6. BIODIVERSITY

6.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) presents a Biodiversity Impact Assessment of the proposed Ballincor Wind Farm (herein referred to as the 'proposed project'). This chapter evaluates potential likely effects on terrestrial and aquatic flora, habitats, and fauna, including volant and non-volant mammals. The chapter outlines the assessment methodology, existing site conditions, potential impacts, and proposed mitigation measures. It should be read in conjunction with Chapter 2 (Description of the Proposed Project). Effects on avian receptors are addressed separately in Chapter 7 (Ornithology).

The purpose of this Chapter is to:

- establish baseline ecological conditions through desktop studies and field surveys, covering both the receiving environment and the wider area.
- evaluate the ecological importance, value, and sensitivity of identified receptors.
- assess potential impacts, including direct, indirect, and secondary effects and cumulative effects, and determine their significance during the construction, operation, and decommissioning phases of the proposed project.
- recommend mitigation measures, where necessary, to avoid, reduce, or offset identified effects.
- identify and describe residual effects following mitigation and consider additional measures to minimise any remaining adverse impacts on the ecology of the receiving environment

The application for the proposed project is also supported by an Appropriate Assessment Screening Report (AASR) and Natura Impact Statement (NIS) report that considers potential impacts of the proposed project on European sites including Special Areas of Conservation (SACs) designated under Habitat Directive, and Special Protection Areas (SPAs) designated under the Birds Directive. This full appraisal is presented as a standalone document that accompanies the Planning Application documentation.

6.1.1 Statement of Authority

TOBIN Senior Ecologist John Sherry (B.Sc. [Hons]) was the lead ecologist and author of this chapter, with contributions from TOBIN Senior Ecologist Sinead O'Reilly (B.Sc. [Hons]., M.Res.). The report was senior reviewed by TOBIN Senior Ecologists Meadhbh Costigan (B.A. [Hons], M.Sc., ACIEEM) and Dr. James Forde (B.Sc. [Hons], M.Sc., Ph.D., MCIEEM).

Multidisciplinary habitat protected flora and fauna, and aquatic surveys informing the proposed project were undertaken by TOBIN ecologists John Sherry, Sinéad O'Reilly, Úna Butler (B.A. [Hons], M.Sc.), Joe Freijser (B.A. [Hons], Dipl. Eng., M.Sc.) and Jarosław Majkusiak (B.Sc. [Hons], M.Sc. Res.), all of whom are suitably qualified and experienced to conduct such surveys in accordance with best practice guidance.

Tom O'Donnell (B.Sc [Hons], M.Sc.), and Oisín O Sullivan (B.Sc [Hons]) of O'Donnell Environmental carried out all detailed bat surveys and impact assessments. All of the above are both qualified, experienced and competent ecologists.

John Sherry

John Sherry is a Senior Ecologist with TOBIN Environment and Planning (E&P). He holds a B.Sc. (Hons) in Wildlife Biology from Munster Technological University (formerly the Institute of Technology Tralee) and has over six years of post-graduate experience in ecology and environmental consultancy.

John's experience includes the surveying and reporting of large-scale renewable energy and infrastructure projects, with particular expertise in the preparation of AA Screening Reports, NIS, Environmental Impact Assessment Reports (EIARs), and Ecological Management Plans. He has extensive field experience in the planning and implementation of ecological surveys, including habitat assessments, non-volant mammal surveys, bat surveys, and ornithological surveys. His primary focus has been on the surveying and reporting of wintering and breeding bird associated with wind energy and other large scale infrastructure developments.

Sinead O'Reilly

Sinead O'Reilly is a Senior Ecologist with the TOBIN E&P division. Sinead has 15 years' post graduate experience in ecology and environmental consultancy. Sinead's experience has involved the renewable energy industry, waste industry, residential and mixed-use developments. Sinead has extensive experience in aquatic surveys (including crayfish trapping, electrofishing, fisheries assessments, biological water quality assessment etc.) as well as experience in terrestrial surveys for protected habitats and species and invasive species. Sinead has written and delivered numerous reports including AA Screenings, NIS reports, Biodiversity Management Plans, Preliminary Ecological Appraisals (PEAs), aquatic reports, invasive species reports, mammal survey reports and other documents for various projects in the renewable energy industry and waste industry as well as residential and commercial industries.

Meadhbh Costigan

Meadhbh Costigan is a Senior Ecologist with TOBIN E&P division. Meadhbh graduated from Trinity College Dublin with a B.A. (Hons) in Natural Science, reading Botany. She then received a M.Sc. in Botany from the University of Kent with training from the Royal Botanic Gardens, Kew. She has 5 years' experience in environmental consulting, primarily engaged in the preparation of impact assessments and biodiversity chapters for the renewable energy sector. Her work focusses on the identification of Annex I habitat types and the assessment of habitat condition. She applies the information she gathers in the field to provide guidance to clients on avoiding and mitigating adverse effects on natural habitats of community importance. She is an Associate Member of the Chartered Institute of Ecology and Environmental Management (CIEEM) and is an elected member of the CIEEM Irish Section Committee.

Dr. James Forde

James Forde is a Senior Ecologist and Technical Director of the TOBIN E&P division. James holds a B.Sc. (Hons) and M.Sc. degrees in marine ecology, and a Ph.D. in ecology. James is also a full member of CIEEM. James has almost 20 years' academic and environmental consultancy experience. He has an extensive understanding of ecology and appreciation of the objectives

and mechanisms of national and international environmental legislation and policy. He has significant experience in preparing and reviewing ecological reports including Screenings for AA, NIS, Ecological Impact Assessment (EcIA) reporting, and EIAR. James has provided strategic technical and environmental advice for developments across a wide range of sectors, including onshore and offshore renewables, telecommunications, flood relief schemes, port and harbour developments, energy generation and transmission.

Una Butler

Úna is an Ecologist with TOBIN has four years post-graduate experience in the environmental consultancy sector. She has a M.Sc. (Agr) in Environmental Resource Management from University College Dublin. She completed the Identiplant Plant Identification Course for Beginners in Serious Botany in 2024, with the Botanical Society of Britain and Ireland (BSBI). Úna has been involved predominantly in large public and private infrastructure projects, acting as Ecological Clerk of Works (ECoW) for a flood relief scheme; carrying out multidisciplinary surveys (including protected and invasive species surveys); and carrying out Screenings for AA, preparing NIS and preparing EcIAs.

Joe Freijer

Joe has 10 years' post-graduate experience in aquatic and terrestrial ecology, environmental consultancy and civil engineering. Joe has a diploma in Civil Engineering, a Bachelor in Coastal Zone Management / Applied Aquatic Biology and a Master in Applied Marine Biology. Joe holds an Associate CIEEM membership and has participated on numerous lake macrophyte field trips with the Botanical Society of Britain and Ireland. Joe has predominantly been involved in a variety of water and infrastructure related projects like flood relief schemes, drainage maintenance works, WWTP upgrades and construction projects throughout Ireland. For these projects he carried out numerous Screenings for AA, NIS and EcIA often also operating as ECoW. Joe has a strong background in fish identification, aquatic surveys and fish habitat assessment including electrofishing, macroinvertebrate kick-net sampling and identification, dip net sampling for fish and amphibians, macrophyte and bryophyte identification, otter surveys, crayfish surveys and chemical water quality sampling.

Jarosław Majkusiak

Jarek is an ornithologist/ ecologist with TOBIN. He conducted the multidisciplinary surveys to support the impact assessments for this biodiversity chapter including aquatic surveys, marsh fritillary surveys, and invasive species surveys. Jarek's role at TOBIN involves carrying out Ornithological surveys such as Wintering Birds (I-WeBS), Vantage Point, Transect, Raptors, Woodcock, and Habitat surveys (general and designated habitats); Jarek has strong GIS mapping software skills (QGIS & ArcGIS). Jarek has experience in data management and data modelling, allowing him to oversee complex survey records. Jarek's contributed to many projects since he started with TOBIN and his main tasks involved producing and reviewing interim baseline bird reports and impact assessment. Other tasks involved reviews of field surveys such as breeding bird surveys, winter transects surveys, raptor, and wader surveys. Jarek has recently published two scientific papers on the common swift *Apus apus*) in the peer-reviewed journal, Irish Birds.

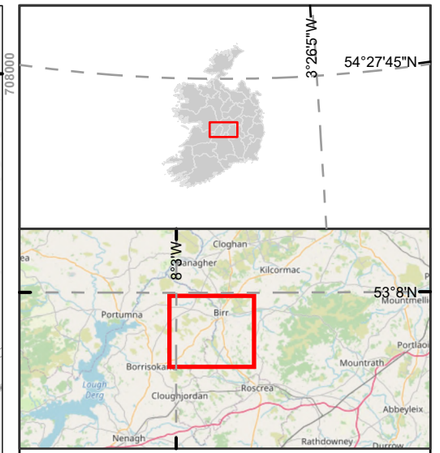
Tom O'Donnell Environmental

Tom O'Donnell is a Chartered Environmentalist and a full member of CIEMM. He was awarded a BSc in Environmental and Earth System Science [Applied Ecology] in 2007 and an MSc in Ecological Assessment in 2009, both from UCC. Tom has over 16 years professional experience in the environmental industry, including working on projects such as wind farms, overhead power lines, roads, cycleways and residential developments. Tom is licensed by NPWS for roost disturbance (Ref: DER/BAT 2023-16) and to capture bats (C25/2023).

Oisín O Sullivan is a Senior Ecologist and Qualifying member of the CIEEM. Oisín has awarded a BSc in Ecology and Environmental Biology at University College Cork in 2020. Oisín has experience in bat surveys for a large variety of projects including wind farms both onshore and offshore, residential and linear infrastructure. Oisín has been licensed by NPWS to disturb (Ref: DER-BAT-2025-191) and handle bat species (075/2025).

6.1.2 Site Description

The proposed wind farm site is located approximately 5 km southwest of Birr, Co. Offaly, between Sharavogue, Co. Offaly, and Carrig, Co. Tipperary (see Figure 6-1). The wind farm site, which measures approximately 355-hectares (ha), lies west of the Little Brosna River, with elevations ranging from 45 to 65 m OD, in a predominantly low-lying peatland, agricultural, and forested landscape, except for Knockshigowna Hill to the southwest. The site comprises raised and cutover bog, wet grassland, mixed broadleaved woodland, oak-birch-holly woodland, bog woodland, and scrub.



Legend

- Wind Farm Site Boundary
- Proposed Grid Connection Route

0 1 2
Kilometers

Spatial Reference
Datum: IRENET95
EPSG: 2157

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Rev	Date	Description	By	Chkd.
D01	18/09/2025	Draft issue	K.K	J.D

Client: RWE

Project:

Ballincor Wind Farm

Title:

Figure 6-1:
Site Location of Proposed Ballincor Wind Farm

Scale @ A3: 1:52,000

Prepared by:	Checked by:	Date:
K.Kale	J.Dillon	September 2025

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Map Ref: 11333-020-OSM-P.App.BO-TOB-A

Draft: D01

6.1.3 Details of the Proposed Project

The proposed project will consist of the development of 11 no. wind turbines and all associated infrastructure including turbine foundations, hardstanding areas, borrow pits, substation, BESS and access tracks. The proposed project also includes the proposed grid connection route (GCR), which extends approximately 12.23 km from the northern edge of the wind farm site to the existing Dallow 110kV substation in the townland of Clondallow, Co. Offaly, and works along the road network for the proposed turbine delivery route (TDR) / Haul Route, more details of which can be found in Chapter 2.

The key aspects of the Construction, Operational, and Decommissioning phases of the proposed project that, in the absence of mitigation, may result in ecological impacts are summarised in the following Section 6.1.3.1 through Section 6.1.3.3.

In the context of this proposed project the following definitions have been included in this chapter:

- The 'proposed project' refers to an 11 turbine Wind Farm and associated infrastructure, including turbine foundations, hardstanding areas, borrow pits, a 110kV on-site substation, a Battery Energy Storage System (BESS), GCR and TDR/ Haul Route
- The 'proposed wind farm site' refers specifically to the area enclosed within the red line boundary, containing the proposed 11 turbines, 110kV substation and BESS and associated infrastructure
- The 'proposed project ' refers to the lands where the proposed project will take place, inclusive of the proposed wind farm site, the GCR and TDR/ Haul Route

6.1.3.1 Construction Phase (timeframe ca. 24 months)

The following outlines the key activities associated with the construction of the proposed project and the potential impacts these activities may have on biodiversity.

- Site clearance, excavation and any drainage requirements at turbine locations, BESS and substation location to facilitate construction
- Construction of the proposed project and associated infrastructure including; access tracks/routes, temporary compounds, turbine hardstanding, onsite BESS, onsite met (meteorological) mast, underground grid connection, bridges, culverts and construction works associated with the turbine delivery route
- The use of heavy machinery and associated disturbance within the works area during construction
- The excavation of soils and peat for the installation of turbines, BESS base, onsite substation foundation associated hard standing areas and any associated drainage requirements
- The excavation of soils, peat and rock at the borrow pit locations

- The excavation of soils and rock for the GCR trenching, joint bays and horizontal directional drilling (HDD)_reception pits
- The use of concrete and other potentially harmful substances at each works area
- Management, storage and re-use of excavated material during the construction phase
- All related site works and ancillary development including landscaping, and soil excavation
- Forestry felling to facilitate construction and operation of the proposed project and any onsite forestry replanting at the temporary construction compounds

6.1.3.2 Operational Phase (timeframe: 35 years)

The operational phase of the proposed project will include the following key activities, which could potentially cause significant effects on the environment, and will therefore need to be considered in the evaluation of ecological impacts:

- Rotating blades of operating turbines (noise and collision[1] risk for bats) within the wind farm envelope
- Maintenance of turbines and site infrastructure throughout the lifetime of the proposed project
- Noise and disturbance due to operational activities and maintenance works

6.1.3.3 Decommissioning Phase (timeframe ca. 6 months)

The decommissioning phase of the proposed project will include the following key activities, that could potentially cause significant effects on the environment, and will therefore need to be given consideration in the evaluation of ecological impacts:

- Decommissioning will include the dismantling of infrastructure, minor excavation activities and the removal of waste offsite which could result in the release of sediment-laden water or pollutants into local watercourses and disturbance impacts for local wildlife
- Impacts during decommissioning are expected to be of similar type and magnitude to those anticipated during the construction phase, but generally of a shorter duration

6.2 METHODOLOGY

6.2.1 Assessment Approach

The aims of this assessment were to:

[1] Rotating blades of operating turbines represent a collision risk for birds; this risk is assessed in Chapter 7 Ornithology.

- To present baseline ecological data and conditions at the proposed wind farm site and surrounding environs
- To determine the ecological value and sensitivity of the identified ecological receptors
- To assess the significance of potential effects, including direct, indirect, secondary, and cumulative impacts, that may arise from the proposed project during the construction, operational, and decommissioning phases.
- To prescribe mitigation measures to avoid and/or reduce the identified impacts
- To identify any residual impacts post mitigation

6.2.2 Legislation, Plans, Policies and Guidance

Regard has been given to a large number of relevant legislation including: :

- European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011), as amended. With particular reference to the Third Schedule of the European Communities Regulations 2011 (S.I. No. 477 of 2011), as amended which deals with invasive non-native species
- The EIA Directive 2011/92/EU, as amended by Directive 2014/52/EU
- European Union (EU) (Environmental Impact Assessment and Habitats) (No. 2) Regulations 2015 (S.I. No. 320/2015)
- Environmental Liabilities Directive (2004/35/EC)
- Planning and Development Act 2025 (the Planning Amendment Act 2025)
- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, herein referred to as the Habitats Directive
- Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds, herein referred to as the Birds Directive
- The EU Water Framework Directive (2000/60/EC)
- The Wildlife Acts 1976 (as amended), herein referred to as the Wildlife Acts
- The Flora (Protection) Order 2022 (S.I. No. 235 of 2022)
- Relevant fisheries legislation up to and including the Inland Fisheries Acts 1959-2017, as amended

This Chapter have considered a wide range of relevant polices including the following:

- The Offaly County Development Plan 2021-2027
- Tipperary County Development Plan 2022-2028
- Ireland 4th National Biodiversity Action Plan, 2023 – 2030
- Climate Action Plan 2025 (CAP25) (DoECC 2025)
- Water Action Plan 2024 River Basin Management Plan 2022-2027 (RPS 2022)

- National Peatlands Strategy 2015 to 2025 (DoAHG 2023)
- EU Biodiversity Strategy for 2030

All relevant policies and objectives relevant to biodiversity from the abovementioned plans have been considered within this assessment.

The potential for effects on nature conservation interests was assessed, taking into consideration the habitats and species that are likely to be affected by the proposed project. This approach included consideration (as appropriate) of the following guidance documents:

- Fossitt (2000). A Guide to Habitats in Ireland. The Heritage Council.
- Environmental Protection Agency (EPA) (2022). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports
- Charted Institute of Ecology and Environmental Management (CIEEM) (2022). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.3. Chartered Institute of Ecology and Environmental Management, Winchester
- NRA (2005). Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes
- NRA (2006). Guidelines for the Treatment of Otters prior to the Construction of National Roads Schemes. National Roads Authority, Dublin
- NRA (2008). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes
- NRA (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes. (Revision 2, National Roads Authority)
- NRA (2010). Guidelines on the Management of Noxious Weeds and Non-Native Plan Species on National Roads
- NatureScot (2021). Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation
- Transport Infrastructure Ireland (TII) (2020). The Management of Invasive Alien Plant Species on National Roads – Technical Guidance
- Smith, G *et al.,* (2011). Best Practice Guidance for Habitat Survey and Mapping. Ireland's Heritage Council: Kilkenny, Ireland.
- 4th National Biodiversity Action Plan and All-Ireland Pollinator Plan.
- EUROBATS and Dark Sky Ireland guidance (Matthews *et.al.,* 2024)

6.2.3 Consultations

Consultation with various non-statutory, state agencies and environmental Non-Governmental Organisations (NGOs) was undertaken in July 2024 and August 2025 to inform this EIAR. State

agencies and NGO's, relevant to the proposed project, were contacted in order to obtain any additional information and data, which may be useful in informing this assessment. The following organisations were contacted:

- An Coimisiún Pleanála
- An Taisce – The National Trust for Ireland
- Bat Conservation Ireland
- Development Application Unit (DAU) via the Department of Housing, Local Government and Heritage
- Inland Fisheries Ireland (IFI)
- Irish Wildlife Trust (IWT)
- National Parks and Wildlife Service (NPWS)
- Offaly County Council – Environment Department
- Tipperary County Council – Environment Department

Table 6-1 below details the responses received in relation to biodiversity from the above consultees. Further information on consultation responses is provided in Chapter 1 (Introduction) of this EIAR.

Table 6-1: Summary of Key Responses from Consultees

Consultee	Consultation response	EIAR section
An Coimisiún Pleanála	Recommended to consider the following in relation to biodiversity: - Considering the proximity of the Sharavogue Bog SAC, it was advised that that any potential impacts on this site be robustly assessed. - Liaison with the NPWS to seek opinions and recommendations in relation to surveys and reports. - That other wind farms occur or are proposed in the area, and these should be considered in any cumulative assessment.	Details on any potential impacts are robustly assessed in section 6.6.2.1 Consultation between the NPWS and the DAU was undertaken. A cumulative assessment was undertaken regarding nearby wind farms (see section 6.9).
An Taisce – The National Trust for Ireland	Did not have the capacity to respond to consultation.	N/A
Bat Conservation Ireland	Bat Conservation Ireland clarified that it does not provide opinions, comments, or input on planning or development proposals. The organisation requested that correspondence with them not be described as a consultation. This statement has been noted, and no further input was requested.	N/A

Consultee	Consultation response	EIAR section
Development Application Unit (DAU)- via the Department of Housing, Local Government and Heritage	The response outlined that the EIAR must include comprehensive ecological surveys covering all project areas, undertaken by qualified ecologists at appropriate times of year, following best-practice methodologies. Impacts on designated sites (SACs, SPAs, NHAs), protected species, and habitats must be assessed, with reference to the 4th National Biodiversity Action Plan and All-Ireland Pollinator Plan. The EIAR should address lighting impacts (following EUROBATS and Dark Sky Ireland guidance), invasive species management, and hedgerow loss, ensuring mitigation through native planting and avoidance during the nesting season. Surveys and mitigation for bats, badgers, otters, and aquatic species are required, maintaining 10 m riparian buffers along waterways. Construction Management Plans must demonstrate effective mitigation measures, prevent habitat disturbance and invasive species spread, and include detailed post-construction monitoring for birds and bats.	A comprehensive suite of surveys has been completed covering all the project areas, these can be found in 6.2.6. All potential impacts on important ecology features have been assessed fully in section 6.6. Any mitigation required following the identification potential impacts on important ecological features has been fully described in section 6.7.
Inland Fisheries Ireland (IFI)	The response outlines concerns, particularly regarding the protection of aquatic habitats and riparian zones associated with the Little Brosna River and its tributaries. The response provides note on details to be included within the EIAR, with emphasises on the need for detailed assessments of watercourses affected by construction, including aquatic biodiversity surveys and electrofishing to identify sensitive species within the watercourses. Inland Fisheries Ireland highlights the importance of soil stability and recommends expert evaluation to prevent landslides. Hydrology and drainage management during both construction and operation phases are critical to avoid erosion and pollution. IFI also highlights the risks of sediment release from road construction, the need for proper waste and pollutant containment, and careful planning of watercourse crossings.	A comprehensive suite of aquatic surveys (including electrofishing) to identify sensitive species has been completed covering all the project areas, these can be found in Section 6.2.6.5. All potential impacts from construction, operation and decommissioning phase on important aquatic features and species have been assessed fully in section 6.6. Any mitigation required following the identification potential impacts on important aquatic features has been fully described in section 6.7. Issues around soil/peat stability has been addressed in Chapter 9

Consultee	Consultation response	EIAR section
		(Hydrology and Hydrogeology).
Irish Wildlife Trust (IWT)	Did not have the capacity to respond to consultation.	N/A
National Parks and Wildlife Service (NPWS)	Information on sensitive species was received following a data request. The information has been analysed and relevant information used to inform this assessment	Details of this data request can be found in section 6.4.1.2
Offaly County Council – Environment Department	No response received	N/A
Tipperary County Council – Environment Department	No response received	N/A

6.2.4 Zone of Influence and Study Area

The Zone of Influence (ZoI) is determined by reviewing all ecological receptors with a source-pathway-receptor chain linking them to the proposed project. The current guidance on ecological assessments (CIEEM, 2018) states that:

> *"The 'zone of influence' for a project is the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries" and that "The zone of influence will vary for different ecological features depending on their sensitivity to an environmental change."*

The ZoI over which significant impacts may occur will differ for different key ecological receptors (KERs), depending on the pathway. Significant impacts are deemed to be those impacts resulting in a likely change in conservation status of a KERs. According to the National Roads Authority (NRA) guidelines (NRA 2009), KERs will be features of sufficient value to be material in the decision-making process for which potential impacts are likely. According to the NRA Guidelines, KERs are therefore defined as features of Local (Higher Value), County, National, or International Importance.

The first step in determining the ZoI is to analyse the characteristics of the proposed project and identify the range of the ZoI using the source-pathway-receptor conceptual model. The mechanism for defining the ZoI is dependent on:

- The nature, size and location of the proposed project
- The sensitivities of the relevant ecological receptors
- The potential impact sources and pathways identified

The ZoI for ecological receptors for which the proposed project could have potential impacts is outlined in Table 6-2 below. The ZoI has therefore been defined through a desk-based

assessment with regard to the sensitivity of habitats and species possibly present/previously recorded in the locality of the proposed wind farm site, areas with connectivity (physical, hydrological or ecological) to the proposed wind farm site and the range of potential impacts that could occur.

Table 6-2: Zone of Influence Informing the Ecological Assessment

Ecological Feature		Potential Source(s) of Impact from proposed project	Potential Effect	ZoI (metres from proposed wind farm site)	Rationale
Internationally Designated Sites (European Sites)		All activities during the construction, operational and decommissioning phases	• Habitat loss • Habitat fragmentation • Disturbance of habitat and species • Changes to key elements of the proposed wind farm site (e.g., water quality) • Changes to the population density and distribution of species	Source-Pathway-Receptor Model (OPR, 2021)	The Source-Pathway-Receptor model is a standard tool in environmental assessment, which allows the identification of impacts (the source), potential pathways (hydrological, physical, or ecological) and receptors (qualifying interests and/or special conservation interests) which may be negatively impacted (OPR, 2021). In order for an effect to occur, all three elements of this mechanism must be in place.
Nationally Designated Sites					
Habitats and Flora	Terrestrial habitats or plant species	Vegetation clearance within the proposed wind farm site during the construction phase	Habitat loss and potential loss of species diversity	0 m (i.e. within proposed wind farm site)	Habitat loss will only occur within the limits of the proposed project site boundary.
	Surface water dependent habitats or plant species	Water quality impacts during the construction, operational and decommissioning phases	Habitat degradation and potential loss of species diversity from water quality impacts	Receiving watercourses within and downstream of the proposed wind farm site	The extent of water quality impacts on downstream receiving watercourses will not be considered effective past the first water body of depositional nature (e.g. lake water body; transitional water body). All watercourses connected to the proposed project flow into the Little Brosna_040 River Waterbody (RWB) within the Lower Shannon_25B catchment.

Ecological Feature		Potential Source(s) of Impact from proposed project	Potential Effect	ZoI (metres from proposed wind farm site)	Rationale
					The extent of water quality impacts on downstream receiving watercourses will not be considered effective past the first water body of depositional nature: Derg TN WFD lake waterbody. The ZoI of water quality effects to the northwest will therefore include the Little Brosna plus all surface water bodies downstream until the Derg TN WFD lake waterbody.
	Dust impacts	Dust impact from excavation activities during the construction phase.	Habitat degradation	Potentially 50 m	The Institute of Air Quality Management (Holman et al., 2014) guidance states that an assessment should be undertaken where ecological receptors are located within 50 m of construction activities that have the potential to generate dust emissions.
Mammals	Breeding or resting sites	Vegetation clearance, and disturbance from construction, operational and decommissioning related activities	Direct injury/mortality or habitat loss	0 m (i.e. within proposed wind farm site)	Habitat loss will only occur within the limits of the proposed wind farm site boundary.
			Disturbance to breeding sites	150 m	The outer extent of the survey area for protected mammal species was defined with regard to the National Road Authority (NRA) guidance related to badger (NRA, 2005) and guidance related to otter (NRA, 2006), which state that noise impacts from construction works can impact breeding

Ecological Feature		Potential Source(s) of Impact from proposed project	Potential Effect	ZoI (metres from proposed wind farm site)	Rationale
					badger setts/otter holts within 150 m of a noise source. Other protected mammal species potentially present at the locality (e.g. hedgehog, *Erinaceous europaeus*) are likely to have a smaller ZoI, as impacts are predominantly associated with habitat damage and will therefore be captured within the 150 m survey buffer.
Bats	Roosting and foraging/commuting sites	Vegetation clearance, and disturbance from construction, operational and decommissioning related activities	Habitat loss and loss of roosting sites	0 m (i.e. within proposed wind farm site)	Habitat loss will only occur within the limits of the proposed wind farm site boundary.
			Disturbance from artificial lighting	Area of light spill from the light source	The ZoI for impacts associated with artificial lighting, will be all illuminated areas from the overspill of proposed lighting.
			Injury or mortality from turbine blades collision	Turbine rotor swept areas	All turbine locations fall within the proposed wind farm site; collision risk applies to bats foraging or commuting through rotor-swept areas.
Invertebrates	Resting and foraging habitat	Vegetation clearance, and disturbance from construction, operational and decommissioning related activities	Direct injury/mortality or loss of habitat	0 m (i.e. within proposed wind farm site)	Habitat loss will only occur within the limits of the proposed wind farm site boundary.

Ecological Feature		Potential Source(s) of Impact from proposed project	Potential Effect	ZoI (metres from proposed wind farm site)	Rationale
Amphibians and reptiles	Resting and foraging habitat	Vegetation clearance, and disturbance from construction, operational and decommissioning related activities	Direct injury/mortality or loss of habitat	0 m (i.e. within proposed wind farm site)	Habitat loss will only occur within the limits of the proposed wind farm site boundary.
Aquatic Species	In-stream freshwater flora and fauna	Vegetation clearance within riparian zones, in-stream works and disturbance from construction, operational and decommissioning related activities	Habitat loss and injury/mortality	0 m (i.e. within proposed wind farm site)	Habitat loss will only occur within the limits of the proposed wind farm site.
			Habitat degradation from water quality impacts	Receiving watercourses within and downstream of the proposed wind farm site	The extent of water quality impacts on downstream receiving watercourses will not be considered effective past the first water body of depositional nature (e.g. lake water body; transitional water body). All watercourses connected to the proposed project flow into the Little Brosna_040 RWB within the Lower Shannon_25B catchment. The extent of water quality impacts on downstream receiving watercourses will not be considered effective past the first water body of depositional nature: Derg TN WFD lake waterbody. The ZoI of water quality effects to the northwest will therefore include the Little Brosna plus all surface water bodies downstream until the Derg TN WFD lake waterbody.

6.2.5 Desk Study

An ecological desktop study of the proposed project included the following steps:

- Identification of KERs and all sites designated for nature conservation within the ZoI of the proposed project. Rationale for establishing the ZoI included, inter alia, distance from the proposed wind farm (refer to Section 6.2.4 above)
- A species list for the proposed wind farm site was generated using the National Biodiversity Data Centre map viewer (NBDC, 2025a). Only rare or protected species recorded during the past 20 years within the 10 km grid squares (hectad) S09 and N00, which encompass the proposed project, were evaluated
- Existing relevant mapping and databases e.g. species and habitat distribution from the following sources:
    - National Parks and Wildlife Services (NPWS, 2025) website (Accessed October 2025)
    - National Biodiversity Data Centre (NBDC, 2025b) website (Accessed October 2025)
    - Environmental Protection Agency (EPA, 2025) website (Accessed October 2025)
    - Water Framework Directive (WFD, 2025) Map Viewer (Accessed October 2025)
- Published and unpublished NPWS reports on protected habitats and species including Irish Wildlife Manual Reports, Species Action Plans and Conservation Management Plans which included, but are not limited to, the following:
    - Irish Wildlife Manuals No. 116, Checklist of Protected and Threatened (Nelson *et al.*, 2022)
    - The Irish Red Data Book 1 Vascular Plants (Curtis & McGough, 1988)
    - Ireland Red List No. 5 Amphibians, Reptiles & Freshwater Fish (King *et al.*, 2011)
    - Ireland Red List No. 3 Terrestrial Mammals (Marnell, 2009)
    - Threat Response Plan – Otter *Lutra Lutra* 2009-2011 (NPWS, 2009)
    - All-Ireland Species Action Plan – Bats (DEHLG, 2008)
    - River Shannon Callows SAC (000216) Conservation Objectives (NPWS, 2022)
- Review of all NPWS designated site and their site synopsise for sites within the ZoI of the proposed project
- Conservation Status Assessment Reports (CSARs), Backing Documents and Maps prepared in accordance with Article 17 of the Habitats Directive

- Review of published data and documents from Bat Conservation Ireland (BCI), Botanical Society of Britain (BSBI) and IFI
- Review of Ordnance Survey maps and aerial photography in order to determine the broad habitats that occur within the study area and thus typical bird communities
- Review of relevant ecological reports, and rehabilitation plans previously completed for the study area
- Review of nearby approved developments and their associated ecological reports
- Review of other plans and projects which may potentially cause cumulative impacts

6.2.6 Field Surveys

A range of ecological field surveys were undertaken by qualified and experienced TOBIN ecologists within the study area between 2022 and 2025, in order to inform the impact assessment of the proposed project. In addition, a number of targeted surveys were also undertaken by third party consultants, namely; Ecology Ireland and O'Donnell Environmental.

All ecological field surveys carried out to inform the proposed project are listed in Table 6-3. The data collected was robust and allowed TOBIN to draw accurate, definitive and coherent conclusions on the possible impacts of the proposed project on ecological receptors. A description of the surveys undertaken are provided hereunder. Further details of the survey methodologies are presented in the subsequent paragraphs. Relevant survey reports carried out by third parties are included as 0 6-2 and 06-3 of this chapter.

Table 6-3: Overview of Ecological Field Surveys Undertaken at the Proposed wind farm site

Surveys	Survey Dates	Personnel
Habitat Surveys (including invasive non-native species)	May, July and August 2022	TOBIN
	June 2023	
	April 2024	
	July 2025	
Non-volant Mammal Surveys	May July and August 2022	
	June 2023	
	April 2024	
	July 2025	
Marsh Fritillary Surveys	September 2023	
Bat Surveys Passive detector Monitoring	Autumn 2020	Ecology Ireland
	Spring, Summer and Autumn 2021	

Surveys	Survey Dates	Personnel
	Spring and Summer 2022	
	Summer and Autumn 2024	O'Donnell Environmental
	Spring and Autumn 2025	
Potential Bat Roost Assessment	August 2022	
	July 2024	
	February 2025	
	July 2025	
	August 2025	
Active Bat Surveys	September 2025 (proposed GCR)	
Aquatic Surveys	Feb 2022	TOBIN
	June 2023	
	July 2024	
eDNA Sampling	August 2024	TOBIN

6.2.6.1 Habitat and Botanical Surveys

Habitat and botanical surveys were undertaken within the proposed wind farm site during the optimal survey period in May, July and August 2022, June 2023 and April 2024. The proposed wind farm site was walked, and all representative habitats were classified, while recording their botanical species assemblage, following methodologies outlined within Smith *et al.*, (2011) and guidelines in NRA (2009) and best practice. All habitats encountered during the site visit were classified in accordance with Fossitt (2000) with reference made to the '*Interpretation Manual of EU Habitats*' (EC, 2013), as appropriate.

Surveys were undertaken of all semi-natural habitats encountered including the collection of data on dominant vegetation, qualitative consideration of plant species diversity, presence of invasive non-native plant species, presence of protected flora, vegetation structure, topography, drainage, disturbance and management.

Species identification and nomenclature followed Parnell *et al.* (2012) for higher plants, Atherton *et al.* (2010) for bryophytes and Fitter & Fitter (1984) for grasses and sedges.

Species protected under Flora (Protection) Order, 2022 (S.I. No. 356 of 2022) or listed under the Irish Red Data List of Irish Plants (Wyse-Jackson *et al.,* 2016) were searched for. This included an assessment of the aquatic vegetation community undertaken at any drainage ditches, streams or rivers within the proposed project to identify any rare macrophyte species or habitats corresponding to the Annex I habitats, e.g., 'Water courses of plain to montane levels, with submerged or floating vegetation of the *Ranunculion fluitantis* and Callitricho-Batrachion

(low water level during summer) or aquatic mosses [3260]' (more commonly referred to as 'floating river vegetation').

Species protected under Flora Protection Order, 2022 (S.I. No. 235/2022) or listed under the Irish Red Data List of Irish Plants were also searched for.

Specific surveys of hedgerows and treelines were also undertaken with a view to assessing their importance based on species composition, structure, and management. The methodology used during the survey of hedgerows broadly followed those proposed by (Murray, 2003).

Walkover surveys along watercourses in the vicinity of the proposed project were also undertaken. Watercourse characteristics including bankside vegetation, substrate, and flow rate were recorded. An evaluation was made on the suitability of the habitat for aquatic species of conservation concern.

Following the completion of the field surveys, habitat maps of the area within the proposed wind farm were prepared in accordance with the methodology outlined in Smith *et al.* 2011. The habitat maps (Figure 6-4) show all habitats and habitat mosaics recorded within the proposed wind farm site. 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).

6.2.6.2 Invasive Alien Species

During habitat surveys, the proposed project, inclusive of the proposed wind farm site and a 150 m buffer, as well as the GCR and the TDR, was searched for evidence of IAS species listed in Part 1 of the Third Schedule of S.I No. 477/2011 – European Communities (Birds and Natural Habitats) Regulations 2011 as amended.

6.2.6.3 Fauna

Terrestrial mammal surveys (refer to Table 6-3) were carried out in line with guidance outlined in NRA (2008). Target surveys for specific protected species were also undertaken and is discussed hereunder.

6.2.6.3.1 Mammals

A terrestrial mammal survey was carried out at the site targeting potential breeding habitat (e.g. scrub, woodlands and bank slopes) in the vicinity of the proposed turbine, bridge, BESS and road access locations. Following the desktop assessment, it was established that the key target mammals potentially occurring within habitats which may be potentially affected by the proposed project are Badger (*Meles meles*), Otter (*Lutra lutra*), and bat species. The potential for the proposed project to support protected mammal species was assessed during the field surveys and any evidence was recorded. All signs and tracks were evaluated as they were encountered in the field (Bang *et al.* 2006). Survey methods adopted during the target species surveys, for Otter, Badger and bats are outlined in the following sections.

6.2.6.3.2 Badger

Badger surveys were undertaken within the footprint of the proposed wind farm site, plus a 150 m buffer from the red line boundary. Badger setts tend to be located in unmanaged woody vegetation associated with hedgerows, treelines, scrub and woodland often located on a slope.

During the multi-disciplinary surveys, particular attention was paid to this type of suitable habitat in proximity to the proposed infrastructure sites. Badger activity was determined by field surveys for setts, trails, latrines and feeding signs. Any evidence of such badger activity was recorded. Badger surveys followed methodologies outlined in Harris *et al.*, (1989) and guidance outlined in NRA (2005).

6.2.6.3.3 Otter

Otter surveys were undertaken along waterbodies (which included rivers and drainage ditches) within the proposed wind farm site plus a 150 m buffer site (including upstream and downstream of waterbodies). Otter holts are more often located near drains and streams linked to more significant foraging habitat e.g. rivers and lakes, although natal dens can be as far as 1 km from a water body (Hayden & Harrington 2000; NIEA 2011). Typical habitat for natal dens would include extensive reed beds, ponds and lakes, deciduous woodlands, young conifer plantations and extensive areas of scrub. Outside these areas, in managed farmland, bare peatlands and mature conifer plantations, the risk of disturbance to breeding sites is low (NIEA 2011). During the multi-disciplinary and aquatic surveys, attention was paid to waterbodies close to any proposed infrastructure site. 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, tracks, couches, feeding remains and territorial marking points (spraints), with each sign recorded. Otter surveys were carried out following methodologies outlined in Chanin (2003) and guidance outlined in NIEA (2011) and NRA (2006).

6.2.6.3.4 Bats

Bat surveys were undertaken by Ecology Ireland and O'Donnell Environmental between 2020 and 2025 (see Figure 6-2). The surveys were undertaken in line the following guideline:

- NatureScot (2021) guidelines, '*Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation*'
- NIEA (2024) '*Guidance on Bat Surveys, Assessment & Mitigation for Onshore Wind Turbine Developments'*
- Collins (2023) '*Bat surveys for Professional Ecologists: Good Practice Guidelines'*
- Marnell et al. (2022) '*Bat mitigation guidelines for Ireland'*
- BTHK *(2018)* Bat Roosts in Trees – *'A Guide to Identification and Assessment for Tree-Care and Ecology Professionals'*

Ecology Ireland and O'Donnell Environmental undertook five different types of bat surveys to collect information on all bats within the proposed wind farm site.

- Passive bat surveys: Ultrasonic detector surveys
- Preliminary Roost Assessment (PRA)
- Ground Level Tree Assessment (GLTA)
- Daytime Roost Inspection Surveys
- Active bat surveys

Ultrasonic detector surveys include the deployment of ultrasonic static bat detectors to record the types of bat species present and to provide an overview of how bat activity is broadly distributed over the site. The passive surveillance surveys were undertaken in line with the NatureScot (2021) and NIEA Guidance (2024).

Preliminary Roost Assessment (PRA) and Ground Level Tree Assessment (GLTA) surveys of all trees and structures within the proposed wind farm site was carried out in accordance with Collins (2023) and Marnell *et al.* (2022). Features inspected included bridges, buildings and trees. Of specific interest are sites which may support significant roosts such as maternity roosts, winter roosting sites and autumn swarming sites.

The Daytime Bat Walkover (DBW) visual assessment was carried out in order to determine the presence of bats or Potential Roosting Features (PRFs) in trees. The suitability of habitat features for bats, within the survey area, was assessed in accordance with Collins (2023), Marnell *et al.* (2022) and BTHK (2018) as described in Appendix 6-2.

Daytime roost inspection surveys were undertaken in accordance with NatureScot (2021) and Collins (2023), to identify key roosting features which could support maternity roosts, significant hibernation and/or swarming sites within the proposed wind farm site. This involved a search area extending to 200 m plus one rotor radius from the proposed wind farm site boundary. The potential for significant roosts was investigated within an area extending to a minimum of 300 m from the proposed wind farm site boundary (as it relates to turbines). Daytime roost inspection surveys were also caried out on bridges with suitability for roosting bats identified along the proposed GCR on the 6th August 2025.

Where a potential roost feature was identified, the feature was then further investigated using a torch and an inspection bat endoscope. Signs of bat use include bat droppings, feeding remains, potential bat access points identified by characteristic staining and scratches, noise made by bats etc.

An active bat survey was used to characterise bat activity along the proposed GCR of the proposed project. The active survey was carried out for approximately 1.5 hours from dusk on 22nd September 2025. The survey was driven following methodology outlined in Roche et al. (2008). Wildlife Acoustics full spectrum Echo Meter Touch handheld detector was used to perform the active survey.

6.2.6.3.5 Other Mammal Surveys

Other protected mammal species such as Pine Marten (*Martes martes*), Pygmy Shrew (*Sorex minutus*), Hedgehog (*Erinaceus europaeus*) and Red Squirrel (*Sciurus vulgaris*), all protected under the Wildlife Act, are likely to occur within the proposed wind farm site (NBDC, 2025a). Any signs like droppings, prints and suitable habitat were recorded using available guidance (NRA, 2008; CIEEM, 2022).

6.2.6.3.6 Invertebrates

The proposed wind farm site was also searched for protected butterfly species during ecological walkover surveys and any species encountered were recorded.

A targeted Marsh Fritillary (*Euphydryas aurinia*) survey was undertaken following methodologies outlined in the NRA (2008) guidance. The survey included the search for suitable

habitat for Marsh Fritillary, which is largely dependent on the presence of Devil's bit scabious (*Succisa pratensis*), the species main food source (Phelan *et al.*, 2021).

6.2.6.3.7 Amphibians and Reptiles

The Common Frog (*Rana temporaria*), the Smooth Newt (*Triturus vulgaris*) and the Common Lizard (*Lacerta vivipara*) are all protected species under the Wildlife Act and have a widespread distribution in Ireland. The following sections describe the survey methodologies undertaken for these species.

6.2.6.3.7.1 Common Frog

A Common Frog survey was carried at suitable habitat within the proposed wind farm site, such as drainage ditches, small ponds and tyre ruts, following methodologies outlined in the NRA (2008) and Reid *et al.* (2013) guidelines. No net dipping, which requires a licence, was carried out. The survey involved visual inspection of water for signs of frogs and tadpole.

6.2.6.3.7.2 Common Lizard

The Common Lizard is widespread in Ireland and occurs in suitable habitats such as stone walls, dry banks, heathland and bog habitats (King *et al.*, 2011). Potential suitable habitat was recorded during the walkover survey.

6.2.6.4 Alpine Newt

An aquatic eDNA sampling survey was carried out on 27th of August 2024 out at five of the 12 aquatic survey sites within and upstream of the proposed project to detect the presence of the non-native species Alpine Newt (*Ichthyosaura alpestris*) which was recorded in 2022 during a TOBIN ecological survey of the proposed project. The surveyed site lies within one of two known areas for this species to occur in Ireland according to the NBDC[2].

Approximately 20 water samples were collected using single-use nitrile gloves, plastic sample bag and a 30 ml ladle supplied in the eDNA kit. After collecting the complete water sample (min. 600 ml) in the sample bag, the sample bag was agitated to mix the sample. After mixing, 500 ml was filtered using a 50 ml syringe and filter element. The samples were taken mostly from stagnant, deep bog channels and were therefore obtained from the bank side at a representative number of accessible locations. One eDNA sample was taken against the flow of the river in a diagonal pattern ensuring no disturbed sediment and organic matter was collected in the sample. Each sample was taken from the middle of the water column (where possible) and at least 10cm below surface water level. All samples were labelled and sent to a laboratory for analysis where twelve replicates of each sample were tested for Alpine Newt eDNA.

6.2.6.5 Aquatic Ecology Surveys

Aquatic surveys were conducted between the 2nd and 3rd of August 2022 and 26th and 30th of June 2023. Electrofishing surveys were carried out by TOBIN ecologists between the 8th and 10th of July 2024. Aquatic surveys consisted of an evaluation of the aquatic habitats, fisheries assessment (fisheries habitat appraisal, salmonid nursery and spawning habitat), biological river quality (aquatic macroinvertebrate species composition) as per McGarrigle *et al.,* (2002), electrofishing and the presence/absence of protected aquatic species including that of White-

[2] Maps - Biodiversity Maps (biodiversityireland.ie)

clawed crayfish (*Austropotamobius pallipes*), Atlantic Salmon (*Salmo salar*), Lamprey species, Freshwater pearl mussel (*Margaritifera margaritifera*) (FWPM) and the suitability of habitat for European eel (*Anguilla anguilla*).

6.2.6.5.1 Watercourse Surveys Site Selection

Representative survey locations on watercourses within the study area were selected for surveying using expert judgement and consideration of the proposed project preliminary site layout.

- Survey sites within the proposed project – field survey sites along watercourses within the proposed works areas, including installation sites for turbines and road crossings, were, where feasible, selected. These sites were selected based on the proposed project preliminary site layout
- Survey sites downstream of the proposed project – the morphology, gradient, size and flow type in terms of the potential downstream export of pollution and sedimentation through mixing zones, were considered during the selection of sites downstream of the proposed project. While survey sites downgradient of the proposed project may be influenced by external factors not related to the proposed project, downstream biota are nonetheless receptors for the proposed project, and acquisition of baseline information at these locations is considered relevant to provide a complete understanding of the receiving environment and aquatic sensitivities
- Sites upstream of the proposed project – representative control sites not impacted by the proposed project were also selected (i.e. typically sites located immediately upstream of the proposed project). These control sites represent watercourses of similar morphology, gradient, size, and flow type as located within or downstream of the proposed project

Sites were also selected based on safe accessibility, previous Q-Value status from Environmental Protection Agency (EPA) surveys, stream order, and providing a good representation of the overall aquatic ecology throughout the study area.

A baseline aquatic ecological assessment was carried out within the WFD LittleBrosna_SC_020 subcatchment (25B_7), on the Little Brosna_040 RWB and selected tributaries of the Little Brosna_040 RWB within and downstream of the proposed wind farm site, including control sites not hydrologically connected to the proposed project. These streams were all located on the northwestern side of the proposed project within proximity to the proposed turbine locations. A total of 12 field survey sites (Table 6-4) were selected within the study area (Figure 6-2), on known watercourses mapped by the EPA/Ordnance Survey Ireland (OSI). All aquatic survey sites were accessed using public roadways, forest tracks and across lands where permitted. The full aquatic report can be found in Appendix 6-3.

6.2.6.5.2 Biological Water Quality

An assessment of biological river quality (i.e., kick sampling) was undertaken on a total of four out of the 12 aquatic survey sites (Table 6-4). Kick sampling, a semi-quantitative method for sampling benthic (or bottom dwelling) macroinvertebrates, undertaken within and downstream of the proposed project following methods outlined in Toner *et al.*, 2005. Macroinvertebrates (e.g., larvae and adult insects, crustaceans, snails) were examined from kick samples, with the type of species present and relative abundance providing an indication on the baseline

ecological health of the waterbody (i.e., biotic index Q-value). Further details can be found in Appendix 6-3.

6.2.6.5.3 Protected Aquatic Species

An assessment of each waterbody at all aquatic survey site locations (i.e., aquatic sites 1-11 [site 12 was for eDNA sampling only]) was undertaken on the suitability of the aquatic habitat for the following protected aquatic species; white-clawed crayfish, salmonids, with particular focus on Atlantic salmon, brook (*Lampetra planeri*), river (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*) and the European eel.

6.2.6.5.3.1 Atlantic Salmon

A fisheries assessment of river waterbodies was carried out at all 12 survey sites utilising elements of the approaches in the Fishery Assessment Methodology (O'Grady, 2006) and '*Ecology of the Atlantic Salmon'* (Hendry and Cragg-Hine, 2003) to broadly characterise the river sites (i.e. channel profiles, substrata etc.). A broad appraisal/overview of the upstream and downstream habitat at each site was undertaken to evaluate the watercourses' ability to support salmonids.

6.2.6.5.3.2 White-clawed Crayfish

White-clawed crayfish habitat and their presence were assessed at each survey site. An assessment of the habitat to support white-clawed crayfish was undertaken following methodologies outlined in '*Guidance on Habitat for White-clawed Crayfish'* (Peay, 2002). This included a visual and hand search for suitable refuge such as boulders, crevices, burrows in the bank, the presence of a partial, or even a complete barrier, food source including leaf litter, in-stream macrophytes, aquatic invertebrates and fish and good water quality absent of pollution.

6.2.6.5.3.3 Lamprey Species

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). A visual assessment was carried out on the habitat suitability for lamprey such as slower flowing water, nursery areas of sandy silt beds, an assessment on potential barriers to migration, potential spawning areas, suitable hiding places and clean spawning gravels over stretches of running water. Juvenile lamprey habitat was identified from the descriptions given in Maitland (2003). Substrate depth and composition was examined for potential ammocoete habitat, especially focusing on the composition of mud, silt, or silt and sand and its suitability for ammocoetes. Areas where suitable spawning gravels may occur, were searched, especially at tails of pools where the gravels have been deposited from upstream and the scouring of pools were examined for potential spawning habitats for adults.

6.2.6.5.4 Freshwater Pearl Mussel

A broad appraisal/overview of the upstream and downstream habitat at each aquatic survey site was undertaken to evaluate the wider contribution to FWPM and the potential for this species to be present within the proposed project. An assessment of habitat to support FWPM was undertaken following methodologies outlined '*Monitoring Populations of the Freshwater Pearl Mussel Margaritifera margaritifera) Stage 3 and Stage 4 Survey'* (Moorkens & Killeen, 2020) and

'Guidance standard on monitoring Freshwater Pearl Mussel (Margaritifera margaritifera) populations and their environment' (National Standards Authority of Ireland, 2017). This included a visual assessment of 1 m^2 areas with each site on the habitat condition of the river including river substratum: physical substrate parameters (assessment of the substrate surface composition), aquatic plants cover (presence of excessive filamentous algae and presence/absence of macrophytes) and coarse decomposing organic matter.

6.2.6.5.5 European Eel

European eel is classified as threatened in Ireland in accordance with the Irish Red List (King *et al.,* 2011). The European eel also has protective status under the European Eel Regulation EC No. 1100/2007 to facilitate their recovery. The suitability of the watercourses within the proposed project to support European eel was assessed.

6.2.6.5.6 Fish Stock Assessment

TOBIN obtained a Section 14 Authorisation licence from the Department of the Environment, Climate and Communications (DECC) on the 18th of April 2024, under the Fisheries Consolidation Act 1959, as substituted by Section 4 of the Fisheries (Amendment) Act 1962, to conduct an electro-fishing assessment of the Little Brosna_040 RWB and selected aforementioned tributaries in Shinrone, County Offaly.

Electrofishing surveys were carried out to establish the presence of support aquatic species of conservation concern (e.g. white-clawed crayfish, river, brook and sea lamprey and Atlantic salmon.

Ten-minute electrofishing surveys were carried out following the methodology set out by Beaumont (2016) and Matson *et al.*, (2018). The electrofishing methodology and technique also complied with the European Committee for Standardisation (CEN) guidelines for fish stock assessment in wadable rivers (CEN, 2003) and Section 14 licensing requirements. A single anode Smith-Root LR24 backpack (12V DC input; 300V, 100W DC output) and electrofishing dip nets were used to electrofish sites on watercourses in the vicinity of the proposed project (Table 6-4).

Water temperature and conductivity were measured at each site and habitat characteristics were recorded, including sediment type, water depth, flow type, shading, channel modification etc.

For salmonids, electro-fishing was conducted in an upstream direction at each site for a standard ten-minute fishing (Matson *et al.*, 2018) Catch Per Unit Effort (CPUE). Approximately 50-75 m of channel was surveyed at each site, where feasible. Lamprey species were specifically targeted in areas of low/reduced flow and with a higher proportion of soft sediment.

7°55'0"W

N

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11

1 2 3 4 5 6 7 8 9 10 11 12

LITTLE BROSNA_040

LITTLE BROSNA_030

N52

N62

R491

53°1'30"N

606000

Ireland

8°3'W

53°8'N

Lough Derg

Legend

- Wind Farm Site Boundary
- Proposed Turbine locations
- Proposed Grid Connection Route

Aquatics Survey Locations

- eDNA - eDNA sample
- EF | eDNA| HA - Electrofishing, eDNA sample, Riverine Habitat Assessment
- EF | HA - Electrofishing, Riverine Habitat Assessment
- HA - Riverine Habitat Assessment
- KS | EF | HA - Kick sample, Electrofishing, Riverine Habitat Assessment
- KS | HA - Kick sample, Riverine Habitat Assessment
- KS | HA | eDNA - Kick sample, Riverine Habitat Assessment

0 500 1,000
Meters

Spatial Reference
Datum: IRENET95
EPSG: 2157

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Rev	Date	Description	By	Chkd.
A	28/11/2025	First issue	S.P	J.D

Client: RWE

Project:

Ballincor Wind Farm

Title:

Figure 6-2:
Aquatic Survey Locations
within the proposed wind farm site

Scale @ A3:	1:20,000	
Prepared by:	Checked by:	Date:
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Map Ref: 11333-021-Aq.Hab-TBD-TOB-A

Draft: A

Table 6-4: Aquatic Ecological Survey Site Locations on Watercourses Within the Study Area of the Proposed Project

Site Number	Survey Type: Kick Sampling (KS) Electrofishing (EF) Habitat Assessment (HA) eDNA Sample	WFD River Sub-Catchment	WFD River Waterbody Code	EPA Name	EPA Code	EPA Segment Code	ITM (x)	ITM (y)
Site 1	EF | HA | KS |	LittleBrosna_SC_020	LittleBrosna_040	Little Brosna	25L02	25_13147	605615	696505
Site 2	HA			Little Brosna	25L02	25_13147	605154	697074
Site 3	eDNA | HA | KS			Wingfield 25	25W41	25_1084	602878	698284
Site 4	EF | HA			Wingfield 25	25W41	25_1084	602646	698687
Site 5	HA			Wingfield 25	25W41	25_1084	602706	699253
Site 6	eDNA | EF | HA			Holy Well Clohaskin	25H28	25_3276	603113	699520
Site 7	eDNA | EF | HA			Holy Well Clohaskin	25H28	25_3276	603430	699426
Site 8	eDNA | EF | HA			Pallas 25	25P26	25_3692	603798	699367
Site 9	EF | HA			Kylenamuck	25I33	25_739	603583	700075
Site 10	HA | KS			Little Brosna	25L02	25_13147	604077	699284
Site 11	HA | KS			Pallas Kylenamuck	25P56	25_634	604060	700092
Site 12	eDNA			N/A	N/A	N/A	603129	699260

6.2.7 Survey Limitation

Access was granted in all areas of the proposed project which were subsequently surveyed by TOBIN Ecologists and a team of third-party specialists. However, some small areas of the proposed project could not be fully surveyed on foot due to dense vegetation, drainage ditches and soft cutover bog habitat. Deep sections of the watercourses were unwadeable and too deep to fully access for aquatic surveys. In accordance with best practice guidelines (CIEEM, 2018), these areas were instead surveyed and visually assessed from adjacent banks, lands and/or from public roads using binoculars, where possible. Observations were further supported by information obtained from aerial photography and desktop study data.

6.3 Baseline Evaluation Criteria

Ecological resources/receptors are evaluated following the NRA (2009) guidelines (Table 6-5), which set out the importance of the ecological resource/receptor in a geographic context. These guidelines are consistent with the approach recommended in CIEEM guidance (CIEEM, 2018).

The information gathered from desk studies and field surveys was used to carry out an impact assessment of the proposed project upon the identification of ecological receptors and classified in accordance with an ecological importance valuation scale ranging from

- International
- National
- County Importance
- Local importance (higher value)
- Local Importance (lower value)

Those features identified as being of high local importance or greater, are then given particular mention in the ecological evaluation as key ecological receptors (KERs) when considering the potential for likely significant effects and subsequent requirement for appropriate mitigation. The criteria shown in Table 6-5 have been used to evaluate the ecological value within the study area. In addition to the criteria listed in Table 6-5 the valuation of habitats and species also considers secondary supporting values where habitats may perform a secondary ecological function.

All potential impacts were assessed and characterised in line with the guidance produced by the EPA, *Guidelines on the information to be contained in Environmental Impact Assessment Report*' (EPA, 2022 - Table 6-6). Via this approach, a scientific and repeatable method was applied whereby all aspects of a potential impact were considered.

Table 6-5: Ecological Valuation Criteria for Features / Receptors (NRA 2009)

Importance	Ecological Valuation
International Importance	• European sites including Special Area of Conservation , Site of Community Importance (SCI), Special Protection Area (SPA), proposed Special Area of Conservation (pSAC), proposed Special Protection Area (pSPA), and/or Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended) • Features essential to maintaining the coherence of the Natura 2000 Network • Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive • Resident or regularly occurring populations (assessed to be important at the national level) of the following: o Species of bird listed in Annex I and/or referred to in Article 4(2) of the Birds Directive and/or o Species of animal and plants listed in Annex II and/or IV of the Habitats Directive • Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971) • World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972) • Biosphere Reserve (UNESCO Man & The Biosphere Programme) • Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979) • Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979) • Biogenetic Reserve under the Council of Europe • European Diploma Site under the Council of Europe • Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988)
National Importance	• Site designated or proposed as a Natural Heritage Area (NHA) • Statutory Nature Reserve • Refuge for Fauna and Flora protected under the Wildlife Acts • National Park • Undesignated site fulfilling the criteria for designation as an NHA, Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Acts; and/or a National Park • Resident or regularly occurring populations (assessed to be important at the national level) of the following: o Species protected under the Wildlife Acts and/or o Species listed on the relevant Red Data list • Site containing 'viable areas[3]' of the habitat types listed in Annex I of the Habitats Directive
County Importance	• Area of Special Amenity • Area subject to a Tree Preservation Order

[3] A 'viable area' is defined as an area of a habitat that, given the particular characteristics of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological processes and function) would be maintained in the face of stochastic change (for example, as a result of climatic variation)

Importance	Ecological Valuation

	• Area of High Amenity, or equivalent, designated under the County Development Plan
	• Resident or regularly occurring populations (assessed to be important at the County level) of the following:
	  ○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive
	  ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive
	  ○ Species protected under the Wildlife Acts and/or
	  ○ Species listed on the relevant Red Data list
	• Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance
	• County important populations of species or viable areas of semi-natural habitats or natural heritage features identified in the National or Local Biodiversity Action Plan (BAP), if these have been prepared
	• Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county
	• Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level

Local Importance (Higher Value)	• Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared
	• Resident or regularly occurring populations (assessed to be important at the Local level) of the following:
	  ○ Species of bird listed in Annex I and/or referred to in Article 4(2) of the Birds Directive
	  ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive
	  ○ Species protected under the Wildlife Acts and/or
	  ○ Species listed on the relevant Red Data list
	• Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality
	• Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value

Local Importance (Lower Value)	• Sites containing small areas of semi-natural habitat that are of some local importance for wildlife • Sites or features containing non-native species that are of some importance in maintaining habitat links

Table 6-6: Description of Effects

Description of Effect	Definition
Quality of Effects	**Positive Effects** A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
	Neutral Effects No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative/Adverse Effects A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
Significance of Effects	**Imperceptible** An effect capable of measurement but without significant consequences.
	Not significant An effect which causes noticeable changes in the character of the environment but without significant consequences.
	Slight Effects An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate Effects An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
	Significant Effects An effect which, by its character, magnitude, duration or intensity, alters a sensitive aspect of the environment
	Very Significant An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound Effects An effect which obliterates sensitive characteristics
Describing the Extent and Context of Effects	**Extent** Describe the size of the area, the number of sites and the proportion of a population affected by an effect
	Context Describe whether the extent, duration or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)

Description of Effect	Definition
Describing the probability of Effects	**Likely Effects** The effects that can reasonably be expected to occur because of the planned project if all mitigations measures are properly implemented.
	Unlikely Effects The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented
Duration and Frequency of Effects	**Momentary Effects** Effects lasting from seconds to minutes
	Brief Effects Effects lasting less than a day
	Temporary Effects Effects lasting less than a year
	Short-term Effects Effects lasting one to seven years
	Medium-term Effects Effects lasting seven to fifteen years.
	Long-term Effects Effects lasting fifteen to sixty years.
	Permanent Effects Effects lasting over sixty years
	Reversible Effects Effects that can be undone, for example through remediation or restoration
	Frequency of Effects Once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually

Based on parameters, an impact is then considered to be either significant or not significant and to be either beneficial or adverse. Likely significant effects are predicted on the basis of the proposed project as set out in Chapter 2: Description of the Proposed Project.

6.4 EXISTING ENVIRONMENT

The following sections provides a description of the baseline conditions for biodiversity within the ZoI of the proposed project. This section is divided into two sections; Desktop Assessment Results and Field Survey Results.

6.4.1 Desktop Assessment Results

This desktop assessment included an assessment of designates sites, data from ecological stakeholders and a review of ecological assessments from nearby projects. The findings of the desktop assessment are detailed hereunder.

6.4.1.1 Designated Conservation Sites

In the following sections all sites of International and National Importance within the ZoI are evaluated (see Section 6.2.4).

6.4.1.1.1 Sites of International Importance

The Birds Directive (2009/147/EC) and the Habitats Directive (92/42/EEC) put an obligation on EU Member States to establish the Natura 2000 network. The Natura 2000 network comprises sites of the highest biodiversity importance for rare and threatened habitats and species across the EU. In Ireland, the Natura 2000 network of European sites comprises SACs and SPAs, where SACs are selected for the conservation of Annex I habitats (including priority types, which occurrence is considered threatened) and Annex II species (other than birds). SPAs are selected for the conservation of Annex I birds and other regularly occurring migratory birds and their habitats.

In this Biodiversity assessment only European sites designated for non-avian species (i.e. SAC). European sites designated for avian species and their habitats (i.e. SPAs) are addressed separately in Chapter 7 (Ornithology) of this EIAR.

The Source-Pathway-Receptor model (OPR, 2021) was used to determine whether viable pathways for effects exists.

There are several SACs within the vicinity of the proposed wind farm site. These European sites and their Qualifying Interests are listed in Table 6-7 and illustrated on Figure 6-3.

The proposed wind farm site lies directly adjacent to the Sharavogue Bog SAC (site code: 000585), separated by the Little Brosna_40 River. The proposed wind farm site is hydrogeologically connected to the Sharavogue Bog SAC via the Shinrone ground waterbody. The proposed wind farm site is also hydrologically connected to the River Shannon Callows SAC (000216), located approximately 14 km north of the proposed project. The impacts on the Conservation Objectives and Qualifying Interests are further assessed in detail in the accompanying NIS.

6.4.1.1.2 Sites of National Importance

Natural Heritage Areas (NHA) are the basic wildlife designation in Ireland. These areas are considered nationally important for the habitats present, or which hold species of plants and animals designated for protection. Under Irish legislation in the form of the Wildlife Acts (as amended), NHAs are legally protected from damage from the date they are formally proposed for designation.

Proposed Natural Heritage Areas (pNHA) were published on a non-statutory basis in 1995 and have not since been statutorily designated. Prior to statutory designation, pNHAs are subject to limited protection, including recognition of the ecological value of pNHAs by Planning and Licensing Authorities however, many now have been upgraded to designated European Sites.

Seven NHAs and 25 pNHAs were identified within the vicinity of the proposed wind farm site, as illustrated in Table 6-7 and Figure 6-3. However, viable source-pathway-receptor links were only identified between the proposed wind farm site and one NHA and four pNHAs.

6.4.1.1.3 Other Sites of Nature Conservation

There are no National Parks with a viable pathway to the proposed wind farm site.

There are no nature reserves with a source-pathway-receptor link to the proposed wind farm site. There is a no source-pathway-receptor link to the proposed wind farm site Slieve Bloom Mountains RAMSAR site (Ramsar code: 335) is located approximately 13.2 km southwest of the proposed wind farm site.

Table 6-7: Designated Conservation Sites Potentially Connected with the Proposed Project

Name	Qualifying Interests / Special Conservation Interests / Feature of Interest	Approximate Distance from the Proposed Project (km)	Source-Pathway-Receptor Link (Yes or No)
International Sites (European Sites)			
Sharavogue Bog SAC (000585)	• Raised Bog (Active)* [7110] • Degraded Raised Bog [7120] • Rhynchosporion Vegetation [7150]	Located 10 m from the proposed wind farm site boundary. There is a hydrologically, physical and ecological connectivity between the proposed project and the SAC.	**Yes** – viable pathways via hydrologically, physical and ecological connectivity identified between the SAC and the proposed project.
Ballyduff/Clonfinane Bog SAC (000641)	• Raised Bog (Active)* [7110] • Degraded Raised Bog [7120] • Rhynchosporion Vegetation [7150] • Bog Woodland* [91D0]	Located approximately 2.8 km northwest of the proposed wind farm site.	No – no viable pathway between the proposed project and the SAC.
Lisduff Fen SAC (002147)	• Petrifying Springs* [7220] • Alkaline Fens [7230] • Geyer's Whorl Snail (*Vertigo geyeri*) [1013]	Located approximately 3.7 km east of the proposed wind farm site.	No – no viable pathway between the proposed project and the SAC.
Arragh More (Derrybreen) Bog SAC (002207)	• Degraded Raised Bog [7120]	Located approximately 5.2 km west of the proposed wind farm site.	No – no viable pathway between the proposed project and the SAC.
Liskeenan Fen SAC (001683)	• Cladium Fens* [7210]	Located approximately 5.7 km west of the proposed wind farm site.	No – no viable pathway between the proposed project and the SAC.
Kilcarren-Firville Bog SAC (000647)	• Raised Bog (Active)* [7110] • Degraded Raised Bog [7120] • Rhynchosporion Vegetation [7150]	Located approximately 6.4 km northwest of the proposed wind farm site.	No – no viable pathway between the proposed project and the SAC.

Name	Qualifying Interests / Special Conservation Interests / Feature of Interest	Approximate Distance from the Proposed Project (km)	Source-Pathway-Receptor Link (Yes or No)
Island Fen SAC (002236)	• Juniper Scrub [5130] • Alkaline Fens [7230]	Located approximately 7.7 km northeast of the proposed wind farm site.	No – no viable pathway between the proposed project and the SAC.
Scohaboy (Sopwell) Bog SAC (002206)	• Degraded Raised Bog [7120]	Located approximately 8.1km southwest the proposed wind farm site.	No – no viable pathway between the proposed project and the SAC.
Ridge Road, SW of Rapemills SAC (000919)	• [6210] Orchid-rich Calcareous Grassland*	Located approximately 9 km north of the proposed wind farm site.	No – no viable pathway between the proposed project and the SAC.
All Saints Bog and Esker SAC (000566)	• Orchid-rich Calcareous Grassland* [6210] • Raised Bog (Active)* [7110] • Degraded Raised Bog [7120] • Rhynchosporion Vegetation [7150] • Bog Woodland* [91D0]	Located approximately 9.1 km north of the proposed wind farm site.	No – no viable pathway between the proposed project and the SAC.
Redwood Bog SAC (002353)	• Raised Bog (Active)* [7110] • Degraded Raised Bog [7120] • Rhynchosporion Vegetation [7150]	Located approximately 12 km north of the proposed wind farm site.	No – no viable pathway between the proposed project and the SAC.
Lough Derg, North-east Shore SAC (002241)	• Juniper Scrub [5130] • Cladium Fens* [7210] • Alkaline Fens [7230] • Limestone Pavement* [8240] • Alluvial Forests* [91E0] • Yew Woodlands* [91J0]	Located approximately 12.5 km west of the proposed wind farm site.	No – no viable pathway between the proposed project and the SAC.
Slieve Bloom Mountains SAC (000412)	• Wet Heath [4010] • Blanket Bogs (Active)* [7130]	Located approximately 13.2 km northeast of the proposed wind farm site.	No – no viable pathway between the proposed project and the SAC.

Name	Qualifying Interests / Special Conservation Interests / Feature of Interest	Approximate Distance from the Proposed Project (km)	Source-Pathway-Receptor Link (Yes or No)
	• Alluvial Forests* [91E0]		
River Shannon Callows SAC (000216)	• Molinia Meadows [6410] • Lowland Hay Meadows [6510] • Alkaline Fens [7230] • Limestone Pavement* [8240] • Alluvial Forests* [91E0] • Otter (*Lutra lutra*) [1355]	Located approximately 14 km north of the proposed wind farm site.	**Yes** – viable pathway via hydrological connectivity identified between the SAC and the proposed project.
National Sites			
Killeen Bog NHA (000648)	Killeen Bog NHA is a small area of raised bog situated approximately 4 km southwest of Birr, Co. Offaly. The site is comprised of areas of high bog and cutover bog. Small areas of pools and hollows are within the site, and it is surrounded by roads to the west and north and a mineral ridge with a birch woodland to the east.	Located approximately 3.7 km north of the proposed wind farm site.	No – no viable pathway between the proposed project and the NHA.
Arragh More Bog NHA (000640)	Arragh More Bog NHA is an area of raised bog situated 9.5 km northeast of Borrisokane, Co. Tipperary. The site is comprised of high bog and cutover bog. The Arragh More Bog NHA is split by mineral ridges between the areas of raised bog. An area of coniferous forestry is planted within a flush to the north of the site. Hen Harrier	Located approximately 5.5 km northeast of the proposed wind farm site. There is no hydrological, hydrogeological, physical and ecological connectivity between the proposed project and the NHA.	No – no viable pathway between the proposed project and the NHA.

Name	Qualifying Interests / Special Conservation Interests / Feature of Interest	Approximate Distance from the Proposed Project (km)	Source-Pathway-Receptor Link (Yes or No)
	(*Circus cyaneus*) have been recorded on this bog.		
Cangort Bog NHA (000890)	Cangort Bog NHA is an area of raised bog situated 1 km north of Shinrone, Co. Offaly. The site is comprised of high bog and cutover bog. The site has hummocks and pools throughout the high bog which is surrounded by cutover bog. The cutover bog has coniferous forestry in the south of the site.	Located approximately 2.5 km southwest of the proposed wind farm site. The NHA is hydrogeologically connected via the Shinrone GWB.	No – no viable pathway via hydrogeological connectivity identified between the NHA and the proposed project.
Scohaboy Bog NHA (000937)	Scohaboy Bog NHA is a large area of raised bog situated 4 km southeast of Borrisokane, Co. Tipperary. The site is comprised of high bog and cutover. The high bog is relatively flat with an area of coniferous forestry to the north, and the bog is dry with limited hummocks and hollows throughout. Cutover bog occurs surrounding the high bog.	Located approximately 8.5 km southwest of the proposed wind farm site. There is no hydrological, hydrogeological, physical and ecological connectivity between the proposed project and the NHA.	No – no viable pathway between the proposed project and the NHA. There is no potential for significant effects.
Lorrha Bog NHA (001684)	Lorrha Bog NHA is situated approximately 1 km northeast of Lorrha Co. Tipperary. The site is comprised of a raised bog which includes areas of high bog and cutover bog. The bog contains areas of hummocks throughout	Located approximately 11.6 km northwest of the proposed wind farm site. There is no hydrological, hydrogeological, physical and ecological connectivity between the proposed project and the NHA.	No – no viable pathway between the proposed project and the NHA. There is no potential for significant effects.

Name	Qualifying Interests / Special Conservation Interests / Feature of Interest	Approximate Distance from the Proposed Project (km)	Source-Pathway-Receptor Link (Yes or No)
	and a small flush in the centre of the bog. Coniferous forestry is within the cutover bog on the south of the site.		
River Little Brosna Callows NHA (000564)	The River Little Brosna Callows NHA is situated 5 km southwest of Banagher Co. Offaly and stretches 9 km along the River Shannon. The site comprises of low-lying callows on floodplains which are subject to flooding in the winter and early spring. There is also raised bog habitats present within the site and an area of mixed deciduous woodland east of Cloghan Demesne. This site is an internationally important site for wintering waterfowl and important for breeding waders including Common Redshank (*Tringa totanus*), Common Snipe (*Gallinago gallinago*) and Northern Lapwing (*Vanellus vanellus*).	Located approximately 9.8 km northwest of the proposed wind farm site. There is no hydrological, hydrogeological, physical and ecological connectivity between the proposed project and the NHA.	**Yes** – viable pathway via hydrological connectivity identified between the NHA and the proposed project.
Ballymacegan Bog NHA (000642)	Ballymacegan Bog NHA is situated in the floodplain of the River Shannon approximately 7 km southwest of Banagher Co Offaly and 6 km north-west of Rathcabbin, in the townland of Redwood, Co. Tipperary. The site comprises a raised bog that	Located approximately14.9 km northwest of the proposed wind farm site. There is no hydrological, hydrogeological, physical and ecological connectivity between the proposed project and the NHA.	No – no viable pathway between the proposed project and the NHA. There is no potential for significant effects.

Name	Qualifying Interests / Special Conservation Interests / Feature of Interest	Approximate Distance from the Proposed Project (km)	Source-Pathway-Receptor Link (Yes or No)
	includes both areas of high bog and cutover bog. Pasture grassland occurs to the south of the site. The River Shannon runs just north and west of the site and Redwood Bog is to the east. The site consists of a small floodplain raised bog. The high bog is flat and uniform, with active peat-cutting on the south-west, south and the eastern boundaries. Downy Birch (*Betula pubescens*) scrub occurs on the old cutover. Flushes are found to the south of the high bog. The bog is surrounded by callow grassland on the west and northern boundaries.		
Sharavogue Bog pNHA (000585)	No Site Synopsis for this pNHA, however a description can be found using the associated SAC. This site is an area of two raised bogs 8 km south of Birr Co. Offaly. This site contains areas of Annex I habitats including [7110] Raised Bog (Active), [7120] Degraded Raised Bog and [7150] Rhynchosporion Vegetation.	Located 10 m adjacent the proposed wind farm site. There is a hydrogeologically, physical and ecological connectivity between the proposed project and the SAC. The SAC is hydrogeologically connected via the Shinrone GWB.	**Yes** – viable pathway via hydrogeologically physical and ecological connectivity identified between the pNHA and the proposed project.
Derrykeel Meadows pNHA (000897)	This site is located in Derrykeel, Co. Offaly. The site is comprised of areas of wet meadows with a	Located approximately 12.7 km northeast of the proposed wind farm site. There is no hydrological, hydrogeological, physical and	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.

Name	Qualifying Interests / Special Conservation Interests / Feature of Interest	Approximate Distance from the Proposed Project (km)	Source-Pathway-Receptor Link (Yes or No)
	stream running through a calcium rich substratum.	ecological connectivity between the proposed project and the pNHA.	
Woodville Woods pNHA (000927)	This site is a deciduous native woodland located 3 km north of Birr Co. Offaly. It contains areas of mature oak and hazel with a small, accreted lake in the east.	Located approximately 8.3 km north of the proposed wind farm site. There is no hydrological, hydrogeological, physical and ecological connectivity between the proposed project and the pNHA.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.
Dovegrove Callows pNHA (000010)	No Site Synopsis for this pNHA, however a description can be found using the associated SPA. This site is an area of callows beside the Little Brosna River and is an important feeding area for Greenland White-fronted Goose (*Anser albifrons flavirostris*).	Located approximately 7.3 km north of the proposed wind farm site. There is a hydrological connectivity via the Little Brosna_040 RWB between the proposed project and the SAC.	**Yes** – viable pathway via hydrological connectivity identified between the SAC and the proposed project.
Lough Coura pNHA (000909)	Lough Coura is a small in-filled lake situated about 10 km west of Kilcormac Co. Offaly and 10 km east of Banagher, Co. Offaly. The site has a long history of botanical recording, and its character has been described as progressing from "*an extensive swamp*" in 1899, "*an extensive limy marsh*" in 1934, "*a dry fen*" in 1969 to "*very few damp areas were found*" in 1972.	Located approximately 14.2 km northeast of the proposed wind farm site. There is no hydrological, hydrogeological, physical and ecological connectivity between the proposed project and the pNHA.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.

Name	Qualifying Interests / Special Conservation Interests / Feature of Interest	Approximate Distance from the Proposed Project (km)	Source-Pathway-Receptor Link (Yes or No)
Ross And Glenns Eskers pNHA (000920)	This site is a gravel esker ridge and a cutaway bog located 5km northwest of Birr Co. Offaly. The esker contains a hazel scrub and uncommon plants including Buckthorn (*Rhamnus catharticus*) and Bee Orchid (*Ophrys apifera*). Within the south of the site is a birch woodland.	Located approximately 9.3 km north of the proposed wind farm site.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.
Ballyduff/Clonfinane Bog pNHA (000641)	No Site Synopsis for this pNHA, however a description can be found using the associated SAC. This site is located 6 km southwest of Birr Co. Offaly. The site is an area of lowland raised bog and contains Annex I habitats including [7110] Raised Bog (Active)*, [7120] Degraded Raised Bog, [7150] Rhynchosporion Vegetation and [91D0] Bog Woodland.	Located approximately 4.9 km northwest of the proposed wind farm site.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.
Redwood Bog pNHA (000654)	No Site Synopsis for this pNHA, however a description can be found using the associated SAC. This site is located 7 km southwest of Banagher Co. Offaly. The site is an area of raised bog with areas of high bog and cutover bog. Greenland White-fronted Goose	Located approximately 14 km northwest of the proposed wind farm site.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.

Name	Qualifying Interests / Special Conservation Interests / Feature of Interest	Approximate Distance from the Proposed Project (km)	Source-Pathway-Receptor Link (Yes or No)
	(*Anser albifrons flavirostris*) has been recorded within the site.		
Friar's Lough pNHA (000933)	This site is located near the village of Lorrha Co. Tipperary. The site contains a small lake which is surrounded by reed beds along its shore and areas of dry broadleaved woodland to the east of the lake and a species-rich wet woodland to the west of the lake.	Located approximately 14.2 km northwest of the proposed wind farm site.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.
Kilcarren-Firville Bog pNHA (000647)	No Site Synopsis for this pNHA, however a description can be found using the associated SAC. This site is located 2 km east of Carrigahorig Co. Tipperary. The site is an area of lowland raised bog containing Annex I habitats including [7110] Raised Bog (Active), [7120] Degraded Raised Bog and [7150] Rhynchosporian Vegetation.	Located approximately 8 km northwest of the proposed wind farm site.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.
Liskeenan Fen pNHA (001683)	No Site Synopsis for this pNHA, however a description can be found using the associated SAC. This site is located 10 km northwest of Borrisokane Co. Tipperary. The site is an area of turlough-like calcareous *Cladium* fen with a swallow-hole at its	Located approximately 7 km west of the proposed wind farm site.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.

Name	Qualifying Interests / Special Conservation Interests / Feature of Interest	Approximate Distance from the Proposed Project (km)	Source-Pathway-Receptor Link (Yes or No)
	centre. The fen includes a small area dry inactive raised bog with mixed woodland and areas of flooded cutaway bog. Also within the site is areas of species-rich dry grassland.		
Fiagh Bog pNHA (000932)	This site is situated 4 km northeast of Borrisokane Co. Tipperary. This site is an area of calcium-rich fen, and an area of lowland raised bog. The Round-mouthed Whorl Snail (*Vertigo geyeri*) has been recorded within this site.	Located approximately 8.2 km west of the proposed wind farm site.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.
Spring Park Wetlands pNHA (000941)	This site is located 5 km north of Borrisokane Co. Tipperary. The site contains an area of reed beds and in the east of the site is a turlough-like lake. At least 20 Whooper swans and other waterbirds including Eurasian Teal (*Anas crecca*), Mallard (*Anas platyrhynchos*), Common Pochard (*Aythya ferina*), Tufted Duck (*Aythya fuligula*) and Gadwall (*Anas strepera)* have been recorded within the lake.	Located approximately 12.5 km west of the proposed wind farm site.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.
Lough Nahinch (Tipperary) pNHA (000936)	This site is located 9 km east of Borrisokane Co. Tipperary. The site is a lake with a peaty basin and surrounded by a sparse Common Club-rush swamp. This site is an	Located approximately 4.9 km southwest of the proposed wind farm site.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.

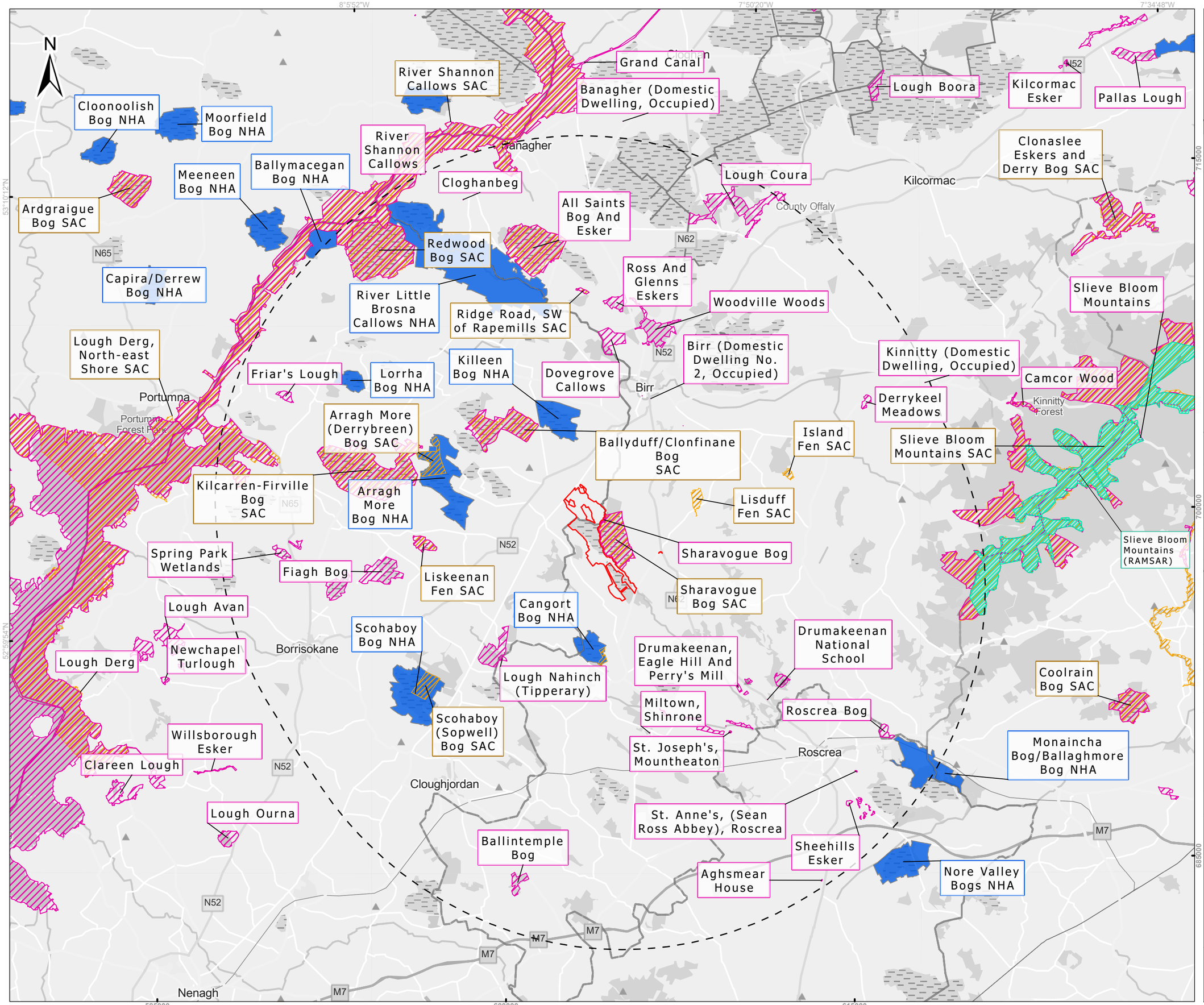
Name	Qualifying Interests / Special Conservation Interests / Feature of Interest	Approximate Distance from the Proposed Project (km)	Source-Pathway-Receptor Link (Yes or No)
	important breeding area for Common Redshank (*Tringa totanus*), Common Snipe (*Gallinago gallinago*) and Water Rail (*Rallus aquaticus)* and used as a wintering site for migratory bird species. There is also an area mature woodland to the north.		
Ballintemple Bog pNHA (000882)	This site is located 13 km southwest of Roscrea Co. Tipperary and contains areas of wet meadows, small pools. Outside of the wetter areas contains areas of colonising Gorse.	Located approximately 14 km southwest of the proposed wind farm site.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.
Mount St. Joseph Woods pNHA (000913)	No Site Synopsis available	Located approximately 6.9 km south of the proposed wind farm site.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.
Drumakeenan, Eagle Hill And Perry's Mill pNHA (000900)	This site contains three separate areas of low esker ridges 4 km northwest of Roscrea Co. Tipperary. Vegetation within these esker ridges include areas of calcareous grassland, spring-flushed slopes, wet calcareous fen and herb-rich wet meadows. Legally protected species including Green-winged Orchid (*Orchis morio*) and Nettle-leaved	Located approximately 7.8 km south of the proposed wind farm site.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.

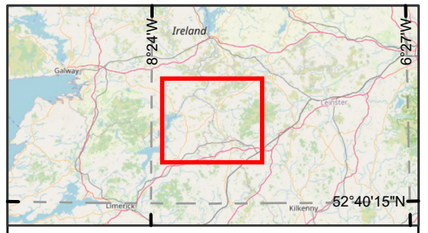
Name	Qualifying Interests / Special Conservation Interests / Feature of Interest	Approximate Distance from the Proposed Project (km)	Source-Pathway-Receptor Link (Yes or No)
	Bellflower (*Campanula tracelium*) may be present here.		
Golden Grove Woods pNHA (000903)	This site is located to the northwest of Roscrea Co. Tipperary. The site is an area of planted Beech woodland with an impoverished ground flora.	Located approximately 8.8 km southeast of the proposed wind farm site.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.
Roscrea Bog pNHA (000583)	This site is a fen on poorly drained glacial drift located 3 km west of Roscrea Co. Tipperary. The site has areas of drained land in the northern section and wetter areas in the centre. To the south of the site is an area of stream and wet woodland. Two rare snail species including *Vertigo genesii* and *Agriolimax laevis* have been recorded within the site. Bird species including Eurasian Curlew (Numenius arquata) and Common Snipe (*Gallinago gallinago*) have been recorded within the site.	Located approximately 13 km southeast of the proposed wind farm site.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.
Slieve Bloom Mountains pNHA 000412	No Site Synopsis for this pNHA, however a description can be found using the associated SAC and SPA. This site is located along the Offaly-Laois border and contains areas of Annex I habitats including [4010]	Located approximately 14.5 km southeast of the proposed wind farm site	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.

Name	Qualifying Interests / Special Conservation Interests / Feature of Interest	Approximate Distance from the Proposed Project (km)	Source-Pathway-Receptor Link (Yes or No)
	Wet heath, [7130] Blanket bogs (Active) and [91E0] Alluvial Forests. Bird species including Hen Harrier (*Circus cyaneus*), Peregrine (*Falco peregrinus*), Merlin (*Falco columbarius*) and Red Grouse (*Lagopus lagopus)* have been recorded breeding within the site.		
Ridge Road, SW Of Rapemills pNHA (000919)	No Site Synopsis available	Located approximately 10.3 km northeast of the proposed wind farm site.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.
St. Joseph's, Mountheaton pNHA (002063)	No Site Synopsis available	Located approximately 7.3 km southeast of the proposed wind farm site.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.
Miltown, Shinrone pNHA (002065)	No Site Synopsis available	Located approximately 7.3 km southeast of the proposed wind farm site.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.
River Shannon Callows pNHA (000216)	No Site Synopsis available for this pNHA, however a description can be found using the associated SAC. This pNHA is a, long, ecologically diverse site consisting of species-rich, seasonally flooded washlands (callows) along the River Shannon. It provides vital habitat for flora and fauna, particularly breeding	Located approximately 14.6 km northwest of the proposed wind farm site. There is a hydrological connectivity via the Little Brosna_040 RWB between the proposed project and the pNHA.	**Yes** – viable pathway via hydrological connectivity identified between the pNHA and the proposed project.

Name	Qualifying Interests / Special Conservation Interests / Feature of Interest	Approximate Distance from the Proposed Project (km)	Source-Pathway-Receptor Link (Yes or No)
	and wintering birds. This pNHA overlaps with the designated River Shannon Callows SAC and SPA.		
Lough Derg pNHA (000011)	No Site Synopsis available	Located approximately 11.5 km northwest of the proposed wind farm site. There is a hydrological connectivity via the Little Brosna_040 RWB between the proposed project and the pNHA.	No – no viable pathway between the proposed project and the pNHA. There is no potential for significant effects.

* indicates a priority habitat under the Habitats Directive





Legend

- Wind Farm Site Boundary
- Initial 15KM Buffer

Designated Sites

- National Heritage Areas (NHAs)
- Protected National Heritage Areas (pNHAs)
- Slieve Bloom Mountains (RAMSAR)
- Special Areas of Conservation (SACs)

0 2 4
Kilometers

Spatial Reference
Datum: IRENET95
EPSG: 2157

Rev	Date	Description	By	Chkd.
D01	08/10/2025	Draft issue	K.K	J.D

Client: RWE

Project:
Ballincor Wind Farm

Title:
Figure 6-3:
Designated European and National Sites within the vicinity of the Proposed Project

Scale @ A3: 1:150,000

Prepared by:	Checked by:	Date:
K.Kale	J.Dillon	October 2025

TOBIN

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Map Ref: 11333-022-EU.S-P.App.BO-TOB-D01

Draft: D01

6.4.1.2 National Parks and Wildlife Services

Spatial data review

EU Habitats Directive Annex I habitat datasets, were downloaded from the NPWS website[4] and overlain on the proposed wind farm site boundary using GIS software to examine the recorded presence of Annex I habitats within the boundary of the proposed wind farm site. Datasets for the National Survey of Native Woodlands, Long Established Woodlands and the Irish Semi-natural Grassland Survey were also reviewed. Available GIS data was downloaded and reviewed.

The spatial data review indicated that six protected habitats are present within the grid squares including Raised bog (active)* (7110), Degraded raised bogs (7120), Alkaline fens (7230), Vegetation Orchid-rich calcareous grassland* (6210), Depressions on peat substrates of the Rhynchosporion (7150) and old oak woodland (91A0). Within the raised bog and degraded raised bog habitat located within the Sharavogue Bog SAC adjacent to the proposed project, there is record of Slender Cottongrass (*Eriophorum gracile*), a plant species listed under the Flora Protection Order 2022 (FPO).

Records of protected and rare species, from the NPWS website, occurring within the proposed wind farm site were also reviewed.

A total of five protected Annex II species have been recorded within the 10 km grid squares. These include the invertebrates Freshwater White-clawed Crayfish (*Austropotamobius pallipes*), Marsh Fritillary, Desmoulin's Whorl Snail (*Vertigo (Vertigo) moulinsiana),* and Geyer's Whorl Snail (*Vertigo (Vertigo) geyeri*) and semi aquatic mammal, the otter. Other protected species include Common Frog (*Rana temporaria*), Red Squirrel (*Sciurus vulgaris*), Stoat (*Mustela erminea*), Irish Hare (*Lepus timidus subsp. hibernicus*),

There were a low number of previous records (1 record) available for Otter (*Lutra lutra*) in the relevant grid square N00 from Atlas of Mammals in Ireland 2010-2015 dataset. Otter, is a qualifying interest for the River Shannon Callows SAC (000216), located approximately 14 km north of the proposed project.

The study area is not located within a Margaritifera (FWPM) Sensitive Area. Records from Article 17 spatial data (NPWS) were also reviewed and show their complete absence from within the catchment.

Sensitive Data Request

A sensitive data request for hectads S09 and N00 (which encompass the proposed wind farm site) was issued to NPWS on 1st of March 2025 and a response was received on 21st of March 2025.

Data obtained from NPWS from a sensitive data request confirmed the plant species Slender Cottongrass present within Sharavogue Bog, previously recorded in 1997 and 2015. No other plant species listed under the FPO are present within the proposed wind farm site or within the 10 km grid squares encompassing the study area. Few additional species were listed in the NPWS data package. The data set contained six historic records of Otter within the N00 hectad. It also contained recorded two historic records of Common Lizard (*Zootoca vivipara*) (1974),

[4] Accessed [October 2025] via: https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17

seven records of Irish Hare (*Lepus timidus subsp. hibernicus*) between 1982 and 2007, four historic records of Stoat (*Mustela erminea*) between 1980 and 1982.

A sensitive data request was sent to the NPWS for records of FWPM within the study area and its sub-catchments. The data received indicated that there are currently no records of FWPM populations being present within the sub-catchments of the study area.

DAU consultation

The consultation response from NPWS is described in Section 6.2.3 and Table 6-1. All of these points are addressed in Section 6.6 and 6.7 of this Chapter.

6.4.1.3 National Biodiversity Data Centre

A search of the NBDC (2025) database was carried out for protected flora and fauna recorded over the past 20 years (excluding avifauna) and IAS listed under the Third Schedule of the Birds and Natural Habitats Regulations (2011) as amended and the First Schedule Regulations 2024 (S.I. 374 of 2024) within hectads S09 and N00 which encompass the proposed wind farm site.

Current records from the General Biodiversity Records from Ireland database[5] show two records of white-clawed crayfish present within the Little Brosna_040 RWB in 2021, approximately 4 km downstream of the study area. Additionally, records from Article 17 spatial data (NPWS) were also reviewed.

Results of protected flora and fauna are listed in Table 6-8. IAS flora and fauna species are listed in Table 6-9.

Table 6-8: Records of Protected Fauna and Flora Species Under the Habitats Directive (HD) and Wildlife Acts (WA)

Species Name	Grid Square	Record Count	Date of Last Record	Title of Dataset	Designation
Amphibians/Invertebrates/Fish					
Freshwater White-clawed Crayfish (*Austropotamobius pallipes*)	N00	5	31/12/2021	General Biodiversity Records from Ireland	EU HD, Annex II, V, WA
	S09	2	31/12/2021		
Marsh Fritillary (*Euphydryas aurinia*)	N00	11	22/09/2016	Butterflies of Ireland pre-2022	EU HD, Annex II
	S09	3	16/08/2016		
Desmoulin's Whorl Snail (Vertigo (*Vertigo) moulinsiana*)	N00	5	25/08/2005	All Ireland Non-Marine Molluscan Database	EU HD, Annex II, WA
Geyer's Whorl Snail (*Vertigo (Vertigo*) geyeri)	N00	10	25/08/2005	All Ireland Non-Marine Molluscan Database	EU HD, Annex II, WA
Common Frog (*Rana temporaria*)	N00	10	28/04/2019	Amphibians and reptiles of Ireland	EU HD, Annex V, WA

[5] https://maps.biodiversityireland.ie/Map/Terrestrial/Species/17487

Species Name	Grid Square	Record Count	Date of Last Record	Title of Dataset	Designation
	S09	6	21/02/2019		
Smooth Newt (*Lissotriton vulgaris*)	N00	1	20/05/2013	Newt Survey 2010-2014	WA
	S09	5	16/05/2018	Amphibians and reptiles of Ireland	
Mammals					
Brown Long-eared Bat (*Plecotus auritus*)	S09	28	02/08/2023	National Bat Database of Ireland	EU HD, Annex IV, WA
	N00	3	26/08/2010		
Daubenton's Bat (*Myotis daubentonii*)	S09	2	14/08/2018		EU HD, Annex IV, WA
	N00	152	21/08/2021		
Lesser Noctule (*Nyctalus leisleri*)	S09	11	22/08/2019		EU HD, Annex IV, WA
	N00	69	15/08/2019		
Nathusius's Pipistrelle (*Pipistrellus nathusii*)	S09	1	14/08/2018		EU HD, Annex IV, WA
	N00	1	21/07/2009		
Natterer's Bat (*Myotis nattereri*)	S09	2	25/07/2009		EU HD, Annex IV, WA
	N00	3	14/09/2018		
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	S09	4	16/07/2007		EU HD, Annex IV, WA
	N00	10	15/08/2019		
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	S09	29	22/08/2019		EU HD, Annex IV, WA
	N00	20	22/05/2019		
Whiskered Bat (*Myotis mystacinus*)	N00	3	18/06/2008		EU HD, Annex IV, WA
European Otter (*Lutra lutra*)	N00	11	11/01/2013	Road Kill Survey	EU HD, Annex II, Annex IV, WA
	S09	1	15/10/2010	Atlas of Mammals in Ireland 2010-2015	
Eurasian Badger (*Meles meles*)	N00	103	02/05/2018	Mammals of Ireland 2016-2025	WA
	S09	97	31/12/2016	Badger Setts of Ireland Database	
Eurasian Pygmy Shrew *(Sorex minutus*)	N00	12	23/06/2013	Atlas of Mammals in Ireland 2010-2015	WA
	S09	5	16/08/2012		
	N00	20	28/09/2018		WA

Species Name	Grid Square	Record Count	Date of Last Record	Title of Dataset	Designation
Eurasian Red Squirrel (*Sciurus vulgaris*)	S09	19	02/06/2017	Mammals of Ireland 2016-2025	
Pine Marten (*Martes martes*)	N00	13	17/08/2021	Mammals of Ireland 2016-2025	EU HD, Annex V, WA
	S09	7	22/02/2020		
West European Hedgehog (*Erinaceus europaeus*)	N00	19	06/07/2020	Hedgehogs of Ireland	WA
	S09	7	10/08/2020		

Table 6-9: Invasive Alien Species listed on Third Schedule (Regulation S.I. 477 of 2011) as amended.

Species Name	Grid Square	Record Count	Date of Last Record	Title of Dataset	Designation
Flora					
Fringed Water-lily (*Nymphoides peltata*)	N00	1	31/12/2010	BSBI tetrad data for Ireland	High Impact Invasive Species >> Regulation S.I. 477 (Ireland)
Giant Hogweed (*Heracleum mantegazzianum*)	N00	1	29/05/2003	Species Data from the National Vegetation Database	High Impact Invasive Species >> Regulation S.I. 477 (Ireland)
Giant Knotweed (*Fallopia sachalinensis*)	N00	5	26/07/2018	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	High Impact Invasive Species >> Regulation S.I. 477 (Ireland)
Giant-rhubarb (*Gunnera tinctoria*)	N00	4	23/04/2020	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	High Impact Invasive Species >> Regulation S.I. 477 (Ireland)
	S09	1	03/09/2008	River Biologists' Database (EPA)	
Indian Balsam (*Impatiens glandulifera*)	N00	31	27/07/2019	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	High Impact Invasive Species >> Regulation S.I. 477 (Ireland)
Japanese Knotweed (*Fallopia japonica*)	N00	1	06/07/2018	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	High Impact Invasive Species >> Regulation S.I. 477 (Ireland)
	S09	1	20/05/2017		
Parrot's-feather (*Myriophyllum aquaticum*)	N00	1	15/08/2018	National Invasive Species Database	High Impact Invasive Species >> EU Regulation No. 1143/2014

Species Name	Grid Square	Record Count	Date of Last Record	Title of Dataset	Designation
					>> Regulation S.I. 477 (Ireland)
Rhododendron ponticum	N00	2	28/08/2003	Species Data from the National Vegetation Database	High Impact Invasive Species >> Regulation S.I. 477 (Ireland)
	S09	1	25/04/2003		
Canadian Waterweed (*Elodea canadensis*)	S09	1	03/09/2008	River Biologists' Database (EPA)	Medium Impact Invasive Species >> Regulation S.I. 477 (Ireland)
Jenkins' Spire Snail (*Potamopyrgus antipodarum*)	S09	10	2/8/06/2014	All Ireland Non-Marine Molluscan Database A national macroinvertebrate dataset collected for the biomonitoring of Ireland's river network, 2007–2018 (EPA)	Medium Impact Invasive Species >> Regulation S.I. 477 (Ireland)
Fauna					
American Mink (*Mustela vison*)	N00	5	08/10/2018	Mammals of Ireland 2016-2025	High Impact Invasive Species, Regulation S.I. 477 (Ireland)
	S09	1	02/06/2017		
Fallow Deer (*Dama dama*)	N00	6	11/07/2018	Mammals of Ireland 2016-2025	High Impact Invasive Species, Regulation S.I. 477 (Ireland), (and protected under the Wildlife Acts)
	S09	1	31/12/2008	Deer of Ireland Database	

6.4.1.4 National Biodiversity Data Centre Bat Landscape Tool

The NBDC Bat Landscapes tool was utilised to determine the bat species recorded in the grid square which encompass the proposed wind farm site. The Bat Landscapes Tool map is based on a habitat suitability index of the surrounding landscape for each bat species. The index ranges from 0 to 100, with 0 being least favourable and 100 most favourable for bats. The bat suitability index calculations are done on a 5 km^2 scale and therefore values within the tables for each grid square show the average landscape suitability index of the 5 km^2 squares. One 5 km^2 square

covers the proposed project. The landscape suitability for 'all bats' was 31.44 (see Table 6-10). This score is considered to reflect moderate suitability.

Table 6-10: Results of the Bat Landscape Suitability

Species	Landscape Suitability
All Bat species	31.44
Soprano pipistrelle *(Pipistrellus pygmaeus)*	40
Brown long-eared bat *(Plecotus auratus)*	42
Common pipistrelle *(Pipistrellus pipistrellus)*	46
Lesser horseshoe bat *(Rhinolophus hipposideros)*	4
Lesser noctule *(Nyctalus leisleri)*	44
Whiskered bat *(Myotis mystacinus)*	27
Daubenton's bat *(Myotis daubentoniid)*	30
Nathusius's pipistrelle *(Pipistrellus nathusli)*	3
Natter's bat *(Myotis nattereri)*	47

6.4.1.5 Aquatic Environment

6.4.1.5.1 Hydrology

The proposed wind farm site and GCR is located within the Lower Shannon Catchment (25B) WFD Catchment. The proposed project lies within the Little Brosna_SC_020 subcatchment and proposed GCR is located within the Little Brosna_SC_020 subcatchment and the Shannon [Lower]_SC_060 subcatchment.

The Little Brosna_040 RWB(WFD Waterbody code (IE_SH_25L020700)) is located within the northwestern site boundary of the proposed project. The GCR crosses the Little Brosna_050 River (WFD Waterbody code (IE_SH_25L020800)) located downstream.

These watercourses were assessed to establish their WFD water quality status for 2019-2024. A search of the EPA Unified GIS Application[6] and the EPA Catchments database[7] was conducted for the Little Brosna_040 and Little Brosna_050 RWB's and their water quality.

The EPA carries out biological monitoring at various locations on these RWB's. One monitoring station is located along the Little Brosna_040 RWB within close proximity to the proposed project, to indicate that the overall water quality in this area. The monitoring station, Sharavogue Br (SW of S. Ho) (d/s on RHS) (station code: RS25L020600) is located on the southern boundary of the proposed project.

[6] Available at https://gis.epa.ie/EPAMaps/ Accessed in August 2025
[7] Available at https://www.catchments.ie/ Accessed in August 2025

The most recent EPA biological water quality results at this station in 2023 show the Little Brosna_040 RWB achieved a Q4 "good" status which indicates it is meeting the requirements of the WFD (2000/60/EEC).

The proposed GCR crosses the Little Brosna_050 RWB. One monitoring station, the Little Brosna – 100 m d/s Croghan Br (Station code: RS25L020810) is located at this crossing, to indicate that the overall water quality river site.

The most recent EPA biological water quality results at this station in 2021 show the Little Brosna_050 achieved a Q3-4 "Moderate" status which indicates it is not meeting the requirements of the WFD (2000/60/EEC).

Overall, the EPAs' published and latest available WFD status classification for the period 2019-2024 indicates that the Little Brosna_040 RWB is at 'Poor' status for the period 2019-2024[8] and is 'At Risk' of failing to achieve WFD 'Good' status objectives in 2027. Poor ecological conditions continue with a high percentage of filamentous green algae covering the substrate. The paucity of pollution sensitive macroinvertebrate taxa and dominance of pollution tolerant taxa indicated a decline from good to moderate and moderate to poor ecological conditions at some stations. For further information on surface water refer to Chapter 9 – Hydrology & Hydrogeology.

6.4.1.5.2 Ground Waterbodies

The proposed project is located within the Shinrone groundwater body (GWB) (ground waterbody code: IE_SH_G_205). The proposed GCR is present within the Birr GWB (groundwater body code: IE_SH_G_041), Birr Gravels GWB (ground waterbody code: IE_SH_G_244) and Banagher GWB (groundwater body code: IE_SH_G_040). Each of these BWB's have been assigned 'Good' WFD groundwater status for 2019-2024 and 'Not At Risk' of failing to achieve WFD 'Good' status objectives in 2027 (EPA, 2026).

[8] Data - Catchments.ie - Catchments.ie Accessed in August 2025

6.4.1.5.3 Fish

Inland Fisheries Ireland (IFI) have assessed the status of fish stocks part of a catchment-wide survey of the Little Brosna WFD catchment undertaken in 2008, 2012, 2015, 2019 and 2021.

Within the Little Brosna sub catchment, and in the Little Brosna_040 RWB, species previously recorded include brown trout, Atlantic Salmon, European eel, Lamprey spp., Minnow, Rainbow trout, Roach, Stone loach and Three-spined Stickleback.

The most recent WFD fish ecological status 2021, "Moderate" was assigned to the Little Brosna_040 RWB based on the stock assessment results. The reasons for the failures and deteriorations in fish ecological status were due to lower-than-expected abundance of type specific indicator species (e.g., Salmon and Brown Trout), absence of certain age cohorts indicating recruitment failures and/or the presence of a relatively high abundance of tolerant fish species (e.g. three-spined stickleback). Failures and deteriorations in fish ecological status were likely caused by pressures such as nutrient enrichment, habitat modification and fish passage issues (IFI 2022).

6.4.1.5.4 White-clawed crayfish

Existing data on the presence and distribution of White-clawed Crayfish (*Austropotamobius pallipes*) within the Study Area was consulted on the NBDC mapping portal. White-clawed Crayfish have not been recorded in any of the watercourses within or downstream of the proposed wind farm site. This species is not expected to occur in the other watercourses draining the proposed wind farm site, considering the siliceous underlying geology.

6.4.2 Field Survey Results

The findings of the ecological field surveys undertaken between 2022 and 2025 are detailed in the following sections.

6.4.2.1 Habitats and Flora within the Proposed Project

All habitats were classified according to Fossitt (2000) during the ecological walkover of the proposed wind farm site. An assessment of the habitats was undertaken in accordance with the NRA (2009) guidelines. The habitats within the proposed project footprint are described in the sections and tables below.

In general, the proposed wind farm site is dominated by raised bog, cutover bog and improved agricultural grassland with a scattered mix of other habitats as shown in Figure 6-4. A description of the principal habitats surveyed by TOBIN that occur within the proposed wind farm site is summarised below. No Annex I habitat was identified within the proposed wind farm site during the habitat surveys.

6.4.2.1.1 BC1 - Arable Crops

Agricultural land cultivated for the production of BC1 Arable crops was recorded along the southwestern boundary of the proposed wind farm site (Plate 6-1). The crops consisted of fields of oats, barley or potato with common ruderal species occurring frequently, including pineapple weed (*Matricaria discoidea*) and dock (*Rumex* spp.).

This habitat type is considered to be of Local Importance (lower value) as an ecological feature containing IAS that are of some importance in maintaining habitat links.

Plate 6-1: Arable Crop Located Along the Proposed Grid Connection Route

6.4.2.1.2 BC2 – Horticultural land

BC2 Horticultural land was recorded within lands proposed for temporary roads along the TDR. The land contained cabbage with extensive bare soil in sections which have been harvested. This habitat was noted to be in poor condition.

This habitat type is considered to be of Local Importance (lower value) as an ecological feature containing non-native species that are of some importance in maintaining habitat links.

6.4.2.1.3 BL1 - Stone walls and other Stonework

BL1 Stone walls and other stonework was identified in the southeastern extent of the proposed wind farm site and within lands proposed for temporary roads along the TDR. The habitat was a stone wall and is associated with a dense WL1 hedgerow bordering the road. The stone wall was c. 2 m in height and was covered in ivy (*Hedera hibernica*) in parts.

This habitat type is considered to be of **Local Importance (higher value)** as it is essential in maintaining links and ecological corridors between features of higher ecological value.

6.4.2.1.4 BL3 - Buildings and Artificial Surfaces

The BL3 Buildings and artificial surfaces recorded within the proposed wind farm site is inclusive of the existing network of access tracks as well as a farm shed located in the north-east.

This habitat type is considered to be of Local Importance (lower value) as it is of some local importance for wildlife and has some local importance in maintaining habitat links.

6.4.2.1.5 FW2 - Depositing/Lowland River

A number of FW2 Depositing/lowland rivers were recorded throughout the proposed wind farm site. These watercourses are all within the Little Brosna_040 RWBs. Much of this watercourse has been modified, straightened and deepened. It has a bank height ranging from 1-1.5 m and bank width from 1-10 m. It had a normal water level and moderate flow. The main channel had

an average depth of 1.5 m. The river profile was 100% glide, with no evidence of riffle or pools present (Plate 6-2). It is heavily silted and evidence of bank trapping and erosion due to cattle access. It also contained filamentous algae in places, evidence of enrichment from local agricultural lands and forestry. Habitat was in moderate to good condition. It contains suitable habitat for fish and crayfish as well as foraging, commuting and resting habitat along the main channel.

The macrophyte species identified within these habitats include Branched bur reed (*Sparganium erectum*), Fools watercress (*Helosciadium nodiflorum*), Pondweed (*Lemna sp.*), *Potamogeton* spp., Lesser water-parsnip (*Berula erecta*), Water starwort (*Callitriche stagnalis*), Ivy leaved duckweed (*Lemna trisulca*), Common reed (*Phragmites australis*), Water mint (*Mentha aquatica*), Yellow water-lily (*Nuphar lutea),* Water forget me not (*Myosotis scorpioides*), Marsh Pennywort (*Hydrocotyle vulgaris*), Canadian waterweed (*Elodea canadensis*), Parrot's-feather (*Myriophyllum aquaticum*), and Marsh marigold (*Caltha palustris*).

The riparian vegetation present included dock (*Rumex obtusifolius*), Creeping thistle (*Cirsium arvense*), Meadow buttercup (*Ranunculus acris*), Canary grass (*Phalaris arundinacea*), Willowherb (*Chamaenerion angustifolium*), Meadowsweet (*Filipendula ulmaria*), Nettle (*Urtica dioica*), Bramble (*Rubus fruticosus*), Reed Canary-grass (*Phalaris arundinacea*), Bottle sedge (*Carex rostrata*), Purple loosestrife (*Lythrum salicaria*), White willow (*Salix alba*), and Cyperus sedge (*Carex pseudocyperus*)

This habitat type is considered to be of **Local Importance (higher value)** as a semi-natural habitat type with high biodiversity in a local context and it is essential in maintaining links and ecological corridors between features of higher ecological value.

Plate 6-2: FW2- Depositing/Lowland River Located within the Proposed Wind Farm Site

6.4.2.1.6 FW4 - Drainage Ditches

FW4 Drainage ditches were recorded throughout the proposed wind farm site. The drainage ditches bank height (on both sides) ranged between 1-2m, and the bank width ranging between 1-2.5 m. Typical characteristics of these drainage ditches constituted evidence of significant modification including deepening and straightening. These drains were heavily silted with slow to stagnant flow. While many drains were dry during surveying, a number of drains contained water (Plate 6-3). Most of the drainage ditches within the proposed wind farm site are interconnected, ultimately draining into the Little Brosna_040 RWB. The drains do not hold fisheries potential, and do not support habitat suitable for Otter or Crayfish to forage. However, they do provide commuting habitat for Otter. The drainage ditches are likely to provide suitable spawning habitat for Common frog and Smooth Newt.

The riparian vegetation with the drainage ditches included Common reed, Hedge bindweed (*Calystegia sepium*), willow, Gorse (*Ulex europaeus*), Willowherb (*Epilobium* sp.), Jointed rush (*Juncus articulatus),* Nettle, Horsetail (*Equisetum sp.*), Soft rush (*Juncus effusus*), Bramble, Honeysuckle (*Lonicera periclymenum*), Dog rose (*Rosa canina*), Birch *(Betula* spp.), Ling heather (*Calluna vulgaris*), Bog sedge (*Carex limosa*), Water mint, and Bracken (*Pteridium aquilinum*).

Macrophytes present within the drains included Fools watercress as well as two IAS (Section 6.2.6.2).

This habitat type is considered to be of **Local Importance (higher value)** it is essential in maintaining links and ecological corridors between features of higher ecological value.

Plate 6-3: Example of Drainage Ditches Located Throughout the Proposed Wind Farm Site

6.4.2.1.7 GA1 - Improved Agricultural Grassland

This habitat is the most commonly recorded habitat present in the proposed wind farm site Improved agricultural grassland includes intensively managed grasslands that have been reseeded and/or regularly fertilised.

The agricultural grasslands recorded within the proposed wind farm site are mainly used for light grazing/silage making and were being grazed by cattle (Plate 6-4). The grassland was dominated by Perennial ryegrass (*Lolium perenne*). Other species present included an abundance of Clover (*Trifolium repens*) Broadleaved dock (*Rumex obtusifolius*), Broadleaved plantain (*Plantago major*), Creeping bent (*Agrostis stolonifera*), Yorkshire fog (*Holcus lanatus*), Creeping thistle, Creeping buttercup (*Ranunculus repens*), Meadow buttercup (*Ranunculus acris*), Dandelion (*Taraxacum officinale agg.*), Ribwort plantain (*Plantago lanceolata*), Cocksfoot (*Dactylis glomerata*) and Hard rush (*Juncus inflexus)*, Nettle (*Urtica dioica*), Silverweed (*Potentilla anserina*), and Pineapple weed.

This habitat type is considered to be of Local Importance (lower value) as it is of some local importance for wildlife and has some local importance in maintaining habitat links.

Plate 6-4: Example of Improved Agricultural Land Throughout the Proposed Wind Farm Site

6.4.2.1.8 GS2 - Dry Meadows and Grassy Verges

The GS2 Dry meadows and grassy verges habitat was recorded in one location in the south-west of the proposed wind farm site, along a field margin. The dominant species present within the habitat was Yorkshire fog and there was also an abundance of Cocksfoot and Silverweed present. The habitat also contained occasional Willowherb, Horsetail, Meadow buttercup, Nettle, Bindweed, Willow, Birch, Vetch (Vicia *spp.*), Bramble, Germander speedwell (*Veronica chamaedrys*), Meadowsweet, and Herb Robert (*Geranium robertianum*) recorded as rare.

This habitat type is considered to be of Local Importance (lower value) as it is of some local importance for wildlife and has some local importance in maintaining habitat links.

6.4.2.1.9 GS4 - Wet Grassland

This habitat was recorded throughout the north-western, south-western, and south-eastern boundaries of the proposed wind farm site (Plate 6-5).

Some parcels of GS4 Wet grassland are species-poor and grazed by sheep and/or cattle. Poaching was noted in some locations. Drainage ditches are often present. Species recorded as frequent to abundant in these fields include: Soft rush, Creeping bent, Yorkshire fog, Rough meadow grass, Perennial ryegrass, Sweet vernal-grass (*Anthoxanthum odoratum*), Meadow buttercup, Yellow flag, Dock, Nettle, Silverweed, Meadow buttercup, Plantain, Meadowsweet, Creeping thistle, Spear thistle (*Cirsium vulgare*), Hard rush (*Juncus inflexus*). Occasionally recorded species within the habitat include: White clover, Creeping buttercup, Stitchwort (*Stellaria* spp.), Ragged robin (*Silene flos-cuculi*), Common marsh bedstraw (*Galium palustre*), Gorse, Hawthorn (*Crataegus monogyna*), Ash (*Fraxinus excelsior*), Oak (*Quercus* spp.).

Other GS4 Wet grassland parcels appear to be ungrazed or under-grazed with good species diversity. Some areas show signs of past flooding. These parcels are located in the south of the proposed wind farm site and host the population of Marsh Fritillary. The extent of devil's bit scabious within this habitat corresponds to the area identified as suitable Marsh Fritillary habitat. Evidence of flooding or waterlogging was noted locally.

Species recorded as locally dominant to abundant within these parcels include: Purple moor-grass (*Molinia caerulea*), Meadowsweet and Soft rush. Species recorded as frequent to occasional include: Timothy (*Phleum pratense*), Cocksfoot, Yorkshire fog, Reed canary-grass, *Fescue* spp., Sweet vernal-grass, Tufted hair grass (*Deschampsia cespitosa*), Soft rush, Meadow buttercup, Common marsh-bedstraw, Ladies bedstraw, Silverweed, Creeping thistle, Dock, Common valerian (*Valeriana officinalis*), Common sedge (*Carex nigra*), Birds-foot trefoil (*Lotus corniculatus*), Common sorrel (*Rumex acetosa*), Meadow vetchling (*Lathyrus pratensis*), Devil's-bit scabious (*Succisa pratensis*), Tormentil (*Potentilla erecta*), Meadow thistle (*Cirsium dissectum*), Lesser stitchwort (*Stellaria graminea*), Field woodrush (*Luzula camprestis*), Lousewort (*Pedicularis sylvatica*), Marsh cinquefoil (*Comarum palustre*), Purple loosestrife (*Lythrum salicaria*). Species recorded as rare within the habitat include: Oak, Yellow iris, Bramble, Gorse, Willow, Red clover (*Trifolium pratense*) and Germander speedwell.

GS4-Wet grassland is considered to be of **Local Importance (higher value)** as a semi-natural habitat type with high biodiversity in a local context, due to the presence of the Annex II Marsh Fritillary species within sections of the habitat.

Plate 6-5: Wet Grassland Habitat Located on the Boundaries of the Proposed Wind Farm Site

6.4.2.1.10 HD1 - Dense Bracken

This habitat is located within the centre of the proposed wind farm site. The vegetation height is approximately 1.5 m. This habitat has low species diversity. The dominant species present is Bracken (*Pteridium aquilinium*), with occasional Birch, Willow, and Ling heather (*Calluna vulgaris*) recorded throughout.

This habitat type is considered to be of Local Importance (lower value) as it is of some local importance for wildlife and has some local importance in maintaining habitat links.

6.4.2.1.11 HH1 - Dry Siliceous Heath

HH1 Dry siliceous heath is located along the north and north-eastern boundary (Plate 6-6). This habitat is located within an area of high bog surrounded by steep 1.5 m banks of exposed peat, with PB4 Cutover bog on one side and WN7 Bog woodland on the other. Historic drains boarder the HH1 Dry siliceous habitat. Encroachment of Birch and Bracken into the habitat was noted throughout the habitat and is indicative of drying.

The dominant species recorded within the habitat is Ling heather with an abundant Bilberry (*Vaccinium myrtillus*) throughout. Other recorded species recorded occasionally throughout include: Bog myrtle (*Myrica gale*), Gorse, Cross leaved heath (*Erica tetralix*), Scots pine (*Pinus sylvestris*), Bog rosemary (*Andromeda polifolia*) reindeer lichen (*Cladonia uncialis*), Peat mosses (*Sphagnum spp.*), and Common Tamarisk-moss (*Thuidium tamariscinum*).

HH1 Dry siliceous heath corresponds to the Annex I habitat type 4030 European dry heaths. The habitat is considered of **County Importance** as it corresponds to a habitat type listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of National importance (Table 6-5). The area of HH1 Dry siliceous heath is not considered viable, due to the limited extent of the habitat as well as the continued impacts from drainage and scrub encroachment.

Plate 6-6: Dry Siliceous Heath

6.4.2.1.12 PB1 - Raised Bog

A large expanse of PB1 Raised bog habitat was recorded across the northern and central sections of the proposed wind farm site (Plate 6-7).

The habitat comprised a relatively flat area of raised bog, with evidence of drainage throughout the habitat. Significant expanses of the PB1 Raised bog habitat has been harvested for turf. Turf cutting has evidently impacted the hydrology of the PB1 Raised bog with drying evident throughout, particularly along the margins. Encroachment into the habitat from Gorse, Birch, and Scots pine was noted.

The vegetation was dominated by Ling heather, Hare's-tail cottongrass (*Eriophorum vaginatum*), Reindeer moss (*Cladonia* spp.), and various Peat mosses (*Sphagnum* spp.), including Cow-horn bog-moss (*Sphagnum denticulatum)*, Acute-leaved bog-moss (*Sphagnum capillifolium)* and Feathery bog-moss (*Sphagnum cuspidatum)*. Frequently recorded species included Cross-leaved heath, Common cottongrass (*Eriophorum angustifolium*), Bog rosemary, Bog asphodel (*Narthecium ossifragum*), and Round-leaved sundew (*Drosera rotundifolia*). Occasional and rare species recorded within the habitat include Bell heather (*Erica cinerea*), Oak (*Quercus* spp.), Field woodrush, Lousewort (*Pedicularis sylvatica*), Purple moor-grass, Birch, and Bilberry (*Vaccinium myrtillus*).

As *Sphagnum* mosses form a dominant component of the vegetation composition, the PB1 Raised bog habitat is likely peat forming and active. As such, this habitat corresponds to the priority Annex I habitat 7110 *Active raised bog.

Given its continued persistence within the landscape, the Annex I habitat is considered to be a 'viable area', meaning the habitat is resilient to stochastic change such as climatic variation (NRA, 2009). However, turf cutting in the immediate vicinity constitutes an on-going threat to the extent and integrity of the habitat. The PB1 Raised bog habitat is valued as of **National Importance** as it is considered a viable area of priority Annex I habitat 7110 *Active raised bog.

Plate 6-7: PB1 Raised Bog Located in Centre of the Proposed Wind Farm Site

6.4.2.1.13 PB4 - Cutover Bog

An extensive area of PB4 Cutover bog was recorded in the north-west of the proposed wind farm site and a relatively smaller parcel in the south-east (Plate 6-8). The habitat is largely unvegetated with disturbed bare peat evident throughout resulting from mechanical turf cutting. Much of the habitat was in poor ecological condition, with extensive drainage networks and encroachment by scrub species. Regenerating vegetation was recorded in areas where harvesting has ceased, largely to the west and north. Typical species occurring in abundance include Common cottongrass, Purple moor-grass, Ling heather, and Bracken, with frequent occurrences of Cat's-ear (*Hypochaeris radicata*), Soft rush (*Juncus effusus*), and Birch. Occasional species included Yorkshire fog, Tormentil, Common sorrel, Cross-leaved heath, Gorse, Bog myrtle, Common sedge, and Jointed rush. Rare species recorded included Bog rosemary, Deer grass (*Trichophorum germanicum*), Scots pine, and Oak.

This habitat does not correspond to Annex I 7120 Degraded raised bogs still capable of natural regeneration given the on-going threat to the habitat from turf cutting as well as the current degraded condition and limited presence of peat-forming species.

Following best practice guidance on the valuation of geographic context peatlands in sub-optimal condition must not be undervalued particularly where they are still capable of supporting indicator species (CIEEM, 2018). As such, the habitat is considered of **Local Importance (higher value)** as a semi-natural habitat type with high biodiversity in a local context and populations of species that are uncommon in the locality.

Plate 6-8: Cutover Bog

6.4.2.1.14 WD1 - (Mixed) Broadleaved Woodland

Small parcels of WD1 (Mixed) broadleaved woodland was recorded in the north, west and south of the proposed wind farm site (Plate 6-9).

The plantation area in the west of the proposed wind farm site was dominated by semi-mature Sycamore (*Acer pseudoplatanus*) and the plantation to the south was dominated by semi-mature Ash (*Fraxinus excelsior*). Trees were a uniform height and arranged in rows. The understory of these parcels was dominated by Bramble and Nettle. The Ash plantation showed clear signs of decline, likely due to ash dieback disease (*Hymenoscyphus fraxineus*).

In contrast, the semi-natural woodland parcels in the north supported a more diverse canopy structure, with frequent occurrences of Ash, Willow, Birch, Hawthorn, Honeysuckle (*Lonicera periclymenum*), Elm (*Ulmus* spp.), Rowan (*Sorbus aucuparia*), Beech (*Fagus sylvatica*), Hazel (*Corylus avellana*), and Ivy (*Hedera helix*). The ground and understory layers were also more structurally and floristically diverse, with the presence of standing and fallen deadwood, contributing to habitat complexity and faunal potential. The woodland ranged in height from approximately 10 to 17 metres.

The WD1 (Mixed) broadleaved woodland habitat is considered of **Local Importance (Higher value)** as a habitat with semi-natural features, populations of species that are uncommon in the locality, and essential in maintaining ecological corridors between features of higher ecological value.

Plate 6-9: WD1 (Mixed) Broadleaved Woodland to the South of the Proposed Wind Farm Site

6.4.2.1.15 WD4 - Conifer Plantation

WD4 Conifer plantations occurred only to the north-west of the proposed wind farm site. The plantations consisted of semi-mature Sitka spruce (*Picea sitchensis*) reaching approximately 15 metres in height with a closed canopy. Due to dense shading and needle litter accumulation, ground flora was largely absent. The habitat is considered in poor ecological condition, with limited structural and species diversity.

This WD4 Conifer plantation is considered to be of **Local Importance** (Lower value) as a feature containing non-native species that are of some local importance to wildlife and some importance in maintaining habitat links.

6.4.2.1.16 WL1 – Hedgerows

Hedgerows were recorded within the northern and western sections of the proposed wind farm site. The majority of hedgerows were mature and dense, showing signs of active management. However, some sections contained gaps or were sparsely vegetated. Hedgerow height varied from approximately 1.5 to 4 metres, with occasional taller Ash and Beech trees present. Most hedgerows exhibited good structural diversity and supported a range of flowering and fruiting species, contributing to their ecological value (Plate 6-10).

The habitat was dominated by Hawthorn and Blackthorn (*Prunus spinosa*), with frequent occurrences of Hazel, Bramble, Elder (*Sambucus nigra*), Willow, Holly (*Ilex aquifolium*), Dogrose (*Rosa canina*), Ash, and Privet (*Ligustrum vulgare*). The understory was composed primarily of Nettle, Bracken, and Cleavers (*Galium aparine*).

WL1 Hedgerows are considered **Local Importance (higher value)** as features essential in maintaining links and ecological corridors between features of higher ecological value.

Plate 6-10: WL1 Hedgerow Within the Proposed Wind Farm Site

6.4.2.1.17 WL2 – Treelines

WI2 Treelines were largely confined to the northern and western sections of the proposed wind farm site (Plate 6-11). The habitat varied in condition from poor to good, with sections showing signs of active management, particularly along pasture edges, while other areas remained unmanaged and gappy. Structural diversity was generally good, with variation in canopy height and a well-developed shrub and ground layer.

The canopy was dominated by Ash and Oak, with abundant Hazel and Willow. Occasional species included Alder (*Alnus glutinosa*), Sycamore, Elder (*Sambucus nigra*), Birch, and Holly. The understory was dense and species-rich, comprising Cleavers, Bramble, Nettle, Dogrose, Guelder rose (*Viburnum opulus*), Honeysuckle (*Lonicera periclymenum*), Hawthorn, Willowherb, Blackthorn, and Ivy. Flowering and fruiting species such as Whitebeam (*Sorbus aria*), Elder, Holly, Bramble, Hazel, and Hawthorn were present throughout.

WL2 Treelines are considered **Local Importance (higher value)** as features essential in maintaining links and ecological corridors between features of higher ecological value.

Plate 6-11: Mature Gappy Treeline

6.4.2.1.18 WN1 - Oak-birch-holly Woodland

The WN1 Oak-Birch-Holly woodland parcels are located towards the centre and south- west of the proposed wind farm site. The woodland canopy ranged in height from approximately 12 to 15 metres and was moderately open, with a well-developed understory and ground layer. Standing and fallen deadwood was present throughout, contributing to structural diversity and faunal potential (Plate 6-12).

The habitat is dominated by Sessile oak (*Quercus petraea*), Birch (*Betula* spp.), and Holly, with an abundance of Bramble, Honeysuckle (*Lonicera periclymenum*), and Ivy in the understory. Frequent and occasional species recorded include Broad buckler fern (*Dryopteris dilatata*), Hazel, Ash, Rowan, Willow, Hawthorn, Elm, and Enchanter's nightshade (*Circaea lutetiana*).

Interrogation of the NPWS Ancient and Long-Established Woodland shows a parcel of this woodland located adjacent to the proposed access track between T7 and T10, indicating this parcel of semi-natural broadleaved woodland is a Long-established woodland which has been continuously wooded since 1830 and for which no evidence of antiquity could be found in older documentation (DoHLGH, 2010).The mapped locations of the WN1 Oak-Birch-Holly woodland parcels also correspond to the shapefiles for the National Survey of Native Woodlands 2003-2008 (DoHLGH, 2012).

The WN1 Oak-Birch-Holly woodland habitat exhibits several structural and floristic characteristics consistent with Annex I habitat type 91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles, including a significant portion of the canopy composed of Sessile oak, the soil being a peat substrate is naturally acid, there is good structural diversity with mature trees and gaps in the canopy allowing for regeneration, as well as a diversity of positive indicator species (Birch, Ivy, Hazel, Honeysuckle, Rowan) (Daly *et al.*, 2023). Several non-native negative indicator species were also identified including Sycamore, Beech, and European Larch (*Larix decidua*) (Daly *et al.*, 2023). As such, the presentation of this habitat within the proposed wind farm site corresponds to the Annex I habitat type 91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles.

Given the Long-established woodland status of the parcel located along the access track, between T7 and T10, it is likely that the mature parcels of WN1 Oak-Birch-Holly woodland within the proposed wind farm site meet the definition of a 'viable area' of Annex I habitat type 91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles, meaning the habitat is resilient to stochastic change such as climatic variation (NRA, 2009). As such, the WN1 Oak-Birch-Holly woodland is considered of **National Importance.**

Plate 6-12: WN1 Oak-Birch-Holly Woodland Located in the Centre of the Proposed Wind Farm Site

6.4.2.1.19 WN5 – Riparian Woodland

The WN5 Riparian woodland habitat is present along the northeastern boundary of the proposed wind farm site (Plate 6-13). The woodland reaches approximately 10 metres in height and is in moderate ecological condition. The canopy is dominated by Alder, with Willow occurring frequently throughout. The ground layer supports a mix of wetland and woodland species, including Meadowsweet, Bramble, Wild Angelica, Bindweed (*Convolvulus* spp.), and Common reed-grass. These ground layer species particularly the Meadowsweet, Wild Angelica and Common reed-grass indicate a degree of waterlogging or periodic flooding from the adjacent Little Brosna_040 RWB.

The area appears to have been planted, with an even age stand of trees occurring in regular rows and several small drains running throughout, suggesting a degree of past management. Despite this, the habitat retains key riparian features and supports a structurally diverse ground layer including positive indicator species such as Meadowsweet and Wild Angelica. As such, the habitat corresponds to the priority Annex I habitat type 91E0 *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae, Salicion albae*).

As no existing threats to the habitat were identified, the habitat is considered a 'viable area' of the priority Annex I habitat type 91E0 *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*). As such, the WN5 Riparian woodland habitat is considered of **National Importance**.

Plate 6-13: Riparian Woodland Located Along the Northeastern Border

6.4.2.1.20 WN7 - Bog Woodland

Parcels of WN7 Bog woodland is present throughout the proposed wind farm site, specifically along the margins of the PB1 Raised bog and PB4 Cutover bog habitats (Plate 6-14). Canopy height ranged from approximately 10 to 12 metres, with woodland structure varying from immature stands to more mature patches. The WN7 Bog woodland parcels were generally dry in character, with surface drains present within or along their margins.

The habitat is dominated by Downy Birch (*Betula pubescens*), with an abundance of Willow and Holly. Frequent and occasional species recorded include Gorse, Sessile oak, Rowan, Yew (*Taxus baccata*), Scots pine, Common haircap moss (*Polytrichum commune*), and locally abundant Hazel. The understory was dense and species-rich, comprising Bracken, Ivy, Bramble, Honeysuckle, Broad Buckler Fern, Bilberry (*Vaccinium myrtillus*) and Ling heather.

While the habitat shares some floristic elements with Annex I habitat type 91D0 Bog woodland, the definition of Annex I 91D0 Bog woodland is a woodland dominated by Downy Birch with at least >25% *Sphagnum* spp. cover (Daly *et al.,* 2023). As such, the parcels of WN7 Bog woodland within the proposed wind farm site do not meet the criteria for Annex I classification due to its dry condition and lack of any notable *Sphagnum* spp. cover.

The WN7 Bog woodland is considered to be of **Local Importance (higher value)** as a semi-natural habitat type with high biodiversity in a local context which is essential in maintaining links and ecological corridors between features of higher ecological value.

Plate 6-14: Bog woodland Located Within the Centre of the Proposed Project

6.4.2.1.21 WS1 – Scrub

Parcels of WS1 Scrub are located throughout the proposed wind farm site (Plate 6-15).

The habitat is largely established on areas of PB4 Cutover bog, with some WS1 Scrub transitioning to WN7 Bog Woodland. These areas are typically dry, and several contain surface drains or are bordered by drainage channels, which influence the hydrological character and limit the development of peat-forming vegetation.

The habitat is dominated by Willow, Gorse, and Birch, with an abundance of Bramble, Blackthorn, Ling heather, and Bracken throughout. Hazel and Ash were recorded occasionally. The understory is composed primarily of Bracken, with scattered pockets of Ling heather, and rare occurrences of notable species such as Spotted heath orchid (*Dactylorhiza maculata*), Lodgepole pine (*Pinus contorta*), and Lesser butterfly orchid (*Platanthera bifolia*). Vegetation height ranged from approximately 1 to 5 metres.

WS1 Scrub is considered to be of **Local Importance (Higher Value)** as a semi-natural habitat type with high biodiversity in a local context which is essential in maintaining links and ecological corridors between features of higher ecological value.

Plate 6-15: WS1 Scrub Located Throughout the Proposed Wind Farm Site

6.4.2.1.22 WS2 - Immature Woodland

One area of WS2 Immature woodland habitat was identified in the north-west of the proposed wind farm site. The area was previously felled conifer plantation, and natural regeneration has resulted in the establishment of immature broadleaved tree species. While the habitat supports native species, it remains limited in ecological complexity and species diversity.

The habitat is dominated by Birch, Willow, and Bracken with occasional Bramble and Scots pine present throughout. Vegetation height is approximately 2.5 metres, reflecting the early successional stage of the habitat (Plate 6-16).

The WS2 Immature woodland habitat is valued to be of Local Importance (Lower Value), as it is of some local importance for wildlife and has some local importance in maintaining habitat links.

Plate 6-16: Immature Woodland Present in the Northwestern Boundary of the Proposed Wind Farm Site

6.4.3 Flora

6.4.3.1 Protected Species

No plant species listed under the Flora Protection Order 2022 (FPO) were recorded within the proposed wind farm site during the TOBIN habitat surveys.

6.4.3.2 Invasive Alien Species

Two IAS which are listed on the Third Schedule (Part 1: Plants) of the S.I No. 477 European Communities (Bird and Natural Habitats) Regulations 2011 as amended and the First Schedule Regulations 2024 (S.I. 374 of 2024) are subject to legal restrictions under Regulations 49 and 50 were recorded during field surveys. The species were Parrot's-feather (*Myriophyllum aquaticum*) and Himalayan balsam (*Impatiens glandulifera*).

Their presence within the survey area is of ecological concern and should be addressed through appropriate management and control measures. The locations of these IAS are illustrated in Figure 6-5 and discussed in more detail below.

6.4.3.2.1 Parrots-feather

Parrot's-feather is listed on the Third Schedule of the S.I No. 477 European Communities (Bird and Natural Habitats) Regulations 2011 as amended and the First Schedule Regulations 2024 (S.I. 374 of 2024). It is considered a high risk IAS (NBDC, 2025c). This species was recorded at a single location within the proposed wind farm site in a drainage ditch c. 450 m from any proposed construction works (Plate 6-17). The drainage ditch discharges in the Little Brosna_040 RWB located c. 20 m downstream.

6.4.3.2.2 Himalayan Balsam

Himalayan Balsam is listed on the Third Schedule of the S.I No. 477 European Communities (Bird and Natural Habitats) Regulations 2011 as amended. It is considered a high-risk IAS (NBDC, 2025e). It was not recorded within the proposed wind farm site. Himalayan balsam was recorded at one location along the GCR route, located within a broadleaved woodland along the banks of the river Little Brosna (Plate 6-17). The broadleaved woodland contains approximately 15 immature stands of Himalayan Balsam, some of which were in flower.

Plate 6-17: Himalayan Balsam (Left Photo) and Dense Abundance of Parrot's-Feather (Right Photo)

7°57'36"W
7°56'4"W
7°54'32"W
53°2'36"N
53°1'18"N
603000
606000
697000
000002

N

R491
N62
N62
Sharavogue

Legend

Wind Farm Site Boundary

Infrastructure

Site Layout

Habitat

- BL3 - Buildings and artifical surfaces
- GA1 - Improved agricultural grassland
- GS2 - Dry meadows and grassy verges
- GS4 - Wet grassland
- WD1 - (Mixed) broadleaved woodland
- WD4 - Conifer plantation
- WS1 - Scrub
- BC1 - Arable crops
- FS1 - Reed and large sedge swamp
- HD1 - Dense bracken HH1 - Dry siliceous heath
- HH1 - Dry siliceous heath
- PB1 - Raised bog
- PB4 - Cutover bog
- WN1 - Oak-birch-holly woodland
- WN5 - Riparian woodland
- WN7 - Bog woodland
- WS2 - Immature woodland
- FW4 - Drainage ditches
- WL1 - Hedgerows
- WL2 - Treelines
- FW2 - Depositing/ lowaland rivers

0 500 1,000
Meters

Spatial Reference
Datum: IRENET95
EPSG: 2157

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Rev	Date	Description	By	Chkd.
D01	08/10/2025	Draft issue	K.K	J.D

Client: RWE

Project:

Ballincor Wind Farm

Title:

Figure 6-4a:
Habitats recorded within
the Proposed Project site

Scale @ A3: 1:18,000

Prepared by:	Checked by:	Date:
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Map Ref: 11333-023-HAB-P.App.BO-TOB-A

Draft: D01

7°59'20"W
7°51'48"W
53°4'48"N
706000
703000
700000
600000
603000
606000
609000

Legend

- Wind Farm Site Boundary

Infrastructure

- Proposed Grid Connection Route

Habitat

- BL3 - Buildings and artifical surfaces
- GA1 - Improved agricultural grassland
- GS4 - Wet grassland
- WD1 - (Mixed) broadleaved woodland
- WL1 - Hedgerows
- WL2 - Treelines

0 500 1,000
Meters

Spatial Reference
Datum: IRENET95
EPSG: 2157

Rev	Date	Description	By	Chkd.
D01	08/10/2025	Draft issue	K.K	J.D

Client: RWE

Project:
Ballincor Wind Farm

Title:
Figure 6-4b:
Habitats recorded within
the GCR

Scale @ A3: 1:30,000

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Map Ref: 11333-026-HAB-GCR-TOB-A

Draft: D01

7°50'20"W

8°24'W

Legend

- Wind Farm Site Boundary

Infrastructure

- Site Layout
- Proposed Grid Connection Route

Invasive Habitat

- Parrots feather
- Himalayan Balsam
- Canadian pondweed
- Canadian pondweed - Elodea canadensis

0 1 2
Kilometers

Spatial Reference
Datum: IRENET95
EPSG: 2157

Rev	Date	Description	By	Chkd.
D01	08/10/2025	Draft issue	K.K	J.D

Client: RWE

Project:

Ballincor Wind Farm

Title:

Figure 6-5:
Location of Invasive Non-Native Species

Scale @ A3: 1:40,000

Prepared by:	Checked by:	Date:
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Draft: D01

6.4.4 Fauna

6.4.4.1 Protected Mammal Species

6.4.4.1.1 Otter

Otters and their breeding and resting sites are protected under the Wildlife Act and are listed under Annex II and IV of the EU Habitats Directive. As part of the ecological surveys, all streams and drainage ditches within the proposed project ZoI were surveyed for signs of Otter activity.

Evidence of Otter presence was recorded at four locations within the ZoI of the proposed project, the location of each can be seen in Figure 6-6. Faded/past Otter prints were observed in soft mud near the water's edge of the Little Brosna_040 RWB, approximately 300 metres from turbine T8 (outside of the proposed project) (Plate 6-18). Otter spraint was recorded on a large boulder along the northwestern boundary, located on the banks of the Little Brosna_040 RWB, approximately 670 m from turbine T4 (outside of the proposed project). Additional spraint was identified along the Brosna_040 RWB, approximately 300 m northeast of turbine T2 (within the proposed project).

In 2022, a potential Otter holt was identified along a drainage ditch connected to the Little Brosna_040 RWB, located approximately 80 m from an access track between T7 to T10. The feature consisted of a deep hole in peaty soil with clear access to nearby water (Plate 6-19). At the time of the initial survey, the holt was noted as inactive, and subsequent visits in 2023, 2024 and 2025 confirmed that it remained inactive.

The Little Brosna_040 RWB within the proposed wind farm site provides suitable habitat for foraging, commuting, and resting. It is also likely that Otters utilise all connected streams and rivers hydrologically linked to the proposed wind farm site for movement and feeding. As a species listed in Annex II and Annex IV of the Habitats Directive, Otter is assessed to be of **Local Importance (higher value)**.

Plate 6-18: Otter Paw Prints Located Along the Banks of the Little Brosna_040 RWB

Plate 6-19: Inactive Potential Otter Holt Located Along the Drainage Ditch Connected to the Little Brosna_040 RWB Within the Centre of the Proposed Wind Farm Site

6.4.4.1.2 Badger

Badger (*Meles meles*) and their setts are protected under the Wildlife Act. Evidence of Badger activity was recorded throughout the proposed wind farm site and within the ZoI, including signs such as setts, paw prints, latrines, and snuffle holes.

A main sett was recorded to the north of the proposed wind farm site within a small area of bog woodland on high bog located outside of the site boundary approximately 200 metres from the nearest turbine T2 and 220 m from the BESS. This sett contained seven entrances. At the time of the 2023 survey, it was inactive, with several entrances disused and no recent signs of activity such as tracks or bedding material observed (see Plate 6-20). Another main sett was identified within the southeast of the site approximately 95 m southeast of the nearest turbine T8. This sett comprised 13 entrances, some of which had collapsed, while others were filled with debris or overgrown with vegetation. This sett was also inactive at the time of first recording in 2022 and remained inactive in subsequent visits in 2023 and 2024.

A subsidiary sett was recorded along the eastern boundary, containing three entrances. No signs of recent activity were observed. Another subsidiary sett was located along the western boundary, comprising four entrances, one partially collapsed and the remaining three filled with debris, indicating inactivity.

Two outlier setts were also recorded. One was located along the northeastern boundary (640 m southeast of T8) and consisted of a single entrance with sticks and debris present outside. The second was situated on the western boundary (267m north of T5) and contained two entrances, both showing signs of disuse, including cobwebs and debris in the entrances.

Although all setts recorded were inactive at the time of survey, the presence of multiple sett types and field signs suggests that Badgers use the proposed wind farm site for resting, foraging, and commuting. The local Badger population is therefore assessed to be of **Local Importance (Higher Value)**.

Plate 6-20: Main Badger Sett Located Within Bog Woodland

6.4.4.1.3 Other Mammal Species

A range of other mammal species was recorded within the proposed wind farm site (see figure 6-6).

Pine marten (Martes martes) is listed under Annex V of the EU Habitats Directive and protected under the Wildlife Act 1976 (as amended). The species was recorded via trail camera footage and scat both within and adjacent to the red line boundary of the proposed wind farm site. The species is likely to be sparsely distributed across the proposed wind farm site, primarily confined to areas of woodland and conifer plantation where suitable cover and foraging opportunities exist.

Irish hare (*Lepus timidus hibernicus*) was recorded on numerous occasions during dedicated surveys and incidental observations. The species appears to be widely distributed throughout the proposed project area, utilising open habitats and transitional zones.

Other mammal species considered likely to occur within the site include Rabbit (*Oryctolagus cuniculus*), Irish stoat (*Mustela erminea*), Pygmy shrew (*Sorex minutus*), and Hedgehog (*Erinaceus europaeus*). This assumption is based on their widespread distribution in Ireland and the presence of suitable habitat types within the project area.

The population of other mammals within the proposed wind farm site is assessed to be of **Local Importance (Higher Value)**.

6.4.4.1.4 Bats

All bat species in Ireland are protected under the Wildlife Act and under Annex IV of the EU Habitat Directive, except for Lesser Horseshoe Bat which is also protected under EU Habitat Directive Annex II. A specialist bat report was carried out by Ecology Ireland and O'Donnell Environmental (See Figure 6-2).

Passive static ultrasonic detector surveys were carried out at the proposed wind farm site from summer 2024 to spring 2025 to record bat activity in the area, from which information on species composition, relative abundance and landscape usage could be derived. The surveys were carried out from 11 monitoring locations and these were based on the turbine layout.

A total of 9 bat species were recorded (possibly ten as Whiskered Bats and Brandt's Bats are indistinguishable through ultrasonic detection). Bat species recorded by static detectors included:

- Soprano pipistrelle (*Pipistrellus pygmaeus*).
- Common pipistrelle (*Pipistrellus pipistrellus*).
- Nathusius pipistrelle (*Pipistrellus nathusii*).
- Brown long-eared bat (*Plecotus auritus*).
- Leisler's bat (*Nyctalus leisleri*).
- Whiskered bat (*Myotis mystacinus*).
- Daubenton's bat (*Myotis daubentoniid*).
- Natterer's bat (*Myotis natterer*i).
- Whiskered or Brant's bat (*Myotis* spp.).

Surveys in spring, summer, and autumn 2024 and spring 2025 recorded moderate to high bat activity at the site.

- Common Pipistrelle and Soprano Pipistrelle were the dominant species, showing the highest levels of activity. Common Pipistrelle activity was high at six locations in both summer and autumn 2024, with a peak of 1,178.71 registrations per night at T5 in autumn 2024. Soprano Pipistrelles showed high activity at three summer locations and one autumn site.
- Leisler's Bat showed moderate activity at several locations in summer and autumn.
- Overall, 158,472 was the total count of registrations recorded in 2024. The highest activity occurred in autumn at T5 (peak = 3,967 registrations, 2,338.86 nightly average), while the lowest was at T2 in spring 2025 (45.85 nightly average).
- Three species made up the majority of registrations:
    - Common Pipistrelle (50.5%).
    - Soprano Pipistrelle (35.1%).
    - Leisler's Bat (9.5%).
- Other species (Natterer's Bat, Brown Long-eared Bat, Whiskered Bat/Brant's Bat, Daubenton's Bat, Nathusius' Pipistrelle, and *Myotis* sp.) each contributed less than 2% and were not present at all sites or seasons.

All monitoring locations (within 15 m of turbines) were considered representative of site habitats. The dominant species are common, widespread in Ireland, and generalist foragers, though typically avoid peatlands.

Additional to the passive static surveys, a potential roost assessment was also conducted at the proposed wind farm site, the proposed GCR to Dallow 110kV Substation and along the proposed TDR.

Within the proposed wind farm site, 18 trees were classified as potential roost features for individual bats (PRF-I) and one as potential roost feature of a maternity colony (PRF-M). In addition, potential roost features were assessed within 300 m of turbine locations (see Appendix 6-2). A desk study of EPA data identified 13 potential roosting sites, with four structures identified during walkovers as having roost suitability. Of these, three buildings were considered to have high roost potential, while one was classed as low suitability and one structure no longer exists

Along the GCR route, two PRF-I trees were recorded. Of the nine bridges/culverts assessed, four were classed as having low roosting suitability and five as negligible suitability. Evidence of bat use was confirmed at bridge crossing an un-named stream approximately 800 m from Riverstown county Tipperary, where faecal samples were collected and DNA analysis verified the presence of Brown Long-eared Bat.

The TDR for the proposed project extends from Foynes Port to the site, primarily along existing roads. A total of 27 points of interest were identified where facilitation works are required; elsewhere, turbine transport is not expected to create impacts beyond normal road usage.

A visual inspection of PRFs along sections of the route where works are proposed was undertaken. Motorway and national road sections, where no works are required, were excluded. The works' zone of influence is highly localised and temporary, confined to the immediate footprint of the interventions. Vegetation clearance, trimming, and tree removal will be necessary at 14 points of interest.

Taking into account the results of surveys described in this report, the modified nature of the site resulting from turbary, forestry, and agricultural management, general lack of roosting opportunities and considering its local context, the study site is considered to be of **Local Importance (Higher Value)** for bats and their roosts.

6.4.4.2 Herpetofauna Species

6.4.4.2.1 Common Frog

Common Frog and its breeding sites are protected under the Wildlife Act and listed under Annex V of the EU Habitats Directive. A live sighting of Common Frog was recorded along the northwestern boundary of the proposed wind farm site, within an area of agricultural grassland. Although no breeding sites were identified during the survey, the presence of this species indicates suitable terrestrial habitat within the site.

The Common Frog population within the proposed project area is assessed to be of **Local Importance (Higher Value)**.

6.4.4.2.2 Alpine Newt

Alpine Newt (*Ichthyosaura alpestris*), native to continental Europe, was first recorded in Ireland in 2022 by Herpetological Society of Ireland (HSI). There are currently 15 records of this species in five different locations in Co Offaly, Co Tipperary and Co Down. This species was also recorded in 2022 during a TOBIN ecological survey of the proposed project.

An eDNA sampling survey was carried out on 27th August 2024 to detect its presence out at five survey sites both within and upstream of the proposed project to detect the presence of Alpine Newt (the locations of these sites can be seen in Figure 6-2). The surveyed site lies within one of two known areas for this species to occur in Ireland according to the NBDC[9].

The number of replicates that show a positive result may indicate a lower or higher amount of eDNA presence in the water body. However, even a score as low as 1/12 is a positive result indicating species present. A negative result, where eDNA is not detected or is present below the threshold of detection, should be interpreted with caution. A negative result does not necessarily confirm species absence, as the species may still be present below the limit of detection.

Samples were collected at five sites across the Little Brosna_040 RWB and an unnamed bog channel.

An overview of the eDNA laboratory analysis results is provided in Table 6-11. Results show that at Site 12, the stagnant bog channel where Alpine Newt was first recorded, there was a strong positive result with all twelve replicates positive. Site 6, 7 and 8 also tested positive. Site 3 showed a negative result.

[9] Maps - Biodiversity Maps (biodiversityireland.ie)

Table 6-11: Alpine Newt eDNA Results

Corresponding Aquatic sampling Site Number	Result	Positive Replicates (Out of 12)
3	Negative	0
6	Positive	5
7	Positive	5
8	Positive	6
12	Positive	12

Given the species' limited distribution, confirmed presence on site, and protected status under the Bern Convention (Annex III), but also considering its non-native origin and lack of national conservation prioritisation, the Alpine Newt population within the proposed wind farm site has been considered as **Local Importance (Lower Value).**

6.4.4.2.3 Common Lizard

Common lizard, a species often found on peatlands and open areas, has been recorded on a number of occasions during the surveys, in bog habitat to the north and centre of the proposed wind farm site, and is likely to be widespread throughout the site. The species is protected under the Wildlife Acts.

The local common lizard population was assessed as being **Local Important (Higher Value).**

6.4.4.3 Insects and Lepidoptera Species

6.4.4.3.1 Marsh Fritillary

Marsh Fritillary is a widespread but locally distributed butterfly species in Ireland, occurring where suitable habitat for its food plant Devil's-bit scabious (*Succisa pratensis*) occurs. Although the species is widespread its distribution is patchy but can be common in optimal conditions. The species is listed as vulnerable on the Red List of Irish Butterflies (Regan *et al.,* 2010) due to ongoing habitat loss and degradation. It is protected under Annex II of the EU Habitats Directive, which requires the designation of Special Areas of Conservation (SACs) for its habitat.

Within the proposed wind farm site, suitable habitat was recorded at two locations along the eastern boundary. The first location supported several Devil's-bit scabious plants and contained six active Marsh Fritillary larval webs. The second location also supported Devil's-bit scabious, but only one active larval webs was recorded in this area.

According to Article 17 reporting, a meaningful estimate for the population size of Marsh Fritillary is largely unfeasible and unlikely to ever be produced due to the biology of the species (NPWS, 2019). It is estimated at 705 occupied 1 km^2 grid squares (NPWS, 2019). The population of Marsh Fritillary mapped within the proposed wind farm site extends over two 1 km^2, (S0596 and S0497) and as such this population likely represents a fraction of the national population (0.3%). Following best guidance on ecological valuation, to be considered of county importance, a Marsh Fritillary population must represent 1% of the county population, which based on 705 nationally occupied grid squares across 32 counties, equates to approximately five occupied 1

km^2 grid squares (NRA, 2009). As such, the population of breeding Marsh Fritillary identified within the proposed wind farm site is assessed to be of **Local Importance (higher value)**.

Plate 6-21: Marsh Fritillary Caterpillars in Web on Devil's-bit Scabious

6.4.4.4 Aquatic Ecology

6.4.4.4.1 Biological Water Quality

Macroinvertebrate sampling was undertaken at four out of the 12 aquatic survey sites. The macroinvertebrate communities recorded at survey sites comprised of a range of macroinvertebrate taxa. Of the four sites sampled, the target of Q4 unpolluted water was not achieved at any of the sampling sites. Site 1 received a Q3-Q4 status, slightly polluted water. Sites 3 and 10 received a Q3 status of moderately polluted water due to the paucity of pollution sensitive taxa, as well as the degree of siltation (considerable) and algal growth (luxuriant). Site 11 received a Q2 status, a site dominated by Group D taxa (Table 6-12).

The current survey results indicate that the overall biological water quality in the watercourses draining the Proposed wind farm site is poor and moderately polluted. The sampled watercourses do not provide water of a quality adequate to support a range of pollution sensitive mayfly and stonefly larvae, as well as salmonids. Full details of the biological water quality results can be found in Appendix 6-3.

Table 6-12 Biological Water Quality and Interpretations at Study Sites on Watercourses Draining the Proposed Project

Site	Q-value	WFD Ecological Status
1	3-4	Moderate status (Slightly Polluted)
3	3	Poor status (Moderately Polluted)
10	3	Poor status (Moderately Polluted)
11	2	Bad status (Seriously Polluted)

6.4.4.4.2 Protected Aquatic Species

6.4.4.4.2.1 Atlantic Salmon

An appraisal of suitable salmonid spawning and nursery habitat was carried out at all aquatic survey sites (with the exception of site 12) whereby spawning gravels, riffles and holding pools providing suitable nursery and spawning habitat was noted. While no Atlantic salmon were recorded during electrofishing surveys of the proposed project, likely due to channel modification and the influence of surrounding habitat (i.e. agriculture and forestry), as previously stated there are records for Atlantic salmon in the Little Brosna sub catchment, and in the Little Brosna_040 RWB (Section 6.4.1.5.3). Refer to Appendix 6-3 for full details.

As a species listed on Annex II of the Habitats Directive, Atlantic salmon are assessed as of **Local Importance (Higher value)**; downstream effects are considered.

6.4.4.4.2.2 White-clawed Crayfish

A habitat assessment and manual search was carried out at all accessible sites for the presence of white-clawed crayfish. No white-clawed crayfish were recorded present at any of the sites, nor were any white-clawed crayfish captured during kick sampling or electrofishing surveys. No evidence of crayfish carapace or claw remains were recorded on the riverbanks or bridge ledges in the form of otter scat or remains from predation. Suitable habitat to potentially support crayfish were recorded at Site 1, Site 4 and Site 10 where refuge and detritus were present with moderate water quality.

As White-clawed crayfish have not previously been recorded in any of the watercourses within or downstream of the proposed wind farm site. This species is not expected to occur in the other watercourses draining the proposed wind farm site, considering the siliceous underlying geology. As such, the species will not be considered further. Refer to Appendix 6-3 for full details.

6.4.4.4.2.3 Lampreys Species

A total of two lamprey were captured across the survey area, at Site 7 during electrofishing surveys. The lamprey were 7cm and 14cm in length. Overall, there was a lack of suitable lamprey habitat within the proposed project (e.g. poor spawning ground, lack of silt habitat) likely due to the modification of the watercourse channels and potential barriers to migrations. The moderate flowing low gradient nature of watercourses in the study area provided suitable conditions for lamprey larvae, which require soft substrates into which they can burrow. Suitable silt habitat was recorded present at Sites 1, 6, 7 and 9. An area of 1 m^2 of each of these sites were surveyed for lamprey. Lamprey were only detected within the proposed wind farm site. Refer to Appendix 6-3 for full details.

As species listed on Annex II of the Habitats Directive, Brook lamprey and River lamprey are assessed as of **Local Importance (Higher value).**

6.4.4.4.3 Freshwater Pearl Mussel

A broad appraisal/overview of the upstream and downstream habitat at each aquatic survey site was undertaken to evaluate the wider contribution to FWPM and the potential for this species to be present within the proposed wind farm site. Based on the general riverine habitat, topography, low gradient, substrate, water quality and surrounding habitat it was determined that the Little Brosna Catchment does not contain suitable habitat. No FWPM were recorded during aquatic surveys for the proposed project.

This species will not be considered further in the assessment as the Study Area is not located within the FWPM Sensitive Area, indeed Article 17 spatial data shows their complete absence within the catchment (NPWS, 2025).

6.4.4.4.4 European Eel

No European eel were recorded at any of the electrofishing sites. The watercourses within the proposed wind farm site offered sub optimal eel habitat given the presence of minimal in-stream refugia such as large boulders and cobble, and the majority lacking large woody vegetation and macrophyte beds which offer vital diurnal refugia for eel populations (Laffaille *et al.,* 2003). It was determined that the main channel of the Little Brosna_040 RWB likely serves more as a migratory pathway for European eel than for foraging and nursery habitats. Refer to 0 for full details.

As species listed on Annex II of the Habitats Directive, European eel is assessed as of **Local Importance (Higher value).**

6.4.4.4.5 Electrofishing Survey Results

A total of 27 fish of five species were recorded during the electrofishing surveys, brown trout (*Salmo trutta*) (n=10), three-spined stickleback (*Gasterosteus aculeatus*) (n= 11), nine-spined stickle back (*Pungitius pungitius*) (n=2), lamprey (*Lampetra* sp,) (n=2) and stone loach (*Barbatula barbatula*) (n=2). The lengths of the fish caught during the electrofishing can be seen in Appendix 6-3. The overall results of fish caught at each site is presented in Table 6-13 below.

Table 6-13 Results of Fish Species and Quantity Recorded at Each Site During Electrofishing Surveys

Site No.	1	4	6	7	8	9	Total
Brown trout	0	7	0	3	0	0	10
Three-spined stickleback	4	3	0	0	0	4	12
Nine-spine stickleback	0	0	0	0	0	2	1
Lamprey spp.	0	0	0	2	0	0	2

Site No.	1	4	6	7	8	9	Total
Stone loach	2	0	0	0	0	0	2

Three-spined stickle back were the most abundant species recorded during electrofishing surveys, with a total of 12 individuals captured at three out of the six sites (50%), followed by brown trout (two sites; 33%), lamprey sp., stone loach and nine-spined stickleback (all only recorded at one site; 16%). The highest number of three-spined stickle back were captured at Site nine. The highest number of brown trout were captured at Site 4. Plate 6-22 provide examples of fish species caught during the survey.

Site 4 had the highest abundance of fish species (n=10), followed by Site 1 (n=6) and Site 7 (n=7). No fish were present in Site 6 or Site 8. Brown trout were recorded at Site 4 and Site 7 and notably absent from Site 1, 6, 8 and 9. Brown trout ranged in length from 4.4cm to 29.8cm. Brown trout in the length range 5.5cm – 7cm are considered 0+ (age in years) fish, 7.5cm - 9cm are deemed 1+ fish, while those in the 9cm – 12cm division are likely 2+ group juveniles. Three cohorts of brown trout are apparent in this population of fish, 0+, 2+ and 3+. These represent the juvenile fish from adults that have spawned in these watercourses likely in 2023-24, 2021-22 and 2019-20 winter seasons. There is an absence of the 1+ cohort from the survey. This could be attributed to a number of factors including lower spawning activity in the earlier 2022-23 season but more likely it is linked to predation and natural mortalities. Refer to 0 for full details.

As species listed on Annex II of the Habitats Directive, Brown trout is assessed as of **Local Importance (Higher value).**

As species protected under the Wildlife Act 1976 (as amended) Stone loach, Three-spined stickleback and Nine-spine stickleback are all assessed as of **Local Importance (Higher value).**

Plate 6-22: Brown Trout (Left) and Lamprey Sp., (Right) Recorded at Site 7

Legend

- Wind Farm Site Boundary

Infrastructure

- Site Layout

Species

- Common Lizard
- Common frog
- Fox
- Irish Hare
- Pine Marten
- Pine marten
- Red fox
- Otter Activity
- Marsh Fritilary
- Badger Activity
- Marsh Fritilary Area

0 200 400
Meters

Spatial Reference
Datum: IRENET95
EPSG: 2157

Rev	Date	Description	By	Chkd.
D01	08/10/2025	Draft issue	K.K	J.D

Client: RWE

Project:

Ballincor Wind Farm

Title:

Figure 6-6a
Observations of fauna recorded within the proposed project site
(excluding birds, bats and aquatic species)

Scale @ A3: 1:11,000

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Map Ref: 11333-025-SPE-HAB-TOB-A_Fig_6.6a

Draft: D01

Legend

- Wind Farm Site Boundary

Infrastructure

- Site Layout

Species

- Common Lizard
- Common frog
- Fox
- Irish Hare
- Pine Marten
- Pine marten
- Red fox
- Otter Activity
- Marsh Fritilary
- Badger Activity
- Marsh Fritilary Area
- Proposed Grid Connection Route

0 200 400
Meters

Spatial Reference
Datum: IRENET95
EPSG: 2157

Rev	Date	Description	By	Chkd.
D01	08/10/2025	Draft issue	K.K	J.D

Client: RWE

Project:

Ballincor Wind Farm

Title:

Figure 6-6b
Observations of fauna recorded within the proposed project site
(excluding birds, bats and aquatic species)

Scale @ A3: 1:9,000

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Draft: D01

6.5 SUMMARY OF ECOLOGICAL EVALUATION

Following a review of the existing environment present above, KERs within the ZoI of the proposed wind farm site were evaluated in accordance with the evaluation criteria set out in Table 6-5 and Table 6-6. Consideration of the existing baseline condition, population stability, conservation status, rarity and legal protection of the KERs was undertaken. A summary of the ecological valuation and identification of KERs is provided in Table 6-14.

In line with the NRA guidance (NRA 2009), identified ecological features which are assessed as Local Importance (lower value) are not selected as KERs.

Table 6-14: Evaluation of Key Ecological Receptors for Protected Sites

Site/Feature	NRA (2009) Ecological Value	KER	Rational for Inclusion as KER
Designated Sites			
Sharavogue Bog SAC (000585)	**International**	**Yes**	**Yes – There is a viable pathway via hydrogeological, hydrological and/or physical connectivity between these SACs and the proposed project**
River Shannon Callows SAC (000216)	**International**	**Yes**	
All other European sites	International	No	No source-pathway-receptor links exist between the proposed project other European sites (see the NIS [Appendix 6-1] for more detail).
National sites			
River Little Brosna Callows NHA (000564)	**National**	**Yes**	**Yes – There is a viable pathway via hydrogeological, hydrological and/or physical connectivity between these SACs and the proposed project**
Sharavogue Bog pNHA (000585)	**National**	**Yes**	
Dovegrove Callows pNHA (000010)	**National**	**Yes**	
River Shannon Callows pNHA (000216)	**National**	**Yes**	
All other National Sites	National	No	No source-pathway-receptor links exist between the proposed project and other National sites.

Table 6-15: Evaluation of Key Ecological Receptors for Habitats

Fossitt Habitat and code	NRA (2009) Ecological Value	KER	Rational for KER determination
BC1 - Arable Crops	Local Importance (lower value)	No	This habitat type is dominated by non-native species that are of some importance in maintaining habitat links.
BC2 –Horticultural land	Local Importance (lower value)	No	This habitat type is dominated by non-native species that are of some importance in maintaining habitat links.
BL3 - Buildings and artificial surfaces	Local Importance (lower value)	No	This habitat type is considered to be of Local Importance (lower value) as it is of some local importance for wildlife and has some local importance in maintaining habitat links.
FW2 – Depositing/ lowland rivers	**Local Importance (Higher value)**	**Yes**	**This habitat type is considered to be of Local Importance (higher value) as a semi-natural habitat type with high biodiversity in a local context and it is essential in maintaining links and ecological corridors between features of higher ecological value.**
FW4 - Drainage ditches	**Local Importance (Higher value)**	**Yes**	**This habitat type is considered to be of Local Importance (higher value) as a semi-natural habitat type with high biodiversity in a local context and it is essential in maintaining links and ecological corridors between features of higher ecological value.**
GA1 - Improved agricultural grassland	Local Importance (Lower value)	No	This habitat type is considered to be of Local Importance (lower value) as it is of some local importance for wildlife and has some local importance in maintaining habitat links.
GS2 - Dry meadows and grassy verges	Local Importance (Lower value)	No	This habitat type is considered to be of Local Importance (lower value) as it is of some local importance for wildlife and has some local importance in maintaining habitat links.
GS4 - Wet grassland	**Local Importance (Higher value)**	**Yes**	**This habitat is considered to be of Local Importance (higher value) as a semi-natural habitat type with high biodiversity in a local context, due to the presence of the Annex II Marsh**

Fossitt Habitat and code	NRA (2009) Ecological Value	KER	Rational for KER determination
			Fritillary species within sections of the habitat.
HD1 - Dense bracken	Local Importance (Lower value)	No	This habitat type is considered to be of Local Importance (lower value) as it is of some local importance for wildlife and has some local importance in maintaining habitat links.
HH1 - Dry siliceous heath	**County Importance**	**Yes**	**The habitat is considered of County Importance as it corresponds to Annex I habitat type 4030 European dry heaths but does not fulfil the criteria for valuation as of National importance**
PB1 – Raised Bog	**National Importance**	**Yes**	**This habitat is valued as of National Importance as it is considered a viable area of priority Annex I habitat 7110 *Active raised bog.**
WD1 - (Mixed) broadleaved woodland	**Local Importance (Higher value)**	**Yes**	**This habitat is considered of Local Importance (Higher Value) as a habitat with semi-natural features, populations of species that are uncommon in the locality, and essential in maintaining ecological corridors between features of higher ecological value.**
WD4 - Conifer plantation	Local Importance (lower value)	No	This habitat is considered to be of Local Importance (Lower Value) as a feature containing non-native species that are of some local importance to wildlife and some importance in maintaining habitat links.
WL1 - Hedgerows	**Local Importance (higher value)**	**Yes**	**WL1 Hedgerows are considered Local Importance (higher value) as features essential in maintaining links and ecological corridors between features of higher ecological value.**
WL2 - Treelines	**Local Importance (higher value)**	**Yes**	**Treelines generally supports large numbers of invertebrates, birds and mammals. Treelines will be potentially impacted along the GCR route.**
WN1 - Oak-birch-holly woodland	**National Importance**	**Yes**	**This habitat is considered of National Importance as a viable area of Long-established woodland corresponding to Annex I habitat type 91A0 Old**

Fossitt Habitat and code	NRA (2009) Ecological Value	KER	Rational for KER determination
			sessile oak woods with Ilex and Blechnum in the British Isles.
WN5 - Riparian woodland	National Importance	Yes	the habitat is considered of National Importance as a viable area of the priority Annex I habitat type 91E0 *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*).
WN7 - Bog woodland	Local Importance (higher value)	Yes	The habitat is considered to be of Local Importance (higher value) as a semi-natural habitat type with high biodiversity in a local context which is essential in maintaining links and ecological corridors between features of higher ecological value.
WS1 - Scrub	Local Importance (higher value)	Yes	The habitat is considered to be of Local Importance (higher value) as a semi-natural habitat type with high biodiversity in a local context which is essential in maintaining links and ecological corridors between features of higher ecological value.
WS2 - Immature woodland	Local Importance (Lower value)	No	This habitat is considered to be of Local Importance (Lower Value) as a feature containing non-native species that are of some local importance to wildlife and some importance in maintaining habitat links.

Table 6-16: Evaluation of Key Ecological Receptors for Fauna

Species	NRA (2009) Ecological Value	KER	Rational for Inclusion as KER
Otter	International Importance	Yes	Otter are likely to occur within the ZoI of the proposed project. There is potential for the works to cause visual and noise disturbance to this species. There is also potential to impact indirectly via potential impacts to surface water which may decrease food availability.
Badger	Local Importance (Higher Value)	Yes	Signs of Badger activity were recorded during the survey of the proposed wind farm site and during the desktop study.

Species	NRA (2009) Ecological Value	KER	Rational for Inclusion as KER
			There is potential to impact on this species.
Other mammals	Local Importance (Higher Value)	Yes	Locally important populations of Red fox, Pine marten, Rabbit, Hare, Red Squirrel, Irish Stoat, Hedgehog and Pygmy Shrew, which are protected under Annex IV of EU Habitats Directive and/or under the Wildlife Acts were recorded at the site.
All bat species recorded onsite and their potential roosts	Local Importance (Higher Value)	Yes	Locally important populations of bat species protected under Annex IV of EU Habitats Directive and under the Wildlife Acts were recorded at the site. Potential for impacts to the local bat population.
Common Frog	Local Importance (Higher Value)	Yes	Common Frog was recorded during the desktop study and throughout the southern part of the proposed wind farm site mostly within forestry drainage ditches which is common breeding habitat. There is potential to impact on this species.
Non-native invasive Amphibian species Alpine Newt	Local Importance (Lower Value)	No	Alpine Newt was recorded during the desktop study and survey, and suitable habitat was recorded (drainage ditches) within the proposed wind farm site.
Common Lizard	Local Importance (Higher Value)	Yes	Common Lizard was recorded during the desktop study and during the field survey, suitable habitat (heathland and stonewalls) was also recorded within the proposed wind farm site. There is potential to impact on this species.
Marsh Fritillary	Local Importance (Higher Value)	Yes	Larval webs and suitable habitat was present within the proposed project. There is potential to impact on this species.
Atlantic Salmon	Local Importance (Higher Value)	Yes	Potential for indirect effects to Atlantic Salmon located downstream of the proposed project.
River Lamprey/ Brook Lamprey	Local Importance (Higher Value)	Yes	Potential for indirect effects to Lamprey located within the proposed wind farm site and downstream.

Species	NRA (2009) Ecological Value	KER	Rational for Inclusion as KER
European eel	Local Importance (Higher Value)	Yes	Potential for indirect effects to European eel located within the proposed wind farm site and downstream.
Brown Trout	Local Importance (Higher Value)	Yes	Potential for indirect effects to Brown Trout located within the proposed wind farm site and downstream.
Other Fish species	Local Importance (Higher Value)	Yes	Potential for indirect effects on fish species including Roach, Nine-spiked stickleback, Three-spiked stickleback, downstream of the proposed project.

6.6 Assessment of Effects

The following sections present the assessment of likely significant effects on biodiversity within the Zone of Influence (ZoI) of the proposed project, covering the construction, operational, and decommissioning phases. The likely significant effects described in this section are the ecological impacts predicted due to the proposed project prior to the consideration of any appropriate mitigation measures. As per the NRA (2009) guidance, likely significant effects have only been assessed for KERs as listed in Table 6-14, Table 6-15, and Table 6-16 with an ecological value higher than 'Local Importance (lower value)'. Section 6.8 on residual effects describe likely effects that remain after all impacts and mitigation measures are considered.

6.6.1 Do Nothing - Future Baseline

If the proposed project does not take place the existing baseline conditions detailed within Section 6.4 will likely remain largely the same. The agricultural grassland will continue to be grazed by livestock or tilled for arable crop and commercial forestry would continue to involve the harvesting of timber as it matures, followed by replanting. The raised bog would continue to be actively cut as per the existing turbary activities in place, while in some drier areas of the peatland habitat, scrub is likely to develop and in time, this may undergo succession to woodland. The remining habitats identified within the proposed wind farm site, including bog woodland and broadleaved woodland, would likely remain in a similar condition. The identified KER species would likely remain as described in the sections above or reflect existing regional, national or global trends.

6.6.2 Assessment of Impacts on Designated Sites

6.6.2.1 European Sites

A Screening for AA and NIS was prepared for the proposed project to investigate the potential for the proposed project to have significant effects on European sites (SACs and SPAs), either alone or in combination with other plans or projects. For the purpose of this biodiversity chapter, only SACs considered in the Screening for AA and NIS are discussed below, while SPAs are discussed in Chapter 7 (Ornithology) of this EIAR.

Fourteen SACs were identified within the ZoI as part of the Screening for AA as having potential for being impacted by the proposed project. From this fourteen and in the absence of mitigation, two were identified to be at potential risk from the potential degradation of habitat quality from the release of suspended solids and/or pollutants and the disturbance to Annex II species of the EU Habitats Directive as a result of construction, operational and decommissioning works and activities. The AA Screening Report conclusion (submitted with this application) is:

> *"Following an examination, analysis and evaluation of the relevant information including, the nature of the proposed project and its potential connectivity with European sites, the conservation objectives, as well as applying the precautionary principle, it is the professional opinion of the authors of this report that that the proposed works, alone or in-combination with other plans or projects and in the absence of mitigation measure could have likely significant effects on the on the following European sites:*
>
> - *Sharavogue Bog SAC*

- *River Shannon Callows SAC*

This conclusion is based off the identified pathways between the proposed project and these European sites and likely significant effects on European Sites, their conservation objectives, and QIs/SCIs. Accordingly, in line with Article 6(3) of the Habitats Directive, a Stage 2 Appropriate Assessment (AA) is required for the proposed project to assess whether the proposed project would adversely affect the integrity of these European sites.

The NIS reporting concludes that, following the application of detailed mitigation measures, likely significant adverse effects will be avoided.

Consequently, it is determined that there will be **no risk of adverse effects** on the qualifying interest habitats and species, and/or on the overall site integrity, nor in the attainment of their specific conservation objectives.

6.6.2.2 National Sites

A total of seven NHAs and 25 pNHAs were identified within the vicinity of the proposed wind farm site, as illustrated in Table 6-7 and Figure 6-3. However viable source-pathway-receptor links were only identified between the proposed wind farm site and one NHA and four pNHAs.

These sites with a source pathway receptor link, were those which coincide with European site boundaries. Therefore, any such effects that may occur, have been assessed in the AA Screening and NIS reports accompanying the planning application for the proposed project. With the implementation of mitigation measures outlined in the NIS, no impacts to the above-mentioned sites are anticipated.

6.6.3 Construction Phase Impacts

Impacts associated with the Construction Phase on the receiving environment are discussed hereunder.

6.6.3.1 Habitats and Flora

6.6.3.1.1 Habitat Loss

The construction of the proposed wind farm and its associated infrastructure will result in a direct effect on habitats in the form of permanent and temporary habitat loss. It is calculated that approximately 9.27 ha (see Table 6-18) of KER habitat area and 2.3 km (see Table 6-19) of KER linear habitats will be lost as a result of the proposed construction phase. A summary of the approximate habitat loss from the proposed project can be seen in Table 6-18 and Table 6-19.

With avoidance of sensitive KERs there will be no direct loss of habitats valued as of County or National importance including HH1 Dry siliceous heath, PB1 Raised bog, WN1 Oak-birch-holly woodland, or WN5 Riparian woodland.

The location of proposed wind farm site infrastructure is largely restricted to habitats valued of Local importance (Lower value) (i.e. Non-KER habitat). This will result in the direct loss of 14.1 ha of GA1 Improved agricultural grassland, 3.27 ha of WD4 Conifer plantation, 0.96 ha of BC1 Arable crops, 0.42 ha of WS2 Immature woodland, 0.21 ha of GS2 Dry meadows and grassy verges and 0.07 ha of BL3 Buildings and artificial surfaces (Table 6-18). An additional 0.08 ha of GA1 Improved grassland will be lost as a result of the proposed TDR and a further 0.14 ha of

GS4 Wet grassland will be lost as a result of the GCR (Table 6-18). As habitats of Local importance (Lower value), the impacts of the proposed project on these habitats need not be considered further in this assessment (Table 6-15).

In addition the proposed wind farm site infrastructure will result in the direct loss off 2.82 ha of WN7 Bog woodland, 0.99 ha of WS1 Scrub, 0.91 ha of WD1 (Mixed) broadleaved woodland, and 0.62 ha of PB4 Cutover bog (Table 6-18). In addition, a further 0.07 ha of WS1 Scrub will be lost as a result of the proposed TDR and an additional 0.11 ha of WD1 (Mixed) broadleaved woodland will be lost as a result of the proposed GCR (Table 6-18).

In terms of linear habitats, a total of 1.3 km of WL1 Hedgerow will be lost as a result of the proposed project with 0.9 km of that loss attributed to the implementation of bat buffers and 0.8 km as a result of vegetation clearance along the TDR (Table 6-18). Similarly, 0.4 km of WL2 Treelines will be lost as a result of the proposed project inclusive of 0.3 km from the implementation of bat buffers and 0.2 km as a result of vegetation clearance along the TDR. Finally, 0.7 km of FW4 Drainage ditch will be lost during the construction phase as a result of the proposed wind farm site infrastructure. A Biodiversity and Enhancement Plan is included in Appendix 6-1.

In the absence of any mitigation, the direct loss of habitats associated with the proposed construction phase is assessed as **likely, permanent, negative effects with significance ranging from moderate to significant** depending on the sensitivity of the habitat (Table 6-17).

Table 6-17: Description of Direct Effects of Habitat Loss as a Result of the Construction Phase

KER	Descriptor	Effect	Rationale
GS4	Quality of Effects	Negative	The loss of 4.77 ha of GS4 Wet grassland is considered a significant effect in a local context as the extent of the Marsh Fritillary habitat within proposed wind farm site will be significantly reduced.
	Significance	**Significant Effects**	
	Extent and Context	4.77 ha	
	Probability	Likely	
	Duration	Permanent	
WN7 Bog woodland	Quality of Effects	Negative	The loss of 2.82 ha of WN7 Bog woodland is considered a significant effect in a local context as the extent of woodland habitat within proposed wind farm site will be reduced.
	Significance	**Significant Effects**	
	Extent and Context	2.82 ha	
	Probability	Likely	
	Duration	Permanent	
WS1 Scrub	Quality of Effects	Negative	The loss of 1.06 ha of WS1 Scrub is considered a moderate effect as scrub is a transitional habitat and clearance within the landscape is consistent with
	Significance	**Moderate Effects**	
	Extent and Context	1.06 ha	

KER	Descriptor	Effect	Rationale
	Probability	Likely	common agricultural practice and existing baseline trends.
	Duration	Permanent	
WD1 (Mixed) broadleaved woodland	Quality of Effects	Negative	The loss of 1.02 ha of WD1 (Mixed) broadleaved woodland is considered a significant effect in a local context as the extent of woodland habitat within proposed wind farm site will be reduced.
	Significance	**Significant Effects**	
	Extent and Context	1.02 ha	
	Probability	Likely	
	Duration	Permanent	
PB4 Cutover bog	Quality of Effects	Negative	The loss of 0.62 ha of PB4 Cutover bog is considered a moderate effect in a local context as the extent of peatland habitat within proposed wind farm site will be permanently reduced, however this is in line with existing baseline trends as ecological succession within the proposed wind farm site often progresses from PB4 Cutover bog to WS1 Scrub to WN7 Bog woodland.
	Significance	**Moderate Effects**	
	Extent and Context	0.62 ha	
	Probability	Likely	
	Duration	**Permanent**	
WL1 Hedgerows	Quality of Effects	Negative	WL1 Hedgerows form a significant ecological resource. The removal of this habitat would reduce the ecological connectivity within the landscape, which is essential for protected faunal species.
	Significance	**Significant Effects**	
	Extent and Context	1.3 km	
	Probability	Likely	
	Duration	Permanent	
WL2 Treelines	Quality of Effects	Negative	Despite the very low occurrence of WL2 Treelines habitats within the proposed wind farm site, the habitat forms a significant ecological resource. The removal of this habitat would reduce the ecological connectivity within the landscape, which is essential for protected faunal species.
	Significance	**Significant Effect**	
	Extent and Context	0.4km	
	Probability	Likely	
	Duration	Permanent	
FW4 Drainage ditches	Quality of Effects	Positive	Drain-blocking and peatland rewetting have been appointed as main targeted rehabilitation actions within the National Peatlands Strategy (DoHLGL, 2023), and the loss/fragmentation of this linear habitat feature would likely
	Significance	**Moderate Effect**	
	Extent and Context	0.7km	
	Probability	Likely	

KER	Descriptor	Effect	Rationale
	Duration	Permanent	improve the site's rehabilitation efforts – See Appendix 6-1. Although the removal of this habitat would reduce connectivity within the site for protected aquatic species, the beneficial hydrological/hydrogeological effects from its removal on habitats are likely to substantially outweigh this biodiversity loss in the long-term.

Table 6-18: Approximate Loss of Habitat Area Arising From the Proposed Project

Habitats	Proposed Infrastructure components (ha)																Total Area (ha)
	Bat Buffer	BESS	Borrow Pits	Compounds	Deposition Area	Met Mast	Overrun areas	Passing bays	Proposed site roads	Security hut	Substation	Turbine Hardstands	Turning areas	Wheel wash	TDR	GCR	
KER Habitats																	
GS4 - Wet grassland		0.92		0.19			0.29	0.04	1.14	0.00	1.15	0.77	0.13			0.14	**4.77**
WN7 - Bog woodland	2.50					0.00			0.20			0.12					**2.82**
WS1 - Scrub	0.19			0.29		0.01	0.21		0.08		0.05	0.14			0.07		**1.06**
WD1 - (Mixed) broadleaved woodland	0.75								0.16							0.11	**1.02**
PB4 - Cutover bog									0.08			0.53					**0.62**
Sub-Total Area (ha)	3.44	0.69	4.22	0.86	1.62	0.01	0.46	0.18	3.5	0	0.05	4.11	0.26	0	0.15	0.11	9.27
Non-KER Habitats																	
GA1 - Improved agricultural grassland		0.69	4.22	0.57	1.62		0.25	0.18	2.98	0.00		3.32	0.26	0.00	0.08		**14.18**
WD4 - Conifer plantation	2.31						0.00	0.03	0.51			0.41					**3.27**
BC1 - Arable crops								0.04	0.24			0.56	0.09		0.03		**0.96**
WS2 - Immature woodland	0.01						0.12		0.21			0.09					**0.42**
GS2 - Dry meadows and grassy verges							0.00		0.16			0.05					**0.21**
BL3 - Buildings and artificial surfaces									0.04			0.03					**0.07**
Sub-Total Area (ha)	2.32	0.92	0	0.19	0	0	0.41	0.11	2.3	0	1.15	1.91	0.22	0	0.03	0.14	19.11
Grand Total Area (ha)	**5.76**	**1.61**	**4.22**	**1.05**	**1.62**	**0.01**	**0.88**	**0.30**	**5.82**	**0.00**	**1.20**	**6.02**	**0.48**	**0.00**	**0.18**	**0.26**	**28.38**

Table 6-19: Approximate Loss of Habitat Length Arising from the Proposed Project

Habitats KER Habitats	Proposed Infrastructure components (m)										Total length (m)
	Bat Buffer	BESS	Hardstand	Overrun Areas	Passing Bays	Proposed Site Roads	Substation	Turbine Foundation	Turning Areas	TDR	
WL1 - Hedgerows	899	13	160			92		25	3	83	**1274**
FW4 - Drainage ditches			250	50	6	246	99	39			**690**
WL2 - Treelines	251		20	4		57				22	**355**
Total length (m)	**1150**	**13**	**430**	**55**	**6**	**399**	**99**	**64**	**3**	**105**	**2323**

6.6.3.1.2 Habitat Degradation Due to Air Quality Impacts

Excavation activities may result in the temporary generation of dust within the vicinity of the proposed project, potentially leading to dust deposition on nearby vegetation, which can inhibit plant growth. The Institute of Air Quality Management (IAQM) provides guidance on assessing dust impacts (IAQM, 2024), which defines potential dust emission risk classes for ecological receptors.

In accordance with these guidelines, and considering the size of the proposed project, the scale of the earthworks is classified as large (as the total site area is greater than 110,000 m^2 and the total site volume is greater than 75,000 m^3). Dust may also arise from track-out associated with vehicle movements. It is anticipated that there will be between 20 and 50 outward HGV movements per day during the construction phase of the proposed project, which can be classified as medium. Based on this, dust impacts may occur up to 250 m from a construction site, however the majority of the dust deposition occurs within the first 50 m (IAQM, 2024).

Dust associated with construction can affect plant productivity by coating vegetation in a fine layer and as such reducing photosynthesis, occlude stomata, resistance to gas exchange, water stress and overall reduce plant fitness (APSIS, 2025). Furthermore, cement dusts are strongly alkaline and may alter the pH of substrates which are strongly acidic, such as those associated with peatland habitats (APSIS, 2025). These chemical changes can lead to long-term alterations in vegetation composition (APSIS, 2025). Woodlands are also sensitive to dust deposition as they receive greater relative quantities of particulate matter resulting from increased air turbulence (APSIS, 2025). This can lead to changes in leaf pigments and reduction in overall growth (APSIS, 2025).

Several ecologically sensitive habitat types are located within 50 m of the proposed wind farm site and haul routes. including;

- HH1 Dry siliceous heath corresponding to Annex I 4030 European dry heaths.
- PB1 Raised bog corresponding to priority Annex I 7110 *Active raised bog.
- WN1 Oak-birch-holly woodland corresponding to Annex I 91A0 Old sessile oak woods with *Ilex* and *Blechnam* in the British Isles.

Impacts from dust on the receiving environment will likely result in negative effects on sensitive habitats within 50 m of the proposed wind farm site infrastructure, however the duration and significance of these effects are likely to change dependant on the structure and function of the habitat type (Table 6-20).

For example, the effects on PB1 Raised bog which corresponds to priority Annex I 7110 *Active raised bog, are likely to be moderate and long term. Dust deposition on this habitat will likely lead to a reduction in the cover of *Sphagnum* spp. and other sensitive moss species within 50 m of the proposed wind farm site infrastructure, although there is not likely to be visible damage to higher peatland plants (Farmer, 1993).

Whereas for WN1 Oak-birch-holly woodland which corresponds to Annex I 91A0 Old sessile oak woods with *Ilex* and *Blechnam* in the British Isles, the effect is likely to be slight and short-term. Dust deposition could potentially reduce plant productivity but the deciduous trees will likely recover to baseline following the completion of works and the production of new growth.

The species composition of the canopy is not likely to change as a result of dust deposition associated with the 24 month term of the construction phase.

Further details on air quality impacts are outlined in Chapter 10 – Air Quality.

Table 6-20: Description of Indirect Effects of Dust Deposition on Habitats as a Result of the Construction Phase

KER	Descriptor	Effect	Rationale
WN7 Bog woodland	Quality of Effects	Negative	Dust deposition may cause temporary effects on vegetation, such as leaf discolouration or reduced growth in some areas. However, these effects are expected to be **slight** and **short-term**, with vegetation recovering naturally through seasonal regrowth following completion of construction activities.
	Significance	**Slight Effects**	
	Extent and Context	Potentially 50 m around project infrastructure	
	Probability	Likely	
	Duration	**Short-term**	
PB4 Cutover bog	Quality of Effects	Negative	Dust deposition at the proposed wind farm site may have minor and localised effects on the PB4 Cutover bog habitat. In particular, it could slightly reduce the cover of *Sphagnum* mosses, potentially affecting the peat-forming capacity of the habitat. The effects are assessed as **moderate negative** and **short-term**. It should be noted that PB4 is already a degraded cutover bog, with significant areas of bare peat, so any additional impact from dust is expected to be limited and consistent with existing baseline conditions. Overall, dust deposition is unlikely to substantially alter the ecological character or restoration potential of the PB4 Cutover bog.
	Significance	**Moderate Effects**	
	Extent and Context	Potentially 50 m around project infrastructure	
	Probability	Likely	
	Duration	**Short-term Effects**	
GS4 Wet grassland	Quality of Effects	Negative	Dust deposition may result in minor, temporary changes to the upper soil horizon, potentially favouring some calcicolous species and slightly altering species composition (Farmer, 1993). However, such **slight** effects are expected to be localised and **short-lived**, with natural processes such as nutrient leaching and seasonal regrowth of perennial grassland vegetation facilitating recovery following construction
	Significance	**Slight Effects**	
	Extent and Context	Potentially 50 m around project infrastructure	
	Probability	Likely	
	Duration	Short-term	
WD1 (Mixed) broadleaved woodland	Quality of Effects	Negative	Dust deposition may cause temporary reductions in tree vitality, with occasional leaf discolouration or slight
	Significance	**Slight Effects**	

KER	Descriptor	Effect	Rationale
	Extent and Context	Potentially 50 m around project infrastructure	growth suppression possible in sensitive individuals. These **slight** effects are expected to be **short-term** and reversible, with natural recovery occurring through seasonal leaf renewal and ongoing growth following completion of construction
	Probability	Likely	
	Duration	Short-term	
HH1 Dry siliceous heath / Annex I 4030 European dry heaths	Quality of Effects	Negative	HH1 Dry siliceous heath is dominated by perennial ericaceous dwarf shrubs, not peat forming *Sphagnum* mosses (NPWS, 2019b). Dust impacts are not likely to generate visible damage to higher peatland plants (Farmer, 1993). The **slight** effects are expected to be **short-term** and reversible with vegetation recovering naturally through seasonal regrowth following completion of construction activities.
	Significance	**Slight Effects**	
	Extent and Context	Potentially 50 m around project infrastructure	
	Probability	Likely	
	Duration	Short-term	
PB1 Raised bog / priority Annex I 7110 *Active raised bog	Quality of Effects	Negative	Dust deposition will likely reduce the cover of *Sphagnum* spp. reducing the peat forming capacity of the habitat. This effect is assessed as **moderate** as the function of the peatland, in terms of peat forming capacity, will be impacted within 50 m of proposed wind farm site infrastructure. The effect is considered to be **long-term**, as 35 years is the timeframe used to estimate rehabilitation potential for Annex I habitat type 7110 Degraded raised bog still capable of natural regeneration.
	Significance	**Moderate Effects**	
	Extent and Context	Potentially 50 m around project infrastructure	
	Probability	Likely	
	Duration	Long-term	
WN1 Oak-birch-holly woodland / Annex I 91A0 Old sessile oak woods with Ilex and Blechnam in the British Isles	Quality of Effects	Negative	Dust deposition may cause minor and temporary effects on vegetation, such as slight leaf discolouration or reduced growth in some areas. However, these **slight negative** effects are expected to be **short-term** and reversible, with vegetation recovering naturally through seasonal regrowth following completion of construction activities
	Significance	**Slight Effects**	
	Extent and Context	Potentially 50 m around project infrastructure	
	Probability	Likely	
	Duration	Short-term	
WL1 Hedgerows	Quality of Effects	Negative	Dust deposition may result in minor, temporary effects on tree productivity, such as slight leaf discolouration or
	Significance	**Slight Effects**	

KER	Descriptor	Effect	Rationale
	Extent and Context	Potentially 50 m around project infrastructure	reduced growth. These effects are expected to be **slight** and **short-term**, with recovery occurring naturally through seasonal leaf renewal and growth following the construction period.
	Probability	Likely	
	Duration	Short-term	
WL2 Treelines	Quality of Effects	Negative	Dust deposition may cause minor and temporary impacts on tree productivity, including slight leaf discolouration or reduced growth. The effect is expected to be **slight** and **short-lived**, with natural recovery occurring through seasonal leaf renewal and growth after the construction period.
	Significance	**Slight Effects**	
	Extent and Context	Potentially 50 m around project infrastructure	
	Probability	Likely	
	Duration	Short-term	
FW4 Drainage ditches	Quality of Effects	Negative	Dust deposition may cause temporary, minor effects on water quality in drainage ditches, localised to areas where construction works are undertaken. These **slight** effects are expected to be **short-term** and reversible, limited to the duration of construction activities.
	Significance	**Slight Effects**	
	Extent and Context	Potentially 50 m around project infrastructure	
	Probability	Likely	
	Duration	Short-term	

6.6.3.1.3 Habitat Degradation Due to the Spread or Introduction of Invasive Alien Non-Species

Two IAS were recorded within the proposed wind farm site and along the GCR; namely, Himalayan balsam and Parrot's-feather (Section 6.4.3.2). These species are listed on the Third Schedule (Part 1: Plants) of the S.I No. 477 European Communities (Bird and Natural Habitats) Regulations 2011-25, and the First Schedule Regulations 2024 (S.I. 374 of 2024) and subject to legal restrictions under Regulations 49 and 50.

In the absence of mitigation, there is potential for the spread of these IAS species throughout the proposed wind farm site via the movement of construction vehicles and construction materials. The spread of IAS has the potential to negatively impact habitats by competitively excluding native plant species, providing less favourable habitats for native fauna (TII, 2020).

Impacts from the introduction and spread of IAS could result in **likely significant, long-term, negative effects** on habitats within the proposed wind farm site.

6.6.3.1.4 Peat and Soil Stability

As noted in Chapter 8 – Land Soils & Geology, there are no known peat instability issues on the proposed wind farm site. The GSI's online data base (www.gsi.ie), does not report any historic landslides within the proposed wind farm site or in the surrounding study area. The majority of the proposed wind farm site has low landslide susceptibility, with small pockets of moderately low and low (inferred) landslide susceptibility located to the east of the proposed project.

Similarly, there are no reported historical landslides along the proposed GCR or TDR. The GCR primarily crosses areas of low and low (inferred) landslide susceptibility. The northern section of the proposed GCR crosses a minor potion of moderate landslide susceptibility, located approximately 0.6km to the southeast of the Dallow 110 kV substation. The TDR works are located in an area of low landslide susceptibility.

There is not likely to be a peat slippage event to occur within the proposed project, and any potential effects arising from such an event are considered to be unlikely.

6.6.3.2 Fauna

Potential construction phase impacts on fauna within the receiving environment is discussed in the following sections.

6.6.3.2.1 Badger

6.6.3.2.1.1 Loss of Habitat

The proposed project will result in the loss of approximately 28.4 ha of habitat (see Table 6-18 (i.e. 19.70 ha of KER habitat and 9.7 ha of Non-KER habitat). While not all of the habitats to be removed were considered suitable foraging habitat for the local Badger population (e.g. bare cutover bog, artificial surfaces and roadways), some areas of grassland and woodland providing suitable foraging or commuting opportunities will be lost. These habitats are common and widespread in the surrounding landscape and other suitable alternative habitat for the local Badger population will remain within the proposed wind farm site.

There will be the requirement for a small area of bog woodland to be removed as part of a proposed mitigation measure relating to bats (intended to avoid encouraging bat activity within the blade-swept area, more details can be found in Sections 6.6.4.2.2 and 6.7.2.2). This woodland lies over an inactive Badger sett. Although the sett has been confirmed inactive over multiple survey years (2022–2024), its structure remains present and could be reoccupied in the future. Following a precautionary approach, the removal of the bog woodland and associated ground disturbance could result in degradation or collapse of the sett structure, potentially rendering the site unsuitable for future occupation or impacting on badger which may have occupied it since 2024. As such, this would represent a long-term loss of potential breeding or refuge habitat for Badger within the immediate area.

No other direct loss of Badger setts is anticipated as a result of the proposed project.

On this basis, and taking a precautionary approach on the potential loss, through degradation of a historical sett, habitat loss effects on local badger populations during the construction phase are assessed as a having a **likely long-term, moderate negative effect on the local Badger population, at a local geographical scale.**

6.6.3.2.1.2 Disturbance/Displacement

Excavation works can result in disturbance impacts for breeding badgers to a distance of up to 50 m from their sett, and this increases to 150 m for piling as per NRA guidelines (NRA, 2005). Two setts were recorded within 150 m of turbine bases where piling will be necessary. Both were located south-east of Turbine 8. One being an inactive main sett of 13 entrances approximately 95 m from the turbine location, and the second an inactive subsidiary sett approximately 145 m away. These setts were confirmed as inactive across multiple survey years (2022–2024). However, following a precautionary approach, there is potential for these locations to become used again by badger. No other setts occur within 50 m of excavation works or 150 m from other areas where piling is required.

Additional Badger signs were recorded elsewhere within the proposed wind farm site, typically along woodland or grassland edges. The nearest confirmed sign, a latrine, was recorded c. 20 m from an access track between Turbines 5 and 7. Construction activities may result in temporary disturbance to foraging or commuting local Badgers within these habitats. However, as Badgers are primarily crepuscular, temporal overlap with peak construction activity will be limited. The majority of works will occur during daylight hours, thereby reducing the potential for disturbance. Temporary construction lighting may occasionally be required outside daylight hours, which could result in some short-term disturbance to local Badger populations foraging or commuting routes within the area. Any such effects are expected to be temporary and localised.

On this basis and taking a precautionary approach that inactive setts may be disturbance, the displacement effects on Badger during the construction phase are assessed as a **likely short-term, significant negative effect on the Badger population, at a local geographical scale.**

6.6.3.2.2 Otter

6.6.3.2.2.1 Loss of Habitat

Otter are a mobile species which may intermittently use certain areas of scrub or woodland away from watercourses (NIEA, 2011) and evidence of their presence was previously recorded within the proposed wind farm site (see Section 6.4.4.1.1).

Construction works at the proposed wind farm site has the potential to result in direct and indirect effects on Otter and the availability of prey items in waterbodies connected to the proposed wind farm site.

6.6.3.2.2.1.1 Direct Habitat Loss

No in-stream works are proposed within natural watercourses; therefore, the loss of suitable aquatic habitat is not anticipated. However, a limited number of crossings will be required over minor artificial drains and peatland channels. These will involve the installation of culverts, constituting limited in-stream works confined to man-made drainage features. These features were recorded as either dry (only wet during periods of prolonged rainfall) or of limited ecological value and not considered suitable habitat for Otter. Additionally, potential habitat loss could also occur at HDD reception pit locations along the GCR. However, these areas will only be approx. 0.25 ha in area, with more suitable habitat available in the wider catchment area.

In the absence of mitigation measures, the direct loss of otter habitat associated with the proposed construction phase of the project is assessed as having a **likely short term, not significant effect on the Otter population of local geographical importance.**

6.6.3.2.2.1.2 Indirect Habitat Loss

During the construction phase of the proposed project, there is potential for sediment-laden runoff or construction-related pollutants to enter drainage ditches and the Little Brosna_040 RWB if not appropriately managed. Such inputs could indirectly affect Otter by degrading water quality. Chanin (2003) notes that while Otters are generally tolerant of poor water quality, pollution that reduces prey abundance can have indirect effects on the species through decreased food availability. Consequently, any reduction in aquatic prey species could lead to an effective loss of foraging habitat. While this potential impact is generally expected to be short term or temporary during construction, in the event of a large pollution incident, combined with the potential for bioaccumulation and the slow recovery of some prey species, the effects of aquatic habitat degradation during the construction phase of the proposed project is considered long term.

A degradation water quality would therefore constitute an indirect effect on Otter foraging habitat causing a **long-term, significant negative effect** at a local geographical scale.

6.6.3.2.2.2 Disturbance/Displacement

Construction works have the potential to disturb active breeding Otter holts within a distance of up to 150 m, in line with NRA guidelines (NRA, 2006). One inactive/disused Otter holt was recorded during surveys along a drainage ditch within the proposed project area. This holt is located approximately 80 m from the nearest construction area (temporary construction compound 3, near T7). The holt is located in a dense woodland and is physically screened from the work area. No piling or excavation activities will occur near compound 3. The holt has not been recorded as active of the entire survey period. However, following a precautionary approach there is potential for it to become used again by otters.

Construction works within the main wind farm site may result in temporary disturbance to Otter when resting, foraging, or commuting nearby. The installation of culverts for access roads and the proposed GCR, particularly where these cross the Little Brosna_040 RWB and associated ditches, also has the potential to cause disturbance. Evidence of Otter activity recorded along the banks of the Little Brosna_040 RWB indicates that this river supports regular use by the species.

Most construction activities will take place during daylight hours, thereby reducing potential disturbance to this predominantly nocturnal species. However, temporary lighting may be required outside daylight hours at certain stages of the works. Direct illumination of holts or riparian corridors could disturb Otter in the vicinity if not appropriately managed.

In the absence of mitigation, disturbance or displacement associated with the construction phase is assessed as a **likely short-term, significant negative effect on the Otter population at a local geographical scale.**

6.6.3.2.3 Other Mammal Species

6.6.3.2.3.1 Loss of Habitat

The desktop study and field surveys provides evidence that the proposed wind farm site supports other small, protected mammal species, such as Pine Marten, Fox, Hedgehog, Red Squirrel, Pygmy Shrew, Irish Stoat and Irish Hare. However, considering the availability of similar habitat within the surrounding environment and the lack of evidence recorded of these species during the surveys, it is considered that the proposed wind farm site is unlikely to be an important site supporting significant numbers of these protected mammal species.

In relation to habitat loss, considering the abundance of alternative suitable habitat within the wider landscape the potential impacts associated with habitat loss are likely to result in **permanent, slight, negative effects, on these populations at a local geographical scale.**

6.6.3.2.3.2 Disturbance/Displacement

In relation to disturbance, given the mobile nature of these species, the minimal evidence recorded during the site visits, and the availability of alternative habitat within the wider area the potential impacts associated with disturbance are likely to result in **short-term, slight, negative effects on these populations, at a local geographical scale.**

6.6.3.2.4 Bats

The following bat species were considered to be high collision risk from the proposed wind farm site

- Leisler's Bat
- Common Pipistrelle
- Soprano Pipistrelle
- Nathusius' Pipistrelle

With the following bat species considered to be low collision risk from the proposed wind farm site.

- Brown Long-eared Bat
- Daubenton's Bat
- Natterer's Bat and
- Whiskered Bat/ Brandt's Bat

6.6.3.2.4.1 Loss of Habitat

Vegetation clearance will be required for the construction of the proposed wind farm site, and the impact of this vegetation loss will result in reduced foraging and fragmented commuting habitat for bats. This includes the loss of 0.12 hectares of treelines and hedgerows and 5.76 hectares of woodland and scrub to facilitate 'bat buffers'. Loss of such habitat function has the potential to disturb or displace bats that forage at the site or commute through the site.

There were also no trees or structures capable of supporting significant numbers of bats or a maternity colony within the areas for clearance of bat buffers. There are a number of potential

roost features trees which will require removal. This includes two trees at T1, three trees at T5, one tree at T6, one tree at T8 and one tree at T11.

In the absence of mitigation, the loss of habitat will result in the **'permanent negative effect'** on commuting and foraging bats at a local geographical scale.

No significant roosting in the form of maternity or hibernation roosts are present on the proposed wind farm site. In a structure 200 m from the proposed wind farm site, minor small population roosts of Brown Long-eared Bat, Soprano Pipistrelle and Common Pipistrelle have been identified. In the wider area, a structure 600 m from the proposed wind farm site contained minor small roosting populations of Common Pipistrelle, Soprano Pipistrelle and Natterer's Bat. There is no plan to remove any of the structures suitable for or containing roosting bats within the proposed wind farm site and given the separation distances from the areas being developed, no disturbance of the roosts are anticipated.

The proposed wind farm site is considered likely to have a **'neutral'** effect on the identified roosts outside of the proposed wind farm site.

Construction related run-off or degradation of aquatic habitats through hydrological links could potentially lead to a deterioration of the feeding resource for bats associated with watercourses within the site boundary and in the wider area. Assessment of potential water quality impacts is addressed in Chapter 9 - Hydrology and Hydrogeology.

Works along the proposed turbine delivery route will result in the loss of 22 m of treeline, 83 m of hedgerow, 0.07 ha of scrub habitat, 0.07 ha of improved grassland and 0.03 hectare of arable crops/horticultural land.

While these habitats are common in the wider landscape, the loss of commuting habitat will potentially displace some bats in the immediate locality of works and marginally reduce habitat connectivity locally. In the absence of mitigation this will result in a **'temporary slight negative'** effect on foraging and commuting bats at a local scale.

There are no works required on bridges to facilitate the proposed turbine delivery route. Therefore, it is concluded a **'neutral effect'** will occur on any bats potentially roosting in bridges along the route.

Two PRF-I trees were identified, and three bridges of low roost suitability were identified along the GCR. There will be a **'neutral effect'** on bats which may make use of PRF-I tree features.

6.6.3.2.4.2 Disturbance/Displacement

Construction phase lighting has the potential to attract certain bat species and displace others, and floodlighting can be a significant source of disturbance to bat species. However, this impact will be temporary in nature and localized to areas around the site compound. There is no lighting proposed in the areas surrounding confirmed roosts.

In the absence of mitigation lighting associated with construction will result in a temporary **'slight temporary negative effect'** on foraging and commuting bats.

A bridge 200 m from the proposed wind farm site was confirmed as a roost of Brown Long-eared Bat with the collection of faecal samples. Horizontal Directional Drilling (HDD) is proposed for the section of GCR adjacent to the bridge. This will avoid direct impacts to the structure of the bridge itself although there is still potential for indirect disturbance of roosting bats in this

bridge through noise and vibrations with works associated with the HDD. In the absence of mitigation there will be a **'slight temporary negative effect'** on roosting bats as a result of noise and visual cues.

Considering all impacts addressed in this section, in the absence of mitigation, potential likely effects resulting from the construction phase on bats would have a **'permanent, slight negative'** effect at a local level following EPA (2022).

6.6.3.3 Lepidoptera Species

Marsh Fritillary is listed on Annex II of the Habitats Directive, meaning the conservation of the species requires the designation of SACs. Outside of these SACs where Marsh Fritillary is a QI, the species does not have legal protection under the Habitats Directive. The species is not listed in the Wildlife Act (as amended). As the butterfly is a threatened European species it is also listed under Appendix 2 of the Bern Convention on the Conservation of European Wildlife and Natural Habitats, meaning the species and its habitat is strictly protected and the deliberate disturbance of the species, particularly during breeding, rearing, and hibernation is prohibited.

6.6.3.3.1 Direct and Indirect Mortality

During baseline during field surveys conducted September 2023, three larval webs were identified within the footprint of the compound at the entrance to the south of the proposed wind farm site as well as one larval web identified within the footprint of the hardstand for T8. These larvae will have undergone emergence and pupation during the 2024 season and again in the 2025 season. Consequently, the exact positions of larval webs in future years, cannot be anticipated at this time and is to be determined through pre-construction surveys. Nevertheless, the 2023 survey data will be used to provide an estimate of likely significant effects on the local breeding population of Marsh Fritillary.

Without the implementation of mitigation measures the direct loss of four webs will likely occur during the construction phase, as the topsoil is removed within the footprint of the project. The quality of this effect on the local population of Marsh Fritillary is negative and very significant. The direct mortality of four of the seven larval webs identified within the proposed wind farm site will diminish the reproductive capacity and genetic diversity of the local population making it less resilient to stochastic events, such as climate change. Although impacts will occur only once during construction phase, but the effects are determined to be long-term as they will likely last between fifteen to sixty years.

Basing the impact assessment on the 2023 data, three of the five larval webs will remain within the retained Marsh Fritillary habitat. If the retained Marsh Fritillary habitat is adequate to support the continuation of the local population within the proposed wind farm site, then some genetic adaptations to local micro-climatic variation is likely to be conserved. Under such conditions, the effects are likely to be very significant, meaning "*an effect which, by its character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment*" (EPA, 2022 - Table 6-6).

Section 6.6.4 discusses the scenario where the retained Marsh Fritillary habitat is negatively impacted by indirect effects from construction to the point where it can no longer support a population of Marsh Fritillary . Under such conditions, the impact of the proposed project on the

local population will meet the definition of a profound effect, meaning "*an effect which obliterates sensitive characteristics*" (EPA, 2022 - Table 6-6).

Considering the **very high likelihood** of the direct mortality of ca. 60% of the local population, impacts are likely to result in **very significant effects** on Marsh Fritillary identified within the proposed wind farm site, which are likely to last over **the long-term.** Under a **worst-case scenario** where 100% of the local population is lost as a result of the project then the effects are likely to be **profound and permanent.**

6.6.3.3.2 Indirect Effects on Meta-populations

Marsh Fritillary live in metapopulations, which means one main population is supported by smaller sub-populations (Phelan *et al.*, 2021). Sub-populations often go through periods of local extinctions due to variability in local environmental conditions, such as parasitism (Phelan *et al.*, 2021). The reduction in the reproductive capacity and genetic diversity of the local population may also have implications for the meta-population within the wider landscape, although more information on landscape population dynamics would be necessary in order to make a clear determination.

Recent Article 17 reporting lists several criteria assessing the conservation status of the species at a national scale as 'favourable', including the habitat, population, and range of the species (NPWS, 2019). However, future prospects and overall assessment of conservation status are listed as 'inadequate', as there are currently no landscape-scale conservation management measures in place (NPWS, 2019).

In brief, the likelihood of significant effects on the meta-population are considered **indeterminable secondary effects**.

6.6.3.3.3 Habitat Loss and Degradation

The suitability of Marsh Fritillary habitat is largely determined by the presence and abundance of Devil's-bit scabious, the larval food plant. The construction of the turbine hardstand at T8 will result in the direct loss of 0.16 ha and the retention of 0.07 ha of suitable Marsh Fritillary habitat. The construction of the proposed compound and infrastructure at the southern entrance to the proposed wind farm site will result in the direct loss of 0.06 ha of suitable Marsh Fritillary habitat and the retention of 0.03 ha of same. In total, the extent of the Marsh Fritillary habitat to be lost is 0.22 ha and the extent of habitat to be retained post-construction is 0.1 ha. As such, 69% of suitable Marsh Fritillary habitat within the proposed wind farm site will be lost during the construction phase.

The direct effects of this habitat loss on the ability of the local population of Marsh Fritillary to persist within the proposed wind farm site are likely to be **very significant**. Devil's-bit scabious was not noted within any other the other habitats across the proposed wind farm site. This means the persistence of the Marsh Fritillary population within the proposed wind farm site is dependent upon the extent of the mapped habitat.

In addition to the direct loss of habitat, the indirect loss of Marsh Fritillary habitat as a result of construction activities must be considered. The Marsh Fritillary habitat is located within GS4– Wet grassland, and as such, the hydrological regime is a key factor in the maintenance of the of integrity of the habitat. Construction activities can significantly impact local hydrological regimes and have the potential to result in *"the loss of entire Marsh Fritillary populations*" (NRA,

2008). Construction activities, including the construction of the compound, infrastructure and hardstand within suitable Marsh Fritillary habitat is likely to have **a significant negative indirect effect** on the integrity of the retained Marsh Fritillary habitat, inclusive of the abundance of Devil's-bit scabious. The extent of the impact of the construction activities upon the GS4-Wet grassland will depend upon factors such as topography, excavation depth, size and depth drainage channels etc. NatureScot recommends adopting the approach put forward by the Peatland Code which considers peatland within 30 m of an artificial drain to be drained (NatureScot, 2024). As the GS4-Wet grassland habitat occurs alongside PB1-Raised bog habitat it is likely the soil is peat, or at least peaty with a high organic matter content. As such, this 30 m buffer has been applied here to estimate the extent of indirect effects on the Marsh Fritillary habitat to be retained. In brief, the remaining 0.1 ha of Marsh Fritillary habitat to be retained falls within this 30 m buffer. It is **likely effects on the 0.1 ha of Marsh Fritillary habitat to be retained will be permanent and profoundly significant.**

The **cumulative effects** of the direct habitat loss combined with indirect habitat degradation are **likely to be profoundly negative and permanent**, leading to the total loss of the local breeding population of Marsh Fritillary as well as the total loss of 0.32 ha of suitable Marsh Fritillary habitat, within the proposed wind farm site.

6.6.3.4 Amphibians

6.6.3.4.1 Common Frog and Smooth Newt

6.6.3.4.1.1 Loss of Habitat and Mortality

The drainage ditches and pools forming in the ruts of forestry tracks within the proposed wind farm site were identified as being suitable habitat for Common Frog and to a lesser extent Smooth Newt. Both species were previously recorded within the site boundary during the desktop study but only Common Frog was recorded during the surveys. The proposed project has the potential to destroy and degrade suitable habitats for the protected amphibian species.

This will result in a short-term loss and degradation of suitable spawning and foraging habitat for Common Frog and Smooth Newt. If construction works occurs within their suitable habitat during the Common Frog and Smooth Newt spawning season (February to June), there is potential that spawn, juveniles (tadpoles) and adults will be impacted. These impacts are likely to result in **short term, moderate effects on the amphibian population at a local geographical scale.**

6.6.3.5 Reptiles

6.6.3.5.1 Common Lizard

6.6.3.5.1.1 Loss of Habitat and Mortality

Common Lizard was recorded within the proposed wind farm site during the ecological surveys. The proposed project has the potential to cause limited disturbance to this protected reptile species during construction activities; however, no suitable habitat for Common Lizard will be directly lost as a result of the proposed project. Areas of raised peat where the species was previously recorded will be retained, and suitable habitat remains widespread and continuous across the surrounding landscape.

Given the absence of direct habitat loss and the availability of extensive supporting habitat in the wider area, potential impacts are likely to result in **short term, imperceptible effects on the Common Lizard population at a local geographical scale.**

6.6.3.6 Aquatic Ecology

6.6.3.6.1 Surface Water Flow

Construction activities at the proposed wind farm site could potentially reduce the infiltration capacity of the soils in areas where earthworks are undertaken thus increasing the rate and volume of direct surface runoff. The potential likely effects on the alteration of surface water flow at the proposed wind farm site are considered **negative, direct, short term, unlikely and slight.** Further information is provided in Chapter 9 – Hydrology and Hydrogeology.

Construction of structures at watercourses has the potential to impact water quality. Watercourse crossings required within the proposed wind farm site are:

- Installation of one clear span bridge crossing of the Holy Well Clohaskin River, and
- Installation of 14 new land drainage culverts

No in-stream works will take place within natural waterbodies within the proposed wind farm site.

There are three stream crossings and four drainage channel crossings required for the proposed GCR (Chapter 9 - Hydrology and Hydrogeology). A combination of measures is proposed to cross the various streams and drainage channels, including the use of culverts. In addition, execution of a horizontal directional drill (HDD) will be used to install the proposed GCR cable under the Little Brosna_040 RWB with an overcrossing of existing Ross_25 culvert.

No new watercourse crossings or modification of existing culverts are required for the works along the proposed TDR. Therefore, the potential likely effects on alteration of surface water flow at the proposed GCR and TDR are considered **negative, indirect, short term, unlikely, and slight**. Further information is provided in Chapter 9 (Hydrology and Hydrogeology).

6.6.3.6.2 Surface Water Quality

6.6.3.6.2.1 Siltation

It will be necessary to progressively clear the topsoil, peat and subsoil material from proposed infrastructure areas at proposed wind farm site to facilitate construction. Large volumes of subsoil will be removed to allow construction of the hardstand areas, borrow pits, construction compound and site roads. The excavated soil will be utilised on site and used to create bunds around the proposed facilities to create surface water runoff barriers. Site clearance, excavation activities and the stockpiling of material have the potential to result in the runoff of sediment and nutrients, which if not appropriately managed, could result in an increase of suspended solids and nutrients depositing within nearby watercourses.

There is also potential for such impacts to occur, at HDD site under the Little Brosna_040 RWB, including drill lubricant (e.g. bentonite) pollution. Increased silt loading in watercourses can stunt macrophyte growth, enhance filamentous algae growth, limit dissolved oxygen capacity and reduce the ecological quality of watercourses ultimately causing increased mortality of fish

and other aquatic organisms. Further information is provided in Chapter 9 – Hydrology and Hydrogeology.

In-stream works are required along the proposed GCR for the Woodfield_25 stream due to the presence of existing cables within the local road at Clondallow. It is proposed to use a dam and flume methodology at the Woodfield_25 crossing. Further detail on methodology is contained in Chapter 2 (Description of the Proposed Project). Further information is provided in Chapter 9 (Hydrology and Hydrogeology).

The degradation of water quality could result in negative effects on aquatic receptors within the Little Brosna_040 RWB and the Woodfield_25 stream, as well as hydrologically connected watercourses downstream. The duration of this impact is likely limited to the 24 months of construction and as such this would constitute a short-term effect. In the absence of mitigation, the negative effects on aquatic receptors are considered **negative, likely, indirect, significant and short term.**

6.6.3.6.2.2 Contamination

During the construction phase of the proposed wind farm, there are several instances described where contaminants, such as those from fuel storage and refuelling operations, could be accidentally released to receiving water bodies:

- Spillage or leakage of oil or fuel from refuelling machinery on-site.
- Spillage or leakage of oils and fuels stored on-site (e.g. hydrocarbons).
- Spillage or leakage of oil or fuel from machinery and vehicle movement and operation.
- Spillages arising during the use of concrete and cement for turbine foundations and hardstanding areas.

The release of these toxic contaminants to receiving water bodies could negatively affect aquatic organisms, as most of hydrocarbon constituents are bioavailable and bioaccumulated (e.g. Chandra Sekhar *et al.*, 2003; Li *et al.*, 2009). These substances can also become adsorbed in sediment, prolonging their persistence in the environment and, consequently, further increasing exposure for the biota (e.g McGrath *et al.*, 2019; Wu *et al.*, 2019).

Therefore, the potential contamination effect to aquatic receptors during the construction phase of the proposed project is appraised as **negative, likely, indirect, significant and long term.**

6.6.3.6.3 Hydrology morphology/habitat

The installation of culverts can fragment populations by acting as barriers to the movement of organisms, breaking the continuity a river or stream provides. The installation of 14 new land drainage culverts is required within the proposed wind farm site. A total of three streams and four drain crossing are required along the proposed GCR (Chapter 9 – Hydrology and hydrogeology). No culverts are required along the proposed TDR.

Culverts can fragment populations by acting as barriers to the movement of organisms, breaking the continuity a river or stream provides (i.e. the *River Continuum Concept* - Vannote *et al.*, 1980). Box and pipe culverts are often associated with barrier effects that can disrupt natural flow conditions, potentially affecting fish communities and a variety of other organisms (Clarke *et al.*, 1999; Peay, 2002; Kemp *et al.*, 2008; Cocchiglia *et al.*, 2012; Anderson *et al.*, 2014; Brunen *et al.*, 2020; Riley *et al.*, 2020; Kelly-Quinn *et al.*, 2022). This type of culvert usually fills rapidly

after rainfall, leading to pooling and deposition in its upstream entrance, while increasing flow velocity and erosion downstream (NRA, 2006).

Nevertheless, in terms of hydromorphological effects to the aquatic ecology, the construction of culverts within the proposed wind farm site and GCR will likely have limited significance. Within the proposed wind farm site, the culverts will be placed within the drainage ditches forming the drainage network, which is formed by artificial channels, with rare bank vegetation cover, likely used opportunistically by mammals, amphibians and insects. As described in Section 6.2.6.5.3 these channels do not hold sustainable fish communities, and the macroinvertebrate assemblages are likely to be dominated by tolerant/opportunistic taxa. Similarly, four of the proposed culverts along the GCR are within drainage channels and only one is within the Woodfield_25 stream. No new watercourse crossings or modification of existing culverts are required for the works along the proposed TDR. Further information is provided in Chapter 9 – Hydrology and Hydrogeology.

Therefore, it is **unlikely** the construction phase of the proposed project will produce hydromorphological effects with higher significance than **slight**.

6.6.3.6.4 Water Abstraction

Dewatering required to construct the turbine foundations and borrow pits could potentially result in a temporary decrease in water levels.

Borrow pits are proposed to be excavated up to 4 m deep in Borrow Pit 2 and 3, therefore will locally effect groundwater levels. Turbine foundations will be excavated to 4-5 m bgl. In terms of turbine construction, potential inflow is limited due to the presence of low permeability material in particular at T8 and T9 which are located >50 m to the west of Little Brosna_040 RWB. Drawdown distance for T8 and T9 are <5 m due to the low permeability soils.

Construction elements are located at sufficient distances from the closest water body, reducing the likelihood of any significant impacts on aquatic ecology from water abstraction during the construction phase of the proposed project. Therefore, no likely significant effects to aquatic ecology are anticipated from water abstraction for these elements of the construction phase of the proposed wind farm.

Therefore, the potential likely effects during the Construction Phase of the proposed wind farm from water abstraction are appraised as **neutral and imperceptible** to aquatic ecology.

Table 6-21: Summary of Predicted Effects on Aquatic Ecology

KER	Descriptor	Effect
Aquatic Ecology (Siltation)	*Quality of Effects*	Negative
	Significance	Significant
	Extent and Context	Hydrological Pathway
	Probability	Likely
	Duration	Short-term

KER	Descriptor	Effect
Aquatic Ecology (Contamination)	*Quality of Effects*	Negative
	Significance	Significant
	Extent and Context	Hydrological Pathway
	Probability	Likely
	Duration	Long-term
Aquatic Ecology (Hydrology morphology)	*Quality of Effects*	Negative
	Significance	Slight
	Extent and Context	Onsite drainage network and drainage along GCR with one stream crossing
	Probability	Unlikely
	Duration	-
Aquatic Ecology (Water abstraction)	*Quality of Effects*	Neutral
	Significance	Imperceptible
	Extent and Context	Hydrological Pathway
	Probability	Likely
	Duration	-

6.6.4 Operational Phase Impacts

Potential impacts associated with the Operational Phase of the receiving environment are discussed below.

6.6.4.1 Habitat and Flora

6.6.4.1.1 Habitat Loss

There will be no loss of habitats associated with the proposed project during the operational phase. During wind farm operation, maintenance activity will be infrequent and low intensity, such maintenance activities will be confined to turbine locations, substations and other hardstanding infrastructures and will not require any additional habitat clearance. It is possible that the overall habitat may improve due to a decrease of grazing activities.

6.6.4.1.2 Habitat Degradation – Surface Water Quality Impacts

During the operational phase of the project, surface water runoff will be managed in accordance with the proposed design (see Chapter 9 - Hydrology and Hydrogeology).

The design of the drainage system will ensure that any surface water arising from the proposed wind farm during operation will be contained and treated to ensure it can be dispersed from the proposed project without any significant impact on existing water bodies and aquatic organisms. The associated management features such as settlement ponds will be appropriately maintained through the operational phase. As such, there will be no habitat degradation as a result of changes in surface water quality and flow.

6.6.4.1.3 Habitat Degradation – Invasive Alien Species Impacts

During operation, vehicles will be accessing the wind turbine site on a regular basis. However, as the IAS Parrots Feather is an aquatic species, there is no risk of spread of this species via vehicles thought the site. The other IAS, Himalayan Balsam was recorded at one location along the GCR route. This habitat will not be disturbed from vehicles during the operation phase. Therefore, there is no risk of spread of these IAS from routine vehicle access to the proposed wind farm site.

6.6.4.1.4 Habitat Degradation – Air Quality Impacts

During operation there will be vehicles accessing the wind turbine site on a regular basis. There is little to no risk of significant risk of impacts on habitats from dust deposition associated with routine vehicle access within the proposed wind farm site.

6.6.4.2 Fauna

6.6.4.2.1 Disturbance/Displacement

Noise and vibration

As outlined in Chapter 11 (Noise & Vibration), during the operation phase, the predicted noise levels associated with the proposed project will be within best practice noise criteria curves recommended in line with guidance in the Wind Energy Development Guidelines, it is not considered that a significant effect is associated with the development. No significant vibration effects are associated with the operation of the proposed project.

During the operational phase the level of operational traffic and ongoing maintenance is expected to be low.

It is considered that any disturbance during the operational phase would result in **imperceptible negative effects on protected fauna at a local geographical scale.**

Lighting

New lighting will be installed at the proposed substation and BESS site. The new lighting will result in a localised increase in artificial lighting within the immediate surrounding area, which can negatively impact nocturnal species (Rich & Longcore, 2005). Lighting can impact bats roosting sites, commuting routes and foraging areas (Bat Conservation Ireland, 2010). Although no confirmed bat roosts were identified within the proposed wind farm site, or within the immediate surrounding area, bats were recorded foraging and commuting within the proposed wind farm site during the dusk activity survey. Direct illumination of bat commuting or foraging routes would constitute a significant negative effect as it could alter feeding patterns, and/or deter bats from commuting along affected corridors, ultimately impacting bat populations.

Excess illumination of bat features could result **in short-term, slight negative effects on the local bat population at a local geographical scale.**

6.6.4.2.2 Collision Risk – Bats

Bat activity at the proposed wind farm site was variable with periods of moderate activity occurring for some high collision-risk species. The habitat loss experienced during the construction phase will continue to persist through the operational phase, leading to decreased connectivity for many bat species. This decreased connectivity is desirable in terms of reducing risk of fatality or injury as a result of contact with rotating turbine blades.

The operation of the proposed wind farm has the potential to disturb commuting and foraging bats. Bat activity at the site was variable, with periods of moderate activity recorded for some high collision-risk species. Both direct collision with turbine blades and barotrauma resulting from close contact with blades have been reported as an issue for bats at wind farms (Cryan *et al.*, (2009), Mathews *et al.*, (2016).

High collision-risk species including Leisler's Bat, Common Pipistrelle, Soprano Pipistrelle and Nathusius' Pipistrelle have been recorded at the proposed wind farm site. The susceptibility of bat species likely to be at risk of impacts from wind turbines is partly associated with the likelihood of different species flying at rotor blade height.

In an Irish context Leisler's Bats is considered to have a somewhat greater mortality risk at wind farms than the other species recorded on the site as this species is a relatively large high-flying species and typically do not follow landscape features such as treelines or woodland edges when foraging. Overall activity levels for Leisler's Bat in the context of the proposed wind farm are considered moderate.

Common Pipistrelle is a common and widespread species in Ireland and considered to be a high-risk species due to their foraging ecology and flight characteristics. Common Pipistrelles were one of the most commonly recorded species across the site. Overall activity levels for Common Pipistrelles in the context of the proposed wind farm are considered moderate to high.

Soprano Pipistrelles is another common and widespread species in Ireland which are considered to be a high-collision risk species due to their foraging ecology and flight characteristics. Overall activity levels for Soprano Pipistrelles in the context of the proposed wind farm are considered to be moderate to high.

It is known that Common and Soprano Pipistrelle are common and widespread in Ireland and are present in a wide variety of habitat types, and so higher activity levels for these species when compared with others is considered typical.

Nathusius' Pipistrelle has a fast flight and is slightly less agile in flight than the other Pipistrelle species and is positively associated with broadleaf woodland and areas where pasture is less extensive (Roche et al., 2014). This species is considered to be of high-collision risk due to their foraging ecology and flight characteristics. Nathusius' Pipistrelle was only recorded in spring and autumn, yielding an overall low activity category.

While activity levels of the above species varied between survey locations (corresponding to proposed turbine locations) it is not possible to determine with any accuracy the different levels of collision risk presented by individual turbines (NatureScot et al., 2021). As per NatureScot et al., (2021) there is no requirement to complete an overall risk assessment for low-risk species.

The low-risk species recorded at this proposed wind farm site were Brown Long-eared Bat, Daubenton's Bat, Natterer's Bat and Whiskered Bat/Brant's Bat. Overall activity levels were low for these species and by the virtue of their low potential vulnerability to wind energy developments, no significant collision related risk is likely. Mitigation measures to avoid habitat loss during the construction phase will continue to influence the site during the operational phase, resulting in reduced movement of bats at turbines. This is beneficial in terms of minimising the risk of collision-related injury or fatality from turbine blades.

Overall, in the absence of mitigation, the proposed wind farm in its operational phase would likely have a **'permanent, slight, negative'** effect on bats at a local level (following EPA, 2022).

6.6.4.2.3 Aquatic Ecology

6.6.4.2.3.1 Surface Water Flow

The proposed permanent wind farm footprint comprises 20 ha within the overall wind farm site area of 355 ha (5%). The presence of hardstand areas may increase the risk of erosion and subsequent sediment laden surface water runoff. In the absence of mitigation, the proposed wind farm site is **likely slight long-term negative effect on the surface water quality**.

No significant excavation works will take place on the proposed TDR or GCR during the operational phase and as such **no significant effects** on surface water quality is predicted.

6.6.4.2.3.2 Surface Water Quality

Elements of the electrical plant at the substation site (primarily transformers) may contain oil for insulation purposes which may be a potential source of contamination. Furthermore, there will be vehicles periodically on the proposed wind farm site at any given time which could lead to the potential runoff of hydrocarbons. The potential likely effects are limited by the size of the fuel tank of the vehicles used on the proposed wind farm site. As a result, occasional/accidental emissions, in the form of oil, petrol or diesel leaks, could potentially cause **slight temporary and localised contamination of surface**

6.6.4.2.3.3 Groundwater Flow and Quality

Groundwater dependant habitats within the proposed wind farm site include PB1 Raised bog. This habitat is considered groundwater dependant in so much as the regional groundwater is critical for support function in maintaining high water levels within the habitat (Kilroy, 2013).

The installation of permanent infrastructure could result in a decrease in groundwater infiltration during the operational phase of the proposed wind farm site, as a result of the proposed permanent wind farm infrastructure. However, the effect is appraised as **not significant, negative, long-term effect** on the alteration of groundwater flow (Chapter 9 – Hydrology and Hydrogeology). As such, further indirect effects on PB1 Raised bog habitat are unlikely. No significant excavation works will take place on the proposed TDR or GCR during the operational phase and as such **no significant effects** on groundwater flow are predicted.

With regard to water quality effects, there will be no direct discharges to the groundwater environment during the operational phase. Vehicles will be occasionally present within the proposed wind farm site during the operational phase, allowing for potential likely effects on ground water quality. The extent of these effects is limited by the size of the vehicles in question. As a result, occasional/accidental emissions, in the form of oil, petrol or diesel leaks, could

potentially cause negative effects on groundwater quality, which are appraised as **likely, slight, negative, temporary and localised** (Chapter 9 – Hydrology and Hydrogeology)**.** Groundwater discharge into PB1 Raised bog habitat is indirect and hydraulic conductivity is low (Kilroy *et al.*, 2013). As such, contamination of groundwater is **not likely to have a significant effect** on PB1 Raised bog habitat

No significant excavation works will take place on the proposed TDR or GCR during the operational phase and as such no significant effects on groundwater flow are predicted.

6.6.5 Decommissioning Phase Impacts

The proposed project is expected to be operational of 35 years. Decommissioning will include the dismantling of infrastructure, minor excavation activities and the removal of waste offsite. Impacts during decommissioning are expected to be of similar type and magnitude to those anticipated during the construction phase, but generally of a shorter duration.

6.7 Mitigation Measures

Mitigation is prescribed with regard to the 'Mitigation Hierarchy' set out in the EPA 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2022), which requires mitigation by avoidance as a first approach. Where this is not achievable, measures to prevent impacts from giving rise to adverse effects, will be adopted. Where impacts cannot be avoided (e.g. generation of noise), mitigation by reduction of impact is prescribed to limit the exposure of the ecological receptor to an acceptable level (often achieved by interrupting the pathway between the source and receptor). When significant effects cannot be prevented, mitigation to counteract the effects is required (i.e. offsetting measures).

6.7.1 Construction Phase Mitigation Measures

Mitigation measures which will be implemented during the construction phase are detailed in the following sections.

6.7.1.1 Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) has been prepared for the proposed project (see Appendix 2-3). All mitigation measures outlined within this Chapter are included within the CEMP.

6.7.1.2 Appointment of Environmental / Ecological Clerk of Works

A suitably qualified Ecological Clerk of Works (ECoW) will be appointed by the Contractor. The ECoW will be experienced in the management all relevant flora and fauna and aquatic, peatland and heathland habitats. The ECoW will oversee all construction works and monitor all relevant receptors as described in this report including possible sources of impact for the duration of the construction programme. The ECoW will guarantee that the construction phase of the proposed project will be undertaken in strict agreement with the methods prescribed within the CEMP and will have the power to stop the works in case any activities or works are not compliant or when impacts rise above environmental thresholds as specified in the CEMP

6.7.1.3 Management of Designated Sites

Mitigation measures which will ensure the protection of the identified designated sites within 6.6.2 are outlined in the NIS that accompanies the Planning Application documentation.

6.7.1.4 Mitigation Measures for Habitats and Flora

The proposed construction work areas will be demarcated prior to the construction works commencing. No clearance of vegetation will be undertaken outside of the demarcated areas within the proposed wind farm site. Vegetation clearance will be kept to a minimum, where possible. Any necessary removal of trees or scrub will be implemented outside of the bird breeding season in line with the Wildlife Act as amended. Construction vehicles will be restricted to designated access tracks to avoid impacting adjacent habitats and to ensure that soil compaction is restricted to these tracks. Large access mats will be used to mitigate rutting and reducing soil erosion and impact to the surrounding habitats. Replacement of access mats will be undertaken when they become heavily used and worn. All disturbed ground will be fully and appropriately reinstated following the completion of the works.

6.7.1.4.1 Establishing WL1 Hedgerows and WL2 Treelines

As mitigation for the loss of 1.3km of Hedgerows and Treelines as a result of the proposed project, new linear habitat will be established within the proposed wind farm site, largely along the proposed access tracks. The tree and shrub species selected for planting will be native and can include, i.e. Hawthorn, Blackthorn, Alder, Grey Willow, Elder, Holly, Hazel, Spindle, Sessile oak, and Rowan. These linear habitats will be managed for biodiversity and maintained until the end of the Operation Phase, or until the planted shrubs and trees will be considered sustainable by the ECoW. Any failed saplings will be replaced as appropriate. Treelines will be side trimmed as necessary but not topped in order to allow trees to reach their full height.

Post-construction compliance monitoring reports shall include hedgerow surveys of these newly established linear habitats as well as recommendations for maintenance and enhancement measures as appropriate.

6.7.1.4.2 Establishing WN7 Bog Woodland

As described in Section 6.6.3.1, the proposed project will result in the direct loss and degradation of 2.82 ha WN7 Bog woodland. To mitigate this loss, 3.2 ha of new WN7 Bog woodland will be established through the planting of suitable native species including Downy birch, Scots Pine, and Willow species on more fertile areas locally (DAFM, 2024). No planting will be undertaken on intact or remnant peatland habitats but instead agricultural areas on peat, peaty podzols or peaty gley will be selected for conversion. Methods for the establishment of native woodlands will follow those set out in the Native Woodland Scheme. A Native Woodland Scheme registered ecologist, and forester will be contracted to oversee works and maintenance. Where feasible, new woodland should be created as a single, contiguous block rather than as several smaller, separate areas.

6.7.1.4.3 Establishing WD1 (Mixed) Broadleaved Woodland

As described in Section 6.6.3.1, the proposed project will result in the direct loss and degradation 1.02 ha WD1 (Mixed) broadleaved woodland. To mitigate this loss, additional planting of 1.02 ha native broadleaved woodland will be implemented within the proposed wind

farm site during the construction phase. As above, a Native Woodland Scheme registered ecologist, and forester will be contracted to oversee works and maintenance. Appropriate species for the establishment of the (Mixed) broadleaved woodland will be dependent upon the soil type. Where possible, species will be selected to compliment the Long-established sessile oak woodland identified within the proposed wind farm site including, Sessile oak, Downy birch, Rowan, and Holly (DAFM, 2024). Where feasible, new woodland will be created as a single, contiguous block. No planting will be undertaken on peatland habitats

6.7.1.4.4 Establishing WS1 Scrub

As described in Section 6.6.3.1, the proposed project will result in the direct loss and degradation of 1.06 ha of WS1 Scrub. By way of mitigation for this loss, a 1.06 ha agricultural greenfield site will be converted to WS1 Scrub through natural regeneration. Grazing on the area will be prohibited year-round and management of the grassland will take place, with the exception of IAS control where appropriate (Section 6.7.1.4.6). Through the process of ecological succession, the area will be allowed to undergo conversion to WS1 Scrub and overtime, its eventual transition to native woodland.

6.7.1.4.5 Mitigation Measures to Prevent Dust Deposition

Mitigation measures associated with construction dust are outlined in Chapter 10- Air Quality. Further specific mitigation measures associated with dust deposition are outlined below.

- Public roads utilised as part of the proposed project will be regularly inspected for dust deposition and sprayed regularly with water during dry weather periods to minimise the release of dust into the air. This includes all construction machinery on the GCR and all construction machinery traveling to and from the proposed wind farm site. The abstraction of water for dust suppression practices will follow IFI Guidelines (2016), water bodies within and downstream of the proposed project will not be used for dust suppression purposes
- Material handling systems and stockpiling of materials will be designed and laid out to minimise exposure to wind. Water spraying (or similar dust suppression methods) will be used as required if particularly dusty activities associated with the construction works are necessary during dry and/or windy periods
- All stockpiles will be covered to prevent wind whipping
- Earthworks and exposed areas/soil stockpiles will be re-vegetated to stabilise surfaces as soon as practicable
- Exposed earthwork activities will also be monitored and sprayed accordingly to reduce dust creation
- During movement of dust-generating materials both on and off-site, trucks will be covered with tarpaulin which are secured in place at all times
- A water bowser will be used to spray work areas (wind turbine area and GCR) and haul roads, especially during periods of excavations works coinciding with dry periods of weather
- The speed of vehicles, heavy goods vehicles (HGV) and machinery within leading into the proposed wind farm site will be limited to 20 km/hr to decrease the suspension of dust into the air and surrounding environment
- Site hoarding of 2.4 m will be erected at a minimum at construction compounds

6.7.1.4.6 Management of Invasive Alien Species

Two IAS, Himalayan balsam and Parrot's-feather were identified within the proposed wind farm site and GCR. In order to comply with Regulations 49 and 50 of the European Communities (Birds and Natural Habitat) Regulations (2011) as amended, and the First Schedule Regulations 2024 (S.I. 374 of 2024), a site specific Invasive Alien Species Management Plan will be prepared prior to the construction works commencing. The document will be prepared in line with best practice guidance on the management of IAS (TII, 2020; NRA, 2010; RAPID, 2021). A summary of mitigation measures which will be applied to the IAS is provided hereunder.

6.7.1.4.6.1 Himalayan Balsam

- A pre-construction IAS survey will be conducted to establish the full extent of the infestation along the GCR. The survey will be undertaken from April when the young plants are first apparent but before the flowering season in June.
- The control of the species must be implemented by suitably qualified contractors.
- The Himalayan Balsam will be pulled from the ground between mid (15) May and the end of (30) June before the seed pods develop. Pulling should be performed prior to the formation of the seed pods which explode at the slightest disturbance when ripe. Himalayan Balsam has very shallow roots, making uprooting by hand easy.
- The pulling technique must be undertaken so that the entire plant is uprooted. This is normally best accomplished when pulled from low down on the plant, near the root structure at the base. If snapping occurs at a node, the pulling must be completed to include the roots.
- Uprooted plants will be left to air dry and decompose on a non-permeable membrane within a site compound to prevent any part of the plant, including its developing seeds entering any watercourse and to prevent dispersion by wind. The plant material is to be removed to a licensed landfill site or buried at least 1 m below ground level within the site compound.
- Once the initial stand of Himalayan Balsam has been pulled, the area of works will be covered with jute material prior to works commencing (or by ECoW approved equivalent) to degrade naturally. If it is necessary to track over this area, the jute material will be secured and steel road plates (or by ECoW approved equivalent) will be placed on top to avoid any ground contact of tracking machinery. If the soil itself needs to be excavated to facilitate the works this will be carried out under supervision of the ECoW, the material will be placed in big-bags or tonne bags. This material will either be removed from site by a licensed contractor, or it will be buried on site at least 1 m below ground level. The removal of invasive material off site may require a licence from the NPWS in advance of any removal, in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477) as amended. Any material that is taken off site must be taken by a licensed waste carrier and must go to a suitably authorised landfill site.
- All areas containing Himalayan Balsam will be cordoned off and clearly marked as exclusion zones with IAS signage.
- A multi-annual approach is required until the plant is eradicated from site.

6.7.1.4.6.2 Parrot's-feather

- A pre-construction IAS survey will be conducted to establish the full extent of the infestation.
- Prior to any treatment works commencing onsite, the ECoW will agree the location for and supervise the demarcation of all working areas/bio-secure areas related to IAS. This will include the establishment of bio-secure zone, haul route for materials and storage area.
- Careful preparation of the site and planning of the works is crucial to the successful treatment of IAS. Site personnel will not be allowed into the contaminated area once work has begun unless they have been inducted into biosecurity measures on site. The surrounding area will be isolated by closing the works area to all pedestrian and vehicular traffic during excavation and construction, until the site has been reinstated. Biosecurity measures shall be put in place to avoid the accidental transport of material. Biosecurity measures will consist of closing off the area to traffic and providing a clean-down and de-contamination area for all vehicles and equipment operating on site.
- Silt curtains will be installed within the drainage ditches at locations identified by the ECoW to contain any silt or plant fragments to prevent movement downstream should they become dislodged.
- Water levels will need to be low during the removal to ensure fragments of the IAS do not travel downstream and spread further. This may be done by damming off the section of river during treatment. The works area surrounding the IAS will be bunded using sandbags, if possible, to create a dry working area prior to any removal works commencing.
- The plants will be mechanically removed. The removal of contaminated material off site may require a licence from the NPWS in advance of any removal, in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477) as amended. Any waste that is taken off site must be taken by a licensed waste carrier and must go to a suitably authorised landfill site. This will be confirmed by the ECoW who is monitoring the works. This treatment should be done by cutting the roots in the sediment with as little disturbance as possible to prevent fragmentation. All parts of the plant will be removed. After cutting the plant, jute matting should then be placed down on the treated area to block light on potential new shoots. Re-treatment must be applied as necessary.
- Removal of the IAS will also need to be carried out within the recommended timeline under the supervision of the qualified ECoW. Monitoring and follow-up treatment protocols (if required) must be implemented to ensure any potential regrowth is effectively treated.

6.7.1.4.6.3 Additional Biosecurity Measures

The following biosecurity measures will be undertaken by the appointed contractor throughout the duration of the construction phase:

- Prior to arrival, all machinery and equipment used during the construction works will be thoroughly cleaned and dried using a high-pressured steam cleaner, with water >65 °C, in addition to the removal of all vegetation, earth and foreign material.

- Items difficult to soak/spray will be wiped down with a suitable disinfectant (e.g. solution of 1% Virkon® Aquatic).
- The contractor will establish and clearly delineate a bunded cleaning/washing areas at the Construction Compounds, where gravity will not drive untreated washed material towards local drains.
- No removed material or run-off is permitted to enter any water bodies (including drainage ditches).
- Evidence that all machinery and equipment was cleaned will be required to be on file for review by the statutory authorities and the appointed ECoW. The level of evidence required of the contractor will be, registration plates of vehicles onsite and a register of when, how and where each of these were cleaned before they arrived on site.
- Spot checks on the adequacy of cleaning will be carried out by the ECoW.
- The contractor will establish and clearly delineate a bunded cleaning/washing area at the Construction Compounds, where gravity will not drive untreated washed material towards local drains.

Table 6-22: Proposed Mitigation Measures for Habitats and Flora

Potential Effect	Proposed Wind Farm Activity	Proposed Mitigation Measure	Further description
Habitat loss and degradation	Earth works, excavations, general construction	Manage access and control site works	▪ The proposed construction work areas will be demarcated prior to the construction works commencing. ▪ No clearance of vegetation will be undertaken outside of the demarcated areas within the proposed wind farm site. Vegetation clearance will be kept to a minimum, where possible. Any necessary removal of trees or scrub will be implemented outside of the bird breeding season in line with the Wildlife Act as amended. ▪ Construction vehicles will be restricted to designated access tracks to avoid impacting adjacent habitats and to ensure that soil compaction is restricted to these tracks. ▪ Large access mats will be used to mitigate rutting and reducing soil erosion and impact to the surrounding habitats. Replacement of access mats will be enforced when they become heavily used and worn. ▪ All disturbed ground will be fully and appropriately reinstated following the completion of the works.
	Earth works, excavations, general construction	Planting of 1.3km of WL1 Hedgerow and WL2 Treelines	▪ As mitigation for the loss of Hedgerow and Treelines habitats, the edges of the tracks will be planted with native shrub and tree species, i.e. Hawthorn, Blackthorn, Alder, Grey Willow, Elder, Holly, Hazel, Spindle, Sessile oak, Rowan; ▪ The new linear habitat should have a minimum extension of 1.3km in total; ▪ These linear habitats will be managed and maintained until the end of the Construction Phase, or until the planted shrubs and trees will be considered sustainable by the ECoW; ▪ Failed saplings will be replaced as appropriate; ▪ Treelines will be side trimmed as necessary but not topped in order to allow trees to reach their full height.
	Earth works, excavations, general construction	Planting of:	▪ 2.82 ha of WN7 Bog woodland will be established through the planting of native species including Downy birch, Scots Pine, and Willow species. No planting will be

Potential Effect	Proposed Wind Farm Activity	Proposed Mitigation Measure	Further description
		▪ 2.82 ha WN7 Bog woodland, ▪ 1.02 ha WD1 (Mixed) broadleaved woodland; and, ▪ 1.06 ha WS1 Scrub.	undertaken on peatland habitats but instead a green agricultural field on peat, peaty podzols or peaty gley will be selected for conversion. ▪ Methods for the establishment of native woodlands will follow those set out in the Native Woodland Scheme. A Native Woodland Scheme registered ecologist, and forester will be contracted to oversee works and maintenance. ▪ Appropriate native species will be selected for the bog woodland including; Downy birch, Rowan, Scots pine, Sessile oak plus Holly, Hawthorn & Hazel. ▪ 1.02 ha of WD1 (Mixed) broadleaved woodland will be established using native tree species. ▪ As above, a Native Woodland Scheme registered ecologist, and forester will be contracted to oversee works and maintenance. ▪ Appropriate species for the establishment of the (Mixed) broadleaved woodland will be dependent upon the soil type. ▪ 1.06 ha of WS1 Scrub will be allowed to develop naturally in a fallow filed where grazing is prohibited year round.
	Earth works, excavations, general construction	Water Quality Mitigation for FW4 Drainage ditches	▪ Mitigation measures including SUDS, settlement ponds, and silt traps will protect the status of water quality within FW4 Drainage ditches throughout the proposed wind farm site.
Habitat degradation – air quality	Construction activities and air quality degradation	Implementation of a dust mitigation measures, as outlined in Chapter 10 – Air and the CEMP	▪ Public roads utilised as part of the proposed project will be regularly inspected for dust deposition and sprayed regularly with water during dry weather periods to minimise the release of dust into the air. The abstraction of water for dust suppression practices will follow IFI Guidelines (2016), water bodies within and downstream of the proposed project will not be used for dust suppression purposes; ▪ Material handling systems and stockpiling of materials will be designed and laid out to minimise exposure to wind. Water spraying (or similar dust suppression methods) will be used as required if particularly dusty activities associated with the construction works are necessary during dry and/or windy periods; ▪ Exposed earthwork activities will also be monitored and sprayed accordingly to reduce dust creation;

Potential Effect	Proposed Wind Farm Activity	Proposed Mitigation Measure	Further description
			▪ During movement of dust-generating materials both on and off-site, trucks will be covered with tarpaulin which are secured in place at all times; and ▪ The speed of vehicles, heavy goods vehicles (HGV) and machinery within leading into the proposed wind farm site will be limited to 20 km/hr to decrease the suspension of dust into the air and surrounding environment. ▪ Temporary dust screens comprising of wooden hoarding and fine mesh netting shall be erected along the construction corridor at select locations where sensitive peatland and woodland habitats occurring within 50 m of same.
Habitat degradation - spread of IAS	All construction works in the proximity IAS	Pre-construction survey	▪ A pre-construction dedicated IAS survey at the proposed wind farm site will be undertaken by the appointed ECoW, particularly focused to the drainage ditches within the proposed wind farm site where IAS have been identified as well as the identified location along the GCR. All IAS individual plants/stands present will be identified, counted and georeferenced.
	All construction works in the proximity IAS	Biosecurity area	▪ A strict biosecurity demarcation area will be installed by the ECoW within the zone where Third Schedule + 2024 Reg listed IAS are present – 10 m from each stand (unless it is not feasible for Health & Safety reasons – e.g. roadside); ▪ Only works outside the biosecurity area will be allowed to proceed.
	Vehicles and machinery accessing the site	ISMP	▪ If any of the proposed works will be required to break the biosecurity area mentioned above, a specific and detailed Invasive Species Management Plan (ISMP) will be developed by the contractor; ▪ The ISMP will detail a strategy of uprooting the IAS plants, currently present at the proposed wind farm site and along the GCR, the most effective management measure for the control of each species.
	Vehicles and machinery accessing the site	Vehicle and machinery cleaning	▪ Prior to arrival on site, the contractor's vehicles and equipment will be thoroughly cleaned and then dried using high-pressure steam cleaning, with water >65 °C, in addition to the removal of all vegetative material; ▪ Items difficult to soak/spray will be wiped down with a suitable disinfectant (e.g. solution of 1% Virkon® Aquatic). ▪ The contractor will establish and clearly delineate a bunded cleaning/washing areas at the Construction Compounds, where gravity will not drive untreated washed material towards local drains.

Potential Effect	Proposed Wind Farm Activity	Proposed Mitigation Measure	Further description
	Vehicles and machinery accessing the site	Vehicle and machinery cleaning	▪ Evidence that all machinery has been cleaned will be required to be on file for review by the statutory authorities and the appointed ECoW. The level of evidence required of the Contractor will be, registration plates of vehicles onsite and a register of when, how and where each of these were cleaned before they arrived on site. ▪ Spot checks on the adequacy of cleaning will be carried out by the ECoW.

6.7.1.5 Mitigation for Fauna

6.7.1.5.1 Pre-construction Survey

Pre-construction surveys for Otter, Badger, and other protected mammals will be completed within the proposed wind farm site by an appropriately experienced ecologist (ECoW). These surveys will identify any changes in protected mammal activity, such as the establishment of new burrows or other signs of use, within the ZoI of the proposed project. The surveys will be conducted in accordance with NRA (2005) guidelines, no more than 10–12 months in advance of construction. If mammal activity (i.e. otter or badger) is recorded during the preconstruction surveys, measures will be implemented in accordance with sections 6.7.1.5.2 and 6.7.1.5.3 below.

6.7.1.5.2 Badger

6.7.1.5.2.1 Management of Habitat Loss

There will be no direct loss of any active Badger setts as part of the proposed project construction activities. However, there is potential for currently inactive setts to the south-east of Turbine 8 to become reoccupied, as discussed in Section 6.6.3.2.1.1. In accordance with NRA (2005), exclusion of badgers from disused or currently inactive setts, may be undertaken during any season. Works to temporarily exclude badgers from any currently active sett will only be carried out during the period of July to November (inclusive) in order to avoid the badger breeding season.

6.7.1.5.2.1.1 Temporary Closer

Confirming that a sett is inactive during the breeding season (that is, ensuring no cubs are present below ground) will require a period of monitoring, typically five or more consecutive days of checks using camera traps, sand pads, or sticks placed at entrances to detect footprints or signs of use.

For disused or verified inactive setts, and to prevent reoccupation, entrances may be lightly blocked using vegetation and a small amount of loose soil (soft blocking). The purpose of soft blocking is to confirm that a sett is not occupied.

If, following soft blocking, no evidence of Badger activity is observed during the monitoring period, construction works may proceed under the supervision of the ECoW. However, if any evidence of current or recent Badger activity is detected during this process, sett evacuation procedures (see Section 6.7.1.5.2.1.2) will be implemented.

6.7.1.5.2.1.2 Sett Evacuation

Where exclusion is required, inactive entrances will first be soft blocked, while any active entrances will be fitted with one way Badger gates (with secure proofing along the sides) to allow Badgers to exit but not return (see Plate 6-23). The gates shall remain tied open for three days before being set to operate in one way mode.

Monitoring tools such as sticks placed within tunnels or camera traps at entrances shall be used to confirm Badger presence or absence. The one-way gates shall remain in place for a minimum of 21 days (including the initial period when tied open), with regular inspections throughout. Any evidence of Badger activity during this period will require repetition of the procedure or the application of additional exclusion measures.

Because one-way gates can be disturbed by other animals or members of the public, frequent monitoring is essential. Badgers may also attempt to dig around or reopen closed entrances, particularly if gates remain in place for extended periods.

In cases where the sett is extensive, temporary electric fencing may be used as an alternative or supplementary exclusion method. The fence shall encompass all entrances, with one-way gates installed at key crossing points along established Badger paths. The exclusion period shall again be a minimum of 21 days and will only conclude once no Badger activity has been observed within the fenced area for the full monitoring duration.

The appointed ECoW will determine the most effective exclusion method for each sett, based on local conditions such as topography, ground conditions, and accessibility.

Plate 6-23: Example of One-way Badger Gates With Chain Link Fencing to Prevent Badgers From Digging Around Closed Entrances

6.7.1.5.2.1.3 Post-Exclusion Reinstatement

Following completion of the exclusion period and confirmation that the sett is inactive, all exclusion measures (e.g. gates, fencing, or proofing) will be removed under the supervision of the Ecological Clerk of Works (ECoW). The area will then be sensitively reinstated using soil and natural vegetation to return the ground surface to its previous condition. This reinstatement will ensure the area remains available for potential future use by Badgers once construction activities are complete. The ECoW will document all reinstatement works and confirm that the area has been appropriately restored following the completion of construction.

6.7.1.5.2.2 Management of Disturbance/Displacement

6.7.1.5.2.2.1 Timing of Works, Lighting and Noise

Badger are predominantly nocturnal in nature and are most active between the or dusk to dawn. To minimise potential disturbance or displacement, all construction works within 150 m of any suitable Badger habitat or known sett, will be confined strictly to daytime hours between 08:00 and 18:00. Works will not commence or conclude during civil twilight periods.

To reduce behavioural disturbance to Badgers, all site lighting will be directional, downward facing, and shielded. Lighting will be used only where required for safety and will not be directed towards woodlands or known Badger setts. High noise activities such as piling or rock breaking within 150 m of known Badger setts will be restricted to daytime hours and kept to the shortest practicable duration. Where operational requirements necessitate deviation from these hours, the works will be subject to review and approval by the ECoW.

6.7.1.5.2.2.2 Pre Commencement Badger Surveys

A pre commencement Badger survey will be undertaken no more than twelve months prior to the start of construction works and updated if works are delayed by more than six months. Surveys will be undertaken in accordance with the methodologies set out in section 6.2.6.3.2. Surveys will be completed by a suitably qualified ecologist. The survey will record all evidence of badger activity, including setts, latrines and snuffle holes. Camera traps may be used to confirm activity levels where required. All results will be mapped and retained within the project's ecological records.

6.7.1.5.2.2.3 Response to Discovery of Badger Setts

In the event that a new sett (established within the interim period) is identified within the footprint of the works or within 150 m of construction activity during the pre-construction confirmatory survey, the mitigation measures as outlined in section 6.7.1.5.2.1, will be implemented as necessary.

6.7.1.5.3 Otter

6.7.1.5.3.1 Management of Habitat Loss

6.7.1.5.3.1.1 Pollution Prevention and Water Quality Protection

To prevent indirect habitat loss impacts on otter through deterioration of water quality or prey availability, the following pollution control measures will be implemented through the CEMP:

- Vegetated buffer strips will be retained adjacent to all watercourses where practicable.
- Silt traps, settlement ponds, and sediment fencing will be installed to prevent sediment laden runoff from entering watercourses.
- Refuelling and fuel storage will take place only within bunded areas located at least ten metres from any watercourse.
- Spill kits will be available at all refuelling locations and a site-specific spill response procedure will be implemented.
- Staff will receive toolbox talks on pollution prevention and emergency procedures.
- Turbidity and suspended solids will be monitored upstream and downstream of active works in accordance with best practice.

6.7.1.5.3.2 Management of Disturbance/Displacement

6.7.1.5.3.2.1 Timing of Works, Lighting and Noise

Otters are predominantly crepuscular in nature and are most active during dawn and dusk. To minimise potential disturbance or displacement, high noise construction activities such as HDD, clear span bridge works, piling, or rock breaking within 150 m of any watercourse, including water crossings and HDD locations along the GCR, will be carried out only during daylight hours between 7:00 and 19:00 Monday to Friday (excluding public holidays) and between 7:00 and 14:00 on Saturdays. These activities will be kept to the shortest practical duration and will not start or finish during civil twilight, which is approximately 20–30 minutes before sunrise and after sunset. Where operational requirements necessitate deviation from these hours, the works will be subject to review and approval by the ECoW.

To further reduce behavioural disturbance to otters, all site lighting will be directional, downward facing, and shielded. Lighting will be used only where required for safety and will not be directed towards riparian habitats. Where updated lighting plans are required, these will be reviewed by an ECoW to ensure no light spill on riparian habitats.

6.7.1.5.3.2.2 Pre Commencement Otter Surveys

A pre commencement otter survey will be undertaken no more than twelve months prior to the start of construction works and updated if works are delayed by more than six months. Surveys will be undertaken in accordance with the methodologies set out above. Surveys will be completed by a suitably qualified ecologist. The survey will record all evidence of otter activity, including spraints, footprints, slides, feeding remains, couches, and holts. Camera traps may be used to confirm activity levels where required. All results will be mapped and retained within the project's ecological records.

6.7.1.5.3.2.3 Response to Discovery of Otter Holts

In the event that a new holt (established within the interim period) is identified within the footprint of the works during the pre-construction confirmatory survey and the following mitigation measures will be applied in accordance with the NRA *Guidelines for the Treatment of Otters during the Construction of National Road Schemes* (NRA, 2006) as follows:

- No wheeled or tracked vehicles (of any kind) will be used within 20 m of active, but non-breeding, otter holts (NRA, 2006). Light work, such as digging by hand or scrub clearance will also not take place within 15 m of such holts, except under licence.
- No works will be undertaken within 150 m of any holts at which breeding females or cubs are present. Following consultation with NPWS, works closer to such breeding holts may take place provided appropriate mitigation measures are in place, e.g. screening and/or restricted working hours on site (NRA, 2006). Breeding may take place in any season, so activity at a holt will be determined on a case-by-case basis by the ECoW.
- A prohibited working area associated with otter holts will be fenced and appropriate signage erected under guidance of the ECoW;
- If holts are found to be inactive prior to construction, exclusion of holts and their subsequent destruction may be carried out during any season under licence with the NPWS. To prevent the reoccupation of holts the entrances will be soft blocked (using vegetation and a light application of soil) for a period of five days (NRA, 2006).

6.7.1.5.4 Translocation of Frog Spawn

Due to the occurrence of Common Frog within the proposed wind farm site, along with the presence of suitable habitat within the proposed works area, it is recommended that a pre-construction frog spawn survey is undertaken within wet grassland and drainage ditch habitats, including tyre rut pools, which may be disturbed during the Common Frog spawning season (1st March – 31st June, inclusive). In the event that frog spawn is identified within the footprint of the proposed works, a license under Sections 22 and 23 of the Wildlife Acts will be sought from NPWS. The license, if required, will detail specific measures to translocate the frogs and spawn to suitable nearby habitat (to be identified prior to carrying out the survey) which will not be impacted by the proposed project.

6.7.1.5.5 Bats

6.7.1.5.5.1 Management of Disturbance/Displacement

6.7.1.5.5.1.1 Construction Phase Mitigation

The removal of trees in order to implement the bat mitigation buffers will result in the loss of 12 trees containing PRF-I features. These PRF-I features in trees may be used on a transitory basis by a small number of bats exhibiting fission-fusion behaviour during which they can occupy roosts for only a small number of days/nights (Kaňuch *et al.* 2022). The absence of roosting bats will be confirmed immediately prior to the removal of these trees with an internal inspection of the potential roost features. These trees will not be removed during the hibernation period (November – March inclusive) to avoid the potential for disturbance effects on any bats which may be in torpor.

To mitigate the removal of roosting features suitable for roosting by small numbers of bats, eight bat boxes will be erected at suitable locations outside of the buffer zones identified above, in consultation with a bat-licensed Ecologist and the ECoW. 'Woodcrete' bat boxes will be used as they are durable and long-lasting and do not require maintenance. A mixture of bat box types should be used to cater for seasonal and species requirements. The following products (or similar) are suitable:

- Schwegler 1FS Colony Bat Box 95.
- Schwegler 2F Universal Bat Box.
- Schwegler 2FN Bat Box 55.

Bat boxes should be installed on suitably large trees or specially installed poles in consultation with a bat-licensed Ecologist. Boxes should be installed at a minimum height of 4 meters above ground level, at suitable aspects (not northern) and in locations which are inaccessible to unaided climbing (to minimise the risk of vandalism) and not vulnerable to artificial light or noise pollution.

As outlined above, a robust and appropriate survey effort was carried out and no evidence of bat roosting, current or historic, was identified within trees scheduled for removal. However, given the potential for delays between reporting and the commencement of construction, and with cognisance of the recommended lifespan of ecological data in relation to mobile species, pre-construction surveys are appropriated to establish if the baseline conditions reported herein remain valid. Prior to commencement of tree felling, survey will be carried out following

Collins (2023) by a bat-licensed Ecologist. If required, a derogation license will be secured in advance of any tree-felling works, if any, and appropriate mitigation measures will be put in place to avoid or reduce impacts on bats.

Construction operations will take place during the hours of daylight in as far as possible to minimise disturbances to bats and other wildlife. It is recognised that key works such as turbine delivery and erection may require night-time working. Where working at night is required the reduction of light levels or application of motion sensor lights will be used where bat foraging habitat is present. All construction phase lighting systems will be designed to minimise nuisance through light spillage and follow ILP (2023) guidance. Shielded, downward directed lighting will be used wherever possible and all non-essential lighting will be switched off during the hours of darkness.

Directional lighting will be used to prevent overspill on to forestry/woodland edges, riparian zones or other habitat features of importance to bats. This will be achieved with the use of covers and shields (baffles, hoods or louvres) to reduce light spill and direct lighting to the intended area only. Luminaires will feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats. Only luminaires with an upward light ratio of 0% and with good optical control will be used. Luminaires will be mounted on the horizontal, i.e. no upward tilt.

6.7.1.5.5.1.2 Turbine Delivery Route Mitigation

Enabling works along the proposed Turbine Delivery Route (TDR) will result in the loss of 22 m of tree line to facilitate the construction. Although no evidence of current or historic roosting by bats was recorded along the TDR at the time of survey, the assessment was based on the design information to date and will be subject to future assessment and application. The majority of the TDR is composed of the M7 Motorway and N69 National Road. The final section of the route is along the R445, N62, and R492. While there are many river crossings and bridges along this route there are no works required on bridges or other features likely to support roosting bats in order to facilitate the delivery. No impact is anticipated on roosting bats as a result of future works along the TDR.

6.7.1.5.5.1.3 Grid Connection Mitigation

Bat roosting has been confirmed within bridge B08 along the GCR through DNA analysis. Horizontal Directional Drilling (HDD) is proposed from bridge B08 with a 'mitigate-by-design' approach adopted in order to avoid potential noise and disturbance effects on this roosting space. A minimum separation distance between the drill trajectory and the foundation of the bridge is 4 metres in order to further minimise the potential for impacts on roosting bats as a result of vibration being carried through the bridge structure. A minimum separation of 45 m between the launch and receptor pits is available and this is considered sufficient to minimise potential for noise and vibrational impacts on any bats roosting within the bridge during directional drilling. Hoarding or acoustic blankets to a height of the parapet wall will be provided prior to the commencement of work between both pits and the barrel facing the proposed works to reduce noise and visual cues. The effect of the HDD considering the above avoidance and mitigation measures is to reduce noise and vibration levels during the directional drilling process to below that level already experienced on an ongoing basis as a result of existing road traffic etc.

In order to ensure the above measures are implemented as outlined, an Ecologist will supervise the directional drill at this location. No further measures are considered warranted. Given this separation distance allowed between source and receptor, and the locations of roosts within enclosed crevices within the barrels of the bridge, the likelihood of disturbance effects on roosting bats as a result of the installation of the grid cable at Bridge 'B08' is considered to be negligible.

6.7.1.5.6 Mitigation Measures for Lepidoptera Species

6.7.1.5.6.1 Marsh Fritillary Pre-construction Surveys

Pre-construction survey will be conducted within suitable habitat for Marsh Fritillary within the proposed wind farm site, which is limited to the mapped area surrounding the proposed compound at the southern entrance of the site and the proposed hardstand at T8 (Section 6.4.2.1.9).

Pre-construction surveys for larval webs will follow best practice guidance (NBDC, 2021) (Section 6.2.6.3.6). The recommended survey season is late August to early September when the webs are most conspicuous (NBDC, 2021). However, the larval webs are also identifiable during early spring (March-April) following the hibernation period (Phelan *et al.*, 2021). As such, it is at the discretion of the ECoW to identify the optimum time to conduct pre-construction larval web searches, as the spring window will likely best suit the timeline for the translocation of larval webs during the month of April (Section 6.7.1.5.6.4).

It is essential that surveys are carried out in optimum weather conditions to improve success rate when searching for larval webs, as caterpillars are only visible in sunny weather (Phelan *et al.*, 2021). The larval web searches will be conducted by suitably qualified ecologists under direct supervision of the ECoW. This will ensure the ECoW is familiar with the exact locations of all larval webs identified as well as the site conditions. The locations of the larval webs will be recorded. This information will be used to inform the exclusion zones (Section 6.7.1.5.6.3).

6.7.1.5.6.2 Pre-construction Toolbox Talks

The ECoW will provide pre-construction briefings to contractors working within the proposed wind farm site, as appropriate, highlighting the presence of species and the associated strict exclusion zones (Section 6.7.1.5.6.3).

6.7.1.5.6.3 Larval Web Exclusion Zones

The key mitigation measure for the species is avoidance of suitable habitat if at all possible (NRA, 2008). During the project design phase several alternatives were identified however these proved non-viable options, as outlined in Chapter 3 (Consideration of Alternatives).

Any larval webs identified within the footprint of the proposed project, inclusive of the works corridor, will be demarcated with temporary fencing. This temporary fencing will act to mark the location of the webs identified for translocation (Section 6.7.1.5.6.4).

The larval webs identified outside of the footprint of the project will be demarcated using post-and-wire fencing. An area of ca. 2 m^2 will be fenced off around each larval web, in order to protect the larval webs from disturbance. Appropriate signage will be used to alert contractors to the purpose of the fence.

Prior to the erection of the fence, the ECoW and the contractor will decide a suitable route to take while traversing the Marsh Fritillary habitat, in order to minimise disturbance to larval webs and supporting habitat. The installation of the fence will be undertaken by hand or using appropriate lightweight machinery, as needed and under the direct supervision of the ECoW. The use of heavy machinery will not be permitted within Marsh Fritillary habitat during the installation of fencing.

6.7.1.5.6.4 Pre-construction Translocation of Marsh Fritillary Larval Webs

Where avoidance of Marsh Fritillary habitat and larval webs is not possible, this will necessitate the translocation of all larval webs identified within the footprint of the project. This is likely to be the case within the footprint of the temporary contractors compound at the southern entrance of the proposed wind farm site as well as the hardstand at T8 The exact number of larval webs to be translocated will not be known until the pre-construction surveys are conducted (Section 6.7.1.5.6.1).

Butterfly Conservation [UK] has published a position paper on the re-introduction of species which states:

> "*Butterfly Conservation considers that translocations to permit the destruction of sites occupied by rare and threatened species is unacceptable* (Butterfly Conservation, 2023)."

In contrast A Code of Practice for invertebrate translocation was in the British Journal of Entomology and Natural History, which states:

> "*There are divergent views for and against translocation, which partly reflect 'philosophical' attitudes for or against human intervention in natural processes. In this context, an important rationale for intervention is that it is designed to mitigate a situation that is considered to be an 'unnatural' result of human activity…It is therefore recommended that no specific proposal for invertebrate translocation be condemned or approved without full discussion and consideration* (Invertebrate Link, 2010)."

It should be noted that for the purposes of these mitigation measures the term 'translocation' refers to the transport of the Marsh Fritillary larvae from within the footprint of project infrastructure to locations outside of the footprint, while remaining within the mapped extent of suitable GS4- Wet grassland habitat which has abundant Devil's-bit scabious.

The translocation of larval webs will be conducted during the month of April, following pre-construction surveys. This avoids disturbance to the species during the hibernation period (winter), which is prohibited under the Bern Convention. In late April the Marsh Fritillary caterpillars disperse from the larval web and pupate, existing as a chrysalis for 2-4 weeks (DAeRA, n.d.). Ideally, the translocations will take place before the caterpillars pupate into a chrysalis.

Translocations will be conducted under direct supervision of the ECoW. Prior to the translocations the ECoW and the contractor will agree a suitable route for the contractor to take while operating within the Marsh Fritillary habitat and while transporting turves/sods containing the webs to the receiving GS4-Wet grassland habitat. The receiving GS4-Wet grassland habitat must be within the mapped area of suitable Marsh Fritillary habitat within the proposed wind farm site. Abundance of devils bit scabious is vital for the larvae as they are

monophagous, meaning they only feed on the one plant species (Phelan et al. 2021). As such, the receiving habitat is limited to 0.03 ha to the south of the temporary contractors compound near the site entrance and 0.07 ha to the north-east and west of T8 (see Figure 6-6). The locations where each turve is to be deposited will also be pre-determined and clearly mapped.

A skilled contractor will be employed to operate a tractor and bucket. Following the pre-agreed route the contractor will arrive at the mapped locations within the receiving Marsh Fritillary habitat. The contractor will remove turves from these locations up to a depth of 0.5 m and deposit them within the surrounding GS4- Wet grassland. This may encourage the proliferation of Devil's-bit scabious beyond the suitable Marsh Fritillary habitat. Selected turves for removal from the receiving GS4-Wet grassland should not contain abundant Devil's-bit scabious, as reducing the cover of the plant will further diminish the suitability of the habitat for the Marsh Fritillary larvae. Turves will be deposited vegetation side up. Every effort will be made to keep the turve intact during removal, transportation and deposition.

The contractor will then follow the pre-arranged route and arrive at the temporary fencing demarcating a Marsh Fritillary web within the footprint of the development. The contractor will allow the ECoW to confirm the presence of the pupae within the turve if necessary and to remove the temporary fencing. The contractor will remove the supporting turve and transport it to the pre-agreed area within the suitable Marsh Fritillary habitat which lies beyond the footprint of the development. This process will be repeated until all identified webs are located beyond the footprint of the proposed wind farm site, inclusive of the works corridor.

6.7.1.5.6.5 Marsh Fritillary Habitat Exclusion Zones

Following the translocation of larval webs, Exclusion zones will be created to protect the wider Marsh Fritillary habitat, which is to be retained namely, the 0.03 ha to the south of the compound and 0.07 ha to the north-east of T8 (see Figure 6-6). The exact delineation of the habitat exclusion zones will be decided with guidance from the ECoW, allowing for the maximum extent of mapped Marsh Fritillary habitat to be retained. The extent of bounds for the exclusion zones shall be clearly demarcated with post-and-wire fencing as well as appropriate signage (NRA, 2008). Light weight mechanical machinery such as an All-Terrain Vehicle (quad bike) will be used as necessary to erect the post and wire fencing.

During the construction phase, access to the exclusion zones will be prohibited for vehicles and contractors. There will be no materials, equipment, or side-casting of material within the exclusion zones. The exclusion zone will remain in place until the construction phase is complete. This approach will limit unnecessary mortality of larval webs and confine habitat loss and disturbance to the extent essential for delivering the proposed project. Fencing of areas of retained Marsh Fritillary habitat is essential in order to protect the species during construction (NRA, 2008).

The ECoW will supervise all works within suitable Marsh Fritillary habitat during construction activities.

6.7.1.5.6.6 Pre-construction Vegetation Management for Marsh Fritillary

Adult Marsh Fritillary are active from the second week in May to the peak emergence period in the first week of June (Phelan *et al.* 2021). During this time, the ECoW will monitor Marsh Fritillary activity. Following field observations on adult flight time, a decision will be made by the

ECoW to begin vegetation management sometime between mid-May to mid-June. The decision to begin vegetation management will be based on when the local population of Marsh Fritillary emerges into adult form, which is weather and site dependant (Phelan *et al.* 2021).

As an adult (butterfly) the species becomes more mobile and as such is less vulnerable to disturbance events when compared to the larval instars. Albeit even adult Marsh Fritillary is considered at risk of vehicle strike owing to the poor flight ability of the species (NRA, 2008).

The vegetation management will be limited to the footprint of the compound at the southern entrance to the wind farm site and the hardstand at T8, inclusive of the identified works corridor. Vegetation management will entail cutting the GS4-Wet grassland vegetation to below a height of ca. < 12cm, mimicking an overgrazed habitat which is less suitable for the species (NBDC, 2021). The aim of this measure is to encourage adult females to lay their eggs outside of the footprint of the project.

Light weight mechanical machinery such as an All-Terrain Vehicle with a mechanical flail can be used under direct supervision of the ECoW. No vegetation management will take place within the demarcated Marsh Fritillary exclusion zones (see 6.7.1.5.6.3).

The disturbance to the GS4-Wet grassland vegetation will make the site less suitable for the breeding population of Marsh Fritillary. The aim of this measure is to encourage dispersion of the local population to alternative habitat within the wider landscape. Adults are largely sedentary and rarely fly more than 100 m but females will occasionally disperse towards the end of the flight season, so individuals may be seen on occasions some distance from suitable breeding sites (Phelan *et al.* 2021).

The removal of any scrub vegetation within the grassland will not be undertaken at this time to avoid disturbance to breeding birds (1st March- 31st August), in accordance with the Wildlife Act (as amended). Any necessary scrub removal shall be done during the winter months preceding construction activities. Scrub clearance within the Marsh Fritillary habitat will be done under direct supervision of the ECoW. The use of heavy machinery for scrub clearance during winter months will not be permitted in suitable Marsh Fritillary habitat.

6.7.1.5.6.7 Continued Monitoring of Marsh Fritillary

A report will be prepared by the ECoW detailing the methods followed and the results of the translocation. The report will be made available to the contractor and the competent authority.

Continued monitoring will take place and associated reports will be issued in year 1, 2, 3, 5, and 10 and every five years thereafter. Monitoring will include larval web searches and habitat condition assessments within suitable Marsh Fritillary habitat. Reports should recommend any habitat management measures to be implemented, such as scrub control and extensive cattle grazing. Due to the importance of hydrology in the maintenance of GS4 – Wet grassland, which has been identified as the supporting Marsh Fritillary habitat within the proposed wind farm site, reporting will also include information on the vegetation community, including habitat changes over time.

6.7.1.5.6.8 Management of GS4 Wet Grassland for Marsh Fritillary

There will be the loss of approximately 0.225 ha of suitable Marsh Fritillary habitat as a result of the proposed project. This habitat has been identified as GS4- Wet grassland with abundant Devil's-bit scabious. To compensate for this habitat loss, 4.8 ha of GS4-Wet grassland located

within the immediate area of the suitable Marsh Fritillary habitat of proposed wind farm site will be managed for suitability of the target species Marsh Fritillary.

For clarity, the existing suitable habitat for marsh fritillary will be referred to here as the 'donor site' and the GS4-Wet grassland identified for mitigation measures will be referred to as the 'receiving site'.

6.7.1.5.6.8.1 Mowing

The management of the receiving site for Marsh Fritillary can begin as soon possible, and before any construction activities have taken place. Vegetation management of the receiving site is necessary to improve the suitability of the site for Marsh Fritillary. The GS4-Wet Grassland habitat survey beyond the Marsh Fritillary habitat was noted to be species-poor (Section 6.4.2.1.9). The receiving site will be topped using an ATV and flail mower once in March and once again in June, to reduce the dominance of purple-moor grass (*Molinia caerulea*) and soft rush (*Juncus effusus*) within the receiving site (INCC, 2018). Mowing is a once-off option for restoring sites that have become overgrown (Phelan *et al.* 2021).

The cuttings will be removed from the receiving site and disposed of following guidance set out in the CEMP (Appendix 2-3).

6.7.1.5.6.8.2 Conservation Grazing

Small-scale non-intensive farming with cattle in spring and summer months is the optimum approach to managing wet grassland for Marsh Fritillary (Phelan et al. 2021). Cattle grazing best facilitates the creation of an uneven sward structure, which is favoured by the Marsh Fritillary (Phelan *et al.* 2021). Grazing rates will likely vairy from year to year, but recommended grazing rates prescribe 1 live unit/ha of cattle (INCC, 2018). Stocking rates may not be increased without written recommendation within post-construction compliance reporting from a suitably qualified ecologist. Monitoring of the receiving site will include observation on sward height, with the aim of the grazing regime to maintain the sward height between 12-25cm (Phelan *et al.* 2021). The cattle must be moved elsewhere if the sward height reaches below 12cm, as this threshold indicative of overgrazing (INCC, 2018). Similarly, if poaching is noted throughout the site, then adjustments to stocking rates and/or the length of the grazing season must be made. Supplementary feed will not be placed within the area as it can lead to localised nutrient enrichment. Controlled burning events will not be implemented (INCC, 2018). Sheep grazing within GS4-Wet grassland habitats within the proposed wind farm site is to be avoided as it is unsuitable for Marsh Fritillary habitat (Phelan *et al.* 2021).

6.7.1.5.6.9 Scrub Management

Small patches of scrub can be beneficial as they provide shelter for adult butterflies during harsh weather (Phelan *et al.* 2021). However, it can reduce overall suitability of the site for Marsh Fritillary (Phelan *et al.* 2021). WS1-Scrub which has been identified as encroaching into the donor site will be target for removal between September 1st- February 28th, outside of the bird breeding season (Phelan *et al.* 2021). All cuttings should be removed from the site to keep fertility levels low (Phelan *et al.* 2021). The removal of WS1-Scrub will only be carried out following direction from the ECoW and/or following recommendations by ecologists included in post-construction compliance reporting. Before WS1-Scrub removal commences the habitat must be surveyed for mammal resting sites.

6.7.1.5.6.10 Translocation of Devil's-bit scabious

No records of Devil's-bit scabious were recorded during the field surveys outside of the donor sites (Section 6.4.2.1). Suitable habitat for Marsh Fritillary will have at least three well-developed Devil's-bit scabious plants per m^2 over more than twenty percent of the habitat (Phelan *et al.* 2021).

In order to promote the establishment of Devil's-bit scabious within the GS4-Wet grassland receiving site, it is recommended to translocate turves of vegetation from the donor site. The removal of Devil's-bit scabious from the donor site will only be done following the full implementation of mitigation measures outlined for the Marsh Fritillary species (Section 6.7.1.5.6). These works will be conducted under supervision of the ECoW.

A second pre-construction survey is required within the donor site to ensure no butterfly have laid eggs on the leaves of Devil's-bit scabious. In order to make these pre-construction surveys effective they must be postponed until the August – September, during the optimum survey season for larval webs and following the implementation of mitigation measures for Marsh Fritillary listed in Section 6.7.1.5.6 (NBDC, 2021). If any larval webs are identified during the second pre-construction marsh fritillary surveys, then mitigation steps outlined in Section 6.7.1.5.6 will be adhered to.

Following confirmation that Devil's-bit scabious plants within the donor site are not hosts to larval webs, the ECoW will pre-select turves with abundant Devil's-bit scabious and mark them for translocation. Similarly, the ECoW will select suitable locations within the receiving site and make them for extraction. The location of these sites will be recorded (ITM) and photographed. This information will be record within a subsequent report so that follow-up monitoring on the success of the translocations can be reported on.

The ECoW and the contractor operating the heavy machinery will identify a suitable for the contractor to take during the translocations. The ECoW will highlight the strict exclusion zones and alert the contractor to the presence of the Annex II Marsh Fritillary species.

The ECoW will direct the contractor to the receiving GS4-Wet grassland habitat. The contractor will remove turves from the marked locations. At the donor site, under supervision of the ECoW, the contractor will extract the marked turves and transport them to the identified locations within the receiving site. The turves will be orientated within the extraction sites. The bucket of the digger can be used to tap the turves in place to ensure good contact with the soil.

All works will take place during suitable weather conditions with avoidance of works after heavy rainfall, as outlined in the CEMP. Ideally, this work will be carried out with light to moderate rainfall forecast in the coming week. This work should not be carried out during a drought period.

Table 6-23: Proposed Mitigation Measures for Lepidoptera Species

Potential Effect	Proposed Wind Farm Activity	Proposed Mitigation Measure	Further description
Direct Mortality	Earth works, excavations, general construction	Translocation of Larval Webs, and Establishing exclusion Zones	▪ Where avoidance of Marsh Fritillary habitat and larval webs is not possible, this will necessitate the translocation of all larval webs identified within the footprint of the project. ▪ Exclusion zones will be created to protect the wider Marsh Fritillary habitat, which is to be retained namely, the 0.03 ha to the south of the compound and 0.07 ha to the north of T8. ▪ A report will be prepared by the ECoW detailing the methods followed and the results of the translocation. The report will be made available to the contractor and the competent authority. ▪ Continued monitoring will take place and associated reports will be issued in year 1, 2, 3, 5, and 10 and every five years thereafter. ▪ Due to the poor flight ability of the Marsh Fritillary, the species is at risk of vehicle strike (NRA, 2008). Mitigation measures to reduce the risk of vehicle strike for the species include standard speed reduction measures of 20 km/hr which are to be implemented across the operational wind farm site.

Potential Effect	Proposed Wind Farm Activity	Proposed Mitigation Measure	Further description
GS4 Wet Grassland Habitat Loss	Earth works, excavations, general construction	Management of GS4 Wet Grassland for Marsh Fritillary	▪ Vegetation management of the receiving site is necessary to improve the suitability of the site for Marsh Fritillary. ▪ The receiving site will be topped using an ATV and flail mower once in March and once again in June, to reduce the dominance of purple-moor grass (Molinia caerulea) and soft rush (Juncus effusus) within the receiving site (INCC, 2018). ▪ Small-scale non-intensive farming with cattle in spring and summer months is the optimum approach to managing wet grassland for Marsh Fritillary, with recommended grazing rates prescribe 1 live unit/ha of cattle (INCC, 2018). ▪ WS1-Scrub which has been identified as encroaching into the donor site will be target for removal between September 1st - February 28th, outside of the bird breeding season (Phelan et al. 2021). ▪ The translocation of turves of vegetation with Devil's-bit scabious plants from the donor site, under direct supervision of the ECoW. ▪ The location of these sites will be recorded (ITM) and photographed. This information will be record within a subsequent report so that follow-up monitoring on the success of the translocations can be reported on

6.7.1.6 Mitigation Measures for Aquatic Ecology

All mitigation measures associated with sediment and pollution control outlined in Chapter 9 – Hydrology and Hydrogeology will be implemented, which will ensure the protection of aquatic habitats and species present within the drainage ditches and rivers hydrologically connected to the proposed wind farm site.

Details on the Sustainable Drainage System (SuDS) are expanded in Chapter 9 – Hydrology and Hydrogeology. For the proposed wind farm the quantity of run-off will be decreased to greenfield rates by providing SuDs methods. SuDS measures are initially required across the construction but will remain in place for the operational and decommissioning phase.

6.7.1.6.1 Mitigation Measures to Prevent Siltation

The construction of temporary settlement ponds will be implemented to capture and treat surface water runoff during the construction phase. These settlement ponds will help to settle out suspended solids and other contaminants, further reducing the risk of siltation in receiving water bodies. Further detail on the design of settlement ponds is contained in Chapter 9 - Hydrology and Hydrogeology.

Further mitigation measures to prevent siltation of water courses are outlined below:

- None of the EPA waterbodies will be altered in any way and no in-stream works will take place within the proposed wind farm site.
- A surface water management plan will be implemented (Chapter 9 - Hydrology and Hydrogeology);
- Appropriate measures, like correctly installed silt fences and earth bunds including natural vegetation buffers, will be taken to prevent runoff from reaching these waterbodies;
- Silt fences will be erected along all areas where the construction works are within 20 m of a drainage ditch or river or and 10 m around stockpiled material under supervision of an ECoW;
- All drainage ditches within the proposed wind farm site, will be blocked at least 20 m upstream of the confluence with the EPA waterbody under supervision of an ECoW prior to the construction works commencing. The drainage ditches will be blocked off using locally sourced subsoil materials and double silt fences will be installed downstream;
- Borrow pits and stockpiled material will be designated and located at least 50 m from any water body or drainage ditch under supervision of an ECoW;
- Excavation works will not be carried out during or following heavy rainfall (i.e. if there is a yellow weather warning in place or 5-mm in a 1-hour period);
- An accidental spillage emergency plan for the construction phase of the proposed project will be implemented through training of on-site personnel.

Further details on the mitigation measures which will be used to control water quality impacts are detailed in Chapter 8 – Land, Soils and Geology.

6.7.1.6.2 Mitigation Measures to Prevent Contamination

6.7.1.6.2.1 Designated Storage Area

Storage of contaminants at the Construction Compound has potential to lead to contamination of surface water. As such, several mitigation measures designed to mitigate the risk of contamination and are summarised below:

- Fuels storage will be minimised onsite;
- However, because it might not be practical to refuel all vehicles and machinery offsite, areas will be designated for contaminant storage at each Construction Compound;
- The designated areas for contaminant storage will be enclosed, appropriately signed, and demarked from the remainder areas of the Construction Compounds;
- Any diesel, fuel, hydraulic oils, paints or any other type of contaminant that will require to be kept onsite, will be stored in bunded storage tanks, only at the designated areas within each of the Construction Compounds;
- Each bund area will have a volume of at least 110% of the volume of the respective stored contaminant(s);
- Each container within the bund area will be appropriately labelled and sealed;
- Only authorised and appropriately trained personnel may access the contaminant storage designated area;

The designated area for contaminant storage will be provided with a log book. The log book will be a register of:

- the number of containers for each contaminant;
- volume of each container;
- approximate volume of each contaminant stored;
- date/time contaminants are taken off/stored in the designated area, and respective destination;
- Signature of the authorised person responsible for the log entry;
- Stock of spillage containment material (e.g. spill kits).
- The ECoW will make a daily verification of the logbooks, confirming the accuracy of the information logged;
- The designated contaminant storage areas will also keep a stock of absorbent materials (e.g. oil binder granules), pads/mats, and drip trays to be made available if needed.

6.7.1.6.2.2 Designated Refiling Area

At each Construction Compound, an area will be designated as “Refuelling Area”;

- The Refuelling Area will be delineated at an easily accessible location by vehicles and mobile machinery, and in the immediate vicinity of the designated area for contaminant storage;
- The Refuelling Area will be appropriately demarked and signed, for easy identification;
- When refuelling, drip trays and fuel absorbent mats will be used to capture any potential spills;

To mitigate spills associated with machinery movement on site, the following measures will be implemented :

- All vehicles and machinery will be provided with emergency drip trays and spill kits;
- The ECoW will undertake weekly checks for spillages on all machinery and vehicles used onsite;
- The ECoW will maintain a logbook to register all checks undertaken, and required maintenance to eliminate leaks.

6.7.1.6.2.3 Mitigation Measures Specific to Horizontal Directional Drilling

Specific mitigation measures which will be implemented during the directional drilling works are summarised hereunder:

- A competent and experienced contractor will be appointed to undertake the trenchless construction works.
- The contractor will prepare a trenchless construction Method Statement which will outline the standard approach for the construction. The Method Statement will include a contingency plan for break-out and for excessive ground settlement.
- The contractor will undertake the trenchless construction in accordance with industry best practice including British Standard EN 16191:2014 Tunnelling machinery, safety requirements and CIRIA C648 "*Control of water pollution from linear construction projects Technical Guidance.*"
- To prevent loss of bentonite or 'frac-out' from occurring, a series of actions will be implemented; the drill fluids operator will monitor drill fluid density, viscosity and solids content on an ongoing basis, to ensure that the fluid does not increase in viscosity, requiring additional pressure to maintain mobility.
- In critical cases, viscometers will be used to measure drill fluid gel strength and shear strength. Filtrate can also be measured to calculate the amount of filter cake building up on the internal wall of the bore. Any increases in pump pressure experienced by the drill operator will be investigated immediately to prevent the risk of pressure build up within the annulus. In some circumstances, dependant on the drilling equipment used, the pilot drill borehole assembly will be fitted with a down hole pressure monitor to measure

pressure in the annulus between the drill and the bore wall. This will give an early indication of pressure build up in the hole and allow the drill operator to prevent a 'break-out'. If there is a risk of a 'frac-out' a number of measures will be implemented including:

- pumping a pill of drilling fluid with a higher density to the risk zone,
- circulate and pump loss circulation material (typically cork or manufactured inert polymers) to the risk zone to seal the risk zone, grouting of the risk zone, and, or launch a packer before the risk zone.
- The contractor will implement procedures to maximise the recirculation or reuse of drilling mud to minimise waste disposal.
- Disposal of drilling fluids will be the responsibility of the contractor to an approved and licenced waste facility.
- Monitoring of the drilling operations will be undertaken at all times by the contractor. The monitoring will include visual inspection of the pits and monitoring of the volume of returns flowing back to the entry pit. The monitoring personnel will be in constant communication with the drilling rig operator and thus will be able to immediately cease drilling if necessary.
- Buffer strips of natural uncleared vegetation shall be preserved between construction activity. Reception pits will be situated outside of the riparian zone. A buffer zone width for smaller channels (<10 m) of 20 m or greater will be maintained.
- The ECoW will prescribe silt fencing if deemed necessary.
- In addition, the ECOW will undertake sediment monitoring both upstream and downstream before, during and after the trenchless construction works.

Table 6-24: Proposed Mitigation Measures for Aquatic Species

Potential Effect	Proposed Wind Farm Activity	Proposed Mitigation Measure	Further description
Aquatic habitats - Siltation	Earth works, excavations, general construction	Avoidance of in-stream works and implementation of appropriate buffer zones	▪ None of the EPA waterbodies will be altered in any way and no in-stream works will take place within the proposed wind farm site. ▪ A surface water management plan will be implemented (Chapter 9 - Hydrology and Hydrogeology); ▪ Appropriate measures, like correctly installed silt fences and earth bunds including natural vegetation buffers, will be taken to prevent runoff from reaching these waterbodies; ▪ Silt fences will be erected along all areas where the construction works are within 20 m of a drainage ditch or river or and 10 m around stockpiled material under supervision of an ECoW; ▪ All drainage ditches within the proposed wind farm site, will be blocked at least 20 m upstream of the confluence with the EPA waterbody under supervision of an ECoW prior to the construction works commencing. The drainage ditches will be blocked off using locally sourced subsoil materials and double silt fences will be installed downstream; ▪ Borrow pits and stockpiled material will be designated and located at least 50 m from any water body or drainage ditch under supervision of an ECoW; ▪ Excavation works will not be carried out during or following heavy rainfall (i.e. if there is a yellow weather warning in place or 5-mm in a 1-hour period); ▪ An accidental spillage emergency plan for the construction phase of the proposed project will be created and implemented through training of on-site personnel.
Aquatic Habitats - Contamination	Storage of contaminants	Designation of Storage Area	▪ Fuels storage will be minimised onsite and a designated area for contaminant storage will be located at each construction compound; ▪ The ECoW will make a daily verification of the log books, confirming the accuracy of the information logged in; ▪ The designated contaminant storage areas will also keep a stock of absorbent materials (e.g. oil binder granules), pads/mats, and drip trays to be made available if need.
	Refuelling	Operation	▪ An area will be designated as “Refuelling Area” at the construction compound;

Potential Effect	Proposed Wind Farm Activity	Proposed Mitigation Measure	Further description
			▪ When refuelling, drip trays and fuel absorbent mats will be used to capture any potential spills;
	Machinery/vehicle movement and operation	Regular Maintenance of vehicles and machinery	▪ The ECoW will undertake weekly checks for spillages to all machinery and vehicles used onsite; ▪ The ECoW will maintain a logbook to register all checks undertaken, and required maintenance to eliminate leaks,
		Spill containment equipment	▪ All vehicles and machinery will be provided with emergency drip trays and spill kits

6.7.2 Operational Phase Mitigation Measures

Mitigation measures which will be implemented during the operational phase are detailed in the following sections.

6.7.2.1 Management of European Sites

Mitigation measures which will ensure the protection of the European sites during the operational phase are outlined in the NIS.

6.7.2.2 Protection Measures for Bats

As mentioned previously in (Section 6.6.3.2.4.1) vegetation clearance buffers 'bat-buffers' will be implemented to each turbine location to avoid encouraging bat activity within the 'blade-swept' area. Reduced rotation speed 'Feathering' will be implemented when turbines are idling, 'Feathering' of idling blades may reduce incidental fatality rates by up to 50% (NatureScot *et al.*, 2021).

No lighting is proposed within the site with the use with the exception of aviation lighting at each turbine and security lighting at the proposed substation / BESS. These permanent lighting systems will be designed in accordance with ILP (2023) in order to minimise nuisance through light spillage. All non-essential lighting will be switched off during the hours of darkness. No artificial lighting will illuminate any trees or structures. This will not prevent disturbance or avoidance to any roosting bats potentially selecting or using any trees or tree structures for roosting or their emergence and re-entry should they roost. To reduce the ecological disturbance from artificial lighting, the following guidance will be undertaken:

- Reduction of non-essential external night lighting
- Lowed the angle of external night lighting
- Use of LEDs, as these emit minimal ultra-violet light
- White and blue wavelengths will be avoided. Wavelength will be <2,700 kelvin
- Lights will peak higher than 550nm

Operational fatality monitoring and activity surveys will be carried out in years 1,2,3,5 and 10 post-construction and will consist of:

- Passive bat monitoring at all turbine locations in order to monitor changes in activity levels relative to pre-construction baseline information (presented herein)
- Fatality monitoring following the methodology presented in Appendix 4 of NatureScot *et al.* (2021) or subsequent updates
- Monitoring of proposed bat boxes by a bat-licensed Ecologist, and relocation of any boxes with no evidence of use in the first year after construction

Monitoring of linear replanting features will be carried out in accordance with the BEMP (Appendix 6-1) to ensure successful establishment of replacement linear features. Any failed plants will be replaced in the first planting season following each monitoring inspection.

Post-construction monitoring data will be analysed and presented in report format to the planning authority. Recommendations will be made in relation to a curtailment strategy if required.

6.7.2.3 Protection of Lepidoptera Species

6.7.2.3.1 Vehicle Strike

The operational phase of the wind farm will see the use of vehicles across the site during routine maintenance works and site visits. Due to the poor flight ability of the Marsh Fritillary, the species is at risk of vehicle strike (NRA, 2008). Mitigation measures to reduce the risk of vehicle strike for the species include standard speed reduction measures of 20km/hr which are to be implemented across the operational wind farm site.

6.7.3 Decommissioning Phase Mitigation Measures

Impacts during decommissioning are expected to be of similar type and magnitude to those anticipated during the construction phase, but generally of a shorter duration. Therefore, the same mitigation measures implemented during the construction phase, will be applied during the decommissioning works. Please refer to Chapter 2 (Description of the Proposed Project) for full details on the decommissioning phase.

In the case of turbine removal and complete decommissioning of the proposed project, the footprint of the infrastructure sites will remain in place and continue to serve for forestry or agricultural purposes. The turbine hardstandings and foundation pedestals will be covered with topsoil, and landscaped to promote natural re-vegetation with the habitat of the surrounding environment (e.g., improved agricultural grassland or conifer plantation) to ensure the proposed wind farm site is returned to its pre-existing state prior to the proposed project.

6.7.3.1 Management of European Sites

Mitigation measures which will ensure the protection of European sites during the decommissioning phase, are outlined in Section 8.2 of the NIS.

6.7.3.2 Protection of Bat species

All decommissioning works will be governed by the same requirements to control run-off or potential pollution to watercourses (feeding resources for bats) as have been implemented during the construction phase (Section 6.6.3.2.4). Any site compound will need to conform to the construction phase mitigation measures including those related to lighting design. Decommissioning phase works will include the reestablishment of woodland and linear features removed during the construction phase.

6.7.3.3 Protection of Lepidoptera Species

6.7.3.3.1 Larval Web Surveys

The monitoring of Marsh Fritillary and suitable habitat for the species will continue throughout the lifetime of the project (Section 6.7.1.5.6.7). This associated reporting will contain information on the presence/absence of the species within the proposed wind farm site as well as the extent of suitable habitat.

If suitable habitat remains within the proposed wind farm site, then prior to decommissioning works, larval webs surveys and habitat condition assessment surveys will be carried out following best practice guidance (Section 6.7.1.5.6.1). This will include recording the location of any larval webs identified and the mapped extent of suitable habitat.

6.7.3.3.2 Marsh Fritillary Toolbox Talks

If evidence of the species has been recorded within the last ten years, then the ECoW will present Toolbox Talks to all relevant contractors working within the proposed wind farm site. Further relevant information can be found in Section 6.7.1.5.6.2.

6.7.3.3.3 Habitat Exclusion zones

All suitable Marsh Fritillary habitat will be demarcated using pot-and-wire fencing along with appropriate signage to prohibit access and disturbance. Further relevant information can be found in Section 6.7.1.5.6.5.

6.7.3.3.4 Larval Web Translocation

If larval webs are identified within the proposed works corridor for the decommissioning phase, then every effort will be made to avoid the larval web. Where this is not possible, and as a last resort, then the translocation of the larval web will be carried out as required by law and, following the method outlined in Section 6.7.1.5.6.4.

6.8 RESIDUAL EFFECTS

The proposed project has been assessed as potentially giving rise to the unmitigated significant effects on some KERs as identified in Section 6.6. To this effect, several mitigation measures, as outlined in Section 6.7, have been proposed with the objective of avoiding and/or reducing the likelihood and significance of each effect.

6.8.1 Habitats and Flora

6.8.1.1 Habitat loss

Following the implementation of the mitigation measures for habitat loss, including the creation of 4.9 ha of native woodland and scrub and 1.3km of hedgerows, the residual effects are assessed as being **not significant** over the long-term (Table 6-25). This time frame allows for the newly created habitats to become established in order to effectively off-set effects.

6.8.1.2 Dust Impacts

The indirect effects of dust impacts on sensitive habitats including PB1 Raised bog, PB4 Cutover bog, HH1 Dry siliceous heath, WN1 Oak-birch-holly woodland are reduced following the implementation of mitigation measures to residual effects which are **not significant**.

6.8.2 Bats

One of the prescribed mitigation measures includes bat buffers around the wind turbines, following NatureScot (2021) guidance. Following the implementation of the bat buffers there **no significant** likely residual effect of the proposed wind farm. To offset these residual effects appropriate enhancement measures have been outlined in Section 6.9.

6.8.3 Fauna

Following the implementation of the mitigation measures residual effects on Otter, Badger, and Common Frog are not significant.

Following the implementation of the mitigation measures residual effects on Lepidoptera are reduced from profound and permanent to **slight effects over the long term** (15-60 years). This timeframe allows for the positive effects of conservation grazing on biodiversity to take affect within the GS4 Wet grassland habitat, creating alternative habitat for the retained Marsh Fritillary population to colonize and expand into. In the worst-case scenario, where the local Marsh Fritillary population located within the proposed wind farm site is lost as a result of the proposed project, this newly created habitat will support the meta-population of Marsh Fritillary within the wider landscape over the long term.

6.8.4 Aquatic Ecology

Following the implementation of water protection measures, the residual effects on aquatic ecology are **not significant**.

Table 6-25: Summary of Residual Effects of KER Following the Implementation of Mitigation Measures

Key Ecological Receptors	Potential Likely Effects	Significance of Effects	Mitigation Measures	Residual Effects
Habitats and Flora				
GS4 Wet grassland	Quality of Effects	Negative	Manage access and control site works Management of 2 ha of Wet grassland for the target species Marsh Fritillary	Following the implementation of the mitigation measures the effects are likely to be **not significant**.
	Significance	**Slight Effects**		
	Extent and Context	4.8 ha habitat loss		
	Probability	Likely		
	Duration	**Short-term**		
HH1 Dry siliceous heath / Annex I 4030 European dry heaths,	Quality of Effects	Negative	Implementation of dust mitigation measures, as outlined in Chapter 10 – Air Quality and the CEMP Manage access and control site works Pre-construction IAS survey, biosecurity area, vehicle cleaning.	Following the implementation of the mitigation measures the effects are likely to be **not significant**.
	Significance	**Slight**		
	Extent and Context	Habit degradation potentially within the 50 m dust buffer around project infrastructure		
	Probability	Likely		
	Duration	**Short-term**		
PB4 Cutover bog	Quality of Effects	Negative	Implementation of dust mitigation measures, as outlined in Chapter 10 – Air Quality and the CEMP Manage access and control site works Pre-construction IAS survey, biosecurity area, vehicle cleaning.	Following the implementation of the mitigation measures the effects are likely to be **not significant.**
	Significance	**Moderate Effects**		
	Extent and Context	0.62 ha habitat loss and habitat degradation potentially within the 50 m dust buffer around project infrastructure		
	Probability	Likely		
	Duration	**Permanent**		

Key Ecological Receptors	Potential Likely Effects	Significance of Effects	Mitigation Measures	Residual Effects
PB1 Raised bog / priority Annex I 7110 *Active raised bog,	Quality of Effects	Negative	Implementation of dust mitigation measures, as outlined in Chapter 10 – Air Quality and the BEMP – Appendix 6-1 includes rehabilitation works on PB1 habitats including drain blocking etc Manage access and control site works Pre-construction IAS survey, biosecurity area, vehicle cleaning.	Following the implementation of the mitigation measures the effects are likely to be **not significant.**
	Significance	**Moderate Effects**		
	Extent and Context	Habitat degradation potentially within 50 m dust buffer around project infrastructure		
	Probability	Likely		
	Duration	Long-term		
WS1 Scrub	Quality of Effects	Negative	Creation of 1.06 ha of WS1 Scrub Manage access and control site works Pre-construction IAS survey, biosecurity area, vehicle cleaning.	Following the implementation of the mitigation measures the residual effects are likely to be **not significant.**
	Significance	**Moderate Effects**		
	Extent and Context	1.06 ha habitat loss		
	Probability	Likely		
	Duration	Permanent		
WD1 (Mixed) broadleaved woodland	Quality of Effects	Negative	Creation of 1.02 ha of WD1 (Mixed) broadleaved woodland Manage access and control site works Implementation of a dust mitigation measures, as outlined in Chapter 10 – Air Quality and the CEMP Pre-construction IAS survey, biosecurity area, vehicle cleaning.	Following the implementation of the mitigation measures the residual effects are likely to be **not significant.**
	Significance	**Significant Effects**		
	Extent and Context	1.02 ha habitat loss		
	Probability	Likely		
	Duration	Permanent		
WN1 Oak-birch-holly woodland /	Quality of Effects	Negative	Manage access and control site works Implementation of dust mitigation	Following the implementation of the mitigation measures the residual effects are
	Significance	**Slight Effects**		

Key Ecological Receptors	Potential Likely Effects	Significance of Effects	Mitigation Measures	Residual Effects
Annex I 91A0 Old sessile oak woods with Ilex and Blechnam in the British Isles.	Extent and Context	Habitat degradation potentially within 50 m dust buffer around project infrastructure	measures, as outlined in Chapter 10 – Air Quality and the CEMP Pre-construction IAS survey, biosecurity area, vehicle cleaning.	likely to be **not significant.**
	Probability	Likely		
	Duration	Short-term		
WN7 Bog woodland	Quality of Effects	Negative	Creation of 3.2 ha of newly established WN7 Bog woodland. Manage access and control site works Implementation of dust mitigation measures, as outlined in Chapter 10 – Air and the CEMP Pre-construction IAS survey, biosecurity area, vehicle cleaning.	Following the implementation of the mitigation measures the residual effects are likely to be **not significant.**
	Significance	**Significant Effects**		
	Extent and Context	2.82 ha habitat loss		
	Probability	Likely		
	Duration	Permanent		
WL1 Hedgerows	Quality of Effects	Negative	Creation of 1.3km of WL1 Hedgerow Manage access and control site works Implementation of dust mitigation measures, as outlined in Chapter 10 – Air Quality and the CEMP Pre-construction IAS survey, biosecurity area, vehicle cleaning.	Following the implementation of the mitigation measures the residual effects are likely to be **not significant.**
	Significance	**Significant Effect**		
	Extent and Context	1.3km habitat loss		
	Probability	Likely		
	Duration	Permanent		
WL2 Treelines	Quality of Effects	Negative	Creation of 0.4km of WL2 Treelines Manage access and control site works Implementation of dust mitigation measures, as outlined in Chapter 10 – Air Quality and the CEMP	Following the implementation of the mitigation measures the residual effects are likely to be **not significant.**
	Significance	**Significant Effect**		
	Extent and Context	0.4km		
	Probability	Likely		

Key Ecological Receptors	Potential Likely Effects	Significance of Effects	Mitigation Measures	Residual Effects
	Duration	Permanent	Pre-construction IAS survey, biosecurity area, vehicle cleaning.	
FW4 Drainage ditches	Quality of Effects	Negative	Water quality protection measures Manage access and control site works Implementation of dust mitigation measures, as outlined in Chapter 10 – Air Quality and the CEMP Pre-construction IAS survey, ISMP, biosecurity area, vehicle cleaning.	Following the implementation of the mitigation measures the residual effects are likely to be **not significant.**
	Significance	Slight Effect		
	Extent and Context	0.7km habitat loss		
	Probability	Likely		
	Duration	Short-term		
Fauna				
Badger	Quality of Effects	Negative	Temporary closure, Sett evacuation, Post-exclusion re-instatement, Avoidance of works during civil twilight periods.	Following the implementation of the mitigation measures the effects are likely to be **not significant.**
	Significance	**Moderate**		
	Extent and Context	Local		
	Probability	Likely		
	Duration	Long term		
Otter	Quality of Effects	Negative	Pollution prevention, Avoidance of works during civil twilight periods, Exclusion zones. Retention of habitat	Following the implementation of the mitigation measures the effects are likely to be **not significant.**
	Significance	**Significant**		
	Extent and Context	Local		
	Probability	Likely		
	Duration	Long term		
Bats	Quality of Effects	Negative	Bat boxes, Limit artificial lighting, Limit to night works, HDD separation distance.	Following the implementation of the mitigation measures the effects are likely to be **not significant**.
	Significance	**Slight**		
	Extent and Context	Local		

Key Ecological Receptors	Potential Likely Effects	Significance of Effects	Mitigation Measures	Residual Effects
	Probability	Likely		
	Duration	Permanent		
Lepidoptera	Quality of Effects	Negative	Pre-construction surveys Strict exclusion zones Translocation of larval webs Translocation of devils-bit scabious 4.8 ha GS4 Wet grassland management for Marsh Fritillary Speed reduction measures of 20km/hr Post-construction compliance reporting and monitoring	Following the implementation of the mitigation measures the effects are likely to be **not significant.**
	Significance	**Profound Effect**		
	Extent and Context	0.22 ha		
	Probability	Likely		
	Duration	Permanent		
Common Frog	Quality of Effects	Negative	Translocation of frog spawn under license if necessary.	Following the implementation of the mitigation measures the effects are likely to be **not significant.**
	Significance	**Moderate**		
	Extent and Context	Local		
	Probability	Likely		
	Duration	**Short term**		
Aquatic Ecology	Quality of Effects	Negative	SuDS, SWMP, Silt fences, watercourse buffer zones Designated storage areas Designated refuelling areas, presence of ECoW onsite.	Following the implementation of the mitigation measures the effects are likely to be **not significant.**
	Significance	**Significant**		
	Extent and Context	Local		
	Probability	Likely		
	Duration	**Long-term**		

6.9 CUMULATIVE EFFECTS

Cumulative effects are defined in the EPA (2022) guidance as "*The addition of many minor or insignificant effects, including the effects of other projects, to create larger, more significant effects*".

Information on the relevant projects within the vicinity of the proposed project is described in Chapter 4 of this EIAR (Policy, Planning & Development Context). The information was sourced from a search of the local authorities planning registers, EPA website, planning applications, EIAR documents and planning drawings which facilitated the identification of past and future projects, their activities and their potential environmental impacts. All projects listed in Chapter 4 of this EIAR were reviewed as part of the cumulative effects assessment. Key projects with the potential for cumulative effects are described further below.

6.9.1 Projects

6.9.1.1.1 Carrig Wind Farm

A Natura Impact Statement (NIS) and Environmental Impact Assessment Report (EIAR) for the Carrig Wind Farm (AIR) Project were prepared by MKO on behalf of Carrig Renewable Energy Limited. These reports identified the potential for likely significant effects on designated sites and potential significant effects to KERs.

The EIAR and supporting ecological assessments identified the potential for effects on biodiversity, flora and fauna, including designated sites and protected species. Baseline conditions were established through desk study, walkover surveys and targeted ecological surveys.

The Carrig Wind Fam site is characterised by degraded cutover bog, conifer plantation and areas of bog woodland, with agricultural grassland, hedgerows and watercourses also present. Mitigation and enhancement measures, including woodland planting, habitat creation and hedgerow reinstatement, will result in a net gain in habitat connectivity and local ecological value.

The ecological assessment considered potential impacts on faunal receptors, including bats, otter, badger and amphibians. Surveys confirmed typical species usage of the site, with no significant sensitivities identified. Following the implementation of mitigation measures, including pre-construction surveys, habitat protection and species-specific measures, no significant residual effects are predicted. A long-term positive effect is anticipated in relation to bats due to enhanced linear features

No significant effects on surface water, groundwater or associated ecological receptors were identified. European sites were assessed separately through the NIS, which concluded that the Proposed Development will not adversely affect the integrity of any European site, either alone or in-combination with other plans or projects.

Given the not significant residual effects for both the proposed project and Carrig Wind Farm, the absence of important shared/geographically connected KERs, and the availability of extensive suitable habitat in the wider landscape, the combined effect does not materially increase overall impact magnitude. The cumulative effect therefore remains negligible and

would not result in measurable impacts for any KER. On this basis, significant cumulative effects are not predicted and no additional mitigation measures are required.

6.9.1.1.2 Carrig (Lacka) Wind Farm

The Carrig (Lacka) Wind Farm has been operational since 2006 and comprises three turbines of a smaller scale and height than those proposed as part of the proposed project. A review of the Carrig (Lacka) Wind Farm planning file on the Tipperary County Council Planning Register found no available information relating to potential effects on European sites. Nonetheless, the potential for the proposed project to give rise to cumulative or in-combination effects when considered alongside the Carrig (Lacka) Wind Farm was examined by comparing proposed potential impacts with the operational wind farm.

As the Carrig (Lacka) Wind Farm is a long-established, operational development, it is considered to form part of the existing environmental baseline. The operational turbines are not subject to ongoing construction or new consent processes that could introduce additional pressures on the existing environment. With the implementation of the mitigation measures outlined in Section 6.7, the potential for significant cumulative effects on KERs is negligible.

6.9.1.1.3 Skehanagh Wind Farm

The Skehanagh Wind Farm has been operational since 2006 and comprises five turbines of a smaller scale and height than those proposed as part of the proposed development. A review of the Skehanagh Wind Farm planning file on the Tipperary County Council Planning Register found no available information relating to potential effects on European sites. Nonetheless, the potential for the proposed project to give rise to cumulative or in-combination effects when considered alongside the Skehanagh Wind Farm was examined.

As the Skehanagh Wind Farm is a long-established, operational development, it is considered to form part of the existing environmental baseline. The operational turbines are not subject to ongoing construction or new consent processes that could introduce additional pressures on the existing environment. With the implementation of the avoidance and mitigation measures outlined in Section 6.7, the potential for significant cumulative effects on KERs is negligible.

6.9.1.1.4 Cush Wind Farm

A NIS and EIAR for the Cush Wind Farm Project were prepared by SLR/Galetech Energy Services on behalf of Cush Wind Farm Limited. These reports identified the potential for likely significant effects on designated sites and potential significant effects KERs.

The NIS concluded that, where the potential for any adverse effect on a European site was identified, the pathway for such an effect has been effectively eliminated through avoidance, appropriate design, and the implementation of mitigation measures set out in the report and its appendices. These measures ensure that the construction, operation, and decommissioning of the Proposed Development will not adversely affect the integrity of any European site.

The EIAR and supporting ecological assessments identified the potential for effects on biodiversity, flora and fauna arising from the Proposed Project across the construction, operational and decommissioning phases. Baseline conditions were established through desk study and a comprehensive programme of field surveys undertaken in accordance with best practice guidance.

The Proposed Project is primarily located within improved agricultural grassland, plantation woodland and areas of cutover bog, with no Annex I habitats or protected plant species recorded. No designated sites occur within the project footprint, although hydrological connectivity to downstream European sites was identified. In the absence of mitigation, there is potential for effects on water quality and localised habitat loss and disturbance.

An iterative, constraints-led design process has been applied to avoid sensitive ecological features. Embedded and additional mitigation measures, including the implementation of a CEMP, Surface Water Management Plan and ecological supervision, will ensure the protection of water quality and minimise disturbance to habitats and species. Pre-construction surveys and standard best practice measures will further reduce potential impacts.

With the implementation of these measures, no significant residual effects on biodiversity, flora and fauna are predicted. The Proposed Project will not adversely affect the integrity of any European site and will not result in significant cumulative effects when considered alongside other developments.

Given the not significant residual effects for both the proposed project and Cush Wind Farm, the absence of important shared KERs, and the availability of extensive suitable habitat in the wider landscape, the combined effect does not materially increase overall impact magnitude. The cumulative effect therefore remains negligible and would not result in measurable impacts for any KER. On this basis, significant cumulative effects are not predicted and no additional mitigation measures are required.

6.9.1.1.5 Derrinlough Wind Farm

A NIS and EIAR for the Derrinlough Wind Farm Project were prepared by MKO on behalf of Bord Na Móna Powergen Limited. These reports identified the potential for likely significant effects on designated sites and potential significant effects to KERs.

The NIS concluded that, where the potential for any adverse effect on a European site was identified, the pathway for such an effect has been effectively eliminated through avoidance, appropriate design, and the implementation of mitigation measures set out in the report and its appendices. These measures ensure that the construction, operation, and decommissioning of the Proposed Development will not adversely affect the integrity of any European site.

The EIAR and supporting ecological assessments identified the potential for effects on biodiversity, flora and fauna associated with the Derrinlough wind farm. Baseline conditions were established through desk study and a programme of walkover and habitat surveys undertaken in accordance with best practice guidance.

The Derrinlough wind farm is located within cutover raised bog habitats, much of which has undergone natural regeneration to scrub, heath and bog woodland communities. Areas of higher ecological value, including remnant uncut bog and native woodland, have been avoided through the design process. While the development will result in localised habitat loss within revegetated bog, this represents a small proportion of the overall study area and is not considered significant.

Faunal surveys recorded a range of common protected species; however, no significant populations of more than higher value (local importance) were identified. The site is generally of

low suitability for sensitive species due to its modified nature. No significant effects on water quality or hydrological regimes have been identified.

Mitigation measures, including the implementation of biodiversity and species management plans, will minimise potential impacts and provide ecological enhancement. With these measures in place, no significant residual effects on biodiversity are predicted, and a net positive effect on habitat quality is anticipated.

Given the not significant residual effects for both the proposed project and Derrinlough Wind Farm, the absence of important shared KERs, and the availability of extensive suitable habitat in the wider landscape, the combined effect does not materially increase overall impact magnitude. The cumulative effect therefore remains negligible and would not result in measurable impacts for any KER. On this basis, significant cumulative effects are not predicted and no additional mitigation measures are required.

6.9.2 Other Smaller Developments

There are a number of small projects in the area surrounding the proposed wind farm site that involve the construction or extension of small residential properties, amenity areas of agricultural building. Given the low magnitude of predicted residual effects for both the proposed project and these smaller developments, the absence of important shared KERs, and the availability of extensive suitable habitat in the wider landscape, the combined (additive) effect does not materially increase the overall impact magnitude. The cumulative effect therefore remains negligible and would not result in measurable impacts for any KER. On this basis, significant cumulative effects are not predicted, and no additional mitigation measures are required.

6.9.3 Plans

National Peatlands Strategy 2015 to 2025

The National Peatlands Strategy 2015–2025 recognises Ireland's peatlands as key wetland habitats supporting specialist flora and fauna. The strategy highlights the degraded condition of many peatlands due to historical turf cutting and agriculture and recommends measures such as controlled livestock management and wildfire prevention to support habitat restoration. Opportunities exist within the proposed project to contribute to these objectives through appropriate land management.

County Offaly Development Plan 2021-2027

The County Offaly Development Plan 2021-2027[10] sets out a range of proposed policy objectives with supporting narrative for development up to 2027. In accordance with national policy, the plan is seeking to develop and improve in a sustainable and environmentally sensitive manner, the social, economic, environmental and cultural assets of the County.

The Plan promotes sustainable development in line with national policy, with a strong emphasis on climate action, renewable energy, and environmental protection. It includes specific policies

[10] https://www.offaly.ie/c/county-development-plan/

and objectives for the protection and enhancement of biodiversity, natural heritage, landscape, and water quality, and supports the development of green infrastructure and ecological connectivity. The Plan seeks to ensure that development is undertaken in an environmentally sensitive manner, safeguarding ecological receptors while facilitating appropriate land use and infrastructure development.

County Offaly Biodiversity Plan

The Biodiversity Action Plan for Offaly is incorporated into the Offaly Heritage Plan 2023 – 2027. It sets out a framework for the conservation and enhancement of biodiversity at a local level. It recognises the ongoing biodiversity loss and climate challenges and promotes measures such as active habitat management, control of invasive species, and the protection of pollinators. The Plan also encourages the recording and monitoring of species through national databases and supports the implementation of initiatives such as the All-Ireland Pollinator Plan. These measures aim to enhance habitat quality, improve ecological resilience, and promote biodiversity awareness and stewardship across the County.

County Tipperary Development Plan 2022 - 2028

The Tipperary County Development Plan 2022 to 2028[11] sets out the strategic framework, policies and objectives for the sustainable development of County Tipperary over the plan period. In line with national and regional policy, including the National Planning Framework and the Southern Regional Spatial and Economic Strategy, the Plan seeks to support compact growth, climate resilience, balanced economic development and the protection of environmental and cultural assets across the county.

The Plan promotes a transition to a low carbon and climate resilient society through policies on renewable energy, including wind, solar and bioenergy, energy efficiency, sustainable transport and resource management. It also sets out a clear settlement hierarchy and housing strategy, alongside objectives for urban and rural regeneration, tourism, recreation, water services, transport infrastructure and the enhancement of natural and built heritage.

The County Development Plan contains policies and objectives to protect and enhance biodiversity, landscape and designated European sites, ensuring that development takes place in an environmentally sensitive and sustainable manner. All new development proposals within the county are required to comply with relevant environmental legislation and policy, including provisions relating to the protection of biodiversity and natural heritage.

Collectively, these national and local policies provide a framework that supports the implementation of the Proposed Project in a manner consistent with biodiversity protection and enhancement objectives.

6.10 Enhancement Measures

A detailed Biodiversity Management Plan has been produced for the effective implementation of mitigation and enhancement measures to offset residual effects – See appendix 6-1.

[11] https://www.tipperarycoco.ie/planning-and-building/development-plan-consultation/tipperary-county-development-plan-2022-2028

6.11 CONCLUSION

This chapter presents an evaluation of the potential ecological effects of the proposed project on biodiversity, and details appropriate mitigation and compensation measures to reduce or off set the significance of potential likely effects. The residual effects assessment, post implementation of the proposed mitigation and compensation measures, concludes that the proposed project, either individually or cumulatively with other projects, will not result in significant effects on the environment and specifically biodiversity.

Overall, it can be concluded, the proposed project will not have significant negative effects on biodiversity at any geographic scale.

6.12 REFERENCES

Andersen, R., Farrell, C., Graf, M., Muller, F., Calvar, E., Frankard, P., Caporn, S. and Anderson, P. (2017). An overview of the progress and challenges of peatland restoration in Western Europe, Restoration Ecology, 25(2), pp. 271–282.

Air Pollution Information System (APIS) (2025). Air Pollution Information System. Available: Cement dusts :: terrestrial ecosystems | APIS [accessed: 29/10/2025].

Atherton, I., Bosanquet, S, & Lawley., M. (2010). Mosses and Liverworts of Britain and Ireland a field guide.

Bang, P., P. Dahlstrøm, R. Mears, and M. Walters. (2006). Animal tracks and signs. Oxford University Press, Oxford, UK.

Bat Conservation Ireland (2010). Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers

Beaumont, W.R.C. (2016). Electricity in Fish Research and Management. Theory and Practice. Electricity in Fish Research and Management. Theory and Practice, John Wiley & Sons Limited, Chichester.

Brunen, B., Daguet, C. and Jaeger, J.A.G. (2020). *What attributes are relevant for drainage culverts to serve as efficient road crossing structures for mammals?*, *Journal of Environmental Management*, 268, pp. 1–12.

Butterly Conservation (2023). Position Statement on Reintroductions and Introductions. Available at: Microsoft Word - Reintroduction Position Statement and Recommendations Dec2022 [Accessed: October 2025].

CEN (2003). Water Quality - Sampling of Fish with Electricity. CEN EN 14011:2000.

Chanin P (2003). Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough.

Chandra Sekhar, K., Chary, N.S., Kamala, C.T., Suman Raj, D.S. and Sreenivasa Rao, A. (2003). Fractionation studies and bioaccumulation of sediment-bound heavy metals in Kolleru lake by edible fish, Environment International, 29, pp. 1001–1008. doi:10.1016/S0160-4120(03)00094-1.

CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

Clarke, G., Howison, J., Hawker, B.H. and O'Hagan, D. (1999). *The Good Roads Guide: Nature Conservation advice in relation to Otters. Design Manual for Roads and Bridges, the Highways Agency*, in. HMSO London.

Cocchiglia, L., Purcell, P.J. and Kelly-Quinn, M. (2012). *A Critical Review of the Effects of Motorway River-Crossing Construction on the Aquatic Environment*, *Freshwater Reviews*, 5(2), pp. 141–168. doi:10.1608/frj-5.2.489.

Cryan, P. M., & Barclay, R. M. (2009). Causes of bat fatalities at wind turbines: hypotheses and predictions. Journal of mammalogy, 90(6), 1330-1340.

Daly, O.H., O'Neill, F.H., & Barron, S.J. (2023). The monitoring and assessment of four EU Habitats Directive Annex I woodland habitats. Irish Wildlife Manuals, No. 146. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland. Available: IWM146.pdf [accessed: 29/10/2025].

Department of Agriculture, Food & the Marine (DAFM) (2024). Forestry Standards Manual. Johnstown Castle Estate, Co. Wexford: Department of Agriculture, Food & the Marine. Available at: 1. Forestry Standards Manual 040625.pdf [Accessed November 2025].

Department of Agriculture, Environment and Rural Affairs (DAERA) (2018). Northern Ireland Priority Species – Habitat Guide: Marsh Fritillary Butterfly. Available at: Habitat Guide - Marsh Fritillary butterfly 0.PDF [Accessed: October 2025].

Department of Housing, Local Government and Heritage (DoHLGH) (2023). *National Peatlands Strategy Mid-Term Review and Implementation Plan*.

DoHLGH (2012). National Survey of Native Woodlands 2003-2008. National Survey of Native Woodlands 2003-2008 - Dataset - data.gov.ie [accessed: 29/10/2025].

Department of Housing, Local Government and Heritage (DoHLGH, 2010). Ancient and Long-established Woodland Inventory 2010. Available: Ancient and Long-established Woodland Inventory 2010 - Dataset - data.gov.ie [accessed: 29/10/2025].

Matthews, J., F. Claireau, J. Dekker, S. Gazaryan, B. Karapandža, F. Mathews, P. Presetnik, R. Raynor, C. Roemer (2024). Guidance on the consideration of bats in traffic infrastructure projects. EUROBATS Publication Series No. 10. UNEP/EUROBATS Secretariat, Bonn, Germany, 112 pp.

European Commision (EC) (2013). Interpretation Manual of European Union Habitats.

Environmental Protection Agency (EPA) (2025). EPA MAPS. Available at https://gis.epa.ie/EPAMaps/ Accessed: October 2025.

EPA (2022). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.

Garrett Kilroy, Fiona Dunne, Jim Ryan, Áine O'Connor, Donal Daly, Matt Craig, Catherine Coxon, Paul Johnston and Henning Moe (2013). A framework for the assessment of groundwater dependent terrestrial ecosystems under the Water Framework Directive. Available at: Untitled Document [accessed: 05/11/2025].

Farmer, A. M. (1993). The effects of Dust on Vegetation – A Review. Environmental Pollution. 79, 63-67. Available: PII: 0269-7491(93)90179-R [accessed: 20/02/2026].

Fitter. R.S.R & Fitter, A.H. (1984). Grasses, Sedges, Rushes and Ferns of Britain and Northern Europe (Collins Pocket Guide).

Harris S, Cresswell P & Jefferies D (1989). Surveying Badgers, Mammal Society.

Hayden, T. J, & Harrington, R. (2000). Exploring Irish Mammals. Town House.

Hendry K & Cragg-Hine D (2003). Ecology of the Atlantic Salmon. Conserving Natura 2000 Rivers Ecology Series No. 7. English Nature, Peterborough.

Holman *et al* (2014). IAQM Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London. www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf.

Invertebrate Link (2010). Invertebrate Translocation – A Code of Conservation Practice. Available at: https://www.royensoc.co.uk/wp-content/uploads/2021/12/Translocation-Code-2010.pdf [Accessed: October 2025].

IAQM (2024). Guidance on the assessment of dust from demolition and construction. January 2024 (Version 2.2).

ILP (2023). Guidance Note 08/23. Bats and Artificial Lighting at Night. Bat Conservation Trust.

Ireland's 4th National Biodiversity Action Plan, 2023 – 2030 [Accessed April 2025] via: https://www.npws.ie/legislation/national-biodiversity-action-plan

The Initiative for Nature Conservation Cymru (INCC) (2018). Habitat Management: The Marsh Fritillary Butterfly. Available from: INCC-Habitat-Management.-The-Marsh-Fritillary-Butterfly-Eng.pdf [accessed: 22/10/2025].

Kaňuch, P., Kasanický, T., Ružinská, R. and Zelenka, J. (2022). The effect of logging on fission-fusion behaviour of tree-dwelling bats explored by an agent-based model. Ecological Informatics, 72, p.101884.

Kelly-Quinn, M., Bruen, M., Turner, J.N., O'Sullivan, J., Carlsson, J., Bullock, C.H., Atkinson, S. and Casserly, C.M. (2022). *Assessment of the Extent and Impact of Barriers on Freshwater Hydromorphology and Connectivity in Ireland (Reconnect)*. University College Dublin. EPA Research Report (2015-W-LS-8).

Kemp, P.S., Russon, I.J., Waterson, B.J., O'Hanley, J. and Pess, G.R. (2008). *Recommendations for a 'Coarse-Resolution Rapid-Assessment' Methodology to Assess Barriers to Fish Migration and Associated Prioritization Tools*. Final report International Centre for Ecohydraulic Research University of Southhampton. Available at: http://eprints.soton.ac.uk/73804/[accessed: 05/11/2025].

King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011). Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Laffaille, P., Feunteun, E., Baisez, A., Robinet, T., Acou, A., Legault, A., and Lek, S. (2003). Spatial organisation of European eel (Anguilla Abou L.) in a small catchment. Ecology of Freshwater Fish, 12(4), 254-264.

Li, L.Y., Hall, K., Yuan, Y., Mattu, G., McCallum, D. and Chen, M. (2009). *Mobility and bioavailability of trace metals in the water-sediment system of the highly urbanized brunette watershed*, *Water, Air, and Soil Pollution*, 197, pp. 249–266. doi:10.1007/s11270-008-9808-7.

Maitland, P.S. (2003). Ecology of the River, Brook and Sea Lamprey. Conserving Natura 2000 Rivers Ecology Series No. 5. English Nature, Peterborough.

Mathews, F., Richardson, S., Lintott, P. & Hosken, D. (2016). Understanding the Risk to European Protected Species (bats) at Onshore Wind Turbine Sites to inform Risk Management. University of Exeter/DEFRA.

Matson, R., Delanty, K., Shephard, S., Coghlan, B. and Kelly, F. (2018). Moving from multiple pass depletion to single pass timed electrofishing for fish community assessment in wadable streams. Fisheries Research, 198, 99-108.

McGarrigle, M.L., Bowman, J.J., Clabby, K.J., Lucey, J., Cunningham, P., MacCárthaigh, M., Keegan, M., Cantrell, B., Lehane, M., Clenaghan, C. and Toner, P.F. (2002). Water Quality in Ireland 1998-2000. Environmental Protection Agency, Wexford.

McGrath, J.A., Joshua, N., Bess, A.S. and Parkerton, T.F. (2019). Review of Polycyclic Aromatic Hydrocarbons (PAHs) Sediment Quality Guidelines for the Protection of Benthic Life, Integrated Environmental Assessment and Management, 15(4), pp. 505–518. doi:10.1002/ieam.4142.

Murray, A. (2003). "Draft Methodology for a National Hedgerow Survey" Unpublished document for Networks for Nature.

National Biodiversity Data Centre (NBDC), (2025a). [Accessed October 2025] via: https://maps.biodiversityireland.ie/Map.

NBDC (2025b). Available at: https://biodiversityireland.ie/ Accessed: October 2025.

NBDC (2025c). Parrot's-feather (*Myriophyllum aquaticum*). Available from: https://maps.biodiversityireland.ie/Species/43333 [accessed: 28/10/2025].

NBDC (2025e). Himalayan Balsam (*Impatiens glandulifera*). Available from: Himalayan Balsam (Impatiens glandulifera) - Detail - Biodiversity Maps [accessed: 28/10/2025].

NBDC (2021) Marsh Fritillary Larval Survey Form. Available at: https://biodiversityireland.ie/app/uploads/2021/11/Marsh-Fritillary-Larval-Survey-Form.pdf [Accessed: October 2025].

National Parks and Wildlife Service (NPWS) (2025). The Status of EU Protected Habitats and Species in Ireland -Terrestrial Species. Available at: The Status of EU Protected Habitats and Species in Ireland [04/11/2025].

NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Available at: https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol3_Species_Article17.pdf [Accessed: October 2025].

NPWS (2019b) *The Status of EU Protected Habitats and Species in Ireland: Article 17 Habitat Conservation Assessments 2019 Volume 2*. Dublin: National Parks & Wildlife Service. Available at: https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol2_Habitats_Article17.pdf [Accessed: 12 November 2025].

National Roads Authority (NRA) (2005). Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. Dublin: National Roads Authority. Available at: https://www.tii.ie/media/gtajacj2/guidelines-for-the-treatment-of-badgers-prior-to-the-construction-of-a-national-road-scheme.pdf [accessed October 2025].

NRA (2010) Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads. National Roads Authority. Available: Noxious weeds Test_Layout 1. [accessed: 20/02/2026].

NRA (2006) Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes. Available at: http://cdn.tii.ie/publications/CC-ENV-01104-01.pdf [accessed September 2025].

NRA (2006). Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes. Available at: Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes [accessed: 05/11/2025].

National Standards Authority of Ireland (2017). Water quality - Guidance standard on monitoring Freshwater Pearl Mussel (*Margaritifera margaritifera*) populations and their environment. I.S. EN 16859:2017. Northern Ireland Environment Agency (NIEA) (2011). Otters & Development. Belfast: Department of Agriculture, Environment and Rural Affairs (DAERA).

NatureScot (2023). Advising on peatland, carbon-rich soils and priority peatland habitats in development management. Available at: https://www.nature.scot/doc/advising-peatland-carbon-rich-soils-and-priority-peatland-habitats-development-management [Accessed: October 2025].

NatureScot *et al.* (2021). Bats and onshore wind turbines – survey, assessment and mitigation. Scotland's Nature Agency. Version: August 2021 (updated with minor revisions).

Northern Ireland Environment Agency, Natural Environment Division (NIEA) (2024). Guidance on Bat Surveys, Assessment & Mitigation for Onshore Wind Turbine Developments. Version 1.1.

O'Connor, W. (2007). A Survey of Juvenile Lamprey Populations in the Corrib and Suir Catchments. Irish Wildlife Manuals No. 26. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Peay, S. (2002). *Guidance on Habitat for White-clawed Crayfish*. English Nature; Environment Agency.

Phelan, N., Lysaght, L, & Nelson, B. (2021). Irelands Butterfly Series Habitat management for the Marsh Fritillary.

O'Grady, M.F. (2006). Channels and challenges: enhancing Salmonid rivers. Irish Fresh- water Fisheries Ecology and Management Series: Number 4. Central Fisheries Board, Dublin.

OPR (2021). Office of the Planning Regulator. OPR Practise Note PN01 Appropriate Assessment Screening for Development Management.

Parnell J, Curtis T, Cullen E (2012). Webb's An Irish Flora, 8th edn. Cork University Press, Cork.

Peay, S. (2003). Monitoring the White-clawed Crayfish *Austropotamobius pallipes*. Conserving Natura 2000 Rivers Monitoring Series No. 1, English Nature, Peterborough.

Pike, C., Crook, V., and Gollock, M. 2020. *Anguilla anguilla.* The IUCN Red List of Threatened Species 2020.

Regan, E.C., Nelson, B., Aldwell, B., Bertrand, C., Bond, K., Harding, J., Nash, D., Nixon, D., & Wilson, C.J. (2010). Ireland Red List No. 4 – Butterflies. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland.

Reducing and Preventing Invasive Alien Species Dispersal (RAPID) Good Practice Management Parrot's feather (*Myriophyllum aquaticum*). Available: Good Practice Management - Parrots feather.pdf [accessed: 20/02/2026].

Reid, N., Dingerkus, S.K., Stone, R.E., Pietravalle, S., Kelly, R., Buckley, J., Beebee, T.J.C. & Wilkinson, J.W. (2013). National Frog Survey of Ireland 2010/11. Irish Wildlife Manuals, No. 58. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Rich, C, & Longcore, T (2005). Ecological Consequences of Artificial Night Lighting. Island Press.

Riley, J.W., Beaulieu, K.M., Walsh, S.J. and Journey, C.A. (2020). *Effects of Box Culverts on Stream Habitat, Channel Morphology, and Fish and Macroinvertebrate Communities at Selected Sites in South Carolina, 2016–18*. U.S. Geological Survey Scientific Investigations Report 2020–5021, p. 51.

Roche, N., Aughney, T., Marnell, F. & Lundy, M.G., (2014). Irish Bats in the 21st Century. Bat Conservation Ireland.

Smith, G. F, O'Donoghue, P., and Delaney, E. (2011). Best Practice Guidance for Habitat Survey and Mapping, The Heritage Council.

The Offaly County Development Plan 2021-2027. [Accessed April 2025] via: https://www. https://www.offaly.ie/c/county-development-plan/

Tipperary County Development Plan 2022-2028. [Accessed July 2025] https://www.tipperarycoco.ie/sites/default/files/2022-09/Volume%201%20Written%20Statement.pdf

Transport Infrastructure Ireland (TII) (2020). The Management of Invasive Alien Plant Species on National Roads – Technical Guidance. Available: GE-ENV-01105 [accessed: 20/10/2025].

Toner, P., Bowman, K., Clabby, K., Lucey, J., McGarrigle, M, Concannon, C., Clenaghan, C., Cunningham, P., Delaney, J., O'Boyle, S., MaCarthaigh, M., Craig, M., and Quinn, R. (2005). Water Quality in Ireland 2001-2003. Environmental Protection Agency, Wexford.

Vannote, R.L., Minshall, G.W., Cummins, K.W., Sedell, J.R. and Cushing, C.E. (1980). The River Continuum Concept, Can. J. Fish. Aquat. Sci, 37, pp. 130–137.

Water Framework Directive (WFD, 2025). https://www.catchments.ie/ Accessed: October 2025.

Wu, H., Sun, B. and Li, J. (2019). Polycyclic aromatic hydrocarbons in sediments/soils of the rapidly urbanized lower reaches of the river Chaohu, China, International Journal of Environmental Research and Public Health, 16. doi:10.3390/ijerph16132302.

Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. & Wright, M. (2016). Ireland Red List No. 10: Vascular Plants. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin, Ireland.