finalised post consent.
- Upon dismantling of turbines, the concrete foundation will remain in situ.
- The 21 no. turbine foundations will infilled with peat and where the foundation is above ground locally that ground will be built up to cover the foundation.
- The MV cable will be removed from the ducting at joint bay locations and ducting will remain in the ground.
- The cable will be disposed of in an orderly fashion by an approved contractor and the joint bays will be backfilled after excavation and post cable removal.
- All electrical equipment will be removed from the control building . The building structure will remain in-situ and will be maintained as part of the operational maintenance of the Oweninny Phase 3 wind farm.
- The transport route for turbine components will be assessed and subject to that assessment any required temporary modifications will be agreed with the local authority in advance of works.
- The components involved in decommissioning will be re-used, recycled or sent for waste disposal and these include, but not limited, to cables, metals, fibreglass and hydrocarbons.
- A waste management plan will be produced prior to works commencing on site.

Civil Works:

- Any tree felling required to facilitate the proposed development will be carried out in advance of the civil works.
- Construct secure construction site boundary fencing as required.
- Construct new site roads, drainage ditches and culverts.
- Carry out necessary improvement works to existing site roads, drainage ditches and culverts.
- Clear and construct hardcore area for temporary construction compounds and associated parking areas and install facilities.
- Prepare excavation areas at three proposed borrow pit locations as required.
- Construct remaining road infrastructure, hard-standing areas and crane pads.
- Install ducting in the roads for electrical and telecommunications cables.
- Prepare on-site substation compound and associated drainage ditches and culverts.

- Construct substation control buildings as well as bunds and plinths as necessary for transformers and electrical equipment. Erect security fencing around substation.
- Decommission Bellacorick turbines and remove above ground turbine components from site.
- Excavate/pile as required for turbine bases. Store excavated material locally for backfilling and re-use, where possible.
- Prepare turbine base areas. Store excavated material locally for backfilling and re-use, where possible. Place blinding concrete to turbine bases on competent strata. Fix reinforcing steel and anchorage system for tower section. Construct shuttering. Fix any ducts etc. to be cast in. Pour concrete bases. Cure concrete and remove shuttering after a suitable number of days.
- Backfill around tower foundations and prepare the area to the specific requirements of the turbine supplier and installer.
- Excavate trench and install ducting for grid connection between the on-site substation and the proposed connection point to the existing overhead 110kV transmission line in, including stream crossings.
- Construct bases and steel towers for underground cable transition to overhead line at existing overhead 110kV transmission line connection point in Bellacorick.
- All improvements and temporary modifications required to facilitate delivery of the turbine components from several routes ending at Killybegs or Galway, the Galway route could also be used to access to Foynes. All of these ports have potential to be accessed.
- Install permanent meteorological mast;
- Upon completion of commissioning works, commence reinstatement works on surrounding lands as required.
- Remove temporary site offices, reinstate northern construction compound to pre-construction condition, provide secured site access and signage as required.
- Upgrade southern temporary construction compound to accommodate permanent public car park and install picnic/seating facilities and signage; and
- Complete landscaping works.

Electrical Works:

- Install internal and external electrical equipment at the on-site substation.
- Install MV electrical cabling and fibre-optic telecommunications cabling between the turbines and the on-site substation in the underground ducting; and
- Install electrical and telecommunications cabling from the on-site substation to the existing overhead 110kV transmission line in Bellacorick.

Turbine Delivery, Installation and Commissioning:

- Prepare transport delivery plan for the turbine components from routes ending at Killybegs or Galway, the Galway route could also be used to access to Foynes. All of these ports have potential to be accessed co-ordinate approval for deliveries with the relevant authorities.
- Backfill tower foundations and cover with suitable material.
- Erect cranes and associated equipment not required at this time.
- Erect tower sections and nacelle first, followed by the turbine blades.
- Complete electrical connection of each of the turbines to the installed MV electrical network - grid connection.
- Remove temporary site offices. Provide any gates, landscaping, signs etc. which may be required.
- Commence turbine commissioning and testing; and
- Complete commissioning and authorisation for wind farm to commence operations.

3.2 CONSTRUCTION HOURS

Construction activities will be carried out during normal daytime working hours (i.e., weekdays 0800 – 2000hrs and infrequent Saturdays 0800 – 1300hrs). The hours of construction activity will be limited to avoid unsociable hours, where possible. However, to ensure that optimal use is made of good weather period or at critical periods within the programme (e.g., concrete pours or to accommodate delivery of large turbine component along public routes), it could be necessary on occasion to work outside of these hours. Any such out of hours working (including routine and unforeseen maintenance of plant & Machinery) will be agreed in advance with the Local Authority.

3.3 EMPLOYMENT

It is anticipated that approximately 100-120 persons will be directly employed during peak construction activities.

3.4 SUMMARY OF KEY PROJECT ELEMENTS

3.4.1 Wind Turbines

The proposed wind turbines will have a tip height of 200m. Detailed drawings, which accompany the planning application, show a typical turbine that may be used for the proposed development, however, the exact make and model of the turbine will be dictated by a competitive tender process of the various turbines on the market at the time. A drawing of the typical size of the proposed wind turbine is shown in Drawing No. 10889-2032.

The proposed development has an assumed rated electrical power output of between 4.5 – 6.5 megawatts (MW) per turbine which would result in an estimated installed capacity of between 81 – 117 MW for the Oweninny Phase 3 Wind Farm.

The turbines installed on the site will be the conventional three-bladed, tubular tower model with horizontal axis. The rotor blades are bolted to the central hub, which is connected to the nacelle. The nacelle typically holds the following turbine components as shown in Figure 3-2:

- Generator.
- Electrical components; and
- Aviation lighting to Irish Aviation Authority (IAA) specifications.

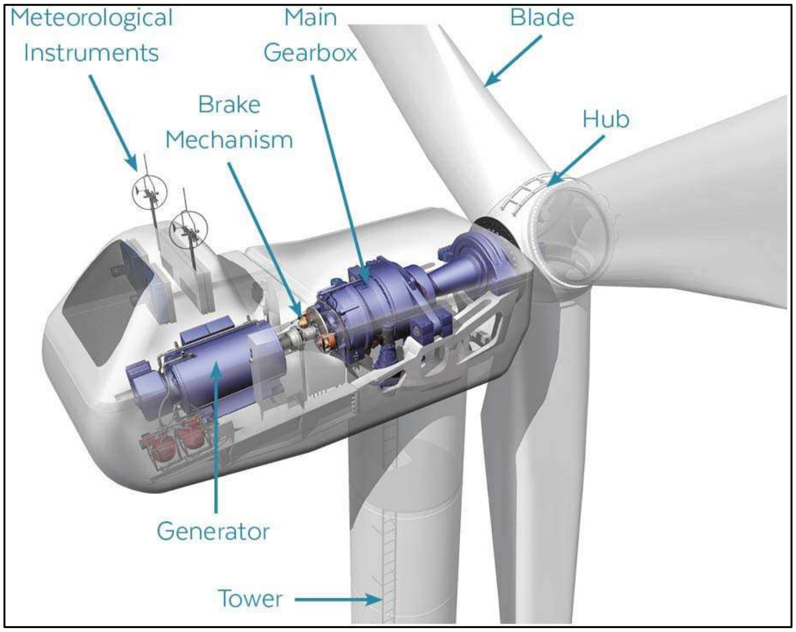

Figure 3.2 Typical turbine nacelle and hub components

The wind turbines will be geared to ensure that the rotors of all turbines always rotate in the same direction. The entire nacelle and rotor are designed to rotate, or 'yaw', to face the prevailing wind. A wind vane located on the nacelle of the turbine controls the yaw mechanism. A control unit is typically located at the base of the turbine and an internal lift or ladder leads up to the nacelle where the shaft, generator and gearbox are located.

The turbine tower is typically a conical steel tube with multiple layer paint finish. Towers generally comprise a steel ring at the base of the tower which is assembled on top of the concrete foundations. The first section is bolted to the steel base, which is cast into the concrete foundation. The tower is usually delivered to site in three to six sections. The base of the tower is typically around 4m in diameter, tapering to approximately 2m where it is attached to the nacelle. The tower is accessed by a galvanised steel hatch door, which will be kept locked except during maintenance. The nacelle is typically 4m in width and varies in length depending on the final hub height. The exact details of the turbine tower will be dictated by final selection of the turbine make and model but will be within the design envelope outlined above.

The blades of modern turbines are generally made of fibreglass or carbon fibre reinforced polyester and are aerodynamically shaped to improve efficiency and lower noise production.

The turbines are multi-ply coated to protect against corrosion. It is proposed that the turbines will be of an off-white or light grey colour to blend into the sky background.

3.4.2 Turbine Foundations

Construction of the turbine bases will require excavation of the surrounding soil from the foundation and crane hardstanding area to founding level with access being provided from adjacent roads at or near the surrounding ground level. The soil will be replaced with select granular fill where required.

Each wind turbine will require a reinforced concrete foundation comprising a base slab bearing onto rock or other competent substrata with a central upstand to support the tower. The foundations for each turbine will be designed by the appointed civil designer, see turbine foundation Drawings 10889-2020 to 10889-2022. The exact size of these detailed foundations will be dictated by the local ground conditions and the turbine manufacturer.

Different turbine manufacturers use different shaped turbines foundations, ranging from circular to hexagonal and square, depending on the requirements of the final turbine supplier.. The turbine foundation transmits any load on the wind turbine into the ground. After the foundation level of each turbine has been formed on competent strata, the bottom section of the turbine tower or "can" is levelled (Figure 3-3). Reinforcing steel is then built up around and through the can as in Figure 3-3 and the outside of the foundation is shuttered with demountable formwork to allow the pouring of concrete.

Figure 3.3 Levelled turbine tower can (left) and steel reinforcement being added (right)

3.4.3 Access Roads and Hardstanding

An existing access to the existing Oweninny Wind Farm Phase 1 is available via a Priority T-Junction on the N59, located approximately 300m north of the junction of the N59 / R312. This access will be controlled by a security guard. The existing wind farm entrance on the N59 will be used to transport materials and equipment to the site including the AILs during the construction phase. During the operational phase this access will be used for maintenance and operations traffic and the amenity traffic. It is envisaged to be used at the decommissioning stage of the development.

No Road Safety Audit and no access works were required as the site access junction on the N59 is existing (as per Oweninny Phase 1) and is currently operating as a operation access. To access the development site, the existing internal access roads will be utilised with some widening and a new section of internal access road constructed, refer to Drawing No. 10889-2063 in the EIAR.

Internal access roads will be constructed as part of the initial phase of the construction of the wind farm. The layout of proposed new roads and road upgrades is shown on Drawing No. 10889-2003. Material will be sourced from both off site quarries and the proposed on-site borrow pits to provide the required base material for the internal roads.

Soil/Peat excavated as part of the construction of the internal roads will be sidecast, bermed and profiled on either side of the roadway or located in one of the designated Peat Deposition Areas. It is proposed that the majority of excavated material will be used for borrow pit reinstatement with the remainder used locally on-site for landscaping. All new roadways will be constructed with a 2.5% camber to aid drainage and surface water run-off. The surface water run-off management during both the construction and operational phases of the proposed development is designed to collect rainfall run-off from impermeable surfaces and direct it to drains installed around new infrastructure and upgraded roads. Further details on surface water management during construction are provided in Section 5.3.

Hardstanding areas consisting of levelled and compacted hardcore will be constructed around each turbine base. The hardstanding areas are used mainly to accommodate large cranes used in the assembly and erection of the turbines, offloading and storage of turbine components, and generally provide a safe, level working area around each turbine. This area is designed primarily for the construction phase works but will also provide safe access for maintenance during operations. The hardstanding area at each turbine is extended to cover the turbine foundations once the foundation infrastructure is in place. The exact size, arrangement and positioning of hardstanding areas are determined by turbine supplier requirements but will be contained within the maximum dimensions described and assessed in the EIAR. A typical hardstanding layout is shown on Drawing No. 10889-2031.

Unbound, levelled assembly areas will be located adjacent to the hardstanding areas at each turbine as shown on Drawing No. 10889-2031. These assembly areas are required for offloading turbine blades, tower sections and hubs from trucks until such time as they are ready to be lifted into position by cranes. They will be surfaced with Clause 804 material or similar.

Similar levelled storage areas will be prepared at the construction compounds for temporary material storage and handling prior to construction. Material will be removed from the temporary storage and assembly areas, and the ground reinstated at the completion of the construction works, except for at the southern construction compound where this area will be upgraded to accommodate the permanent public car park and recreational facilities.

3.4.4 Stone and Fill Requirements

As part of construction of the proposed development, a significant amount of stone and aggregate fill material will be required. This will be used under and around key infrastructure including the turbines, substation, site roads, hardstands and construction compounds. The following are estimates of the material requirements at the various main infrastructure locations:

- Total access roads – 148,350m3
- Met mast hardstand, cable route and grid connection, substation compound, construction compound and storage area – 40,323m3 (sourced from peat spoil stone)
- Turbine and hardstand– 88,621m3

The majority of the required stone volume will be sourced from the onsite borrow pits. As a worst-case scenario, the traffic assessment in the EIAR assumes that all required stone will be sourced off site.

Hardstands and site roads will be constructed to heights of 0.5m to 1.0m above existing ground level based on the various extents of potential surface water flooding across the site, see Section 3.8 Construction Methodologies for additional information.

3.4.5 Borrow Pits

It is proposed that two borrow pits will be constructed as part of the proposed development, in order to provide a source for stone material requirements within the site itself. The borrow pit selection was based on the following factors:

- Avoidance of potential ecological receptors including intact blanket bog and fens
- Avoidance of deeper peat where possible

- Location near areas of known sand and gravel deposits or gravelly till.

Some remnant undeveloped peat areas on site are avoided for consideration. Areas of deeper peat were anticipated and not considered for borrow pit areas. Additionally, several areas of gravels and intact blanket bog were not considered.

There are three areas considered for the borrow pit location (see Drawing No. 10889-2003). Area 1 is located to the northwest of Furnought Hill between T6 and T7, covering an area of approximately 100,000m^2. Area 2 is located to the northeast of Furnought Hill and has a surface area of 34,000m^2. Having two borrow pits onsite will minimise material transport on site and will minimise the depth to which the borrow pit excavations will be required.

Once the required rock has been extracted from each borrow pit, they will be reinstated using any surplus inert material from the site and made secure using permanent stock proof fencing.

Post-construction, the borrow pit area will be partially backfilled with overburden and excavated material from elsewhere on the site and permanently secured. The temporary access roads to the borrow pits will be removed. Berms will be erected around the area to prevent access as necessary. Appropriate health and safety signage will also be erected on the berms and at locations around the borrow pit.

3.4.6 Spoil Management

The use of the borrow pits shall be phased. This will then allow materials to be placed in the first borrow pit thereby minimising the volume of soils requiring temporary storage. To further reduce temporary storage requirements, reinstatement of soils and turves around infrastructure, and in restoration and landscaping works on areas of excavated/disturbed ground, will be carried out during the construction phase or as soon as is practical after the completion of the works in any one area of the site.

Topsoil and sub-soil will be stockpiled separately. Turves will be stored turf side up and will not be allowed to dry out. Stockpiles will be isolated from any surface drains and a minimum of 50m away from watercourses. Measures such as interceptor ditches around the bases of these areas, sediment traps and seeding of the bunds shall be incorporated to prevent runoff of suspended solids laden surface water and soil erosion. No permanent spoil or stockpiles will be left on site.

The method for restoration of excavated or disturbed areas is to encourage stabilisation and early establishment of vegetation cover. Where available, vegetative sods/turves or other topsoil in keeping with the surrounding vegetation type will be used to provide a dressing for the final surface.

To prevent erosion and run-off and to facilitate vegetation reinstatement, any sloped embankment will be graded such that the slope angle is not too steep and that embankments match the surrounding ground profile.

3.4.7 On-Site Substation

It is proposed to construct a 110kV electricity substation within the site boundary neatest to T2 as shown on Drawing No. 10889-2003. This substation will provide a connection point to the existing overhead 110kV electrical transmission line running from Bellacorick Substation.

The construction and electrical components of the on-site substation will be to EirGrid specifications and within the parameters assessed in the EIAR. The substation compound will have a maximum area of approximately 10,125m^2, and will include two control buildings and electrical components necessary to facilitate the generated power from the wind turbines to export onto the transmission system.

Two substation control buildings will be located within the substation compound. Control Building 1 (Asset Owner Control Building) will measure approximately 25 metres by 18 metres and approximately 9.7 metres in height. Control Building 2 (IPP Control Building) will measure approximately 19 metres by 12 metres and approximately 7 metres in height. Layout drawings of the control buildings are shown on Planning Drawings 10889-2017 to 10889-2018.

The substation and compound will be surrounded by steel palisade fencing which will be approximately 2.4m in height. Internal fences will also be provided to segregate different areas within the main substation compound. Lighting will be required on site, and this will be provided by lighting poles located around the substation and exterior wall mounted lights on the control buildings.

The wind farm control buildings will include the Asset Owner Control Building (AOCB) and the Independent Power Producer (IPP), as well as an office space and welfare facilities for staff during the operational period. Toilet facilities will be installed with a low-flush cistern and low-flow wash basin. Due to the specific nature of the proposed development, there will be a very small water requirement for occasional toilet flushing and hand washing. It is proposed to install a rainwater harvesting system as the source of water for this, with all potable water being brought onsite in bottles.

It is proposed to manage wastewater from the staff welfare facilities in the control buildings by means of a sealed storage tank, with all wastewaters being tankered off-site by a permitted waste collector to a wastewater treatment plant. It is not proposed to treat wastewater on-site. The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying.

A local electrical power supply will be provided as a back-up to the on-site substation for light, heat and power purposes. The local supply will be designed and constructed by ESBN, and the exact source of the supply will be confirmed and determined by ESBN. It is anticipated that the local supply will enter the site by either overhead or underground MV cable and will include a step-down transformer to covert to low voltage (LV). The supply will enter the substation by underground cable and terminate on a distribution board in the control building.

3.4.8 Internal Underground Cabling

Clusters of turbines will be connected to the on-site proposed 110kV substation via underground MV cables. Fibre-optic cables will also connect each wind turbine to the wind turbine control system located within the IPP Control Building. The electrical and fibre-optic cables running from the turbines to the substation compound will be run in cable ducts approximately 1.2 metres below the ground surface alongside the proposed wind farm internal roadways.

3.4.9 Grid Connection

Approval for connection of the wind farm to the national electrical transmission network will be sought from EirGrid. A valid grid application can only be made subsequent to a grant of permission for the wind farm. The proposed 110 kV substation will be connected to the national grid at the existing 110 kV Bellacorick substation via underground HV cables and will export power via the existing 110 kV overhead line infrastructure from Bellacorick substation.

The proposed development requires approximately 5km of 110 kV underground cable (UGC) installation from the 110 kV onsite substation to the existing ESB Bellacorick 110 kV substation. The entire UGC will be installed along the existing wind farm access roads. The entire UGC route was assessed and included in this assessment.

The 110kV cable route from the proposed substation to the existing on site Bellacorick substation encounters a number of natural and manmade obstacles along the route that will require minor amendments to the cable installation methodology. . The location, description and methodology amendments are detailed in Table 3.3 of Chapter 3 in the EIAR.

The proposed underground cable route lies within the development boundary, so the disruption to the traffic and the public will be minimal. Before the construction commences, contractors will carry out detailed site investigations along the proposed route in advance of the approved designs being finalised for the UGC trenching and ducting civil works. These site investigations will include slit trenches along the roadways to detail the route and ensure sufficient space to install a 110 kV cable trench typically measuring approximately 0.6m (width) by 1.2m (depth). Refer to Planning Drawing 10889-2070 to Drawing 10889-2071 for the proposed cable trench arrangement. The cables will be laid in trenches as per Eirgrid/ESB Networks Specification (Planning Drawing 10325-2058).

A Traffic Management Plan (TMP) has been prepared for the proposed development and is included as Appendix A to this CEMP. This is a living document and will be used by the Contractor throughout the construction project to address traffic management. A confirmatory survey of the road condition, including the condition of all water crossings in the public road, will be carried out along the grid connection route in advance of any works, and these will be submitted to the local authority.

3.4.10 Meteorological Mast

A permanent meteorological mast will be installed as part of the proposed development. The mast will be equipped with wind monitoring equipment at various heights and will be a slender, free-standing lattice structure up to 120m in height. The mast will be constructed on a hardstanding area sufficiently sized to accommodate the crane that will be used to erect the mast. The mast will be located to the west of T13 and South of T12 as shown on Drawing No. 10889-2003 and will be accessed via an existing internal access road. An indicative detail of the proposed met mast is shown on Drawing No. 10889-2060.

3.4.11Recreation and Amenities

An amenity track, approximately 4.8km in length, will be provided as part of the development facilitating a route through the site from a local road off the N59 at Dooleeg as shown on Drawing No. 10889-2003. This access point is close to the Western Way (Slí an Iarthair) Trail which runs along the N59 and continues north to Ballycastle, along the western periphery of the Bellacorick Bog Complex.

The amenity track will be suitable for both walking and cycling. Feedback from public consultation suggests that current users would prefer that the existing surface of the track be retained where possible. Where this is not possible, in localise areas gravel/crushed stone will be used to improve the track surface.

3.4.12 Decommissioning

The wind turbines proposed as part of the proposed development are expected to have a lifespan of 30 years. Following the end of their useful life, the wind turbines may be replaced with a new set of machines, subject to planning permission being obtained, or the site will be decommissioned fully, except for the electricity substation. If it were to be confirmed that the substation was not required in the future for any other useful purpose, it could be removed. The site will be decommissioned by the following steps:

- Disconnect turbines from the grid
- Dismantle and removal by competent contractor
- Cranes will be erected on hardstand areas left after the construction phase.
- Turbine to be dismantled fully from blade tip to top of foundation.
- Firstly the rotor blades and hub will be taken down and then the nacelle (incl. generator) will be taken down.
- Depending on Original Equipment Manufacturer (OEM) requirements the generator may need to come down first and temporary works are sometimes utilised to hold hub and blades in place whilst it comes down.
- Sequence above might alter slightly from above depending on OEMs requirements and crane company's lift plan.
- The tower sections will be removed section by section and lowered to the ground.
- Finally all parts will be transported by road to its final destination either wholly intact or in more transportable components and will be either properly disposed or reused.
- The turbines will be removed from site by articulated trucks as part of the proposed Traffic Management Plan and Transport Management Plan which will be finalised post consent.
- Upon dismantling of turbines, the concrete foundation will remain in situ.
- The turbine foundations will infilled with peat and where the foundation is above ground locally that ground will be built up to cover the foundation.
- The MV cable will be removed from the ducting at joint bay locations and ducting will remain in the ground.
- The cable will be disposed of in an orderly fashion by an approved contractor and the joint bays will be backfilled after excavation and post cable removal.
- All electrical equipment will be removed from the control building. The building structure will remain in-situ.
- The transport route for turbine components will be assessed and subject to that assessment any required temporary modifications will be agreed with the local authority in advance of works.
- The components involved in decommissioning will be re-used, recycled or sent for waste disposal and these include, but not limited, to cables, metals, fibreglass and hydrocarbons.
- A waste management plan will be produced prior to works commencing on site.

All above ground turbine components will be separated and removed off-site for recycling. Turbine foundations and hardstanding areas will remain in place underground and will be covered with earth and allowed to revegetate or reseed 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 potentially significant environment nuisances such as noise, dust and/or vibration. Most of the site roadways will be in use for additional purposes to the operation of the wind farm (such as a mature amenity and recreational use) by the time the decommissioning of the project is to be considered, and therefore it will be more appropriate to leave the site roads in situ for future use. If it were to be confirmed that the roads were not required in the future for any other useful purpose, they could also be removed.

3.5 ROLES AND RESPONSIBILITIES

An indicative organisational chart is provided below which identifies the typical roles and associated responsibilities for the construction of the proposed development. This will be subject to specific contractual agreements upon appointment of a Main Contractor and any additional/further appointments required in compliance with a grant of permission.

The Project Manager will have overall responsibility for environmental management and compliance during the construction works. He/she will be supported in this role by an SHEQ Officer, or Environmental Officer as appropriate, who will liaise directly with the relevant regulatory bodies and stakeholders throughout the construction phase. Additional specialist input will be included from an ecological clerk of works, archaeologist or other disciplines as required.

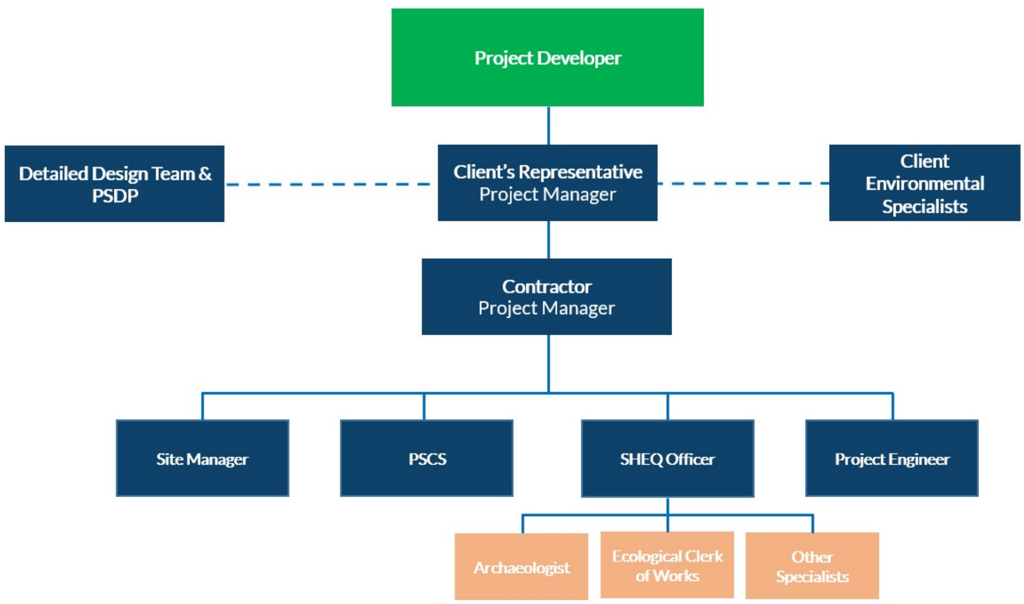

Figure 3.4 Project Development Organisation Chart

3.6 CONSENTS, LICENCES, NOTIFICATIONS AND PERMISSIONS

The key consents, licences, notifications, and permissions which may be required for the project are summarised as:

- Planning permission and associated planning compliance.
- Commission for Energy Regulation (CER) Authorisation and Licence to Generate.
- A Commencement Notice for Development will be lodged with the Building Control Authority (BCA) via the online Building Control Management System (BCMS) not less than 14 days and not more than 28 days before development works commence on site.
- Abnormal loads – it is envisaged that permits will be required for the abnormal loads that will be required for the delivery of turbine components and oversized plant such as piling rigs to the site.
- Archaeological excavation licence, as required.
- Office of Public Works (OPW) consultation and agreement for watercourse crossings.

- Inland Fisheries Ireland (IFI) method statement approval for works in or near to watercourses.
- NWPS consent will be required for surface water protection measures; and
- 30-day prior notification to the Irish Aviation Authority (IAA) ahead of turbine erection works.

The above list is non-exhaustive but identifies the key consents, licenses, notifications, and permissions required for the project. This list will be further populated as required through planning compliance and stakeholder engagement to ensure that any further consents are identified as early as possible and do not impact on the construction programme.

Additional method statement and monitoring programme submissions may be required by the Local Authority as part of the grant of planning.

4.0 CONTRACTOR FACILITIES, SAFETY AND SITE SECURITY

4.1 CONSTRUCTION COMPOUND AND FACILITIES

At the commencement of the construction phase, a single large temporary compound areas will be constructed at location as shown Drawing No. 10889-2003 and 10889-2025 – 10889-2028 to provide office space, welfare facilities, car parking and material laydown areas.

The site accommodation will consist of temporary porta-cabins constructed on unbound, levelled hardcore aggregate. Broken stone and appropriate capping aggregate will be used to create a base for the welfare facilities as well as a suitable surface for material lay-down areas and car parking. The use of four separated construction compounds will improve efficiency and capacity across the wind farm site area.

1. Main compound at the entrance (includes the storage compound)
2. Substation compound
3. Compound between T7 and T8
4. Compound between T11 and T14

All four compounds will be secured by means of a chain link fence on timber posts which will be approximately 2.4m in height, see Drawing No. 10889-2015 to Drawing No. 10889-2018. There will be one access gate into each compound which will be secured and controlled by the Contractor. A combination of bottled water, tanker water supply and rainwater harvesting will be used to supply water for the welfare facilities in both compounds during the construction works. Rainwater harvesting will be utilised to supplement the tanker water supply for non-potable uses. Wastewater generated at the welfare facilities in the construction compounds will be managed by means of a temporary sealed storage tank, with all wastewater being filtered off-site by a permitted waste collector to a wastewater treatment plant. The proposed temporary wastewater storage tanks will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying.

Fuels, oils, lubricants and other hazardous liquids required for maintenance of equipment during the construction phase will be stored on a dedicated impermeable storage platform in the compound. This area will be away from drains and open water and will be easily accessible for machinery to refuel and to accommodate fuel deliveries to site. COSHH Risk assessments and MSDS sheets will be provided for each hazardous liquid and operatives will be briefed on the hazards. MSDS Sheets will be kept in the storage area for ease of reference. Fuel containers will be stored within additional secondary containment e.g., bund for static tanks or drip trays for smaller mobile containers. A fuel bowser, used for refuelling equipment on-site where off-site refuelling is not possible, will be stored in the compound area on a dedicated storage platform. Whenever possible, this bowser will be refilled off-site and brought to site for on-site refuelling. The fuel bowser will be hauled around the site by a suitably equipped 4x4 vehicle.

In the interest of best practice and to avoid the potential for the transfer of alien invasive plant species into the site, it is proposed to install a self-contained wheelwash system at the project site. Planning Drawing 10889-2062 includes details of a proposed self-contained wheelwash system which will be installed as part of the construction phase of works. The wheelwash will be located at the construction and delivery entrance of the site, off the N59, as shown on Planning Drawing 10889-2003.

A road sweeper will be available if any section of the surrounding public roads becomes soiled by vehicles associated with the proposed development.

There is / will be a drawing for each compound showing the proposed arrangement of welfare facilities, fuel storage, car parking and storage areas. The actual arrangement of cabins and storage areas within the compounds will vary depending on Contractor requirements but will be similar to that shown in the drawings.

4.2 SAFETY AND SECURITY

All activities carried out by the appointed Contractor on the proposed development will be in accordance with the requirements of the *Safety, Health and Welfare at Work Act 2005* as amended and Regulations made under this Act.

The scale and scope of the proposed development will require the appointment of a Project Supervisor Design Process (PSDP) and Project Supervisor Construction Stage (PSCS) in accordance with the provisions of the *Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2103)*, as amended. These persons will be appointed by the Developer and notified to the Health and Safety Authority (HSA) prior to commencement of detailed design works (in the case of the PSDP) and prior to commencement of construction (in the case of the PSCS). The PSDP will prepare a Preliminary Health and Safety (H&S) Plan which will identify any particular risks, residual risks and particular sequences of work that are envisaged during the design of the works.

Prior to commencement of construction, this Preliminary H&S Plan will be provided to the Contractor and the PSCS will further develop the document to prepare a Construction Stage H&S Plan addressing all aspects of the construction process and providing relevant contact details and emergency response procedures for the project. This H&S Plan will be developed at the procurement stage and developed further at construction stage to the satisfaction of the Developer. The H&S Plan will identify the potential safety hazards associated with the site and the works and assess the associated risks. Mitigation and control measures will be implemented to minimise the identified risks.

Evidence of completion of construction safety training, typically in the form of a Safepass Card, will be required for all construction personnel prior to commencing on site. A record of Safepass Cards and personnel approved for entrance to site will be completed as part of a site induction process. The Contractor's H&S Plan will detail the site induction and access requirements. Where relevant, equipment operators or specialist works will require personnel to hold a valid Construction Skills Certificate Scheme Card. All equipment and machinery used on site will be appropriately certified for its intended purposes. The Developer will ensure that only competent contractors are appointed to carry out the construction works on the site.

Public safety will be addressed by restricting site access during construction works and the erection of security fencing as appropriate at construction works areas. There will be only one entrance to the wind farm construction site from the south which will be controlled by the Contractor. Construction vehicle access to the site will be via the existing access to Oweninny Wind Farm Phase 1 at the Priority T-Junction on the N59, located approximately 300m north of the junction of the N59 / R312. The site entrance gates from the N59 / R312 will be securely locked outside of construction hours to prevent unauthorised entry and will be monitored during construction hours to regulate access to the site for authorised personnel.

For the duration of the construction works, access to the visitor centre will be facilitated by a shuttle bus that will pick up and drop off at the existing Bord na Mona works areas located off the N59 to the east of the construction entrance and existing entrance to the Visitor centre.. Appropriate signage will be erected directing the public onto an alternative route as set out in Chapter 6 (Population and Human Health) of the EIAR.

4.3 SIGNAGE

Warning signs will be erected at the construction works areas clearly stating that construction works are underway (see Figure 4-1). A notice board will be erected at the site entrance and at the construction compound gates with information on the contact details for site management, PPE requirements for the site and any other information deemed necessary in accordance with the H&S Plan.

Signage will be erected on both sides of the N59 National Road both north and south of the site entrance location to warn approaching vehicles of the construction site entrance location and the potential presence of slow-moving vehicles. Signage will also be erected on the R312 Regional Road where construction vehicles will cross the road. On the internal roadway, signage will be erected at either side of the R312 crossing to remind construction traffic that this local road is not permitted to be used as part of the project construction works. Prior to exit from the site onto the N59, signage will be erected directing traffic to main settlement areas to the left and right.

Road signage on the public road will be in accordance with the current *Traffic Signs Manual*[1] Chapter 8 and associated best practice guidelines. Signage in respect of traffic management is discussed in the TMP in Appendix A and will be in accordance with the Local Authority recommendations and relevant planning conditions. Within the site, maximum speed signage will be erected along the access roads for construction vehicles and health and safety signage will be erected at borrow pits and where deep excavations, or other areas of increased risk, are occurring. Signage will also be erected as a reminder to concrete delivery drivers that concrete truck wash-out is not permitted on-site and identifying the area(s) where concrete chute wash-out is permitted.

[1] Department of Transport, Tourism and Sport, *Traffic Signs Manual – Chapter 8: Temporary Traffic Measures and Signs for Roadworks* (August 2019)

Figure 4.1 Indicative Safety Signage (Source: safetysigns.ie)

4.4 EMERGENCY RESPONSE PLAN

The Contractor will be responsible for developing a detailed Emergency Response Plan (ERP) for the proposed works, to cover health and safety emergencies as well as environmental emergencies, as part of the H&S Plan. This ERP shall be activated in the event of an emergency such as an accident, fire, spillage, collapse etc. and will provide details on who is required to be notified, first aid facilities and closest hospitals. The ERP will also include details of all personnel inducted and authorised to work on the site as well as next of kin contact details and relevant medical information.

In the event of an emergency, the SHEQ Officer and Project Manager will be notified immediately and will determine the scale of the emergency and the requirement for the assistance of emergency services. Works will cease in the area of the incident and contact will be maintained with the emergency services to direct them to the scene of the incident as required.

As part of the ERP, an evacuation drill will be carried out on a regular basis to make all personnel aware of the procedure to be followed in the event of an emergency where a full site evacuation is required. Emergency muster point(s) will be identified at suitable locations in the construction compounds and the ERP will outline the persons responsible for checking names at the safety muster points. Records will be maintained of such drills.

The ERP must include contact names and telephone numbers for the relevant local authorities (all sections/departments) including ambulance, fire brigade, An Garda Siochána and the HSA. Reporting of environmental emergencies to the local authority will be required as well as other relevant stakeholders such as IFI, NPWS or the EPA.

Further information relating to the management of spills or leaks is provided in Section 4.6 and the procedure for responding to a health and safety or environmental incident is outlined in Section 4.7.

4.5 FUELS AND OILS MANAGEMENT

Construction vehicles will be refuelled off-site, wherever possible. This will primarily be the case for road vehicles such as vans and trucks. However, for construction machinery that will be based on-site will be carried out at least 50m from any watercourse. The fuel bowser, typically double bunded, containing limited amount of fuel will have to be stored on site. On-site refuelling of machinery will mainly be carried out using a mobile double skinned fuel bowser typical of that shown in Figure 4-2. Refuelling axle custom-built refuelling trailer, will be re-filled off-site, where possible, or at either of the two construction compounds and will be towed as required within the site by a 4x4 vehicle to where machinery is located. It is not practical or preferable for most heavy construction vehicles (such as cranes, excavators, dozers, dumpers etc.) to travel back to the refuelling point in the construction compounds given the size of the proposed wind farm site. The 4x4 vehicle will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level impermeable area in either of the construction compounds when not in use.

Figure 4.2 Typical mobile fuel bowser (Source: Clarke Machinery Group)

Oils, lubricants and other hazardous liquids required for maintenance of equipment during the construction phase will be stored on the dedicated impermeable storage platform in the construction compounds as described in Section 4.1. Any additional fuel containers, other than the fuel bowser, used for smaller equipment (such as generators, lights etc.) will be stored within additional secondary containment e.g., bund for static tanks or drip trays for smaller mobile containers. Taps/nozzles for fuels and storage containers for oils will be fitted with locks to ensure their use is controlled. Only designated trained and competent operatives will be authorised to refuel plant on site as per the approved refuelling and maintenance procedure.

New clean ancillary machinery equipment such as hoses, pipes and fittings required on-site will be contained within a bunded area, however any used or damaged parts will not be stored on-site and will be removed immediately. Any repair works required on machinery involving fuel and oil control will be carried out off-site where practical, or in the construction compounds over an impermeable surface. Unless unavoidable, repair works carried out in the field where machinery is operational will use spill trays and absorbent materials to prevent release of contaminants to the ground. Maintenance and repair works will be carried out at least 50m from any watercourse.

At least daily checks prior to start-up of plant and machinery will minimise the risk of break-down and associated contamination risks for on-site repairs. Records of daily pre-start checks will be maintained and kept in the site office. A clean site policy and diligent housekeeping will also reduce the potential of hydrocarbon release on-site.

4.6 SPILL CONTROL AND RESPONSE

Emergency spill kits with oil boom and absorbent materials will be kept on-site in the event of an accidental spill. Spill kits will be kept in both construction compounds, the 4x4 vehicle transporting the fuel bowser and smaller spill control kits will be kept in all construction machinery. All construction personnel will be notified of where the spill kits are located as part of the site induction and will be trained on the site procedures for dealing with spills.

In the event of a leak or a spill in the field, the spill kits will be used to contain and absorb the pollutant and prevent any further potential contamination. The absorbed pollutants and contaminated materials will be placed into leak proof containers and transferred to a suitable waste container for hazardous materials in the construction compounds. Where a leak has occurred from machinery, the equipment will not be permitted to be used further until the issue has been resolved.

The SHEQ Officer (or equivalent appointed person) will be notified of any spills on-site and will determine the requirement to notify the authorities as set out in Section 4.7.

4.7 INCIDENTS

All safety or environmental incidents associated with the project will be reported and investigated in line with the ERP. Typically, the following procedures will be followed in the event of an incident:

- Works will stop immediately where safe to do so.
- The SHEQ Officer will be contacted.
- The size of the incident will be assessed and determined if it can be controlled by site staff or if emergency services are required to attend.
- The appropriate enforcing authority will be contacted.
- The SHEQ Officer will investigate after the incident.
- The findings will be sent to the appropriate authority; and
- An action plan will be prepared to set out any modifications to working practices required to prevent a recurrence.
- All operatives and staff to be briefed on the updated working practices/procedures.

4.8 COMPLAINTS

This section sets out a procedure to manage and resolve any complaints received from members of the public during the construction phase of the proposed development. The following measures will be adopted and refined, as necessary, taking account of any relevant planning conditions. The following measures will be implemented to deal with complaints and the Final CEMP will contain more specific details regarding phone numbers to contact:

- Clearly display a notice board at the site entrance so that the public know whom to contact if they have a complaint or comment.
- Personnel on site, including sub-contractors are required to perform their duties in accordance with this CEMP, and in such a way as to minimise the risk of complaints from third parties.
- All complaints received regarding the construction works will be recorded and categorised (e.g., noise, property damage, traffic, dust etc.) within a central Site Complaints Log. This complaints log will include the following key details:
    - Name, address and contact details of the complainant (with the complainant's permission).
    - Brief outline of the complaint.

- Date of Complaint.
- Name of person receiving complaint details; and
- Agreed timeline for response to complaint.

- All complaints will be communicated to the Project Manager and the Developer immediately.
- All complaints will be followed up and resolved in so far as is practicable; and
- The complainant, Developer and other stakeholders will be kept informed of the progress in resolving the complaint.

5.0 ENVIRONMENTAL MANAGEMENT

As part of the development of this CEMP, a series of Environmental Management Plans (EMPs) have been prepared to ensure appropriate environmental management of specific aspects of the proposed works. The EMPs have been prepared in accordance with the design and mitigation measures set out in the EIAR and the NIS. The requirements outlined within the following plans are a summary of key implementation constraints, site specific obligations and best practice requirements with which the Contractor shall comply. The construction methodology for the proposed development is set out in Chapter 3 (Description of the Proposed Development) of the EIAR.

Construction of the proposed development will be carried out in line with best practice guidance in all areas of potential environmental impact and these specific guidance documents are identified within the following sections. Across the full project duration, the Contractor will utilise the general guidelines set out in the CIRIA C741 publication *Environmental Good Practice on Site (4th Edition)*[2].

Following grant of planning for the proposed development, the appointed Contractor will further develop this planning stage CEMP into a final CEMP which will incorporate any additional measures identified during the planning assessment process, specified in planning conditions and associated post-planning statutory body consultation for the management of the environment during the construction works. The final CEMP will include an updated and refined construction phase programme of works and will set out specific timings and requirements for surveys and monitoring prior to and throughout the construction works. The final CEMP will be a dynamic document and will be continuously reviewed and updated throughout the construction works to ensure it takes account of all environmental auditing and site inspections.

5.1 Noise and Vibration

The Contractor will be required to have regard to BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites*[3], which sets out detailed guidance on the control of noise and vibration from construction activities.

An assessment of construction phase noise emissions has been carried out in Chapter 13 (Noise and Vibration) of the EIAR and outlines the predicted noise levels from construction activities at the closest noise sensitive locations (sensitive receptors). The SHEQ Officer, or equivalent, will supervise the works to ensure compliance with the noise and vibration limits set out in the Standards document referred above and the EIAR.

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[2] CIRA *Environmental Good Practice on Site (4th Edition)* (C741) (2015)
[3] British Standards Institute (BSI), *BS 5228-1:2009+A1:2014 Code of Practice for noise and vibration control on construction and open sites* (2008)

The following general measures for control of noise and vibration from construction works will be implemented:

- Construction working hours are limited to those set out in Section 3.2 to avoid noise generation during unsociable hours.
- Duration of works which create high levels of noise or vibration, such as rock-breaking, blasting or piling, will be limited and staggered to prevent constant annoyance.
- Communication channels will be established between the Developer/Contractor and local residents to inform of upcoming works which may generate higher than normal construction noise or vibration and provide a means for local residents to register complaints regarding noise and vibration.
- The local authority will also be informed of the communication channels.
- The SHEQ Officer, or equivalent, will address complaints relating to noise and vibration.
- Periodic monitoring of construction noise and vibration during critical periods will be carried out at sensitive receptor locations; and
- Internal access roads will be maintained in good condition to minimise noise and vibration generation from heavy goods vehicles.

In addition to the above, the Contractor will be required to select plant and equipment with a low inherent potential for generation of noise and/or vibration in lieu of noisier alternatives and place noisy/high vibration equipment as far away from sensitive receptors as permitted by site constraints. Where possible, contractors will use noise dampers or other attenuation methods for particularly noisy operations. Compressors will be attenuated models, fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers. Any noisy plant, such as generators or pumps, which is required to operate outside of the typical working hours (for maintaining water levels or safety lighting etc.), will be surrounded by an acoustic enclosure or portable screen. Regular maintenance of plant and equipment will be carried out to ensure that the equipment is operated efficiently and generating minimal noise emissions. Plant or equipment which is not in use will be shut down while not required or throttled back to a minimum.

Specifically in relation to rock-breaking activities, the following measures will be employed as required:

- Fitting suitably designed muffler or sound reduction equipment to the rock breaking tool to reduce noise without impairing machine efficiency.
- Ensuring all leaks in air lines are sealed.
- Erecting acoustic screen(s) between compressor or generator and a noise sensitive area. Where possible, the line of sight between top of machine and reception point needs to be obscured; and
- Enclosing the breaker or rock drill in portable or fixed acoustic enclosure with suitable ventilation.

Further requirements with regard to noise and/or vibration monitoring which may be set out in planning conditions will be updated in the final CEMP.

5.2 AIR QUALITY

The Contractor will have due regard to relevant guidance such as *The Control of Dust and Emissions during Construction and Demolition* published by the Greater London Authority (GLA) in 2104 and *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* published by the National Roads Authority (NRA), now Transport Infrastructure Ireland (TII) in 2011.

During the construction phase, dust or air pollutants generated from the proposed development will typically arise from:

- Movement of construction vehicles.
- Transportation of turbines and construction materials to and within the site.
- Excavation and crushing of rock for use as a base material for internal roads and hardstanding areas.
- Piling operations.
- Excavation, movement and placement of soil stockpiles; and
- Wind generated dust from stockpiles, exposed unconsolidated soils and roads.

An assessment of the potential effects of construction traffic movements associated with the proposed development is presented in Chapter 12 (Air Quality and Climate) of the EIAR. Maximum utilisation of the on-site borrow pits will reduce the need to import excavated materials to the site and where excavated material, concrete and building materials are required to be brought to site, local quarries and suppliers will be preferred to minimise the carbon footprint of construction material deliveries.

In order to minimise emission of pollutants from plant and equipment, the following measures will be implemented during the construction works:

- Regular maintenance of plant and equipment will be carried out to ensure that the equipment is operated efficiently and generating minimal air emissions; and
- Plant or equipment will not be left running unnecessarily and low emission fuels will be used.

The greatest potential impact on air quality during the construction stage will be from dust emissions associated with the construction works. The proactive control of fugitive dust, rather than an inefficient attempt to control dust once released will ensure the prevention of significant emissions.

The following measures will be implemented to minimise the potential for dust generation:

- Minimisation of extent of working areas.
- Stockpiling of excavated materials will be limited to the volumes required to practically meet the construction schedule.
- Drop heights of excavated materials into haulage vehicles will be minimised to a practicable level; and
- Daily inspections by site personnel to identify potential sources of dust generation along with implementation measures to remove causes where found.

A Dust Management Plan (DMP) has been prepared which sets out the measures that will be implemented by the Contractor to minimise and control dust emissions (see Section 5.2.1) This DMP will be updated by the Contractor in the final CEMP to account for any additional measures identified in Planning Conditions.

5.2.1 Dust Management Plan

The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and any impacts from dust deposition will typically be within 200m of the construction area. It is noted that the vast majority of construction works are located at distances greater than 200m from residential properties with the exception of small areas of work, namely along the grid connection route and the Turbine Delivery Route (TDR), which will have a short duration at any one location.

In order to ensure mitigation of the effects of dust nuisance, a series of measures will be implemented. Site access roads shall be regularly cleaned and maintained as appropriate; dry sweeping of large areas shall be avoided. Hard surface access roads shall be swept to remove mud and aggregate materials from their surface while any un-surfaced access roads shall be restricted to essential site traffic only. Furthermore, any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.

Vehicles using site access tracks shall have their speeds restricted where there is a potential for dust generation. Vehicles delivering material with dust potential to an off-site location shall be always enclosed or covered with tarpaulin to restrict the escape of dust. Access gates to site from the N59 are located at least 250m from receptors which will prevent significant dust effects on residents.

Vehicles exiting the site, prior to the local road crossing point, will make use of a wheelwash facility prior to entering onto public roads to ensure mud and other wastes are not tracked onto public roads. Public roads outside the site shall be regularly inspected for cleanliness daily and cleaned using a street sweeper, as necessary (see Figure 5-1). Before entrance onto public roads, trucks shall be adequately inspected to ensure no potential for dust emissions. On-site haul routes shall be inspected for integrity and necessary repairs to the surface instigated as soon as reasonably practicable. Records shall be kept of all inspections of the haul routes and any subsequent action(s) in a site logbook.

Figure 5.1 Typical road sweeper (Source: CMP Road Planning)

The following measures will be implemented to prevent significant dust emissions from material stockpiles. Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind as per Section 3.4.6 and Section 5.5. Sand and other aggregates will be stored in bunded areas and not allowed to dry out unless this is required for a particular process, in which case appropriate additional control measures will be put in place. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods. At all times, the procedures put in place shall be strictly monitored and assessed by the SHEQ Officer. In the event of dust nuisance occurring outside the site boundary, appropriate procedures shall be implemented to rectify the problem.

This DMP shall be reviewed at regular intervals during the construction phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust using best practices and procedures. As per Section 4.8, the name and contact details of a person to contact regarding air quality and dust issues shall be displayed on a notice board at the site entrance. Community engagement before works commence on site will be put in place, including a communications plan. All dust and air quality complaints shall be recorded, and causes identified, along with the measures taken to reduce emissions. Daily on and off-site inspections shall occur for nuisance dust and compliance with this DMP. This shall include regular dust soiling checks of surfaces within 100m of the construction works. Cleaning shall be provided if necessary.

5.2.2 Climate

There is the potential for a number of embodied greenhouse gases (GHGs) and GHG emissions during the construction phase of the development. Construction vehicles, generators etc., may give rise to CO_2 and N_2O emissions as well as the large quantities of material such as stone, concrete and steel that will be required for the proposed development. The Institute of Air Quality Management (IAQM) document *Guidance on the Assessment of Dust from Demolition and Construction* (2014) states that site traffic and plant is unlikely to make a significant impact on climate.

To minimise climate impacts associated with delivery of construction materials to the site, the Contractor will source quarry materials as close to the site location as possible and use local builder's providers where possible. Borrow pits on-site will be utilised as much as possible to minimise import of quarried stone material. In some cases, it will not be possible to locally source building materials due to the technical nature of parts and equipment required.

Prior to commencement of construction on-site, the turbines to be installed at the site will be manufactured off-site. The chosen route for delivery of the turbine components from either Galway port or Killybegs port to the site has been determined based on the suitability of port infrastructure and the shortest feasible route, given the nature of road network constraints, which will minimise vehicle emissions associated with the turbine component deliveries.

5.3 SURFACE WATER MANAGEMENT

The proposed development is located within a former peat extraction site. An extensive network of drainage channels was present throughout the peatland is managed under IPC licence P0505-01 Oweninny bog group. During production, the peatlands were made up of large production fields (700 to 1800m in length) which were separated by drainage channels 15m apart. At the end of each production field there was a 21m turning ground.

Rehabilitation of the peatland started pre 2003. Since 2003, all production in the bog ceased and a rehabilitation programme was implemented. To date the rehabilitation programme has resulted in the recolonisation of the peatlands with typical bog species such as the heath vegetation and Sphagnum. A number of ponds and pools now occur in topographical depressions on site as a result of rehabilitation works.

All equipment associated with peat extraction works including rail tracks within the peatland area have been decommissioned and a programme of sedimentation pond decommissioning has been completed on ponds near roads and access points.

The peatlands are located within the Owenmore, Moy and Killala Bay Hydrometric Catchment Areas. The majority of the bog is drained into the Muing and Owenmore Rivers (also known as the Oweninny River). The eastern sections of the peatlands are drained by the Fiddaunagosty and Shanvolahan Rivers. The surface water management system will be visually inspected daily during construction works by the SHEQ Officer to ensure that it is working optimally. The frequency of inspection will be increased at settlement ponds adjacent to areas where earthworks are being carried out and at the borrow pits during excavations. Where issues arise, construction works will be stopped immediately, and the source of the issue will be investigated. Records of all maintenance and monitoring activities associated with the surface water network will be retained by the Contractor on-site, including results of any discharge testing requirements.

The Contractor will implement control measures such as temporary drains and drainage diversions, from commencement of construction to limit the volume of water that requires treatment. Temporary control measures implemented during construction works may include silt fences, silt bags, temporary settlement tanks and run-off attenuation, as required. Examples of silt fences and temporary settlement tanks are shown in Figures 5-2 and 5-3.

Figure 5.2 Silt fencing measures (Source: SSI Environmental (left) and Thrace Group (right)

Figure 5.3 Temporary site settlement tanks (Source: Siltbuster)

There is potential for earthworks to lead to release of suspended solids to surface water bodies. The main factors influencing the rate of soil erosion and subsequent sediment release includes:

- Climate.

- Length and steepness of slopes.
- Characteristics of the soil/soil erosion potential.
- Soil vegetation/cover.
- Duration and extent of works; and
- Erosion and sediment control measures.

Erosion and sediment control measures which will be implanted will include, but will not be limited to:

- Minimisation of soil exposure, by controlling, in so far as is practical, the locations where vegetation/soil is stripped and when vegetation/soil is stripped.
- During the side casting of soils, silt fences, straw bales and/or biodegradable geogrids will be used to control surface water run-off from material storage areas; and
- All surface water run-off from the development (including during construction works) will pass through either temporary or permanent settlement ponds.

To maximise the erosion and sediment control benefits of natural vegetation soil cover, stripping of soil is to be kept to a minimum and confined to construction areas only. Where practical, construction works will be staged to minimise the extent and duration of disturbance, e.g., plan for progressive site clearance, only disturbing areas when they are scheduled for current construction work.

<u>Pre-Emptive Site Drainage Management</u>

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

The following forecasting systems are available and will be used daily at the site to direct proposed construction activities:

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

Works will 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 works being suspended the following control measures will be completed:

- Secure all open excavations.
- Provide temporary or emergency drainage to prevent back-up of surface runoff.
- Avoid working during heavy rainfall and for up to 24 hours after heavy events to ensure drainage systems are not overloaded; and
- Provide cover to material storage areas i.e., adequate tarpaulin over stockpile areas if material cannot be reinstated prior to suspension.

As a further precaution, near-stream construction work will only be carried out during the period permitted by IFI for in-stream works according to the Eastern Regional Fisheries Board (2004) guidance document *"Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites"*, that is, May to September inclusive. This time coincides with the period of lowest expected rainfall and, therefore, minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses.

Run-off will be maintained at greenfield (pre-development) run-off rates. The layout of the development has been designed to collect surface water run-off from hardstanding areas within the development and discharge to associated surface water attenuation ponds adjacent to the proposed infrastructure. It will then be managed by gravity flow at greenfield run-off rates.

It is proposed, that during the ground clearance of the proposed development, water control measures will be implemented to limit the impact on water quality. Suspended solid (silt) removal features will be implemented in accordance with CIRIA C697 Sustainable Drainage System (SuDS) Manual, and CIRIA C648 Control of water pollution from linear construction projects.

All temporary and permanent drainage from the site shall be designed to have as a minimum three stages of treatment, as defined in the SuDS Manual. Management of run-off will include the following:

- Filtration of water through filter media (sand / stone check dam, silt fence).
- Detention / settlement in settlement ponds or behind check dam in swales; and
- Conveyance of shallow depths of water in vegetated swale.

<u>Interceptor Drains</u>

Interceptor drains/diversion ditches will be installed ahead of the main earthworks activities to minimise the effects of collected water on the stripped/exposed soils once earthworks commence. This drainage will integrate into the existing peatland drainage. These drainage ditches will be installed on the upgradient boundary of the areas affected by the access track earthworks operations and installed ahead of the main track construction operations commencing. They will generally follow the natural flow of the ground. The interceptor drains will intercept any storm water surface run-off and collect it to the existing low points in the ground, allowing the clean water flows to be transferred independently through the works without mixing with the construction drainage. It will then be directed to areas where it can be redistributed over the ground by means of a level spreader.

<u>Swales</u>

Track edge drainage/swales are required to control run-off from the running surface to lower water levels in the subgrade, to control surface water and to carry this flow to outlet points.

Swales along access tracks will be installed in advance of the main construction phase. On sections of track where there is significant longitudinal gradient, regular surface water interception channels will be employed – these will typically be at 10-20m intervals to collect any surface water that is discharging as sheet flow along the track and discharge the flow into the trackside swale.

Swales will provide additional storage of storm water where located along gradient. Given the steep longitudinal gradients on some sections of access track, regular check dams will be employed within the trackside swale on these sections to reduce the flow velocity and provide settlement opportunity. Check dams will be constructed from course gravel/ crushed rock (See Figure 5-4). Check dams will have a minimum 0.2m freeboard (from top of check dam) to top of swale level, to prevent overtopping of flows onto the access track. All check dams, etc will be checked at least once weekly via a walkover survey during the full period of construction. All excess silts will be removed and placed in borrow pit reinstatement or embankments. Where check dams have become fully blocked with silt, they will be replaced.

Figure 5.4 Typical example of stones used in a check dam to slow down water flow (Source: SNH, 2015)[4]

Swales will be re-vegetated by hydro-seeding with indigenous seed mix as soon as is practicable following excavation. This will reduce the flow velocity, treat potential pollutants, increase filtration and silt retention.

<u>Settlement Ponds</u>

Settlement ponds will be located downstream of road swale sections and at turbine/hardstand locations, to manage/buffer volumes of run-off discharging from the drainage system during periods of high rainfall, thereby reducing the hydraulic loading to watercourses. Settlement ponds are designed in consideration of the greenfield run-off rates.

The following shall apply to construction of settlement ponds at the site:

- Pond depths generally to be excavated to less than 1.5m.

[4] Scottish Natural Heritage (SNH), *Good Practice during Wind Farm Construction* (2015)

- Side slopes to be shallow, nominally at a 1 in 3 side slope (maximum); and
- Material excavated from the settlement pond should be compacted around the edge of the pond.

The settlement pond design is based on primary settling out of suspended solids from aqueous suspension. The theory behind the design of the settlement lagoons is the application of Stoke's Law. The settlement lagoons will be designed to provide sufficient retention time and a low velocity environment to allow suspended solids of a very small particle size to fall out of suspension prior to allowing the water to outfall to the receiving environment. Flow rates for storm events will be maintained at or below greenfield run-off rates.

Settlement lagoons will be installed concurrently with the formation of the road and will be fenced off for safety. They will be located as close to the source of sediment as possible and as far as possible from the buffer zones of existing watercourses. The minimum buffer zone width will be 50m as outlined above.

Subject to potential planning conditions and prior to commencement of construction activity, this drainage design (including construction specific measures) will be reviewed by the appointed Contractor as part of the review of this Construction Environmental Management Plan (CEMP).

A Surface Water Management Plan (SWMP) has been prepared and is included as Appendix 11.3 of the EIAR. The purpose of this plan is to ensure that all site works are conducted in an environmentally responsible manner so as to minimise any adverse impacts from the proposed development on surface water quality. The plan will incorporate the following specific objectives:

- Provide overall surface water management principles and guidelines for the construction phase of the Oweninny Wind Farm project.
- Address erosion, sedimentation and water quality issues; and
- Present measures and management practices for the prevention and/or mitigation of potential downstream impacts.

During the operational phase of the project, the management of surface water will be carried out in accordance with the proposed design and associated management features. The design of the wind farm has been developed following a detailed examination of the existing drainage on site. The drainage design ensures that any surface water arising from the proposed wind farm during operation will be contained and treated to ensure it can be dispersed out from the proposed development without any significant impact.

The decommissioning phase will not require any significant works that will impact on the drainage network.

The protection of water quality and prevention of pollution events requires a sustained and concentrated input from the Contractor with regard to the provision and maintenance of sediment control structures. The drainage system, as it is designed, does not impact on the existing drainage regime on site.

<u>Proprietary Silt Control Measures</u>

Temporary settlement tanks can be utilised, in lieu of constructing temporary settlement ponds, to remove suspended particles from controlled water in small works areas such as localised excavations that require pumping out of water. The tanks, as per Figure 5-3 are proven to be very effective, have a small footprint and are very mobile with the potential to move around the wind farm site using a telehandler. These types of units are recommended by the Scottish Environmental Protection Agency (SEPA) and the UK Environmental Agency for use on construction sites for the treatment of sediment laden water. Sediment retained in settlement ponds or tanks will be removed on a regular basis and deposited at a suitable location, such as embankments or borrow pit reinstatement stockpiles.

Dewatering silt bags allow the flow of water through them while trapping any silt or sediment suspended in the water (see Figure 5-5). The silt bags provide a passive non-mechanical method of removing silt from silt-laden water collected from works areas within a construction site. Silt bags are easily disposed by a licensed waste contractor. Check dams will also be used in the site drainage system during construction to minimise sediment transport (see Figure 5-4). These check dams will slow down the movement of water in site drains, and thereby reducing the amount of sediment transported by the water. Stones are typically used at each dam to reduce soil erosion, to stabilise the dam and aid in filtration.

The proposed works will require significant trenching for on-site cabling and for the grid connection. Trenches will be dug in short sections at any one time to avoid potential for water flowing into the excavations. Any water that does accumulate in trenches will be allowed to naturally percolate to ground where possible. Any excavated material which is not removed immediately will be stored on the upgradient side of the trench, where possible, so that any sediment run-off will be collected in the trench. Clay plugs will be installed at regular intervals to prevent conduit flow of water through the trench after construction.

In specific locations, silt fences will be installed as an additional water protection measure around existing watercourses, particularly where works are proposed within the 50-metre buffer zone of a stream.

Silt control measures e.g. silt bags, will be implemented as required during the construction process.

Figure 5.5 Examples of Proprietary Silt Control Measures

<u>Culverts</u>

Culverts will be where the site roads, crane pads and turbine pads cross main bog drainage networks. Indicative locations of the culverts are shown on Planning Drawing 10889-2037

Precast concrete culverts of minimum 300mm in diameter shall be provided, a typical detail of which is shown on Planning Drawing 10889-2037. The proposed culverts and any diversion of the existing main drainage network across the site are specified on Planning Drawing 10889-2037.

5.3.1 TDR and Grid Connection Route

Silt fencing will be erected at the location of stream crossings along the grid connection route. Silt curtains and floating booms will also be used where deemed to be appropriate and this will be assessed separately at each individual location.

No refuelling of machinery will take place within 50m of a watercourse. Excavated material will not be stockpiled or side-cast within 50m of a watercourse. Appropriate steps will be taken to prevent soil/dirt generated during the temporary upgrade works to the TDR from being transported on the public road. Road sweeping vehicles will be used to ensure that the public road network remains free of soil/dirt from the location of the TDR works and grid connection when required. This will reduce the potential for sedimentation of surface watercourses locally.

5.3.2 Dewatering

Extraction could be undertaken by dry or wet working.

- Dry working requires dewatering. Dry excavation would require the use of initial drainage channels to reduce the hydraulic head, followed by sump dewatering in the pit or well dewatering. The volume of water requiring extraction initially is high in the gravels due to drainage from storage, however as the gravel area is surrounded by lower permeability materials the volume of groundwater encountered for the short-term use of the pit may be limited
- There may be circumstances where pumping may not be required:
  i. Shallow workings (e.g., sand and gravels) from which the mineral can be dredged.
  ii. Shallow quarries where the water table is close enough to the surface to allow the installation of passive drainage measures.
  iii. Quarries where there is a general lowering of the water table as a consequence of mineral extraction providing there is some natural outlet for groundwater drainage

With a shallow excavation in the area, material up to 4m below ground level or 2.5 m below the water table are accessible with conventional excavators or if required long reach excavators. Wet working can help to limit the impact on local groundwater resources. See Chapter 9, Table 9-9 for dewatering options of the various borrow pit locations. Potential effects are negative, slight, direct, long-term, certain effect on peat and soils.

5.3.3 Concrete Handling

Only ready-mixed concrete will be used during the construction phase, with all concrete being delivered from local batching plants in sealed concrete delivery trucks. The use of ready-mixed concrete deliveries will eliminate any potential environmental risks of on-site batching. When concrete is delivered to site, only the chute of the delivery truck will be cleaned, using the smallest volume of water necessary, before leaving the site. Concrete trucks will be washed out fully at the batching plant, where suitable facilities are already in place.

The small volume of water that will be generated from washing of the concrete trucks chute will be directed into a temporary lined impermeable containment area, or a concrete wash unit. This type of unit catches the solid concrete and filters and holds wash liquid for pH adjustment and further solids separation. The residual liquids and solids can be disposed of off-site as waste material. Where temporary lined impermeable containment areas are used, such containment areas will be excavated and lined with an impermeable membrane (see Figure 5-6).

Figure 5.6 Example of temporary concrete washout area

Measures to prevent surface water contamination from concrete pouring on-site will include:

- Using weather forecasting to assist in planning large concrete pours and avoiding large pours where prolonged periods of heavy rain is forecast.
- Restricting concrete pumps and machine buckets from slewing over watercourses while placing concrete.
- Ensuring that excavations are sufficiently dewatered before concreting begins and that dewatering continues while concrete sets.
- Ensuring that covers/mesh are available for freshly placed concrete to avoid the surface washing away in heavy rain.
- Disposal of surplus concrete after completion of a pour off-site; and
- Discussing arrangements for concrete deliveries with the suppliers before works commence to ensure they are aware of on-site wash-out restrictions.

5.4 GROUNDWATER

No significant groundwater resources are present at the site, although localised perched groundwater may be associated with areas of granular overburden. No significant geological resources are known at the site and geological heritage is limited to the banks of the Bellacorick River.

The project site is relatively flat lying, with cutover blanket peat overlying deep glacial sandy tills The site overlies a poor aquifer that is unproductive except for local zones. The residual impacts on the surrounding groundwater quality, hydrology and existing drainage regime at the site are negligible and short term in nature. The existing on-site drainage system will remain active during construction and operation of the proposed wind farm and will be enhanced by a proposed drainage plan that has been designed for this development.

The construction timescale of activities within the site will be phased and short-term in duration and, thereafter, the only activities within the site that will be associated with maintaining existing drains, ongoing maintenance and monitoring during the operational phase. There are no significant long-term impacts.

The principal risks associated with soil and geology at the site are the management of soils, particularly regarding the generation of silty waters, and the loss of construction and operational materials (concrete, fuel and oil, etc) to water. It is expected that these risks can be fully mitigated through the adoption of construction and operational good practice.

5.5 LAND, SOILS AND GEOLOGY

The management of excavated materials is an important component of controlling dust as well as sediment and erosion control. Excavated topsoil, subsoils and peatland encountered, will only be moved short distances, and will be used locally for landscaping and benching/battering, where possible. Excavated material will not be stored in excessive mounds on the site. Excess soils/subsoils/peat, including from the grid connection cable trench excavations and drilling, will be hauled to the borrow pits and stockpiled temporarily pending backfill into the pits once the required rock resources have been extracted. Placed soils will be sealed and levelled using the back of an excavator bucket to prevent erosion. Where possible, the upper vegetative layer will be stored with the vegetation side of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the berms. Seeding of the placed materials with indigenous species will be carried out only where natural revegetation or the reuse of the upper vegetated layer is unsuccessful. The re-vegetation of these areas will promote stability, reduces desiccation, run-off erosion and susceptibility to freeze/thaw action.

Excavations in some areas may be susceptible to collapsing depending on material encountered and depth of the excavation. Where battering back of excavations to a safe angle is not feasible, a physical barrier will be applied between the excavations and the potentially unstable material in the form of a granular berm or sheet piles. Excavations for turbine bases and substation infrastructure will be backfilled to ground level following foundation installation. Temporary works designs will be carried out by a competent engineer during detailed design to account for the existing ground conditions and the chosen turbine specification. The borrow pits will be reinstated insofar as is possible with excess excavated material from across the wind farm site and grid connection route.

As discussed in Section 4.1, temporary wastewater holding tanks will be used to store wastewater generated from the welfare facilities in the two construction compounds. This will eliminate the need for any wastewater treatment and percolation at the site. No concrete truck wash-out will be permitted at the site either to protect the existing ground conditions. Only concrete truck chute washing will be permitted on site in accordance with the measures outlined in Section 5.3 above. The management and handling of fuels, oils and lubricants will be in accordance with the measures set out in Section 4.5 to reduce the potential for spillage or contamination of soils.

Surface water management measures as set out in Section 5.3 will be put in place from start of construction works and installed alongside internal roadways to ensure that surface water run-off is controlled and does not cause erosion of exposed surfaces or generate sediment laden discharge.

Several turbine component transport options have been identified, the routes originate from Galway port (Route A) and Killybegs port (Routes B and C). These routes are described in detail in Chapter 17 Traffic and Transport. Any upgrades to the identified haul route options (including the existing Oweninny phase 1 and 2 TDR – See Chapter 17 Traffic and Transport) will be carried out in advance of turbine deliveries and following consultation and agreement with Mayo County Council.

5.5.1 Peat Deposition Areas

Due to the nature of the development, i.e., deposition of soil and peat, there is the potential for impacting the shallow soil and geology environment. Excavation of peat and subsoil will be required for construction of works for the installation of access roads. This will result in a permanent removal and relocation of cutover peat and subsoil. There is no loss of peat or subsoil, as it will all be relocated within the proposed development.

The amount of peat and soil excavated from tracks depends on the final design i.e., cut or floating. Worse case scenarios were utilised in the excavation calculations. Peat depth information (both probed and extrapolated depths) was used to determine the preliminary estimates of excavation volumes for each of the main infrastructure elements.

It is anticipated that peat deposition to a repository area will be required, which will be designed to be fully stable, it is anticipated that deposited peat thickness will not exceed 1m. The design aimed to minimise further the amount of peat excavated by proposing floating tracks wherever possible. A Peat Management Plan (PMP) has been prepared for the development. Recommendations made in the PMP will be taken into consideration during the design and construction stage of the proposed development. Guidance regarding the management of Peat stability must be inherent in the construction phase of the project. A Peat Management Plan (PMP) was developed as part of the planning application – See Appendix 9-3. This plan documents how Peat will be managed on site for re-use of materials, the design for on-site re-use and disposal options, and a scheme for the tracking and recording of soil movements.

5.6 BIODIVERSITY

The following general measures will be taken to minimise potential effects on the local and regional biodiversity during construction:

- An Ecological Clerk of Works (ECoW) will be appointed to ensure compliance during the construction stage with all mitigation measures and planning conditions related to ecology and with wildlife law.
- A Biodiversity Enhancement Plan (BEP) has been prepared and is included in Appendix 7-5 of the EIAR. It will be a living document, updated and amended by the ECoW during the lifetime of the project. The updated BEP will become part of the final CEMP for the construction works.
- A particular focus of the plan will be the management of habitat creation and enhancement measures and bat buffer zones.

5.6.1 Habitat/Flora

5.6.1.1 Habitat Loss/Degradation & Habitat Creation/Enhancement

The habitat creation and enhancement sites. Management measures will be developed on a site-specific basis and will include:

- Drain blocking, to increase wetland habitat area and improve ecological function and species composition.
- Scrub removal.
- Invasive species removal in selected areas

Where the clearance of vegetation cannot be avoided, vegetation removal will be kept to a minimum. Where applicable and to minimise peat/ vegetation loss, surface vegetation and upper layers of peat (scraw) will be carefully stripped and temporarily stored to one side, following construction activities this scraw can be reinstated in original areas, in the case of borrow pits and temporary compounds or relocated beside infrastructure sites, such as hard stands or roadways.

All proposed works area will be defined at the outset to define the limits of the proposed works area. The demarcation of the works area will ensure no vegetation clearance will occur outside the proposed development site boundary.

In accordance with Section 40 of the Wildlife Acts, all vegetation proposed to be removed to facilitate the works will be cleared outside of the birds nesting season (1st March to 31st August inclusive). This will ensure there is no loss of nests because of the proposed construction works. If clearance of vegetation is required within the bird nesting season, vegetation will first be surveyed by an experienced ecologist to identify the presence of active nests. Only vegetation confirmed to be nest free may be cleared. If a nest is confirmed as present, the nest will either removed under license obtained from NPWS or the nest will be cordoned off until the chicks have fledged or until nesting has failed.

5.6.1.2 Pollution Control/Sedimentation

All pollution control measures will be designed, installed, and maintained in accordance with CIRIA guidance for 'Environmental Good Practice on Site' (C741), 'Control of Water Pollution from Linear Construction Projects. Technical guidance' (C648) and regarding IFI guidance 'Guidelines on the Protection Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters' (IFI 2016) to ensure the protection of watercourses located within the proposed development site.

5.6.1.3 Maintaining Site Hydrology

Existing surface water flows across the site will be maintained through such measures as cross drains transferring water across access tracks. Further information on surface water management is provided in Section 5.3.

5.6.1.4 Watercourse Protection

The proposed development has been designed to avoid significant impacts on watercourses. The turbines have been located an excess of 50m from all watercourses. No in-stream works are proposed as part of the proposed works. The access track to T05, which crosses the Muingamolt stream and access track to T16, which cross which crosses the Fiddaunfura Stream twice will be constructed via a clear-span bridge. The proposed clear-span bridges will comprise a reinforced concrete bridge bed placed on foundations, set 2.5m back from the bank, either side of the stream.

5.6.2 Fauna

5.6.2.1 Otter

Evidence of otter was recorded within the proposed development site. It is likely that otter occasionally uses large watercourse such as the Muing River within the proposed development site for commuting and foraging. No otter holts or resting places were recorded onsite.

Due to the presence of otter activity recorded within the proposed development site, a pre-construction otter survey (as part of a general ecological pre-construction walkover survey) will be undertaken to identify the presence of any new holts or activity. The pre-construction survey should be conducted no more than 10—12 months in advance of the construction works as per the NRA (2008) guidelines. An otter survey was undertaken within the proposed development site in August 2020 as well as other incidental observations recorded during other surveys (April 2020 – March 2021). No signs of otter (which included, tracks, slides and spraints), otter holts or resting sites were identified during the August 2020 surveys. But Two incidental records of otter however were recorded near waterbodies in October 2020. These were live sightings of otter foraging in lakes within the proposed development site on cutover bog, one located within to the northwest portion of the site and one located near the centre of the site.

Otter is a qualifying interest of the Owenduff/Nephin Complex SAC (000534) and the River Moy SAC (002298) which are located approximately 4km and 7km downstream of the proposed development site. The territories of otter can stretch for several kilometres, ranging from as small as 2km and extending up to 20km in cases.

Otter, which may occur in proximity to the proposed development may be associated with the downstream SAC population; therefore, otter is categorised as being of International Importance. If a new holt is identified within the ZoI of the proposed works, a derogation license will be sought from NPWS. The derogation licence will allow the disturbance of the holt (if located within the ZoI) once all mitigation measures outlined in the license are implemented accordingly.

No construction lighting will be directed towards watercourses or lakes within the site, to maintain a dark corridor for commuting and foraging otter.

Water quality will be protected in all the watercourse onsite following the mitigations detailed in Chapter 7, Sections 7.9.1.2.2 and 7.9.1.2.3.

5.6.2.2 Badger

Signs of badger were recorded within the proposed development site including a dead (roadkill) animal and signs of foraging. No setts however were identified within the ZoI of the proposed works. Due to the presence of badger activity recorded within the proposed development site, it is recommended that a pre-construction badger survey within 150m of the proposed development works is carried out prior to the works commencing.

Pre-construction surveys (as part of a general ecological pre-construction walkover survey) will be carried out in accordance with 'Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes' (NRA, 2006). Should any new setts be encountered within the ZoI of the proposed development, a disturbance derogation licence, if required, will be sought from the NPWS. The derogation licence will allow the disturbance of the sett(s) once all mitigation measures outlined in the license are implemented accordingly.

Any temporary construction lighting used during the construction works will be cowled away from potential foraging sites to prevent disturbance to badger within the area.

To protect individual badgers during the construction phase of the proposed development, all open excavations on site will be covered when not in use and backfilled as soon as possible. Any deep excavations which are left uncovered will contain egress ramps in place to allow mammals to safely exit excavations should they fall in.

5.6.2.3 Pine Marten

The felling of the conifer plantation will be limited to time periods outside which pine marten may have young in dens (March and April). Where this is not feasible then areas to be clear felled will be re-surveyed (as part of a general ecological pre-construction walkover survey) in advance by a suitably qualified ecologist to determine whether any occupied pine marten dens are present. A license under the Wildlife Acts will be applied for should any dens have to be disturbed.

5.6.2.4 Common Frog

If frog spawn is identified during a survey during common frog's spawning season within the footprint of the works, a derogation license under Sections 9, 23 and 43 of the Wildlife Acts will be sought from NPWS. The derogation license, if required, will detail specific measures to translocate the frogs and spawn to suitable nearby habitat which will not be impacted by the proposed development.

5.6.2.5 Bats

Mitigation is best achieved through avoidance especially in relation to bat fauna. It is proposed that measures outlined in Chapter 7, Table 7-16 of the EIAR be put in place to avoid or lessen the degree of impacts on local bat populations.

A high level of mitigation is required T1, T2, T3, T4, and T7 areas. Moderate level Bat Mitigation applies to T6, T8, T9, T11, T13, T14, T17 and T18. This also applies to remaining Internal Road Network. T5, T10, T12, T15 and T16 requires a low level of mitigation.

5.6.3 Aquatic Ecology

The rivers and watercourses within and immediately adjacent to the site were found to provide important spawning and nursery habitat for crayfish, lamprey, and salmon. The release of construction pollution and/or sediment into the watercourses has the potential to degrade water quality indirectly impacting these aquatic species and their habitats. As such mitigation to control pollution/sedimentation (as discussed in section 5.6.1.2) and mitigation to protect watercourses (as discussed in Chapter 7 Section 5.6.1.2.) will be followed. Proposed drainage measures to reduce and protect the receiving waters from the potential.

5.6.4 General Mitigation

Construction-phase mitigation measures to protect retained habitats and to protect watercourses are described in Section 7.10.1 of the EIAR.

5.6.4.1 Habitat Loss

Where areas of potentially sensitive breeding bird habitat are proposed to be removed during construction, these works will be timed to avoid the breeding birds nesting season from 1st of March to 31st of August. This measure will avoid any potentially significant effects to breeding bird species. If the bird nesting season cannot be avoided, a license will be sought from NPWS to undertake the clearance of vegetation within the season. Upon license approval, a suitably qualified ornithologist/ecologist will undertake a pre-construction survey of the vegetation proposed to be removed to establish the presence or not of breeding birds. Where an active nest is found, the nest will be clearly marked and avoided if possible. Where avoidance of the nest is not possible, the nest will only be removed once the chicks have fledged or where nesting has failed.

A pre-construction survey for ground nesting species, which have been identified as having a confirmed or possible breeding status, or species which may potentially be found nesting (e.g. Greenshank, Dunlin, Golden Plover, Redshank, Lapwing, Ringed Plover, Common Sandpiper, Curlew, Snipe, Meadow Pipit or Common Gull) will also be undertaken within the cutover bog located at the south and east of the proposed development site to identify the presence of any nest prior to the clearance of vegetation.

5.6.4.2 Disturbance/Displacement of Protected Species

The following measures, in relation to birds, are proposed for the construction phase:

- As part of the iterative project design process, turbines have been located away from habitats identified as particular value to protected or sensitive avian species and all will be in habitats not evaluated as valuable to avian species and typically of low ecological value. This mitigation by avoidance will reduce potential habitat loss impacts for key avian species.
- Pre-construction surveys will be required to identify the location of any breeding birds onsite, in particular breeding waders (e.g., Greenshank, Dunlin, Golden Plover, Redshank, Lapwing, Ringed Plover, Common Sandpiper, Curlew or Snipe) and breeding gulls (e.g. Common Gull). These surveys are required to inform site clearance activities given the legal protection of all breeding birds.
- As noted, the removal of any vegetation will be undertaken outside the bird breeding season, where feasible, which begins on the 1st day of March and ends on the 31st day of August. Where this is not possible, a derogation license will be sought from NPWS. If a nest is found in proximity to the proposed works area, hoarding will be erected between the nest and the proposed development site.

5.7 WASTE MANAGEMENT PLAN

All waste generated from the proposed development will be managed in accordance with the provisions of the *Waste Management Act* 1996 as amended and associated Regulations.

All excavated topsoil, subsoils and peat will be reused within the site boundary, insofar as possible, primarily for reinstatement of the borrow pits. Any excess material which cannot be reused in creating berms or reinstating the borrow pits will be transferred off-site to a licensed waste facility. Similarly, any excess or unsuitable rock material which cannot be reinstated in the borrow pits will be transferred off-site. However, it is not anticipated that any excess material will not be suitable for reuse within the site.

Typical waste streams (including material-related streams such as metals, paper and cardboard, plastics, wood, rubber, textiles, bio-waste and product-related streams such as packaging, electronic waste, batteries, accumulators and construction waste) will be managed, collected, segregated and stored in separate areas at the construction compounds and removed off site by a licensed waste management contractor at regular intervals for the duration of the construction works. Skips and bins of appropriate sizes will be stored in both construction compounds and used to maximise source segregation of waste materials. This will include food and packaging waste from welfare facilities. Appropriate control of food waste in the compound will minimise the potential for pests and rodents to visit the area.

Any contaminated materials used for spills and equipment maintenance works will be separately stored in a suitable container for collection by an authorised hazardous waste contractor.

The Contractor will encourage all project teams to minimise waste generation and to maximise the segregation of waste at source. Material wastage will be avoided by delivering only the required quantities of material to site and utilising off-site manufacturing of steel reinforcement cages and concrete materials as much as possible. The Contractor will establish 'just-in-time' deliveries to avoid excess material storage at the site which can lead to waste generation. Delivery drivers will be encouraged to remove any excess packaging from materials delivered to site and remove unused timber pallets where possible.

Reusable formwork for concrete pouring will be used, particularly for turbine bases, in preference of non-reusable options. Other opportunities for material reuse across the site will be sought by the Contractor.

The SHEQ Officer, or other appropriate person, will be appointed as the Waste Manager for the duration of the project in accordance with the general guidance set out in the *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* (Department of the Environment, Heritage and Local Government (DoEHLG, 2006).

At the pre-construction stage, the construction and demolition (C&D) Waste Manager will be able to require fellow designers to take full advantage of all reasonable C&D waste prevention, reuse and recycling opportunities. During construction, the practicalities of waste prevention, salvaging re-useable materials, and the need to synchronise the recycling of waste materials through the timing of their use in the new construction works will be emphasised by the Waste Manager.

The Waste Manager will be responsible for auditing waste handling and storage throughout the project and for advising construction personnel on best practices. All waste collections and records of waste movement off-site will be collated by the Waste Manager and retained in the site office.

5.8 TRAFFIC AND TRANSPORT

A TMP for the construction phase of the works has been prepared and is included in Appendix A to this document. The primary objectives of the TMP as set out in the document are to:

- Outline minimum road safety measures to be undertaken at site access / egress locations during the Construction Phase, including approaches to such access / egress locations; and
- Demonstrate to the Developer, Contractor and suppliers the need to adhere to the relevant guidance documentation for such works.

Mitigation measures regarding traffic and transport as set out in the EIAR are provided in the following sections.

5.8.1 Traffic Impact

To mitigate the impact of the construction traffic, the Wind Farm will utilise all available resources within the existing site to reduce the requirement for importation of materials to site.

The second largest traffic volume impact is associated with the haulage of the materials for the internal access track construction. In addition to the borrow pits, the internal access tracks have been designed to utilise existing Wind Farm access tracks where feasible, reducing the volume of materials required for importation to the site.

The largest volume traffic impact is associated with the concrete pours for the turbine foundations. The works at other areas within the main site will continue during these concrete pours, but only essential deliveries will be scheduled to occur on the same days as the concrete pours. To mitigate this impact, liaison with local authorities and the community in advance of the foundation pours as well as minimising other works/deliveries as noted.

5.8.2 Internal Access Tracks & Passing Bays

To access the development site, the existing internal access roads will be utilised with some widening and a new section of internal access road constructed, refer to Drawing No. 10889-2003.

5.8.3 Drainage

Drainage works to be carried out alongside the internal access tracks are discussed in Section 5.3.

5.8.4 Haul Routes

A number of turbine component transport options have been identified. These routes are described in detail in Chapter 17 Traffic and Transport. The three routes identified originate from Galway port (Route A) and Killybegs port (Routes B and C).

5.8.5 Pre- and Post-Construction Pavement Surveys

The client will undertake pre-construction and post-construction visual pavement surveys on the Haul Roads. Where the surveys conclude that damage on the roadway is attributable to the Construction Phase of the proposed project, the developer will fund the appropriate reinstatement works to bring the road back to pre-construction condition as a minimum, details for which will be agreed with the Roads Authorities.

5.8.6 Traffic Management Plan (TMP)

The successful completion of this project will require significant co-ordination and planning, and a comprehensive set of mitigation measures will be put in place before and during the construction stage of the project to minimise the effects of the additional traffic generated by the proposed development. The Traffic Management Plan (TMP) proposed for the Oweninny Wind Farm Phase 3 is included in Appendix A of this report.

Note, the TMP has been included as a separate document. Any changes which may arise from the planning process and in the detailed construction programme can be incorporated.

The following mitigation has been incorporated into the TMP:

- Haul route selection to avoid sensitive receptors.
- Widened approaches to the site accesses within the development to facilitate queuing of construction vehicles off the public road.

- Traffic Management Operatives (TMOs) will be provided by the principal contractor in accordance with their Traffic Management Plan at the site accesses during peak construction traffic activities, refer to the TMP.
- A wheel wash will be provided within the site.
- Passing bays on the internal access track and a loop layout within the Wind Farm site to facilitate safe passing of vehicles within the site, vehicles travelling in a forward direction (reducing higher risk reversing manoeuvres).

5.8.7 Project Delays

To avoid delays to the project programme all required road opening licenses, agreements with the Local Authorities and An Garda Síochána to facilitate movement of abnormal loads shall be sought by the appointed Contractor in a timely manner to avoid delays to the project.

5.9 CULTURAL HERITAGE

There are no recorded archaeological, architectural or cultural heritage sites located within the footprint of the proposed project, therefore, there are no predicted impacts to the recorded heritage resources during the construction phase.

Previously unknown archaeological sites and features may survive below the current ground level across the proposed project. Should any such remains be encountered during construction direct and negative impacts may occur. Prior to the application of mitigation these have the potential to range from moderate to profound negative, depending on the nature, extent and significance of any such archaeological features.

The National Monuments Act, as amended requires that, in the event of the discovery of archaeological finds or remains that the relevant authorities, the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht (DoCHG) and the National Museum of Ireland, should be notified immediately. Allowance will be made for full archaeological excavation, in consultation with the National Monuments Service of the DoCHG, if archaeological remains are found during the construction phase.

In areas where there is the potential that archaeological, architectural or cultural heritage site, structures, monuments or features could be impacted on during the construction phase, one or both of the following mitigations measures will be implemented:

Archaeological testing – best practice in areas of moderate archaeological potential demands caution, to ensure that archaeological deposits are identified as early as possible, thereby ensuring that any loss from the archaeological record is minimised. During archaeological testing, a licensed eligible archaeologist will supervise excavations of pre-determined trenches undertaken with a toothless grading bucket, under licence to the National Monuments Service of the DoCHG. Undertaking this confirmatory surveying will ensure that sufficient time can be allowed within the construction schedule for the excavation of any archaeological deposits discovered.

Archaeological testing was carried out in the townland of Bellacorick, to the west of the proposed development area. The peat was recorded as deep as 1.7m in places. Nothing of archaeological significance was identified (Licence Ref.: 11E0101, Bennett 2011:447).

Archaeological monitoring – in areas of moderate archaeological potential, excavations associated with construction works, namely topsoil stripping, will be monitored by a suitably qualified archaeologist. If archaeological deposits are discovered, work in the area will cease immediately and the archaeologist will liaise with the National Monuments Service of the DoCHG and the National Museum of Ireland.

Oweninny Bog, including a large portion of the overall proposed project boundary, was previously subject to archaeological survey as part of the Peatland Survey 2003 (Licence Refs.: 03E1319 and 03E1320). No archaeological features or deposits were noted within the area of the proposed project (Bennett 2003:1320). A possible mass path was identified in the townland of Drumanaffrin, outside of the study area of the proposed project (Bennett 2003:1296).

Archaeological monitoring was carried out within the townland of Shanvodinnaun, under licence 17E0418, in advance of the erection of a wind mast. A total of 23 anchor point trenches were excavated under archaeological supervision. Nothing of archaeological significance was identified (Bennett 2017:143).

Archaeological monitoring was undertaken (unlicensed) in the townland of Srahnakilly in advance of the construction of a wind monitoring mast. No archaeological features were identified, and no archaeological artefact were recovered (Bennett 2020:496).

Archaeological monitoring of groundworks associated with the erection of a meteorological mast was carried out under licence 16E0384. Nothing of archaeological significant was recorded (Bennett 2016:339).

A suitably qualified cultural heritage consultancy/consultant will be appointed to oversee the effective implementation of the archaeological mitigation measures recommended in this chapter for the construction phase of the proposed development. The consultancy/consultant will maintain continuing liaison with the National Monuments Service of the DoCHG and Mayo County Council's (MCC's) Executive Archaeologist throughout the construction phase of the development.

Archaeological Mitigation – measures for different components and locations of the wind farm project are detailed below.

All archaeological mitigation is to be undertaken under licence to the National Monuments Service of the DoCHG and the National Museum of Ireland.

During the construction phase all stripping of topsoil/peat across the proposed development area will be monitored by a suitably qualified archaeologist. Should any features of archaeological potential be discovered during the works the DoHLGH will be informed immediately and archaeological excavation (preservation by record) or in-situ will be required. Any further mitigation will require approval from the DoHLGH.

6.0 CONCLUSION

This Construction Environmental Management Plan (CEMP) presents a summary of the overall proposed development works, the management of the site during the construction works and the mitigation measures required to ensure the proposed works do not have a significant effect on the environment. This document is prepared in accordance with Best Practice documents as set out above and in the EIAR and the NIS.

Prior to commencement of construction, the appointed Contractor will be required to update this document with site specific details including the location of spill kits on the site, the layout of the construction compounds, machinery pre-start checklists and provide details on the persons responsible for environmental management for the duration of the works. The updated

CEMP will also be required to include any specific construction phase environmental management procedures identified in the grant of planning for the development or subsequent to the planning submission. The final CEMP document will be agreed with the Developer prior to commencement of works and submitted to the planning authority. It will be a live document and updated accordingly throughout the project.

Appendix A – Traffic Management Plan

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BORD NA MÓNA POWERGEN LTD.

OWENINNY WIND FARM PHASE 3

TRAFFIC MANAGEMENT PLAN

MARCH 2023

OWENINNY WIND FARM

TRAFFIC MANAGEMENT PLAN

Document Control Sheet	
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1.0 INTRODUCTION

This Traffic Management Plan (TMP) was prepared as requested by Mayo County Council's Roads Department. The TMP is a "living document". Therefore, any changes which may occur in the planning process and in the detailed construction programme can be incorporated, as can inputs by the Contractor(s), the detailed design team and Client. The commitments included within the Environmental Impact Assessment Report (EIAR) are the minimum commitments that the Contractors shall follow, and others will be developed during the Construction Phase in consultation with the various stakeholders, including the Local Authorities.

1.1.1 Objectives

This document is a Traffic Management Plan (TMP), prepared as an Appendix to the Construction Environmental Management Plan (CEMP). This TMP has been prepared prior to the appointment of a Contractor, material suppliers and final Construction Phase programme. It will be updated following grant of planning permission and prior to commencement of any construction works as outlined in section 3 of the CEMP.

The primary objectives of this TMP are to:

- Outline minimum road safety measures to be undertaken at site access / egress locations during the Construction Phase, including approaches to such access / egress locations; and
- Demonstrate to the developer, Contractor and suppliers the need to adhere to the relevant guidance documentation for such works.

The TMP shall address the following issues which are explained in detail in this report:

- Consent, Licenses, Notifications and Permissions;
- General Provisions;
- Site Access and Egress;
- Routing of Construction Traffic;
- Site Specific Temporary Traffic Measures;
- Enforcement of Traffic Management Plan; and,
- Emergency Procedures During the Construction.

1.1.2 Implementation and Monitoring

The principal Contractor shall agree and implement measures to monitor the effectiveness of the TMP, in conjunction with the Local Authority and Client. On finalisation of the TMP, the Contractor shall adopt the plan and associated monitoring measures.

In order to ensure that environmental awareness and compliance is communicated effectively at the start and throughout the construction works, this TMP in conjunction with the CEMP and its contents will be communicated to all site personnel, including management staff, operatives and sub-contractors. The key elements of this CEMP will form part of the site induction which will be mandatory for all employees, Contractors and visitors attending the site. Refer to Aims and Objectives in section 1.4 of the CEMP.

2.0 THE PROJECT

2.1 PROJECT LOCATION

Oweninny Wind Farm Phase 3 is located on Oweninny Bog near Bellacorick in County Mayo. The Oweninny Bog is situated approximately 12km west of Crossmolina, 8km east of Bangor Erris, and just north of the N59 National Road. The closest settlement to the site is Bellacorick village which is located at the southwestern extents of the bog. The area around the Oweninny Bog is a relatively sparsely populated area.

The proposed development site is located on the eastern side of Oweninny bog, within the townlands of Laghtanvack, Croaghaun (also known as Croaghaun West), Moneynieran, Corvoderry, Shanvolahan, Dooleeg More, Shranakilly, Bellacorick and Shanvodinnaun. The application site surrounds but does not include a forestry plantation at Corvoderry on third party lands, seen in Figure 2-1.

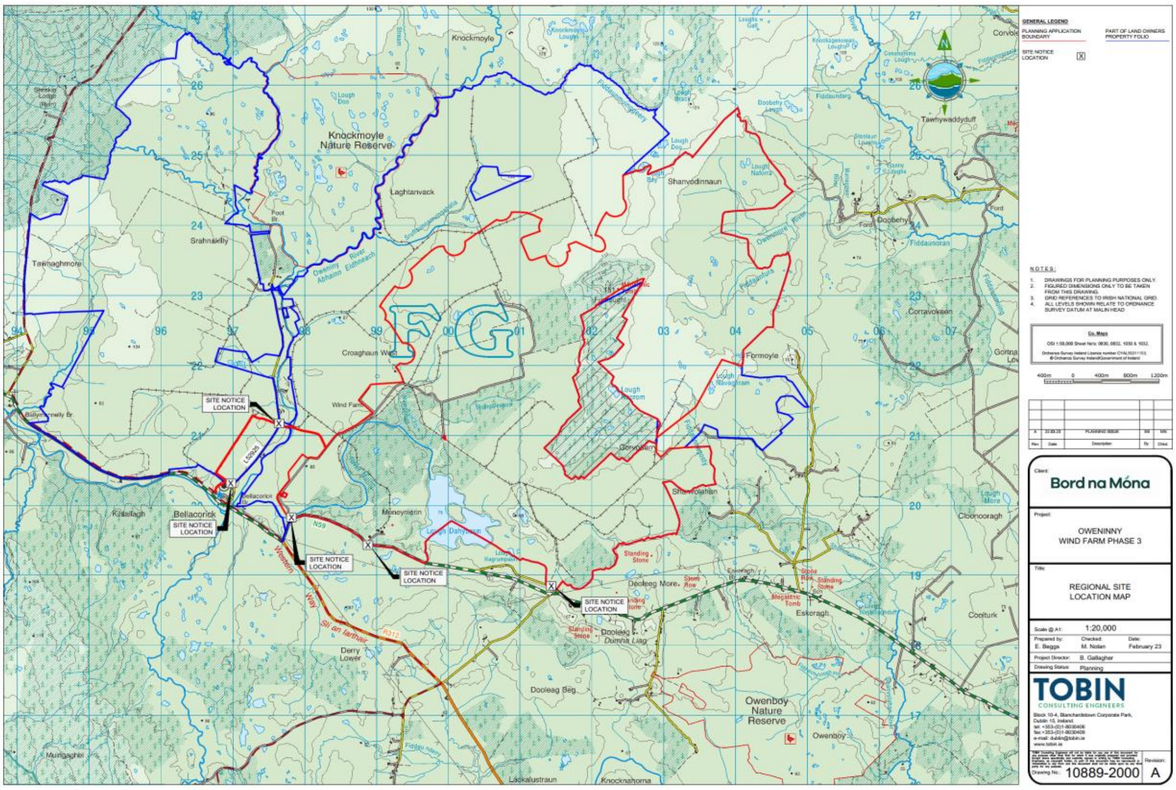

Figure 2-1 Site Location Map - Regional

2.2 PROJECT DESCRIPTION

The proposed development comprises the construction of 18 no. wind turbines and ancillary works. The turbines will have a blade tip height of 200m above the top of the foundation level and will be accessible from internal access routes within the Bord na Móna site. In addition, there will be a requirement for minor temporary modifications to public road infrastructure to facilitate the delivery of abnormal loads. Seen in Figure 2-2 and 2-3.

A 10-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm is being sought. Decommissioning will occur after the operational phase.

The proposed development (as described in full in Chapter 3 (Description of the Proposed Development) of the main EIAR) will generally comprise of the following:

- 18 no. wind turbines (including tower sections, nacelle, hub, and rotor blades) and all associated foundations and hard-standing areas in respect of each turbine;
- Decommissioning and removal of 21 no. existing Bellacorick Wind Farm wind turbines (including tower sections, nacelle, hub, and rotor blades) with a tip height of 62m;
- New internal site access roads, approximately 26,500m in length (permanent and temporary), passing bays, car parking and associated drainage;
- An amenity route through the site to the existing Visitors Centre with access from a public road off the N59 near Dooleeg;
- 3 no. borrow pits;
- 5 no. peat deposition areas;
- 1 No. permanent Meteorological Mast 120m high, and the decommissioning and removal of an existing 100m Meteorological Mast on site;
- 5 no. temporary construction compounds, including material storage, site welfare facilities, and site offices;
- 1 no. 110kV electrical substation compound. The electrical substation will have 2 No. control buildings, a 36m high telecommunications tower, associated electrical plant and equipment and a wastewater holding tank.
- All associated underground electrical and communications cabling connecting the wind turbines to the proposed substation;
- All works associated with the connection of the proposed wind farm to the national electricity grid, including a 110kV underground electrical cable from the proposed on-site electrical sub-station to the existing sub-station at Bellacorick;
- All related site works and ancillary development including (but not limited to):
    - Earthworks;
    - Peat management works;
    - Site security;
    - Groundwater and surface water management;
    - Overburden (soils/peat) storage and management; and
    - Site reinstatement, landscaping and erosion control.

Grid Connection

The proposed 110 kV substation will be connected to the national grid at the existing 110 kV Bellacorick substation via underground high voltage (HV) cables and will export power via the existing 110 kV overhead line infrastructure from Bellacorick substation.

The proposed development requires approximately 5km of 110 kV underground cable installation from the 110 kV onsite substation to the existing ESB Bellacorick 110 kV substation. The entire underground cable will be installed along the existing wind farm access roads.

Construction Haul Routes

There are two types of haul routes:

- The Construction Haul Route, see Figure 2-2 and
- the Abnormal Indivisible Load (AIL) Haul Route, see Figure 2-3.

Construction Haul Route for standard construction traffic (i.e. max. legal articulated vehicles and rigid vehicles) uses the N59 from Bangor Erris and Crossmolina with access to national, regional, and local road networks from these towns.

Advanced Abnormal Indivisible Load (AIL) Haul Route

For Oweninny Wind Farm a number of AIL delivery haul route(s) have been considerations including the following:

- **Route A** - Port of Galway, Galway City
  Route A commences at Galway port, and utilising both motorway and national roads to the site via Rathmorrissey Interchange to Tuam and onwards to Claremorris, Charlestown, Foxford and Crossmolina to the site access.

- **Route A1** - Shannon Foynes Port, Co. Limerick
  Route A1 commences in Foynes, towards Limerick City and north to the Rathmorrissey Interchange and continuing along Route A.

- **Route B and Route C** - Killybegs Port, Co. Donegal

  Route B commence at Killybegs port, through Bundoran and onto Crossmolina. This route continues south of Sligo to Collooney and west to Ballina via Tobercurry via the R294. From Ballina, it follows the same route to Crossmolina and onward to the site access as per Route A.

  Route C commence at Killybegs port, though Bundoran and onto Crossmolina. This route continues west, south of Sligo at Ballysadare via the N59 onto Ballina. From Ballina, it follows the same route to Crossmolina and onward to the site access as per Route A.

Note: Route C is the route utilised in 2019 and 2021 for Oweninny Wind Farm Phase 1 and 2 for the transport of the turbine blades of 57.5m in length.

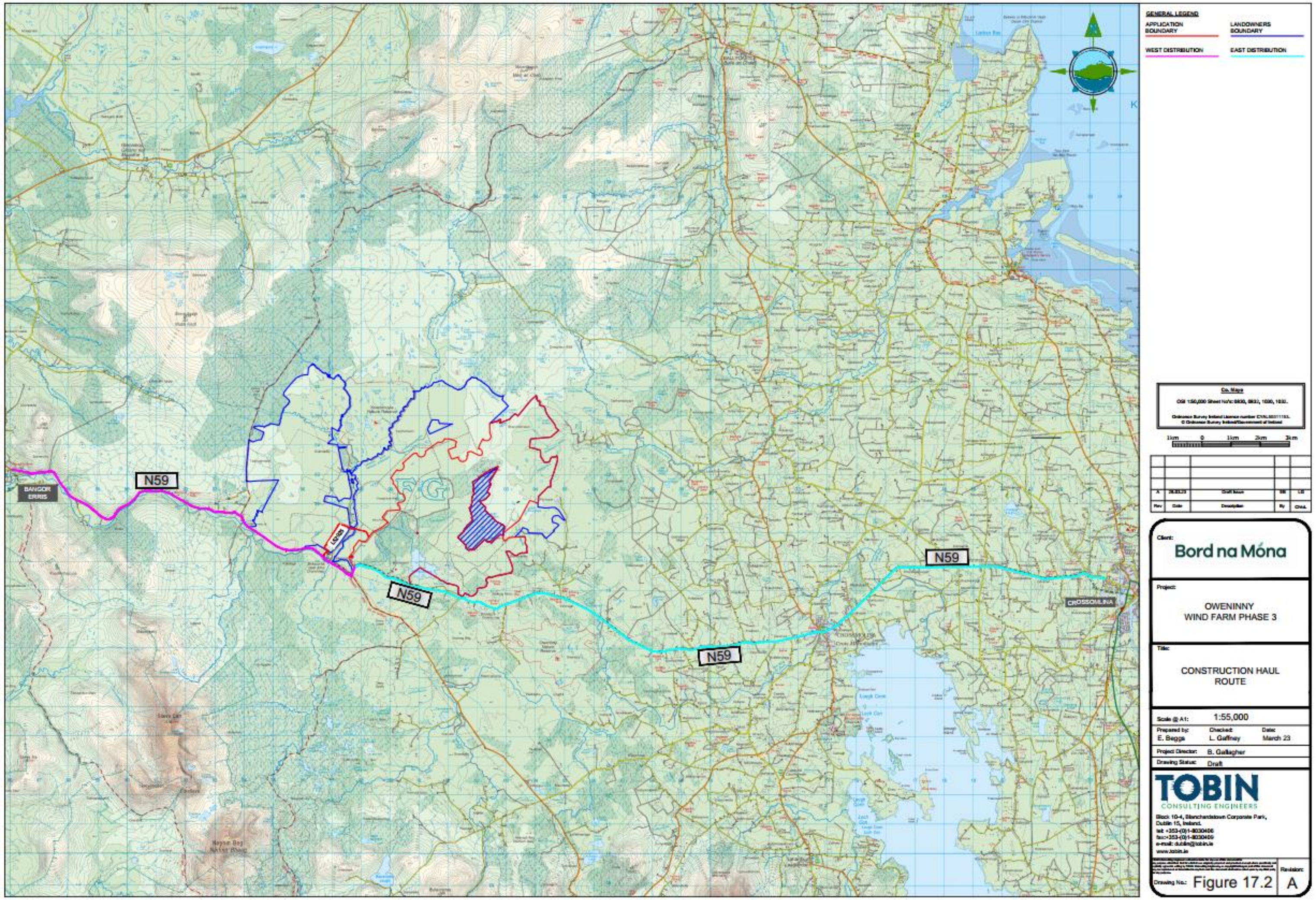

Figure 2-2 Construction Haul Route

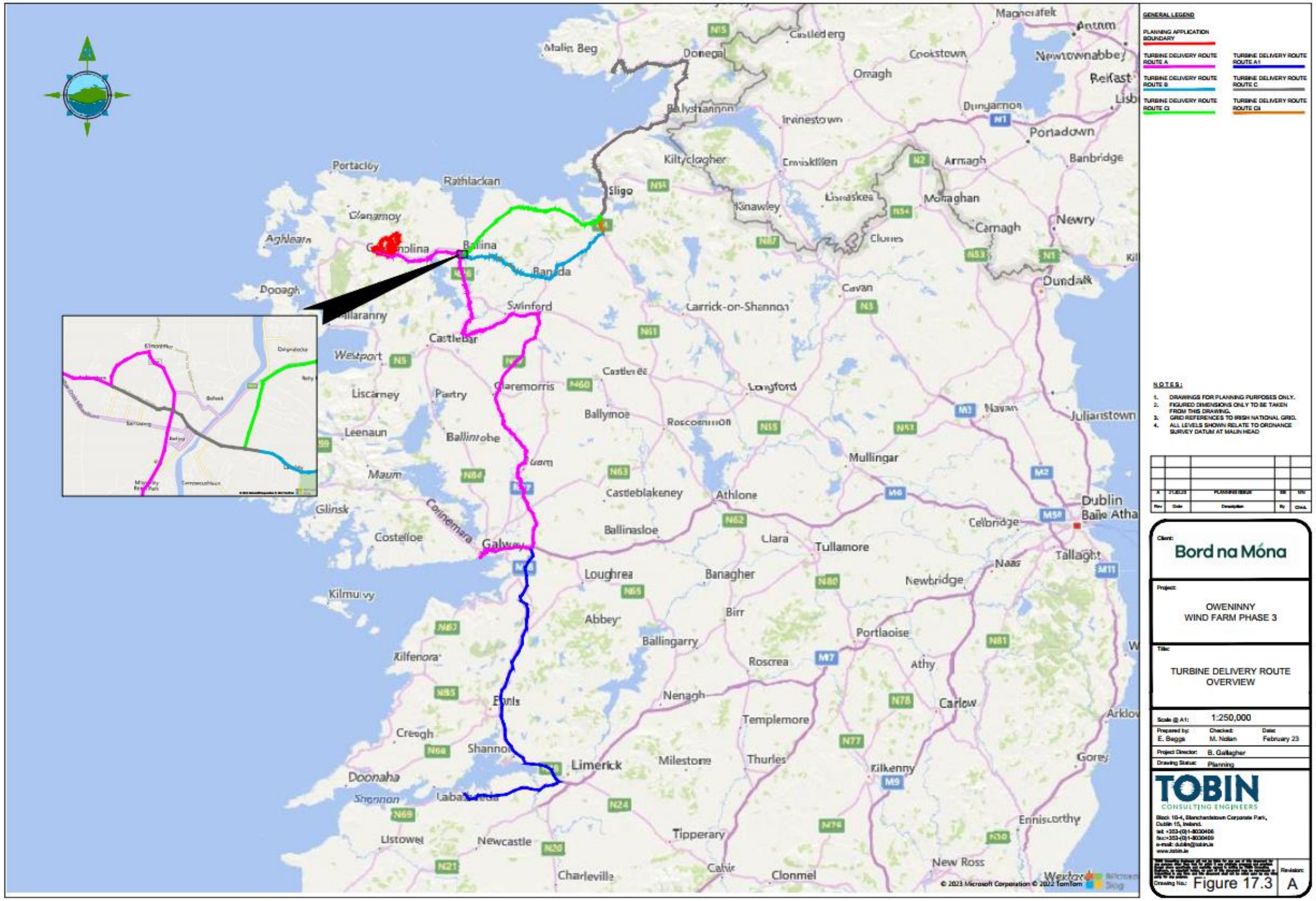

Figure 2-3 Abnormal Indivisible Load (AIL) Delivery Routes / Turbine Delivery Route (TDR)

2.2.1 Proposed Site Access & Egress

The proposed development will utilise the existing access to Oweninny Wind Farm Phase 1. The existing entrance is located via a priority T-Junction on the N59, located approximately 300m north of the junction of the N59 / R312.

This entrance will be the construction entrance and exit to the site and will facilitate both the delivery of materials to the site as well as large oversize components (AILs). During the operational phase of the wind farm this entrance will also be used as the access point to the Visitors Centre and associated pathways and cycleways.

2.2.2 Existing Road Network

The EIAR Traffic Chapter 17 describes the existing surrounding road network impacted by the proposed wind farm development. The main haul routes to the site are via the national and regional road network, which has sufficient width to accommodate two-way passing typical construction vehicles (i.e. HGVs). Construction traffic movements are limited on the local road network, with use of the local roads only in the absence of an alternative on the national and regional road network. The construction haul route along the N59 has been identified and the final source of materials on procurement by the appointed Contractor will determine the haul route extents.

The haul route for the AILs may commence at Killybegs, Galway or Shannon-Foynes Port. The routes primarily use the national road network where feasible. Two alternative swept path movements were undertaken to assess the AIL routes. With minor works on the existing road network, as detailed in Appendix 17.1 of the EIAR. The AIL assessment shows the existing road network can accommodate these AIL deliveries with minor modification at a number of pinch points, refer to APPENDIX 1 of this TMP.

The cable route will be along the internal access roads, with crossing of one public road, the L52925 local road. The crossing will be by hydraulic directional drilling to mitigate the impact on the public road.

The following existing roads may be utilised by the proposed Phase 3 wind farm development:

- Motorway
  - M6
  - M17
  - M16
- National Road
  - N59
  - N6
  - N18
  - N17
  - N83
  - N4
  - N15
  - N56
  - N69
- Regional Road
  - R339
  - R336
  - R263
  - R314
  - R510
  - R257
  - R445
- Local Road
  - L52925

3.0 CONSTRUCTION PHASE

3.1 CONSTRUCTION PHASE WORKS

The wind farm construction has a construction period of approximately 24 months with construction envisaged to commence in January 2025, with the construction completion date in 2027. The construction phases can be broken down into three overlapping phases;

Construction Phases:

- Phase 1 - Civil Engineering Works 18 months
- Phase 2 - Electrical Works 18 months
- Phase 3 – Installation Turbine Erection 10 months

The durational and phasing of the works are outlined in detail in the EIAR Chapter 3, Chapter 17 and is included in Section 3.1 of the CEMP. As evident in the above list, the phases will be overlapping and occurring concurrently at different works areas within the main site.

3.2 CONSTRUCTION HOURS

The hours of construction activity will be limited to avoid unsociable hours, where possible. Construction operations shall generally be restricted to between 08:00hrs and 20:00hrs on weekdays and between 08:00hrs and 13:00hrs on Saturdays.

However, to ensure that optimal use is made of good weather periods or at critical periods within the programme (i.e. concrete pours or to accommodate delivery of large turbine components along public routes), it may be necessary on occasion to work outside of these hours. Any such out of hours working will be agreed in advance with the Local Authority.

3.3 CONSTRUCTION PHASE TRAFFIC

3.3.1 Staff Levels

For the Phase 3 wind farm construction, a peak workforce of approximately 100-120 personnel are anticipated on site. There will be peaks and troughs in the numbers, throughout the estimated construction period of 24 months.

3.3.2 Staff Traffic Generations

The 100-120 workers will generally travel to the site via light vehicle (LV) (i.e. car or small van) assuming 2 persons per vehicle, or 50-60 trips to and 50-60 trips from the site.

3.3.3 Construction Vehicles

The construction phase for the proposed development will result in additional traffic on the roads in the vicinity of the development. The proposed HGVs will typically be rigid vehicles (i.e. concrete trucks, dump trucks, delivery vehicles) or maximum legal articulated vehicles within normal vehicle loading.

This additional construction traffic will include the following:

- Construction worker vehicles, e.g. cars or vans (light vehicles).
- HGVs carrying conventional earthworks equipment such as an excavator, a roller, stone crusher, forklifts, etc.
- Mobile Cranes.
- Delivery vehicles carrying:
  - conventional construction materials for the site, e.g. aggregate, concrete, rebar, etc.
  - conventional construction materials for the substation, e.g. electrical components, bricks, concrete, rebar, fencing, etc.
  - drainage infrastructure i.e. culverts, tanks, etc.
  - met mast, electric cabling, inverter stations and electrical equipment for the on-site substation.

3.3.3.1 Abnormal Indivisible Load

The transformer and the wind turbine components will be abnormal indivisible loads (AILs). An assessment of the AIL loads have been made based on segmented and non-segmented blades with two haulage vehicle types pending confirmation of the specification during procurement at Construction Stage. The two haulage vehicle types are:

- Rear actuated tractor and trailer for segmented blades and
- Blade lifter technology for non-segmented blades.

The AILs will be transported by convoy. Typically the convoy will have 3 or 5 no. components per convoy. The number of components in the convoy will be agreed in advance with MCC and all associated local authorities and stakeholders.

The contactor will be responsible for obtaining all associated licenses from the Local Authority or Gardaí during construction for the abnormal load.

3.3.4 Construction Vehicles Traffic Generation

It is estimated that the peak construction phase will generate approximately 143 no. HGVs (one-way) and 60 LVs (one-way) movements during peak construction activity at the site. This includes for the concrete pours which account for 75 of these one-way HGV movements. The peak construction traffic generations relate to peak HGV movement in September 2025 to November 2025 (i.e. 3 months). During this period the following activities are occurring simultaneously: site compounds, site roads, turbine hardstands, turbine foundations and substation construction with electrical works.

The construction methodology for the concrete turbine foundations requires them to be poured on a single day, resulting in all 75 HGVs required to arrive to site on a single day, on 18 occasions for the turbine foundations.

The average construction traffic will be associated with the 53 HGV one-way movements and variable LVs for staff.

For the grid connection cabling works within the site, these are accounted for in the site peak and average traffic generations., For the road crossing works by Hydraulic Directional Drilling (HDD) on the local road (L52925), approximately 4/5 persons will be required.

3.3.5 Construction Haul Route

3.3.5.1 Construction Traffic Deliveries

The deliveries to the development will be via the existing Oweninny Wind Farm Phase 1 site access on the northside of the N59, national road. The existing access is a priority T-junction with existing “STOP” road marking and signage, see Plate 3-1. The haul routes identified utilise principally the national and regional road network with carriageway cross sections facilitating passing of two-way HGV movements. The principal route will be east or westbound to the site on the N59, see Figure 2-2.

Plate 3-1 Site Access on N59The haul routes have been optimised to maximise the use of the national and regional road network over the use of local roads. The haul routes selected also take into consideration the sensitive receptors presented by towns and villages, with routes avoiding towns and villages when the opportunity presents itself.

The haul routes have been reviewed and are considered suitable to accommodate the two-way passing delivery vehicles anticipated at the site in terms of alignment, condition, and width. It is not anticipated that any works will be required on the road network for the purpose of normal construction deliveries.

3.3.5.2 Abnormal Indivisible Load Deliveries - AIL

All the AIL Routes terminate at the bellmouth of the existing priority T-Junction on the N59, Existing bollards are present at the back of the bituminous surface and on the east side of the access a compacted hardstanding overrun area for the turning movement of the AILs is available behind the bollards, see Plate 3-2. This overrun area was formerly used during the previous Phase 1 turbine component delivery (i.e. AILs) to the site and is proposed for use in Phase 3. The assessment of the AIL for Phase 1 and Phase 2 are comparable in size and the access is deemed suitable based on the previous movements to Phase 1.

Temporary removal of the bollards during the deliveries of the AILs is proposed at the site access. The bollards will be reinstalled between each convoy to reinstate the roadway to its existing condition.

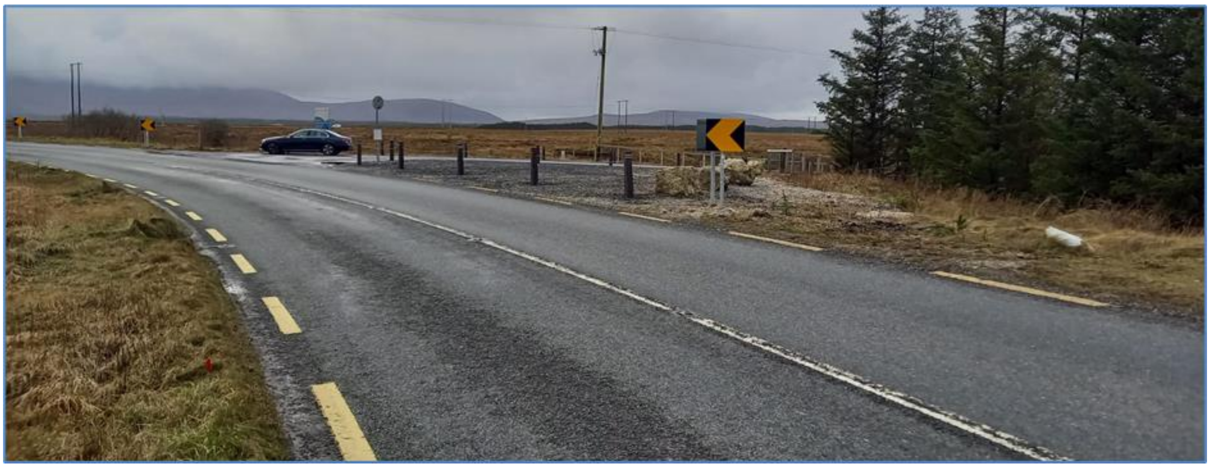

Plate 3-2- Site Access on N59 – AILs

Along the Routes, see Figure 2-3, various interventions will be required to accommodate the AIL movements (see APPENDIX 1). The AIL Route C was previous used in for Oweninny Wind Farm Phase 1 and 2, and as such all permanent interventions are in-place for a low load trailer. Only temporary demounting of road infrastructure (i.e. traffic signs) from retention sockets may be required.

Swept paths of Route A and B were undertaken to inform the potential impacts on these routes. Minor works are required on these routes with typically works including pruning vegetation, demounting signs and diversion of overhead lines. Only 1 no. location on Route B, is identified requiring road strengthening works on the R294. This area is for widening on the inside of the bend and will require similar works as for road maintenance.

Various routes confirmed by the swept path analysis through Ballina Town are shown in Figure 3-1.

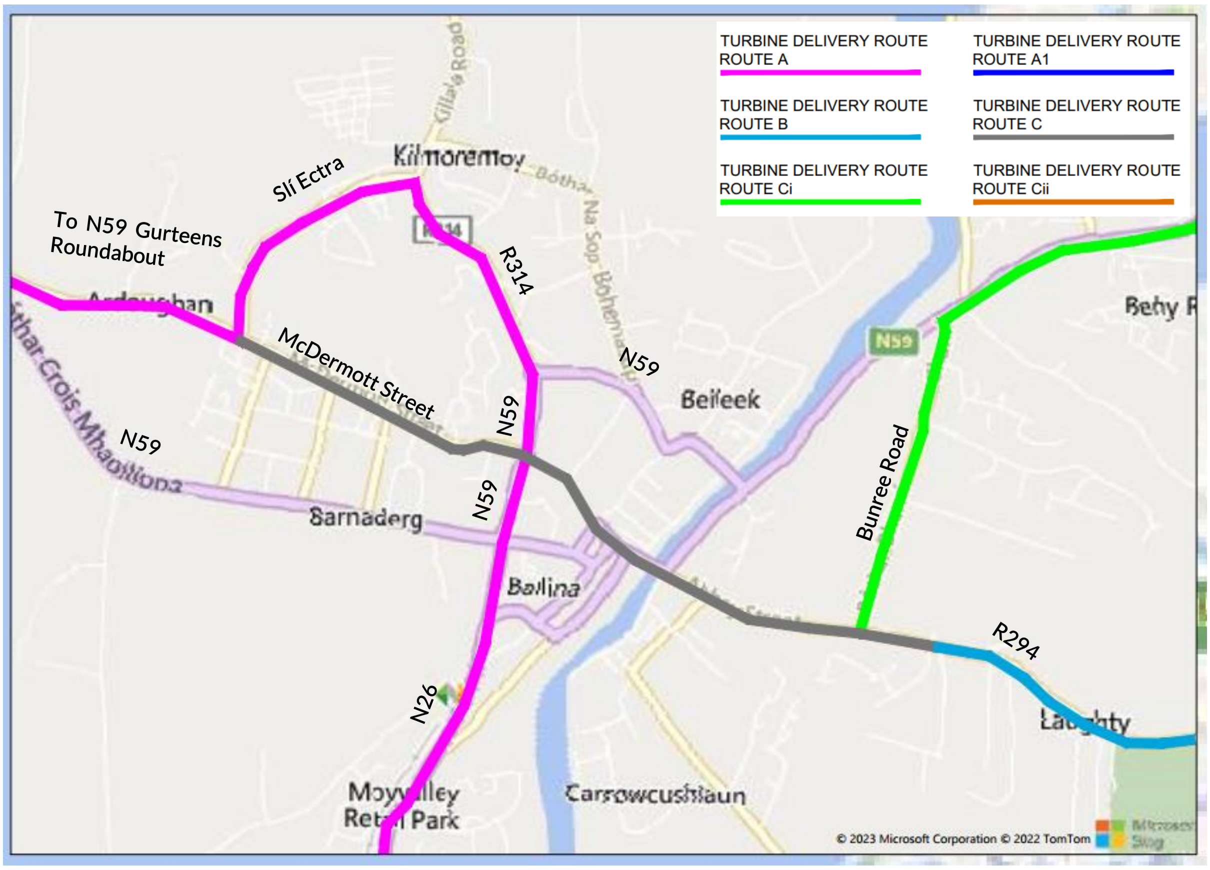

Figure 3-1 AIL Haul Route - Ballina

3.3.6 Internal Access Track Construction Haul Route

The internal access tracks have been designed to utilise existing Wind Farm access tracks where feasible, reducing the volume of materials required for importation to the site. The internal access roads are shown in Figure 3-2. Passing bays are proposed along the internal access roads to accommodate two-way passing HGVs. Turning heads are provided at each turbine location within the site.

During the construction stage a temporary self-contained wheel wash will be installed at the site entrance to minimise the transfer of dirt and dust from the site onto the public road and to minimise the potential for transfer of alien invasive species onto the site.

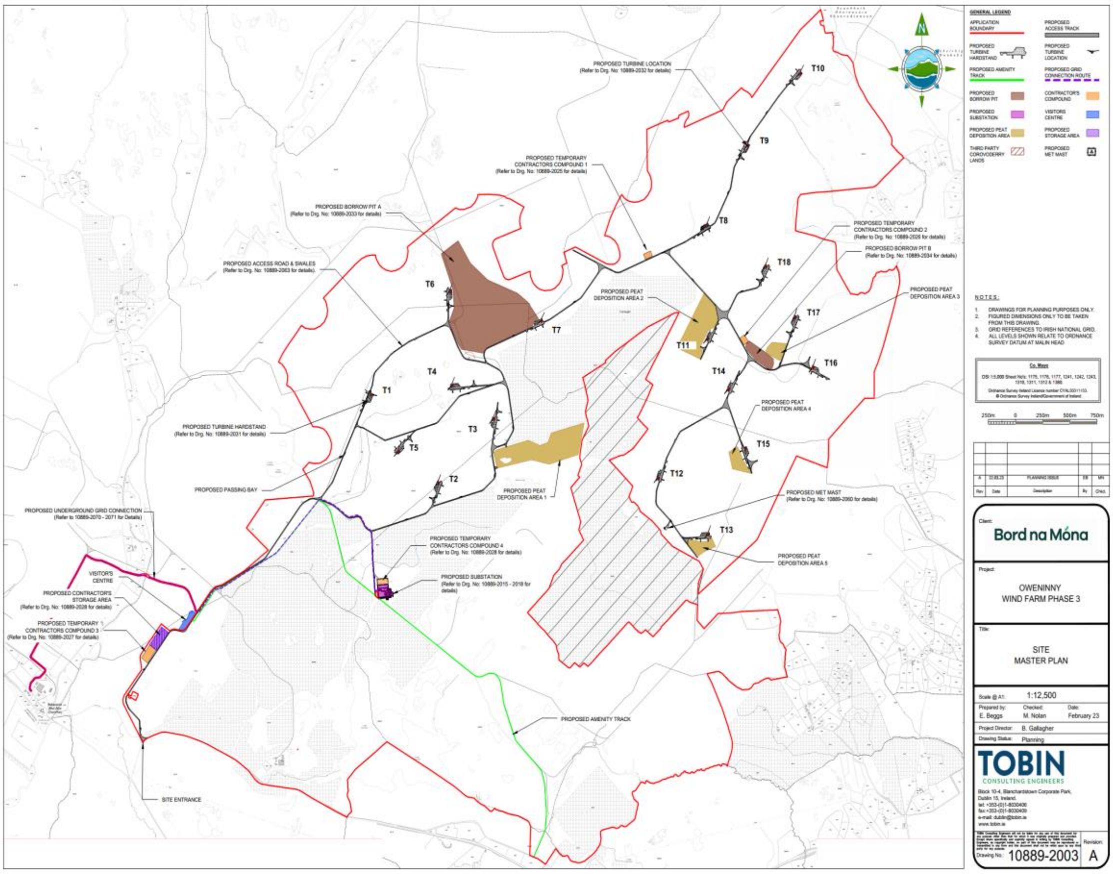

Figure 3-2 - Internal Master Plan – Internal Access Roads

3.4 CONSTRUCTION PHASE SUMMARY

The construction traffic impact of the additional HGVs and LVs on the existing road network has the potential to impact on the existing pavement condition, the carrying capacity of the road, the existing traffic flows on the haul route and at the site access and crossing point of the local road, L52925, for the duration of the construction programme. The peak and average construction phase traffic volumes, as outlined in section 3.1, will have varying impacts on the road network and environs.

The Wind Farm construction has an envisaged construction programme of 24 months, with lower traffic volume impacts on the road network outside of the 3 month peak period with overlapping construction activities.

Passing bays will be utilised within the internal access track layout to accommodate two-way traffic.. The widened approach to the access will provide safe locations for vehicles to queue and pass clear of the public road network.

4.0 CONSTRUCTION PHASE TRAFFIC MANAGEMENT PLAN - TMP

The Contractor shall develop and take account of the commitments imposed within this TMP. The following are the commitments made at the planning stage of the project which shall be further developed by the Contractor and agreed with the Roads Authorities, prior to works commencing on site:

- General Provisions;
- Site Access & Egress;
- Routing of Construction Phase Traffic;
- Site Specific Temporary Traffic Measures;
    - Traffic Management Logistics;
    - Traffic Management Speed Limits;
    - Traffic Management Signage;
    - Road Closures;
    - Timings of Material Deliveries to Site;
    - Abnormal Load;
    - Road Cleaning;
- Enforcement of Traffic Management Plan and
- Emergency Procedures During the Construction.

4.1 CONSENTS, LICENCES, NOTIFICATIONS AND PERMISSIONS

The key consents, licences, notifications and permissions likely to be required for the project with regards to traffic and roads are summarised as:

- Planning permission and associated planning compliance.
- Abnormal Indivisible Loads (AILs) – it is envisaged that permits will be required for the AILs that will be required for the delivery of the transformer and turbine components to the site.
- Road opening licences for underground cable works, potential junction upgrade works (depending on the AIL Haul Route), foundations in the public roadway (i.e. for TTMP signage) etc.
- Approval of temporary traffic management plans.
- Road closures and diversions.
- Permission for works outside of standard construction operation hours agreed with the Mayo County Council.
- Permission from the Motorway Maintenance and Renewal Contractor (MMaRC) / Public Private Partnership Contractor (PPP) on the relevant national roads.

The above list is non-exhaustive but identifies the key consents, licenses, notifications and permissions required for the project. This list will be further populated as required through planning compliance and stakeholder engagement to ensure that any further consents are identified as early as possible and do not impact on the construction programme.

4.2 GENERAL PROVISIONS

The construction traffic impacts of the proposed development have been identified as being temporary in nature. It is important that any impact caused by the proposed development is minimised as far as possible and, considering this the following mitigation measures shall be included in future developments of this TMP:

- Traffic movements will be limited to 08:00 - 20:00 Monday to Friday and 08:00 – 13:00 Saturday, unless otherwise agreed in writing with Mayo County Council.
- The selected the haul route has with low volume of sensitivity receptors (i.e. vulnerable road users young children). Therefore, the HGV movements for the proposed development will have little to no interaction within sensitive areas.
- No parking shall be permitted along the access route for unloading or activities that result in blockages of access routes. Such vehicles will be immediately requested to move to avoid impeding the works and traffic on the road network.
- Measures to remove queuing of construction traffic on the adjoining road network including turning space and queuing of convoy HGVs will be provided within the site.
- Wheel wash equipment will be used on site to prevent mud and stones being transferred from site to the public road network.
- Activities generating dust will be minimised where practical during windy conditions. Loads will be covered on arrival and departure from site, where required. Other measures are outlined in the CEMP.
- Clear construction warning signs will be placed on the public road network to provide advance warning to road users to the presence of the construction site and slower moving vehicles making turning manoeuvres.
- Access to the construction site will be controlled by on site personnel and all visitors will be asked to sign in and out of the site by security / site personnel and site visitors will all receive a suitable Health and Safety site induction.
- Security gates will be sufficiently set back from the public road, so that vehicles entering the site will stop well clear of the public road.
- Compound locations have been identified for storage, site offices and welfare facilities.

The final TMP will also include provision by the appointed Contractor, for details of intended construction practice for the development, including:

- Traffic Management Co-ordinator – a competent traffic management co-ordinator will be appointed for the duration of the project and this person will be the main point of contact for all matters relating to traffic management;
- Delivery Programme – a programme of deliveries will be submitted to Mayo County Council (MCC) in advance of the delivery of the turbine components to site;
- Information to locals – local residents in the area will be informed of any upcoming traffic related matters, e.g. temporary lane/road closures (if required) or any night deliveries of turbine components, via letter drops and posters in public places. Information will include the contact details of the Developer's representative, who will be the main point of contact for all queries from the public or local authority during normal working hours. An "out of hours" emergency number will also be provided;
- Pre and Post Construction Condition Survey;
    - A pre-condition survey of roads on approach to the site will be carried out prior to construction commencement to record the condition of the road;
    - A post construction survey will be carried out after works are completed;
    - Impacts on the road condition as a result of the proposed development will be rectified and the road condition returned at least to its original condition.
    - The timing of these surveys will be agreed with MCC;
- Liaison with Local Authorities – liaison with MCC and other Local Authorities, including the roads and transport section, through which the delivery route traverses and An

Garda Siochána, during the delivery phase of the AILs, wherein an escort for all convoys may be required;

- Temporary Alterations – implementation of temporary alterations to road network at critical junctions;
- Temporary traffic signs – As part of the traffic management measures, temporary traffic signs will be put in place;
- TMOs will be present at the site access during peak delivery times; and,
- Delivery Times of Large Turbine Components – The management plan will include the option to deliver the large wind turbine plant components at night in order to minimise disruption to general traffic during the construction stage.

The Traffic Management Plan (TMP) will be updated by the principal Contractor (on appointment) and agreed with the Planning Authorities prior to commencement of development in the event of a grant of permission.

4.3 SITE ACCESS AND EGRESS

An existing site access is the proposed access to Oweninny Wind Farm Phase 3 development. The exiting access is currently being used for Oweninny Wind Farm Phase 1. This entrance will facilitate all construction and AIL traffic.

The principle Contractor shall be required to utilise a safe system of traffic management, including the use of Traffic Management Operatives (TMOs) for the control of traffic during access / egress operations at the site access during the peak construction activities (e.g. 3 months of overlapping construction activities including the delivery for the concrete pours).

4.4 ROUTING OF CONSTRUCTION PHASE TRAFFIC

The proposed haul roads were identified based on sources of materials and focus on the l road network (i.e. N59) in consultation with the local authorities. The haul routes utilise the national network as much as feasible.

All construction traffic to the Wind Farm site will arrive via the N59, as previously mentioned the majority of materials delivered to site will be delivered using maximum legal articulated lorries or smaller vehicles. The principle Contractor shall be required, in the further development of the TMP, to identify the sources and proposed haul routes for all material supplies.

Project construction HGV traffic will be directed away from communities and sensitive receptors (i.e. schools, dense residential areas, urban centres) where possible to minimise the effect on these communities.

4.5 SITE SPECIFIC TEMPORARY TRAFFIC MEASURES

The specific details of temporary traffic measures shall be developed by the Contractor(s) for each traffic measure in consultation with the Roads Authority, An Garda Síochána and other emergency services, before being submitted to the Roads Authority for formal approval prior to any works taking place.

Any requirement for a traffic lane closure will be controlled by an active traffic management system (i.e. temporary traffic signals or Stop & Go / Téigh discs). An Garda Síochána shall be consulted prior to the implementation of the active traffic management system. The operation of a manual 'Stop & Go / Téigh' system will be undertaken by trained personnel, wearing suitable high visibility garments. The operators of this type of system will be in verbal contact (i.e. walkie talkie) and preferably inter-visible. At these locations queue lengths will be estimated initially with onsite measurements to determine the necessary warning distance for approaching drivers. The signage shall be adjusted as necessary when the actual impact on traffic flows is established.

The optimum traffic lane width shall be 3.3m, with a minimum width of 3.0m. Reduction of the temporary traffic lane width below these parameters may result in the requirement for marshalling of larger vehicles (i.e. HGV and buses) or alternatively implementing a diversion route for traffic, which shall be approved by the Road Authority following consultation with the Road Authority, An Garda Síochána and other emergency services.

Where roadworks impede dwelling access onto the road network, the residents shall be instructed on how to egress the property at times when a shuttle system is in operation. The Contractor shall provide a TMO at accesses where the motorist is having difficulty following the instructions.

Where reasonably practicable, consideration will be given to the possibility of removing the traffic management measures in order to deal with:

- Particularly high traffic volumes due to sporting or other events;
- Adverse weather conditions;
- Emergency access; or
- Times when work is not in progress.

If the night-time or weekend Temporary Traffic Management (TTM) measures varies from daytime plan, a separate TTM will be prepared to be approved by the Roads Authority.

On completion of the works, the traffic management measures are to be removed when the road is safe and free from obstructions, all reinstatement of road surfacing is completed and all permanent signs, road markings and other items are in place.

4.5.1 Traffic Management Systems / Logistics

The principal Contractor as a minimum shall employ the following traffic management systems and logistics to facilitate the safe transport of materials to and from the proposed development.

4.5.1.1 Traffic Management Operatives (TMOs)

No pinch points are present on the public road during the delivery of materials from the material sources on the haul routes to the site access on the N59. The N59 has adequate width for vehicles to turn into the site and advanced warning signage is proposed. During the average construction deliveries TMOs and TTM are not envisaged to be required.

Traffic Management Operatives (TMOs) will be provided by the principal Contractor in accordance with their Traffic Management Plan at the site access during peak construction traffic activities only. TMOs will be required within the site to manage the movement of HGVs within the internal layout, during these peak construction activities.

TMOs and TTM for the AIL delivery will be developed by the appointed Contractor in consultation with the specialised haulage provider, An Garda Síochána (AGS) and the Local Authority.

4.5.2 Traffic Management Speed Limits

It shall be noted that where a temporary speed limit is deemed appropriate by the Contractor(s) to facilitate the Construction Phase activities along the public roads serving the proposed development, it shall be a requirement for the appointed Contractor to liaise with the relevant Roads Authority for the purpose of obtaining a temporary speed limit.

4.5.3 Traffic Management Signage

Signage for temporary traffic measures shall be provided in accordance with the Department of Transports Traffic Signs Manual, August 2019 - Chapter 8 – Temporary Traffic Measures and Signs for Roadworks (or any subsequent update of the standards that will be in place at the time of construction).

Advanced warning signs will be used to alert drivers to the unexpected road layout. Clear construction warning signs shall be placed at adjacent roads and the entrances, to advise the general public of the presence of construction sites and activities. All permanent road signs contrary to the proposed roadworks will be covered for the duration of the works and uncovered on removal of the temporary traffic management measures.

MCC requested that all temporary traffic management signs located on the N59, be permanently installed in concrete foundations on passive steel posts for the duration of the construction works. This is due to cross winds as a result of the exposed section of the N59 near the site access.

4.5.4 Timing of Material Deliveries

In order to reduce impacts on local communities and residents adjacent to the proposed sites, it is proposed that:

- Construction activities will be undertaken based on a six-day working week, with deliveries between 08:00-20:00 on weekdays and 08:00-13:00 on Saturdays.
- HGV deliveries shall avoid passing schools at opening and closing times where it is reasonably practical. Deliveries are restricted between the hours of 08:00 and 09:00hrs, the morning peak traffic on the road network.
- Construction activities and deliveries outside these hours shall be agreed with the Local Authority in advance.
- The Contractor shall liaise with the management of other construction projects and the local authority to co-ordinate deliveries.
- The Contractor shall schedule deliveries in such a way that construction activities and delivery activities do not occur during peak traffic flows or run concurrently, such as;
    - avoiding pouring of concrete on the same day as other large material deliveries to site in order to avoid conflicts between vehicles.
    - staggering the pouring of concrete on different days.
- HGV deliveries to the development site will be suspended on the days of any major events (i.e. sporting, agricultural etc), that have the potential to cause larger than normal traffic volumes on the existing road network, in the vicinity of the works.

- The Contractor will be required to interact with members of the local community to ensure that deliveries will not conflict with sensitive events such as funerals; and
- It is likely that some deliveries will be required to be undertaken outside these hours. For example, during large concrete pours or other essential continuous operation whereby the continuous delivery of material will be required. Such deliveries will be agreed in advance with MCC.

The scheduling of material deliveries is required in order to facilitate the implementation of traffic management activities at the site and the works zones within the site. It will also impact on the offsite works locations for the AIL advanced works. A convoy system shall be employed for HGVs departing the proposed development to reduce the frequency of isolated HGV movements on the public road network as much as practicable.

4.5.5 Abnormal Indivisible Load

A total of 217 no. AILs are anticipated to be transported to the site along the AIL haul route. It is envisaged that these loads will be moved outside of normal hours as night-time works in convoys.

Prior to the construction of the Proposed Development a test run of the proposed transport operation along the proposed route will be completed using vehicles with attachments to simulate the dimensions of the turbine components. Following this test run, the Traffic Management Plan will be reviewed and updated with the haulage company when the final transport arrangements are known, delivery dates confirmed and escort proposals in place. The plan will then be submitted to the relevant County Councils for agreement in writing in advance of any abnormal loads using the public roads. The plan will provide for all necessary safety measures, including a convoy and Garda escort as required, off-peak turning/reversing movements and any necessary safety controls.

The principal Contractor shall ensure that the haulage of these AILs is done in conjunction with an Gardaí Síochána and the Roads Authorities. The principal appointed Contractor and their haulage provider will be responsible for obtaining all necessary permissions and licences from the local authorities and Gardaí.

4.5.5.1 Convoy System

The deliveries of turbine components to the site will be made in convoys of three to five vehicles and mostly at night when roads are quietest. Convoys will be accompanied by escorts at the front and rear operating a "stop and go" system. Although the turbine delivery vehicles are large, they will not prevent other road users or emergency vehicles passing, should the need arise. The delivery escort vehicles will ensure the turbine transport is carried out in a safe and efficient manner with minimal delay or inconvenience for other road users.

It is not anticipated that any section of the public road network will be closed during transport of turbines, although there will be some delays to local traffic at pinch points. During these periods, it may be necessary to operate local diversions for through traffic.

4.5.6 Road Closure

The traffic volumes for the AILs will be low, with no immediate road closures foreseen for typical construction traffic. However, detailed traffic management plans will be formalised by the appointed Contractor and agreed with the Roads Authority if road closures are required (including TII representatives on the national roads).

Grid connection via cabling from the Wind Farm to the Bellacorrick Substation is proposed. The route for the cable will cross the L52925, local road. The current construction methodology envisions that the technique of Hydraulic Directional Drilling (HDD) will result in no impacts to the existing traffic operations (i.e. no road closures). However if the current methodology were to change a temporary road closure maybe required.

4.5.7 Road Cleaning

Regular visual surveys of the road network in the vicinity of the sites will be carried out. Where identified / required, the Contractor shall carry out road sweeping operations, employing a suction sweeper to remove any project related dirt and material deposited on the road network by construction / delivery vehicles. It shall be a requirement of the works contract that the Contractor(s) will be required to provide wheel cleaning facilities, and any other necessary measures to remove mud and organic material from vehicles. In addition, the cleaning of delivery lorries such as concrete delivery lorries shall be carried out at the material storage yard as outlined in the CEMP.

4.6 ENFORCEMENT OF TRAFFIC MANAGEMENT PLAN

The appointed Contractor will further develop this TMP in consultation with the Road's Authority Mayo County Council. The Contractor will, during the development and adoption of the TMP, agree and implement an appropriate way of monitoring the effectiveness of the plan.

All project staff and material suppliers will be required to adhere to the Traffic Management Plan. Inspections / spot checks will also be carried out by the Contractor(s) to ensure that all project staff and material supplies follow the agreed measures adopted in the Traffic Management Plan.

4.7 EMERGENCY PROCEDURES DURING THE CONSTRUCTION

In the case of an emergency, the following procedure shall be followed:

- Emergency Services will be contacted immediately by dialling 112;
- Exact details of the emergency/ incident will be given by the caller to the emergency line operator to allow them to assess the situation and respond in an adequate manner;
- Follow the instructions of the Local Authorities and An Garda Síochána;
- The emergency will then be reported to the Site Team Supervisors and the Safety Officer;
- Where required, appointed site first aiders will attend the emergency immediately; and
- The Safety Officer will ensure that the emergency services are enroute.

It is important that during the Construction Phase, emergency services can gain ready access to any property along the Haul Road or in the vicinity of any of the Infrastructure sites, or indeed can gain priority usage of any Haul Road. Emergency procedures will be agreed, and contact numbers provided to the local Emergency Services. On being notified of a priority condition, all construction vehicles will be directed to give right of way to the emergency vehicles until the need for priority access has passed.

With respect to an emergency condition arising on any of the sites, priority access to and from these sites will be given to ambulance or fire tenders.

During the transportation of the AILs the Emergency Services will be provided with adequate space for overtaking and or undertaking manoeuvres in the event of an emergency. As the AILs transport will be under a Garda escort at all times.

5.0 OPERATIONAL AND DECOMMISSIONING PHASES

5.1 OPERATIONAL PHASE

The operational phase of the project is envisaged to last for a duration of 30 years. During this time, the development will generate small volumes of traffic for operational and maintenance purposes. 8 no. LV movements per day (i.e. 4 arrivals and 4 departures), with an additional movement to and from once a month for a worst-case scenario of 10 LV movements per day.

On the Oweninny Wind Farm is an existing permitted Visitors Centre, which will be operational during the Oweninny Wind Farm Phase 3 operational phase. Based on previous data at similar sites, an additional 300 visitors are anticipated at the Visitor Centre with a mix of tour buses and passenger cars.

Estimates for the vehicle numbers are based on 3 no. buses with occupancy of 52 visitors and 72 no. passenger cars with 2 visitors per car. Staff during the peak tourist season are envisaged to be 3 no. staff and are assumed to arrive / depart by individual passenger car. The estimated associated traffic volume is 156 vehicles per day, with peak activities on weekends.

The combined operational traffic (i.e. Wind Farm Phase 3 and Visitor Centre) for the two-way movements is 166 vehicles.

Overall, due to the relatively low operational and recreational traffic, it is envisaged that the operational impacts of the proposed development will be a negligible addition to operational traffic of the existing Phase 1 wind farm.

5.2 DECOMMISSION PHASE

The design life of the wind farm is 30 years, after which time a decision will be made to determine whether or not the turbines may be replaced with a new set of machines, subject to planning permission being obtained, or the site may be decommissioned fully.

It is proposed that turbine foundations and hard-standing areas will be left in place and covered with peat/soil/topsoil. It is proposed to leave the access tracks in situ at the decommissioning stage (i.e. for forestry / agricultural / recreational use). It is considered that leaving the turbine foundations, access tracks and hard-standing areas in situ will cause less environmental damage than removing and recycling them. The decommissioning will be managed on a phased basis and the recreational use will be restricted during these times.

If the site is decommissioned, cranes will disassemble each turbine tower and all equipment. All infrastructure including turbine components will be separated and removed off-site for re-use, recycling and waste disposal.

The traffic management of the decommissioning phase will be advised by the road conditions at the time of decommissioning. It is not possible to predict the changes to the public road infrastructure and policies in the next 30-40years. It is envisaged that a Traffic Management Plan will be developed for the decommissioning phase.

6.0 CONCLUSION

The TMP is a living document and shall be developed through the Detailed Design and Construction phases with ongoing consultation with the Local Authority, An Garda Síochána, Emergency Services and other stakeholders.

This TMP has thus far been developed to the Planning Stage, so that the necessary steps are taken throughout the planning proposals to support an efficient, safe transportation operation, with the least possible impact upon vulnerable road users and traffic along the haul roads or in close proximity to the proposed development.

APPENDIX 1 AIL Haul Route: Swept Path Table of Potential Impacts

Table 6-1 Swept Path Analysis – Route, Drawings and Actions

Route	Dwg No. (EIAR Appendix 17.1)	Title	Demount Signage	Prune Vegetation	Overhead Wire Removal	Public Lighting Removal	Widen Road / Footway Strength	Oversail
A	359222-070B1.1 Foxford	Junction of Main Street and N2 (Option 1 N58 to N26)	✓		✓			✓
A	359222-080B1.1 Foxford	Option 2 - Junction of Davitt Street (N58) & Morrogh Bernard Road (N58)			✓			✓
A	359222-081B1.1 Foxford	Option 2- Junction of Morrogh Bernard Road (N58) & N26			✓			✓
A	359222-090B1.1 Foxford	Right Bend & Bridge Crossing on N26, Foxford			✓			✓
A	359222-091B0.1	N26, Heading Out of Foxford			✓			
A	359222-100B0.1	Approach to a Left Bend in a Hamlet North of Foxford			✓			
A	359222-110B0.1	Right Bend on N26			✓			
A	359222-111B0.1	Overhead Cables on N26 - Junction with L1317			✓			
A	359222-112B0.1	Overhead Cables on N26 - Left Bend			✓			
A	359222-113B0.1	Overhead Cables on N26 - Left Bend			✓			
A	359222-130B0.1	Overhead Cables - Cross Road of N26/ N59/ R294			✓			
A	359222-131B0.1	Overhead Cables - Crossroad of N59/ McDermott Street & Tone Street			✓			
A	359222-132B0.1	Overhead Cables - Killala Road (R314) After Roundabout			✓			

Route	Dwg No. (EIAR Appendix 17.1)	Title	Demount Signage	Prune Vegetation	Overhead Wire Removal	Public Lighting Removal	Widen Road / Footway Strength	Oversail
A	359222-133B0.1	Overhead Cables - Left Bend on Killala Road			✓			
A	359222-134B0.1	Junction Of Killala Road and Slí Ectra			✓			✓
A	359222-135B0.1	Junction Of Slí Ectra and The L1119						✓
A, B, C	359222-136B0.1	Overhead Wires - Left Bend on L1119						✓
A, B, C	359222-137B1.1	Gurteens Roundabout, Ballina (With Flow)	✓					✓
A, B, C	359222-137B1.2	Gurteens Roundabout, Ballina (Contra Flow)						✓
A, B, C	359222-138B0.1	Overhead Wires - N59 To Bangor, Ballina	-	-	-	-	-	-
A, B, C	359222-140B0.1	Overhead Wires - Left Bend N59, Bundeelin			✓			
A, B, C	359222-150B0.1	Overhead Wires - Right Bend N59, Crossmolina	-	-	-	-	-	-
A, B, C	359222-151B0.1	Overhead Wires - N59, Crossmolina			✓			
A, B, C	359222-152B0.1	River Bridge - N59, Crossmolina						✓
A, B, C	359222-153B0.1	S Bend Junction on N59/ Church Street/ The Boreen, Crossmolina			✓	✓	✓	✓
A, B, C	359222-154B0.1	Overhead Wires - Erris Street (N59), Crossmolina			✓			
A, B, C	359222-160B1.1	Overhead Wires - N59	-	-	-	-	-	-
A, B, C	359222-161B1.1	Left Bend on N59, Cloonawillin	-	-	-	-	-	-

Route	Dwg No. (EIAR Appendix 17.1)	Title	Demount Signage	Prune Vegetation	Overhead Wire Removal	Public Lighting Removal	Widen Road / Footway Strength	Oversail
A, B, C	359222-162B1.1	Overhead Cables on N59, Cloonawillin	-	-	-	-	-	-
A, B, C	359222-163B1.1	Overhead Cables on N59, Cloonawillin	-	-	-	-	-	-
A, B, C	359222-170B1.1	Overhead Cables on N59, Moylaw	-	-	-	-	-	-
A, B, C	359222-171B0.1	Overhead Cables on Right Bend On N59, Moylaw						✓
A, B, C	359222-172B0.1	Overhead Cables On Left Bane On N59, Moylaw	-	-	-	-	-	-
A, B, C	359222-173B0.1	Overhead Cables On Right Bend On N59, Moylaw			✓			
A, B, C	359222-174B0.1	Right Bend On N59, Moylaw	-	-	-	-	-	-
A, B, C	359222-180B1.1	Overhead Cables On N59, Eskeragh		✓				
A, B, C	359222-181B0.1	Overhead Cables On Left Bend On N59, Eskeragh	-	-	-	-	-	-
A, B, C	359222-182B0.1	Overhead Cables On N59, Eskeragh	-	-	-	-	-	-
A, B, C	359222-190A0.1	Right Bend On N59, Dooleeg	-	-	-	-	-	-
A, B, C	359222-191B0.1	Overhanging Trees On N59, Dooleeg		✓				
A, B, C	359222-192B0.1	Left Bend On N59, Dooleeg	-	-	-	-	-	-
A, B, C	359222-193B0.1	Right Bend On N59, Dooleeg						Verge
A, B, C	359222-194B0.1	S - Bend On N59, Dooleeg			✓			
A, B, C	359222-200B0.1	Overhead Cables On N59, Oweninny						Verge
A, B, C	359222-201B0.1	Right Bend On N59, Oweninny						Verge

Route	Dwg No. (EIAR Appendix 17.1)	Title	Demount Signage	Prune Vegetation	Overhead Wire Removal	Public Lighting Removal	Widen Road / Footway Strength	Oversail
A, B, C	359222-210B0.1	Left Bend On N59, Oweninny Wind Farm	-	-	-	-	-	-
A, B, C	359222-210B0.1	Left Bend On N59, Oweninny Wind Farm	✓				At Site Access to Oweninny, pavement strengthening in place from Phase 1	Verge
B	359222-300B0.1	Right Bend On N26, Foxford			✓			Footway
B	359222-410B0.1	N17, East Tobercurry			✓			
B	359222-411B0.1	N17 At The Junction With Humber Street, Tobercurry						Footway
B	359222-412B1.1	N17 At The Junction With Humber Street, Tobercurry		✓	✓			
B	359222-413B0.1	LEFT BEND ON R294, TOBERCURRY						
B	359222-600B1.1	Overhead Cables & Right Bend on R294		✓	✓			Verge
B	359222-602B0.1	Overhead Cables & Left Bend on R294		✓				
B	359222-610B1.1	Overhead Cables on Left Bend On R294, Gorterslin		✓	✓			
B	359222-612B1.1	Overhead Cables on Right Bend On R294, Gorterslin		✓	✓			Verge
B	359222-620B1.1	Overhead Cables and Right Bend On R294, Glenavoo		✓	✓			Verge
B	359222-622B1.1	2nd Right Bend and Overhead Cables On R294, Glenavoo		✓	✓			Verge
B	359222-624B0.1	Junction On R294 With Road to Lough Talt, Glenavoo		✓	✓			Verge

Route	Dwg No. (EIAR Appendix 17.1)	Title	Demount Signage	Prune Vegetation	Overhead Wire Removal	Public Lighting Removal	Widen Road / Footway Strength	Oversail
B	359222-630B1.1	Left Bend on R294, Glenavoo		✓	✓		✓	Verge
B	359222-632B1.1	Left Bend on R294, Glenavoo		✓				Verge
B	359222-640B1.1	Left Bend on R294		✓				Verge
B	359222-650B1.1	S Bend on R294, Near Lough Talt		✓	✓ (Electrical pole to be removed)			Verge
B	359222-652B1.1	S Bend on R294, Near Lough Talt		✓				
B	359222-654B1.1	Right Bend on R294, Near Lough Talt		✓				Verge
B	359222-660B1.1	Left Bend on R294	-	-	-		-	-
B	359222-662B1.1	Left Bend on R294	-	-	-		-	-
B	359222-670B1.1	Right Bend in Series Of Bends On R294						Verge
B	359222-672B1.1	Left Bend in Series Of Bends On R294	-	-	-		-	-
B	359222-674B1.1	Right Bend in Series Of Bends On R294						✓
B	359222-676B1.1	S - Bend in Series Of Bends On R294			✓			✓
B	359222-678B1.1	Left Bend in Series Of Bends On R294		✓				Verge
B	359222-680B1.1	Left Bend on R294, Near Bonnyconnellan			✓			Verge
B	359222-682B1.1	Overhead Wires on R294, Near Bonnyconnellan			✓			Verge
B	359222-684B1.1	Left Bend on R294, Bonnyconnellan		✓				

Route	Dwg No. (EIAR Appendix 17.1)	Title	Demount Signage	Prune Vegetation	Overhead Wire Removal	Public Lighting Removal	Widen Road / Footway Strength	Oversail
B	359222-686B1.1	Left Bend on R294, Bonnyconnellan		✓		✓		✓
B	359222-688B1.1	Left Bend on R294, Bonnyconnellan	-	-	-		-	-

Note:

1. The blade adaptor in the swept path analysis has been elevated to reduce the oversail of third-party lands.
2. The blade adaptor has been lowered in elevation where feasible to avoid overhead lines.
3. In urban areas, parking restriction will be required to facilitate the turning movements of the vehicles.
4. At Construction Stage, the appointed Contractor and Haulage Company will be responsible for the temporary traffic management, agreements, and licensing with the Local Authorities and an Garda Síochána.

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