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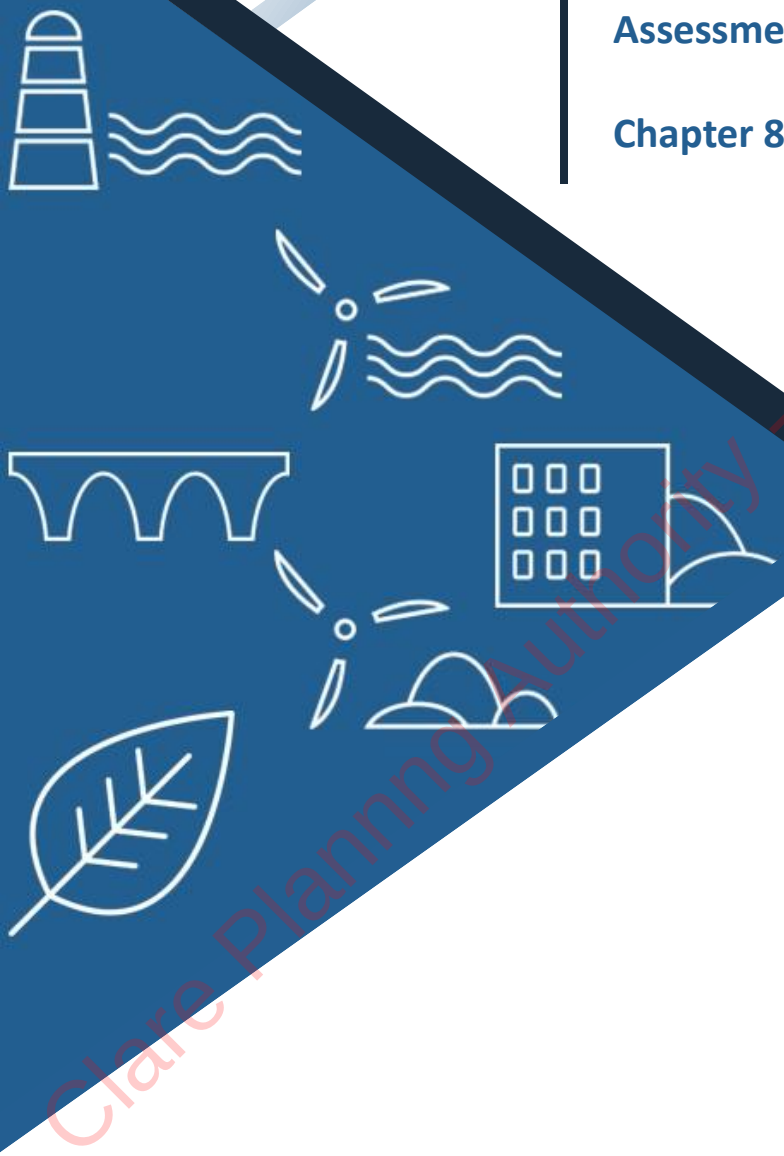
Illaunbaun Wind Farm - Environmental Impact Assessment Report

Chapter 8: Biodiversity and Ornithology



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ACRONYMS

AA	Appropriate Assessment
ARC	Amphibian and Reptile Conservation
BCI	Bat Conservation Ireland
BOCCI	Birds of Conservation Concern Ireland
BTO	British Trust for Ornithology
BWI	Birdwatch Ireland
CIEEM	Chartered Institute of Ecology & Environmental. Management
CRM	Collision Risk Modelling
DAU	Development Application Unit
DECC	Department of the Environment, Climate and Communications
DEHLG	Department of Housing, Local Government and Heritage
EC	European Commission
ECoW	Ecological Clerk of Works
EEA	European Economic Area
EEC	European Economic Community
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
EU	European Union
I-WeBS	Irish Wetland Bird Survey
IBA	Important Bird Area
IEF	Important Ecological Features
IFI	Inland Fisheries Ireland
IWT	Irish Wildlife Trust
NBDC	National Biodiversity Data Centre
NHA	Natural Heritage Area
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Services
NRA	National Road Authority
OPR	Office of the Planning Regulator
OSI	Ordinance Survey Ireland
pNHA	Proposed Natural Heritage Area
PRA	Preliminary Roost Assessment
QI	Qualifying Interests
SAC	Special Areas of Conservation
SCI	Special Conservation Interests
SHMP	Species and Habitats Management Plan
SNH	Scottish Natural Heritage
SPA	Special Protection Areas
S-P-R	Source-pathway-receptor model
TDR	Turbine Delivery Route
VP	Vantage Point
WFD	Water Framework Directive
ZoI	Zone of Influence

GLOSSARY OF TERMS

Cumulative impacts	'The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects' (EPA, 2022a).
Indirect impact	'Impacts on the environment, which are not a direct result of the project, often produced away from (the site) or as a result of a complex pathway' (EPA, 2022a).
Mitigation	Measure or action which would avoid, reduce, or remediate an impact.
Special Area of Conservation	A designated site under the EU Habitats Directive (Council Directive 92/43/EEC). This Directive requires all Member states to establish a strict protection regime for species listed in Annex IV, both inside and outside of Natura 2000 sites.
Special Protection Area	A designated site under the. Birds Directive (Council Directive 79/409/EEC). Under this Directive, Member States of the EU have a duty to safeguard the habitats of migratory birds and threatened birds.
Water Body	A surface water body as defined under the Water Framework Directive (WFD) i.e., a river/stream, lake, transitional, coastal or groundwater body.

8 BIODIVERSITY

8.1 INTRODUCTION

This chapter of the Environmental Impact Assessment (EIA) Report presents the assessment of the likely significant effects (as per the "EIA Regulations") of the Proposed Development on Biodiversity arising from the construction and operation of the scheme, both alone and cumulatively with other plans and projects, and was determined following the issue of the *Illaunbaun Wind Farm - Environmental Impact Assessment Scoping Report* to stakeholders described in Chapter 6 - Project Scoping and Consultation.

The assessment presented is informed by technical appendices A08-01 to A08-09, which include the baseline reports for habitats and species, the Collision Risk Modelling report and the Species and Habitats Management Plan for the Proposed Development.

The primary purpose of this chapter is to describe the Important Ecological Features (IEF) of the receiving environment and consider any potential significant effects arising from construction and operation of the Proposed Development. Such ecological features will be those that are considered to be important and potentially affected by the Proposed Development. This chapter comprises the following elements:

- A summary of relevant policy and guidance;
- The data sources used to characterise the Study Area of the Proposed Development;
- A summary of consultations with stakeholders;
- The methodology followed in assessing the impacts of the Proposed Development (such as information of the Study Area and the approach taken in assessing the potential impacts);
- An assessment of likely effects arising from the construction and operation of the Proposed Development;
- A review of baseline conditions;
- Identification of further mitigation measures and/or monitoring requirements in respect of any significant effects (following the 'mitigation hierarchy' of avoidance, minimisation, restoration and offsets in consecutive order); and
- A summary of residual impact assessment determinations in the case of any additional mitigation measures identified during this process.

8.2 STATEMENT OF COMPETENCE

Dr Alex Copland BSc PhD MCIEEM MIEnvSc (Inis Environmental Consultants Ltd) is an experienced conservation scientist specialising in the conservation of wild birds and biodiversity in the wider countryside, particularly in agricultural, upland and peatland landscapes. Alex is proficient in data analysis and has studied bird populations in Ireland for over 18 years. He has managed several large-scale, multi-disciplinary conservation projects including research and conservation work for species of conservation concern. Alex has also worked with NGOs at EU-level and EU institutions (European Commission and European Parliament). Alex provided technical support during the production of this report.

Oliver Barnett PhD CEnv MCIEEM (Mortimer Environmental) is a Chartered Environmentalist and Full Member of CIEEM with 25 years of consultancy experience. He is Co-convenor of CIEEM's Enhancement, Restoration & Habitat Creation (EHRC) Special Interest Group, has undertaken ecological impact assessments for a range of projects including major utility and national infrastructure schemes, and has provided technical leadership to ecology teams engaged in collating baseline data to inform such assessments

Conor Daly MSc BSc (Hons.) ACIEEM (Inis Environmental Consultants Ltd) drafted and amended the sections relevant to the Ecological baseline assessment and source-impact pathways for the identified sensitive features for the Proposed Development as the Inis EIAR writing team lead. Conor was awarded an MSc in Biodiversity and Conservation from Trinity College Dublin in 2017 and a BSc Hons. in Zoology for the University of Galway in 2016. Conor has been conducting ornithological surveys for projects since 2021 for a variety of projects including industrial estates and wind farms (small-large). Conor has experience in raptor conservation with ample experience with bird of prey pressures and threats to protected species and has provided EIAR and Natura Impact Statement (NIS) reports.

Laura Stenson BSc (**Inis Environmental Consultants Ltd)** contributed to the review of this report. Laura is an Ecologist with an honours BSc in Earth and Ocean Sciences from University of Galway and has three years' experience working in consultancy. Laura has extensive report writing experience, which includes the production, review and editing of Appropriate Assessment Screening Reports (AA), NIS and Ecological Impact Assessments (EcIA). She has experience in multi-disciplinary surveys, including habitat classification, mammal surveys, various bird surveys (e.g., wintering and breeding birds, I-WeBS, adapted Brown & Shepherd wader surveys), invasive species surveys, pre-construction mammal surveys, and bat surveys. She is a Qualifying member of CIEEM.

Cillian Burke BSc (**Inis Environmental Consultants Ltd**) contributed to the drafting of this report. He is an Ecologist with a BSc (Hons) in Environmental Science from the Galway University. Cillian is a Qualifying member of CIEEM and has experience in undertaking multi-disciplinary surveys including habitat classification, ornithology vantage point surveys, breeding wader surveys, Ecological Clerk of Works and bat surveys, and has authored ecological reports including EIARs, AA Screening Reports, NIS, EcIA and Biodiversity Net Gain (BNG) Reports.

Andrew Whitfield MA BA CEnv CEcol (Whitfield Ecological Services) has over 30 years of experience in undertaking and co-ordinating ecological and environmental impact assessments across a wide variety of infrastructure projects. These included projects of varying type and scale, ranging from new nuclear power generation facilities and wind farm developments to major road and rail construction schemes. Andrew has undertaken Habitats Regulations Assessments (HRA) of various plans and projects including transport improvement options for the Scottish Government, water supply options for Greater London, and the Heads of the Valleys road improvements in South Wales, where marsh fritillary and lesser horseshoe bat were a key concern. Andrew has extensive experience of undertaking Phase 1 habitat surveys, and surveys for otter, water vole, badger, red squirrel, amphibians, butterflies and dragonflies. He has given evidence at approximately 20 planning inquiries/hearings in the UK, Ireland and Africa. Andrew led the production of this EIAR chapter.

George Wilkinson BSc MSc MCIEEM (RSK Biocensus) is a Senior Ornithologist with over seven years of consultancy experience and over 17 years of experience of studying and watching wildlife. George frequently leads ecological assessments and surveys for a variety of species and development types including wind farms. This has included work on wind farms and other development types in Ireland. George is experienced in surveying for and assessing impacts on bird species relevant to this report. George provided input into the assessment of effects on bird populations.

Mark Tomlinson BSc MIFM (RSK Biocensus) is a Principal Aquatic Consultant with over 25 years' experience in aquatic ecology and consultancy. Mark has experience of survey techniques in rivers, from headwaters to estuaries, still-waters, lowland drainage systems and coastal waters. This experience has allowed Mark to author and contribute to a wide variety of ecological reports including HRAs and EcIAs.

Statements of Authority for the individuals who conducted the specific ecological surveys are detailed in the respective Technical Appendices.

8.3 RELEVANT LEGISLATION AND GUIDELINES

The following policy, legislation, plans and guidance are considered applicable to this chapter.

8.3.1 NATIONAL AND INTERNATIONAL LEGISLATION

- The European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) (the "Habitats Regulations") which transposes Directive 92/43/EC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (the "Habitats Directive"), and Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the Conservation of Wild Birds (the "Birds Directive");
- The EU Water Framework Directive 2000/60/EC (as amended) (the "Water Framework Directive"), which is transposed into Irish Law by the European Communities (Water Policy) Regulations 2003 (the "European Communities (Water Policy) Regulations");

- Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment as amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 (the "EIA Directive");
- S.I. No. 374/2024 - European Union (Invasive Alien Species) Regulations 2024;
- The Convention on the Conservation of Migratory Species of Wild Animals 1979 (the "Bonn Convention");
- The Convention on the Conservation of European Wildlife and Natural Habitats 1979 (the "Bern Convention");
- The Convention on Wetlands of International Importance Especially as Waterfowl Habitat 1971 (the "Ramsar Convention");
- The Wildlife Act 1976 (as amended) (the "Wildlife Act"); and
- Regulation (EU) 2024/1991 of the European Parliament and of the Council of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/869 (Text with EEA relevance).

8.3.2 RELEVANT POLICIES AND PLANS

National and local planning policy relevant to this assessment include the following statutory policies:

- Project Ireland 2040: National Planning Framework;
- Climate Action Plan 2024 – Securing our Future (Government of Ireland);
- The Biodiversity Sectoral Climate Change Adaptation Plan;
- National Biodiversity Plan 2023-2030;
- The All-Ireland Pollinator Plan 2021-2025;
- Clare County Development Plan 2023 – 2029;
- Clare County Biodiversity Action Plan 2017-2023; and
- Lesser Horseshoe Bat Species Action Plan 2022-2026.

Further information outlining the relevance of these policies to this EIAR chapter is provided in the guidance section below.

8.3.3 GUIDANCE

Good practice guidance relevant to this assessment includes:

- Guidelines on the Information to be contained in EIA Reports. Environmental Protection Agency (EPA, 2022);

- Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority (NRA ,2008a);
- Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes. National Roads Authority (NRA, 2008b);
- Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes. National Roads Authority (NRA, 2006);
- Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. National Roads Authority (NRA, 2005);
- The Good Roads Guide: Nature Conservation Advice in Relation to Otters Design Manual for roads and Bridges (DMRB Vol 10 S. 4 Part 4 HA 81/99) (Highways Agency, 1999);
- Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission, 2021);
- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government (DEHLG, 2010);
- Managing Natura 2000 Sites: The Provisions of Article 6 of the 'Habitats Directive' 92/43/EEC (European Commission, 2018);
- Wind Turbine/Wind Farm Development Bat Survey Guidelines (Bat Conservation Ireland, 2012);
- Guidelines For Ecological Report Writing. Chartered Institute of Ecology and Environmental Management (CIEEM, 2017a);
- Guidelines for Preliminary Ecological Appraisal: Vol. 2nd ed. Chartered Institute of Ecology and Environmental Management (CIEEM, 2017b);
- Bat Mitigation Guidelines for Ireland V2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, DEHLG (Marnell *et al.*, 2022);
- Bats and onshore wind turbines – survey, assessment and mitigation (NatureScot, 2021);
- Status of Protected EU Habitats and Species in Ireland. National Parks and Wildlife Service (NPWS, 2019a-c);
- Guidelines for Assessment of Ecological Impacts of National Road Schemes. National Roads Authority (NRA, 2009);
- Best Practice Guidelines for the Irish Wind Energy Industry (Irish Wind Energy Association, 2012);
- Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management (CIEEM, 2024);

- The economic cost of invasive and non-native species in Ireland and Northern Ireland, A report prepared for the N.I. Environment Agency and NPWS (Kelly *et al*., 2013a);
- Risk analysis and prioritisation for invasive and non-native species in Ireland and Northern Ireland, A report prepared for the N.I. Environment Agency and NPWS (Kelly *et al*., 2013b); and
- Ireland's invasive and non-native species – trends in introductions, NBDC Series No. 2 (O'Flynn *et al*., 2014).

8.4 DATA SOURCES

Ecological features relevant to the Proposed Development were determined through the completion of baseline ecological surveys and desk-based studies undertaken between April 2022 and May 2025. Technical appendices accompanying this chapter detail the full scope of methods, results and IEFs identified for the assessment of effects conducted in this chapter.

The following information sources were consulted in undertaking this assessment:

- National Parks & Wildlife Service (NPWS) website www.npws.ie
- National Biodiversity Data Centre website (NBDC) www.biodiversityireland.ie
- https://www.roscommoncoco.ie/en/Transport Infrastructure Ireland (formerly NRA) www.tii.ie
- European Union (EU) www.europa.eu
- Water Framework Directive (WFD) www.wfireland.ie
- Scottish National Heritage (Nature Scot) www.nature.scot
- The Heritage Council www.heritagecouncil.ie
- Construction Industry Research and Information Association www.ciria.org
- Irish Wildlife Trust (IWT) www.iwt.ie
- Environmental Protection Agency website (EPA) www.epa.ie
- Inland Fisheries Ireland (IFI) www.fisheriesireland.ie
- Birdwatch Ireland (BWI) www.birdwatchireland.ie
- Birdlife International https://datazone.birdlife.org/site/mapsearch
- Bat Conservation Ireland (BCI) www.batconservationireland.org
- Butterfly Ireland www.butterflyconservation.ie

Satellite imagery was also reviewed to identify areas of potentially suitable habitat for species considered relevant to this assessment.

8.5 CONSULTATION

Information requests were issued to the following statutory authorities regarding the Proposed Development's general area on 11th May 2022; Inland Fisheries Ireland (IFI), the Development Application Unit (DAU) in the Department of Housing, Local Government and Heritage, and the National Parks and Wildlife Service (NPWS). The response received from the NPWS on 20th May 2022 detailed relevant protected and threatened species within c.5 km of the Proposed Development. Additional data on the occurrence of bird species were also received. Details of the response received with regard to ornithology are provided in Appendix A08-03.

The response from the DAU was received on 28th June 2022. This response was comprehensive in addressing relevant ecological features and specified detailed requirements for the ecological assessment of the Proposed Development to appropriately inform the EIAR and NIS. Ecological features identified in the DAU response are detailed below:

- Birds: hen harrier (*Circus cyaneus*), merlin (*Falco columbarius*), peregrine (*Falco peregrinus*), kestrel (*Falco tinnunculus*), snipe (*Gallinago gallinago*), woodcock (Scolopax rusticola), meadow pipit (*Anthus pratensis*), red grouse (*Lagopus scotica*), skylark (*Alauda arvensis*), cuckoo (*Cuculus canorus*), sparrowhawk (*Accipiter nisus*), dipper (*Cinclus cinclus*), kingfisher (*Alcedo atthis*), other wildfowl and wetland birds;
- Bats;
- Watercourse and wetland species including otter (*Lutra lutra*), Atlantic salmon (*Salmon salar*), sea lamprey (*Petromyzon marinus*), freshwater pearl mussel (*Margaritifera margaritifera*), white-clawed crayfish (*Austropotamobius pallipes*), common frog (*Rana temporaria*) and smooth newt (*Lissotriton vulgaris*);
- Hedgerows and scrub habitats, and relevant species they are likely to support, including badger (*Meles meles*);
- Marsh fritillary (*Euphydrias aurinia*); and
- Alien invasive species: including rhododendron (*Rhododendron ponticum*) and Japanese knotweed (*Fallopia japonica*) should be fully addressed in the EIAR to address accidental spreading or introduction of these species.
- The above species and habitats were all considered in respect of the scoping for the Proposed Development to ensure the DAU response fed into the iterative design of the Proposed Development.

A response to the consultation letter to Inland Fisheries Ireland was received on 7th August 2022. The response included no specific measures due to the initial planning stage of the Proposed Development stage at the time of submission, but did request *"that in terms of stability both during the construction and operational phases, the developers assess and critically review the soil type and structure at the proposed turbine locations, and along the route of any proposed access track(s)/road(s) including areas where temporary or permanent stock piling of excavated material*

takes place. This is particularly important if the areas concerned contain peat soil. These potential impact pathways are considered in detail as part of the impact assessment, as relevant soil types and habitats exist as part of the ecological baseline of the wind farm element of the Proposed Development. Additional comments included use of clear statements regarding the use of concrete on site and the correct storage of oil and fuels on site.

8.6 ASSESSMENT METHODOLOGY

Baseline ecological surveys and assessments undertaken to inform this EIAR chapter are detailed in the Technical Appendices supporting this Chapter and are summarised below:

Table 8-1: Summary of surveys undertaken to inform the Biodiversity assessment

Feature	Surveys	Dates	Relevant EIAR Appendix
• Terrestrial habitats	○ Habitat survey following Fossitt (2000) and Smith *et al.* (2011) within the Proposed Development plus a 50 m buffer.	2022-2024	A08-02
• Birds	○ Vantage Point Surveys to inform bird flight activity within the Proposed Development, with a 500 m buffer around proposed turbine locations (as per SNH, 2017).	2023-2025	A08-03
	○ Countryside Bird Surveys (breeding and wintering bird transect surveys) to characterise bird populations within the Proposed Development (BirdWatch Ireland, 2012; Bibby *et al.*, 2000).	2023-2025	
	○ Wintering Wetland Bird Surveys (I-WeBS; BirdWatch Ireland, 2019) of the Proposed Development plus an 8 km buffer (as per SNH, 2017).	2023-2025	
	○ Breeding Woodcock Surveys of suitable habitats within 500 m of Proposed Development turbine locations (SNH, 2017; Hoodless *et al.*, 2009; Heward *et al.*, 2015; Brewin *et al.*, 2022).	2023; 2024	

Feature	Surveys	Dates	Relevant EIAR Appendix
	○ Breeding Wader Surveys of suitable habitats within and up to 500 m outside of the Proposed Development (SNH, 2017; Brown & Shepherd, 1993).	2023; 2024	
	○ Breeding Raptor Surveys up to 2 km from the Proposed Development, including: merlin (SNH, 2017; Lusby *et al.*, 2011; Hardey *et al.*, 2013), peregrine (SNH, 2017; Hardey *et al.*, 2013), kestrel (SNH, 2017; Hardey *et al.*, 2013), barn own (SNH, 2017; TII, 2017; Shawyer, 2011; Lusby & Clery, 2014) and hen harrier (Hardey *et al*., 2013).	2022-2024	
	○ Hinterland Hen Harrier Roost Surveys up to 2 km from the Proposed Development (SNH, 2017; O'Donoghue, 2019; Gilbert *et al.*, 2011).	2023-2025	
• Invertebrates	○ Marsh Fritillary Survey for larval webs in areas of suitable habitat up to 50 m from the Proposed Development (NRA, 2009).	2022-2023	A08-07
• Amphibians and reptiles	○ Amphibian Activity Surveys in suitable habitats up to 50 m from the Proposed Development (ARC, 2021a/2021b).	2024	A08-07
	○ Reptile Activity Surveys in suitable habitats up to 50 m from the Proposed Development boundary (ARC, 2021b).	2022	
• Bats	○ Preliminary Roost Assessment (PRA) of suitable trees and structures up to 500 m from the Proposed Development (NatureScot, 2021; Collins, 2016; Collins, 2023).	2022, 2024	A08-04
	○ Roost Emergence Surveys of suitable trees and structures up to 500 m from the Proposed	2022, 2024	

Feature	Surveys	Dates	Relevant EIAR Appendix
	Development (where identified from PRA above; Collins, 2016; Collins, 2023).		
	○ Activity Surveys (transects) sampling suitable habitats within the Proposed Development (NatureScot, 2021; Collins, 2016; Collins, 2023).	2022	
	○ Activity Surveys (static detectors deployments) at or approximate to turbine locations as per good practice guidance.	2022	
• Terrestrial mammals	○ Walkover Surveys for badger and other terrestrial mammals within the Proposed Development Area plus a 100 m buffer (NRA, 2005).	2022-2024	A08-05
	○ Otter Surveys of suitable habitats within the Proposed Development plus a 50 m buffer (NRA, 2005), as well as all watercourses within 300 m (Highways Agency, 1999).	2022-2024	
	○ Camera Trap Surveys based upon mammal signs and tracks identified during the terrestrial mammal walkover surveys.	2022-2023	
• Freshwater aquatic species and habitats:	○ Fisheries Assessment (electro-fishing) and/or appraisal at n=32 riverine sites and n=1 lake site (Matson *et al.*, 2018; CEN, 2003).	2022	A08-06
	○ Site visit to collect data on physical and riparian habitats, macrophytes and aquatic bryophytes, and macro-invertebrates.	2022	
	○ Biological water quality sampling (Q-samples) at n=32 riverine sites (ID to species; Feeley *et al.*, 2020).	2022	

Feature	Surveys	Dates	Relevant EIAR Appendix
	○ Macro-invertebrate sweep samples at n=1 lake site (ID to species; Cheal *et al.*, 1993).	2022	
	○ White-clawed Crayfish Surveys (hand-searching/sweep netting) as per Reynolds *et al.* (2010).	2022	
	○ eDNA sampling for high conservation value species (salmonids, European eel, freshwater pearl mussel, white-clawed crayfish, crayfish plague and smooth newt) at n=3 riverine sites.	2022	
	○ Otter Surveys with 150 m radius of survey sites (n=33 sites), additional to the otter surveys undertaken of the Proposed Development.	2022	

8.6.1 POTENTIAL IMPACTS ASSOCIATED WITH WIND FARM DEVELOPMENT

Wind farm developments may result in the following impacts on IEFs:

Direct habitat loss and fragmentation: the construction and (typically to a lesser extent) operational maintenance of wind farm infrastructure have the potential to result in both permanent and temporary loss and alteration of habitats, potentially resulting in reduced habitat extent, quality and connectivity.

Disturbance and displacement: the construction and operation stages of a wind farm may result in disturbance of ecological features within and near to the wind farm. This may lead to certain species avoiding the wind farm and its surrounding habitats (i.e., displacement). Displacement may also include barrier effects, resulting in species being deterred from using normal dispersal routes and corridors both to and from feeding, breeding and roosting grounds.

Death and injury: the operation of wind turbines can result in wildlife fatalities and injuries through collisions with turbines and interactions with other wind farm infrastructure. This includes potential barotrauma (i.e., potentially fatal lung over-expansion due to entering an area of significantly lower air pressure) of bats flying near operational turbines.

Pollution of habitats: the construction and operation stages of a wind farm may result in the pollution of habitats within and adjacent to the site. In particular, aquatic ecological features can be subject to the following impacts:

- **Input of silt:** as well as directly affecting fish and their ability to use their gills for respiration, the input of silt into waterbodies and watercourses has the potential for medium to long-term impacts as it settles on the riverbed, smothering coarse patches of sediment with fine particles thereby affecting macro-invertebrate species and benthic communities. This can deplete oxygen levels within the sediment by reducing the flow of water through the sediment, causing direct mortality of eggs and early life stages of fish and other aquatic species;
- **Input of cement:** the introduction of cement into an aquatic environment can change the water chemistry (particularly pH and dissolved oxygen) and add suspended solids, both of which can negatively impact aquatic species, resulting in significant adverse effects;
- **Input of hydrocarbons and chemicals:** spillage of hydrocarbons and their chemicals into aquatic environments has the potential to cause increased mortality of plants and animals through physiochemical reactions and direct toxicity; and
- **Input of nutrients:** significant increases in nutrient levels in aquatic environments primarily from forestry felling can result in elevated biological productivity and excessive plant and algal growth (e.g., from increased nitrogen and phosphorus). This causes ambient dissolved oxygen levels to fall and leads to eutrophication, which is known to result in adverse effects on a range of aquatic species.

Hydro-morphological changes: these can result from direct mechanical disturbance to watercourses and/or significant changes within the catchment, potentially affecting the abundances and distributions of aquatic species through spawning habitat availability and river channel structure, which are key determinants of aquatic ecology status under the WFD.

For each of these potential impacts, detailed knowledge of the characteristics and distributions of ecological features within and adjacent to the Proposed Development has been used to predict impacts on ecological features. Impacts are assessed during the construction and operation stages, and cumulatively in consideration of other plans and projects.

8.6.2 ASSESSMENT OF EFFECTS

The assessment of potential effects from the Proposed Development on IEFs has taken into consideration of the following factors:

- The quality of the effect: assessing the effect as either positive (a change which improves the quality of the environment), neutral (no effects, or effects that are imperceptible), or negative (a change which reduces the quality of the environment);
- The duration of the effect: assessed as either 'short-term' (up to one year), 'medium-term' (one to ten years) or 'long-term' (more than ten years);
- The sensitivity of the feature: the likelihood of the feature being significantly affected by a potential impact source, considered on a scale of negligible, low, medium or high;

- The magnitude of change: the extent of change in the baseline conditions of the ecological feature as a result of the project, in terms of size, amount, intensity and volume. Expressed in absolute terms where possible and considered on a scale of negligible, low, medium or large;
- Frequency and timing: the number of times an activity or impact may occur and result in the consequential effect;
- Extent: the spatial or geographical area over which the impact and resulting effect may occur under a suitably representative range of conditions; and
- Reversibility: an irreversible effect is one from which recovery within a reasonable timescale is not possible or where there is no reasonable expectation of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted through mitigation.

Following the classification of an effect based on the factors described above, a clear statement is made as to whether the effect is "significant" or "not significant" in regard to the assessment of the Proposed Development. In accordance with CIEEM (2024) guidelines, the significance of an effect on an ecological feature has been determined based on analysis of the factors that characterise the effect.

A significant effect is defined as "an effect that either supports or undermines biodiversity conservation objectives for the ecological feature or for biodiversity in general". The assessment considers whether an effect has potential to alter the conservation status of a species or species assemblage.

The conservation status of a species or species assemblage is defined as "the sum of the influences acting on it which may affect its long-term distribution and abundance, within the geographical area of interest". Conservation status is considered to be favourable under the following circumstances:

- Population dynamics indicate that the species is maintaining itself on a long-term basis as a viable component of its habitats;
- The natural range of the species is not being reduced, nor is it likely to be reduced for the foreseeable future; and
- There is (and probably will continue to be) a sufficiently large area of habitat to maintain its population on a long-term basis.

Terminology regarding the significance of effects described in this EIAR chapter references guidelines published in CIEEM (2024) and EPA (2022). Definitions for the level of significance outlined in EPA (2022) are presented in Table 8-2**.** Table 8-3 summarises how those criteria correspond to the equivalent level of significance defined by CIEEM (2024). Definitions for the level of significance set for ornithological features are described further below.

Table 8-2: EPA Guidelines for determining significance of ecological effects

Effect significance following EPA Guidelines	Definition
Profound	Significant effect on an internationally designated site. An effect which obliterates sensitive characteristics. Total/near total loss of feature populations due to mortality or displacement. Total/near total loss of productivity of a feature population due to disturbance. Guide: >80% of population/habitat lost.
Very significant	Significant effect on a nationally designated site. An effect which, by its character, magnitude, duration, or intensity significantly alters most of a sensitive aspect of the environment. Major reduction in the status or productivity of a feature population due to mortality, displacement, or disturbance. Guide[1]: 21-80% of population/habitat lost.
Moderate	An effect that alters the character of the environment that is consistent with existing and emerging trends. Partial reduction in the status or productivity of a feature population due to mortality, displacement, or disturbance. Guide: 6-20% of population/habitat lost.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. Small but discernible reduction in the status or productivity of a feature population due to mortality, displacement, or disturbance. Guide: 1-5% of population/habitat lost.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences. Very slight reduction in the status or productivity of a feature population due to mortality, displacement, or disturbance. Reduction barely discernible, approximating to the “no change” situation. Guide: <1% population/habitat lost.

Table 8-3: Comparison of CIEEM and EPA effect terminology

Significance following CIEEM (2024) Criteria	Equivalent significance using the EPA (2022) Criteria
Significant effect on a feature of International importance	Profound
Significant effect on a feature of National importance	Very significant

[1] Guide values used to inform (but not necessarily be relied upon) in assessing effect significance are as stated in Percival (2007).

Significance following CIEEM (2024) Criteria	Equivalent significance using the EPA (2022) Criteria
Significant effect on a feature of County importance	Moderate
Significant effect on a feature of Local (High Value) importance	Slight
Significant effect on a feature of Local (Low Value) importance	Not significant

As outlined above, a significant effect on a receptor of international importance (as per CIEEM guidance) is generally aligned with a profound effect under the EPA framework, in terms of severity and spatial scale. As a deviation from the standard EIA methodology, minor effects identified within this chapter have been classified as negligible to ensure that (as per the CIEEM guidelines) a clear statement is made as to whether an effect is "significant" or "not significant".

8.6.2.1 METHODOLOGY OF ASSESSING EFFECTS ON BIRD FEATURES

Guidance from Percival (2007) and NRA (2009) has been used to evaluate the sensitivity of bird species to the Proposed Development (Table 8-4). This rating system has also been used as a general guide for other biodiversity receptors throughout this report. These guidelines were utilised with consideration of the more recent guidance from EPA (2022) and CIEEM (2024) for conducting impact assessments to clearly identify effects and assigning importance in the context of the relevant receiving environment. The primary use of Percival and NRA guidance was to identify magnitude levels and sensitivity levels in line with Irish ecological baselines. The EPA (2022) guidance matrix table for significance is applicable with Percival guidance on assigning significance on likely effects in concert with the duration of and character of the impacts on species as per CIEEM (2024).

Table 8-4: Bird sensitivity rating equivalency (Percival (2007) and NRA (2009a) combined)

Sensitivity of bird feature	Percival (2007) Criteria	NRA resource evaluation	NRA Criteria	Combined Criteria
Very High	Species is cited interest of SPA. Species present in Internationally important numbers.	International Importance	Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive.	• Species is cited interest of SPA. • Species present in Internationally important numbers. • Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive.
High	Other non-cited species which contribute to integrity of SPA. Ecologically sensitive species (<300 breeding pairs in UK) and less common birds of prey. Species listed on Annex 1 of the EU bird's directive. Regularly occurring relevant migratory species which are rare or vulnerable.	National Importance	Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list.	• Other non-cited species which contribute to integrity of SPA • Ecologically sensitive species (<100 breeding pairs nationally to align with "Birds of Conservation 2020-2026" (Gilbert *et al*., 2021) and less common birds of prey. • Species listed on Annex 1 of the EU Bird's Directive. • Regularly occurring relevant migratory species which are rare or vulnerable. • Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts; and/or Includes species listed on the relevant Red Data list that have experienced recent population declines or range contraction (BoCCI Red List).
Medium	Species present in regionally important numbers (>1% of regional population).	County Importance	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	• Species present in regionally important numbers (>1% of regional population). • Species occurring within SPA's but not crucial to the integrity of the site.

Sensitivity of bird feature	Percival (2007) Criteria	NRA resource evaluation	NRA Criteria	Combined Criteria
	Species occurring within SPA's but not crucial to the integrity of the site. Species listed as priority species in the UK BAP subject to special conservation measures.		referred to in Article 4(2) of the Birds Directive; County important populations of species. Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.	• 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; • County important populations of species. • Species that are rare or are undergoing a decline in quality or extent at a national level. This includes all other BoCCI Red-listed species not included under "High" sensitivity and Amber-listed species that have experienced recent population declines or range contraction.
Low	Species covered above which are present very infrequently or in very low numbers. Any other species of conservation interest not covered above, e.g. species listed on the red or amber lists of the BoCCI.	Local (High Value) Importance	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 protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list.	• Locally important populations of priority species 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 protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. • Amber listed species (BoCCI) excluding those under "Medium" sensitivity which have experiences population decline/range contraction. • Species of particular value for the ecological niche habitats within the baseline (i.e. multiple nesting pairs/breeding colonies; key food source for species of higher conservation value; habitats essential to foraging, roosting, breeding for species of similar importance)

Sensitivity of bird feature	Percival (2007) Criteria	NRA resource evaluation	NRA Criteria	Combined Criteria
Negligible	Species that remain common and widespread.	Local (Low Value) Importance	N/A.	• Species that remain common and widespread. • Green Listed Species.

8.6.2.2 DETERMINING MAGNITUDE OF IMPACTS ON BIRD FEATURES

A definition of terms used in respect of magnitude for bird species evaluations is outlined in Table 8-5. This rating system has also been used as a general guide for magnitude quantification for other biodiversity features throughout this report.

Table 8-5: Determining magnitude of impacts (Percival, 2007)

Magnitude	Description
Very High	Total loss or very major alteration to key elements/ features of the baseline conditions such that the post-development character/ composition/ attributes will be fundamentally changed and may be lost from the site altogether. Guide: 80-10% of population/ habitat lost[2].
High	Major loss or major alteration to key elements/ features of the baseline (pre-development) conditions such that post-development character/ composition/ attributes will be fundamentally changed. Guide: 20-80% of population/ habitat lost.
Medium	Loss or alteration to one or more key elements/features of the baseline conditions such that post-development character/composition/attributes of baseline will be partially changed. Guide: 5-20% of population/ habitat lost.
Low	Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible but underlying character/composition/attributes of baseline condition will be similar to pre-development circumstances/patterns. Guide: 1-5% of population/ habitat lost.
Negligible	Very slight change from baseline condition. Change barely distinguishable, approximating to the “no change” situation. Guide: < 1% population/ habitat lost.

8.6.2.3 DETERMINING THE RISK OF IMPACTS ON BIRD FEATURES

The guideline probability rating definitions used to inform bird species evaluations in conjunction with the probability definitions are detailed in

[2] Guide thresholds specified in Table 8-5 were applied to the estimated population size for the feature in question, and/or to the extents of habitats identified as being essential for supporting this population, based on the anticipated impacts from the Proposed Development and adopting the precautionary principle. The assessed magnitude of the effect relates to the importance of the feature in question, rather than an effect magnitude being intrinsically linked with a certain feature importance (for example, the effect magnitude on a feature assessed as being of International importance could be high (e.g., if 20-80% of the population is anticipated to be lost), or low (e.g., if 1-5% of the population is anticipated to be lost).

Table 8-6 and Table 8-7. In some instances, consideration of a species' sensitivity and/or separation distance has merited an evaluation of less than Low in respect of the probability of impacts (e.g., where probability is considered much lower than the 5% threshold stated in

Table 8-6). This is explained in the text where applicable.

This rating system has also been used as a general guide for determining risk in relation to other biodiversity receptors throughout this report.

Table 8-6: Risk classifications or likelihood that an impact will occur on bird features (Percival, 2007)

Probability	Description	Comments
High	Impact is likely to occur (>50% likelihood).	Species known to be vulnerable to specific impact.
Medium	Impact may occur (5-50% likelihood).	Species may be affected by specific impact.
Low	Impact is very unlikely (<5% likelihood).	Species known to be tolerant to specific impact.

EPA guidelines (2022) also define the probability of effects to be considered in Environmental Impact Assessment Reports as detailed in Table 8-7.

Table 8-7: Probability of effects (EPA, 2022)

Likely effects	Unlikely effects
The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

8.6.2.4 DETERMINING THE SIGNIFICANCE OF EFFECTS ON BIRD FEATURES

The Percival (2007) significance matrix used for bird species evaluations is provided in

Table 8-8: , below. This matrix has also been used as a guide for determining the significance of impacts in relation to other biodiversity receptors throughout this report. The equivalent EPA (2022) significance ratings area included below to the table.

Table 8-8: Determining the significance of effects (Percival (2007), with equivalent EPA (2022) significance ratings)

Significance		Sensitivity			
		Very High	High	Medium	Low
Magnitude	Very High	Very high/ Very significant	Very high/ Very significant	High/ Significant	Medium/Moderate
	High	Very high/ Very significant	Very high/ Very significant	Medium/Moderate	Low/ Slight
	Medium	Very high/ Very significant	High/ Significant	Low/ Slight	Very low/ Not significant
	Low	Medium/ Moderate	Low/ Slight	Low/ Slight	Very low/ Not significant
	Negligible	Low/ Slight	Very low/ Not significant	Very low/ Not significant	Very low/ Not significant

Note: 'Very Low' significance (as per Percival (2007)) is considered equivalent to the EPA (2022) definitions for 'Not Significant', or 'Imperceptible' or 'Neutral' depending on the context of the magnitude of the effect or the sensitivity of the receptor, determined by the authors based on their professional ecological judgement and experience (CIEEM, 2024). Similarly, the significance of effects where the magnitude is Negligible is determined by the authors based on the context of the effect and their professional ecological judgement and experience. 'Very High' Significance would equate to a Profound effect within the EPA (2022) definitions.

8.6.2.5 EPA EIAR GUIDANCE DEFINITIONS OF EFFECTS

Table 8-9 and

Table 8-10 outline the EPA evaluation criteria utilised in this assessment. These criteria are included in the EPA's guidelines on Information to be contained in Environmental Impact Assessment Reports (EPA, 2022).

Table 8-9: Quality of effects (EPA, 2022)

Quality of effect	Description
Positive effect	A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem or removing nuisances or improving amenities).

Quality of effect	Description
Neutral effect	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Negative/adverse effect	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).

Table 8-10: Duration of effects (EPA, 2022)

Duration of effect	Description
Momentary effect	Effect lasting from seconds to minutes.
Brief effect	Effect lasting less than a day.
Temporary effect	Effect lasting less than a year.
Short-term effect	Effect lasting one to seven years.
Medium-term effect	Effect lasting seven to fifteen years.
Long-term effect	Effect lasting fifteen to sixty years.
Permanent effect	Effect lasting over sixty years.

8.6.3 ASSESSMENT OF IN-COMBINATION EFFECTS

Sources for effects attributed to the Proposed Development were considered for in-combination interactions with sources and pathways from other plans and projects within the wider receiving environment. The same analysis of magnitude and significance was applied with consideration to effects on the wider landscape scale via other wind farm sites within 20 km of the Proposed Development and other projects interacting with the same ecological features. This study area was selected based on the potential impacts of the Proposed Development, and on relevant good practice guidance regarding the typical movement patterns of mobile ecological features such as birds (e.g., Scottish Natural Heritage (SNH) (2016) guidance).

8.6.4 MITIGATION HIERARCHY

In accordance with CIEEM Guidelines for Ecological Impact Assessment (CIEEM, 2024), a sequential process has been adopted to avoid, mitigate, and offset negative ecological impacts and resulting effects, otherwise known as the 'mitigation hierarchy'. Avoidance, mitigation, offsetting, and enhancement measures have been identified where required as part of the impact assessment process for the Proposed Development. These principles underpin any ecological impact assessment and are adapted from CIEEM (2024) guidance as follows:

- **Avoidance**: seek options that avoid harm to ecological features (for example, by relocating the project to an alternative site).
- **Mitigation:** negative effects should be avoided or otherwise minimised through the implementation of appropriate mitigation measures, either through the design of the project or subsequent measures that can be guaranteed (for example, through a planning condition or obligation).
- **Offsetting:** where significant negative effects are likely despite the proposed mitigation measure, these should be offset through the provision of appropriate compensatory measures.
- **Enhancement:** seek to provide benefits for biodiversity over and above requirements for avoidance, mitigation and offsetting. Enhancement measures are outside the core mitigation required to avoid or reduce significant effects under EIA legislation and are considered separately where opportunities arise.

Wherever possible, strategies of avoidance have been implemented to minimise any impacts on ecological features. If and where avoidance has not been possible, mitigation and offsetting measures are proposed, as described in Sections 8.10.1 and 8.10.2 of this chapter.

8.7 ECOLOGICAL BASELINE: BIODIVERSITY IN RECEIVING ENVIRONMENT

The ecological baseline provided below summarises the IEFs as identified in the relevant technical appendices. Any designated site, habitat or species identified as an IEF is considered as a receptor to potential impacts from the Proposed Development, with its assessed importance level informing the degree of sensitivity to impact sources (in reference to the approach described in Section 8.6).

8.7.1 LIMITATIONS OF ASSESSMENT

The information provided in this EIAR chapter accurately and comprehensively describes the ecological baseline of the Proposed Development and provides a prediction of the likely ecological effects of the Proposed Development, along with avoidance, mitigation and compensation measures as necessary. The specialist studies, analysis, reporting, and assessment methodologies have all been undertaken in accordance with the appropriate guidelines. No significant limitations in relation to the scope, scale, or context of the impact assessment have been identified. The technical appendices to Chapter 8 specify any minor deviations from the methodology and address any significant limitations relating to the field survey data.

The ornithology data presented in this report were collected in optimal weather conditions. In some months, Vantage Points (VPs) were surveyed multiple times in one month to compensate for months when no survey work took place at a given VP, typically due to local weather conditions being unsuitable to allow the necessary visibility conditions for an accurate VP flight activity survey. All four seasons were monitored for the minimum 36 hours as set out in SNH (2017) good practice

guidance. All efforts were conducted with an acceptable time gap between surveys in accordance with SNH (2017) good practice guidance.

Whilst desk study data is useful in providing supplementary ecological information for a site, it should be acknowledged that these data are dependent on the submission of records to the relevant organisation. As such, a lack of records for a particular species does not necessarily mean that the species is absent from the site and/or wider search area. Similarly, records of a particular species do not necessarily mean that the species is still present within the site and/or wider search area.

It should be noted that ecological features are transient, and that the distributions of habitats and species may be subject to change. As such, in line with CIEEM guidance, the ecological survey data presented in this report are considered valid for at least two years (CIEEM, 2019), after which it may be necessary for further field surveys to be undertaken. Where data exceed this validity period of two years, this has been taken into consideration when assessing potential feature importance and scoping in features for further impact assessment on a precautionary basis and will be verified through confirmatory pre-construction surveys where necessary.

Bat activity surveys were conducted in 2022, with follow-up surveys in 2024. Guidance for the pre-2024 surveys followed Collins (2016) guidance while the 2024 surveys followed Collins (2023) guidance. This reflects the updated guidance for bat baseline assessments and the improving standards in bat survey and assessment methods, towards incorporating thermal imaging and more detailed consideration of tree roost features (Appendix A08-04).

The majority of bat activity data was recorded in 2022. As this data is 3 years old at the time of submission. This factor is considered in weighing both the presence/absence of species and determining the impact on receptors within the ecological baseline.

Static detector deployment for Turbine 6 malfunctioned during the summer effort. Although this reduces the accuracy in the area for this turbine. The detectors deployed across the study area covered similar habitat (Grassland border conifer woodland). As such, this is not considered a significant constraint on informing the bat ecological baseline.

In summary, it is considered that no significant limitations exist, and the survey data provide accurate detail on the baseline biodiversity in relation to habitats and species within the receiving environment of the Proposed Development.

No other significant limitations were encountered during the course of the ecological baseline surveys. Any specific constraints that occurred during specific surveys are discussed in detail in the corresponding technical appendices.

8.7.2 DESIGNATED SITES

Designated sites are present within the 15 km precautionary Zone of Influence (ZoI) of the Proposed Development, as summarised in Table 8-11 and shown in the figures provided in Appendix A08-01. Potential connectivity (e.g., hydrological, habitat linkage, flight paths) was identified between

designated sites and the Proposed Development, with potential impact pathways discussed in detail in Section 8.9.2. These sites were therefore brought forward for impact assessment in relation to the Proposed Development. European sites within 10 km of the Proposed Development designated under the Birds Directive (i.e., Special Protection Areas (SPA)) were also included for further consideration based on the potential for species listed as Special Conservation Interests (SCI) to be affected (e.g., when passing through the wind farm airspace), in accordance with typical movement patterns for relevant IEFs stated in SNH (2016) guidance.

Table 8-11: Relevant designated sites

Site code	Site name	Distance to Proposed Development (km)	Hydrological connectivity and distance
Special Area of Conservation (SAC)			
000036	Inagh River Estuary SAC	5.64	22km downstream via the Derrymore 28
001021	Carrowmore Point to Spanish Point & Islands SAC	6.36	No
002250	Carrowmore Dunes SAC	14.27	No
Special Protection Area (SPA)			
004182	Mid-Clare Coast SPA	6.49	No
004005	Cliffs of Moher SPA	9.82	No
Important Bird Area (IBA)			
	West Clare Uplands IBA	3.5	No
National Heritage Area (NHA) / Proposed Natural Heritage Area (pNHA)			
002397	Slievecallan Mountain Bog NHA	4.32	No
000036	Inagh River Estuary pNHA	5.65	22km downstream via the Derrymore 28
002400	Cragnashingaun Bogs NHA	9.57	No
001021	Carrowmore Point to Spanish Point & Islands pNHA	6.35	No
000026	Cliffs Of Moher pNHA	10.5	No
002367	Lough Naminna Bog NHA	11.14	No
001007	White Strand/Carrowmore Marsh pNHA	12.27	No

Site code	Site name	Distance to Proposed Development (km)	Hydrological connectivity and distance
001024	Caherkinallia Wood pNHA	12.31	No
002421	Lough Acrow Bogs NHA	13.25	No
000048	Lough Goller pNHA	13.27	No

8.7.2.1 INTERNATIONALLY DESIGNATED SITES

A precautionary approach was adopted when identifying relevant internationally designated sites, assessing all internationally designated sites with physical or potential hydrological connectivity to the Proposed Development, as well as sites with mobile SCIs or Qualifying Interests (QIs) which could potentially occur outside of the designated site boundary within or in close proximity to the Proposed Development (OPR, 2021).

Following analysis of potential connectivity between the Proposed Development and internationally designated sites, only one is considered relevant to the wind farm element of the Proposed Development (Appendix A08-01). This is the West Clare Uplands IBA, located c.3.5 km south of the Proposed Development and designated for hen harrier; the West Clare IBA and its relevant qualifying species therefore comprise IEFs of **International Importance** to be considered in Section 8.9. The four remaining sites, Inagh River Estuary SAC, Carrowmore Point to Spanish Point & Islands SAC, Carrowmore Dunes SAC and Mid-Clare SPA are all screened out due to a lack of ecological connectivity between these sites and the Proposed Development. Only the Inagh River Estuary SAC is downstream of any river relevant to the Proposed Development (Derrymore_28 [IE_SH_28I010300]). This pathway connects the Proposed Development with this SAC over a 22km hydrological pathway through multiple waterbodies. As such, even in a worst case scenario of contamination, no likely effect is expected to impact this SAC based on the extent of dissolution between source and receptor. The other SACs are separated via rivers and the coastal waterbody (Shannon Plume (HAs 27;28) [IE_SH_070_0000]). As such, no likely significant effects are likely based on the extent of dissolution between source and receptors. See **Appendix 08-01** for full details of pathway assessment.

The Mid-Clare SPA has no hydrological connectivity with the Proposed Development. None of the designated SCIs were recorded utilising the lake or peatland habitats related to the ecological baseline. As these species were designated for their breeding populations and are primarily coastal species, no likely *ex-situ* interactions were considered likely to occur as a result of the Proposed Development (**Appendix 08-01**). AA screening for relevant European sites is also attached along with the EIAR.

8.7.2.2 NATIONALLY DESIGNATED SITES

National Heritage Areas (NHA) are nationally designated sites of nature conservation importance protected under the Wildlife Act. Whilst pNHAs do not have the legal protection afforded to NHAs until designation is confirmed, these should still be taken into consideration when establishing the potential for impacts from a plan or project on a precautionary basis.

None of the NHAs or pNHAs are in close proximity, or have connectivity to, the Proposed Development through distance from the Proposed Development, hydrological or other linkages, and are therefore not considered further in the assessment. Further assessment of these NHAs and pNHAs is presented in Appendix A08-01. This was based on these sites having no clear river waterbodies connecting the Proposed Development to these sites. The only one site with any potential connectivity was the Inagh River Estuary pNHA. This site was scoped out under the same reasoning as its SAC counterpart.

The Carrowmore Point to Spanish Point and Islands pNHA, Cliffs Of Moher pNHA and White Strand/Carrowmore Marsh pNHA were scoped out under the same reasoning as their European site counterparts.

The remainder pNHA and NHA sites had no mobile species requiring ex-situ effects (Appendix 08-01). As such, no sites had pathways via direct proximity or hydrological pathway for likely significant effects to occur.

8.7.3 TERRESTRIAL HABITATS

8.7.3.1 SURVEY RESULTS AND IMPORTANCE

The habitats present within the Proposed Development's ecological baseline, as assessed in accordance with Fossitt (2000), included areas predominantly related to conifer plantation forestry, habitats within private property, and mosaics of recolonising or bare ground. A full account of habitats present within the ecological baseline is provided in Appendix 08-02.

Two lakes form part of the ecological baseline within the receiving environment of the wind farm element of the Proposed Development. Both lakes serve as potential foraging and roosting habitats for various species including birds, bats, terrestrial mammals, amphibians and invertebrates. As such, both lakes are considered of **County Importance** based on their value to the receiving environment for birds, amphibians and general invertebrate biodiversity in the immediate and wider environment (Appendix 08-02).

Table 8-12 identifies the habitat types and their extents recorded within the Proposed Development.

Table 8-12: Habitats present within the Proposed Development

Habitat type (area)	Pre-construction extent within the Proposed Development (ha)
BL3 Buildings and artificial surfaces	1.03

Habitat type (area)	Pre-construction extent within the Proposed Development (ha)
BL3/GA2 Buildings and artificial surfaces/Amenity grassland (improved)	0.53
ED1 Exposed sand, gravel or till	0.02
ED2 Spoil and bare ground	0.15
ED3 Recolonising bare ground	0.11
ED3/GS4 Recolonising bare ground/Wet grassland	0.04
ED4 Active quarries and mines	0.14
ED4/ED3 Active quarries and mines/Recolonising bare ground	0.23
ED4/FL8 Active quarries and mines/Other artificial lakes and ponds	0.08
FL1 Dystrophic lakes	0.40
FL8 Other artificial lakes and ponds	0.07
GA1/GS4 Improved agricultural grassland/Wet grassland	0.004
GM1 Marsh	0.10
GS4 Wet Grassland	8.63
GS4/HH3 Wet grassland/Wet Heath	2.92
HH3 Wet heath	7.77
HH3/ED3 Wet heath/Recolonising bare ground	0.12
HH3/GS4 Wet heath/Wet grassland	0.87
HH3/GS4/WS1Wet heath/Wet grassland/Scrub	0.34
HH3/PB2 Wet heath/Upland blanket bog	1.78
HH3/WD4 Wet heath/Conifer plantation	1.59
HH3/WS1 Wet heath/Scrub	1.04
PB2/HH3 Upland blanket bog/Wet heath	9.53
PB4/HH3 Cutover Bog/Wet heath	0.04
WD4 Conifer plantation	27.77
WD4/HH3 Conifer plantation/Wet heath	0.82
WS1 Scrub	0.86

Habitat type (area)	Pre-construction extent within the Proposed Development (ha)
WS1/GS4 Scrub/Wet grassland	0.16
WS1/HH3 Scrub/Wet heath	0.08
Habitat type (linear)	**Pre-construction extent within the Proposed Development (m)**
Stone walls and other stonework (BL1)	134
Earth banks (BL2)	4,141
Earth banks/ Stone walls and other stonework (BL2/BL1)	435
Earth banks/Treeline (BL2/WL2)	30
Drainage ditches (FW4)	1,260
Hedgerows (WL1)	700
Hedgerows/Earth banks (WL1/BL2)	246
Treeline (WL2)	82

The varied habitats present pre-development within the footprint of the wind farm element of the Proposed Development include diverse heath, bog and wetland mosaic habitats such as:

- Marsh GM1;
- Wet grassland GS4;
- Wet grassland/Wet Heath GS4/HH3;
- Wet heath HH3;
- Wet heath/Wet grassland HH3/GS4;
- Wet heath/ Upland blanket bog HH3/PB2;
- Upland blanket bog PB2;
- Upland blanket bog/Wet heath PB2/HH3; and
- Cutover bog/Wet heath PB4/HH3.

These are assessed as being of **Local (High Value) Importance**. These habitats have important local value for biodiversity for subterranean and terrestrial invertebrates and consequently for birds, amphibians and terrestrial mammals including badger, hen harrier, passerines and common frog. Given they maintain a degree of naturalness and a lack of agricultural improvement associated with many of the other habitats present within the Proposed Development, these habitat areas are considered to be IEFs.

Additional habitats considered IEFs based on their value to local biodiversity included:

- Hedgerows
- Treelines

These are also assessed as being of **Local (High Value) Importance**. This is based on these features having importance for pollinators, nesting passerines and mammals. Even small sections of linear habitat like these can create vital biodiversity zones in otherwise benign areas (i.e. agricultural grassland and artificial surfaces).

The remaining habitats recorded within the Proposed Development baseline were high value habitats for biodiversity that are within mosaics with less valuable habitats reducing their overall value. Many of these mosaics were less than 1 ha in size and indicated that areas of the habitats scoped in for **Local (High Value) Importance** have become fragmented by encroaching scrub, conifer woodland or deteriorating peatland condition. As such, the remaining habitats were assessed to be of **Local (Low Value) Importance**.

8.7.3.2 SENSITIVITY TO CHANGE

All IEF habitats that are scoped in from the ecological baseline are sensitive to similar impacts, being vulnerable to excessive drainage and overgrazing from livestock, which can expose peaty soil and dry out the habitat, resulting in gradual habitat degradation. The increase in nutrient input from livestock and sediment run-off can affect the water quality within associated waterbodies and peatland/heath habitats, affecting its suitability for sensitive species such as invertebrates and breeding birds.

Where additional drainage is introduced as part of the Proposed Development, appropriate consideration of magnitude and duration of such impact will be given.

8.7.3.3 FUTURE BASELINE (THE 'DO-NOTHING' SCENARIO)

The surveys undertaken for the Proposed Development provide a baseline classification of habitats within and near the Proposed Development. No previous habitat information at a suitable scale is available from which trends can be identified or changes evaluated. The lakes, wet grassland and wet heath habitats may undergo further decline due to climate change resulting in reduced rainfall and prolonged dry periods in summer. Between this assessment and the anticipated construction of the Proposed Development, no significant natural changes to the baseline habitats are anticipated beyond these identified potential effects from climate change.

8.7.3.4 RECEIVING ENVIRONMENT (THE BASELINE + TRENDS)

It is assumed in this report that the baseline environment in relation to habitats, particularly the lakes and wet heath mosaic habitats, as identified above, will be the receiving environment at the time of construction given the short time period likely to elapse in the interim. This assumes there

will be no significant changes in land use which could affect the characteristics and assessed importance of habitats within the Proposed Development.

8.7.4 BIRDS

8.7.4.1 SURVEY RESULTS AND IMPORTANCE

Desk study and field survey results for ornithological features are described below. Detailed survey data, figures and species accounts are provided in Appendix A08-03.

8.7.4.2 RAPTORS

Barn owl

Barn owl is included on the BoCCI Red List and has undergone a short-term population decrease in Ireland. Favoured breeding sites include ruined buildings (e.g., castles) and outbuildings (e.g., barns, sheds), whilst suitable foraging habitat typically comprises rough grassland with a thick, tussocky mix of native grass species, which small mammals (i.e., favoured prey) may inhabit. The desk study identified two barn owl records in the OSI grid squares within which the Proposed Development is located (NBDC, 2025): one record dating back to the 1968-1972 breeding bird atlas (Sharrock, 1976), with the second (i.e., most recent) record involving a single individual seen in March 2020, c.7 km north-northeast of the Proposed Development.

Surveys undertaken in 2023 and 2024 throughout the Proposed Development and a 2 km buffer identified one high suitability potential nest site within the Proposed Development boundary and one low/moderate suitability nest site outside of the Proposed Development boundary but within the 2 km buffer zone. No barn owls or evidence of barn owl activity were recorded at these suitable nest sites.

Whilst containing suitable foraging and nesting habitat, no evidence of barn owl activity was recorded within the Proposed Development during any of the targeted barn owl surveys, nor were any incidental observations recorded during the large number of additional surveys within the Proposed Development for other species. Barn Owl Trust (BOT) guidance[3] states that the majority of barn owl flights typically occur within 3 m of ground level (i.e., significantly below the rotor sweep zone), and cites only one confirmed case of a barn owl being killed by a wind turbine in Britain. This leads the BOT to state that, *"Overall there is no evidence that wind turbines have a significant impact on Barn Owls in the UK"*. Considering the similar nature of barn owl behaviour and habitat use in Ireland to the UK, this guidance is also deemed applicable in an Irish context.

Considering the lack of barn owl activity recorded within the Proposed Development, and the limited sensitivity of this species to wind farm developments, barn owl is not included for further consideration as an IEF despite its conservation status and suitable nest sites within the baseline. This is in line with scoping decisions being made based on the combination of the species'

[3] See Wind turbines and Barn Owls - The Barn Owl Trust (accessed 29/07/2025).

conservation status, site usage/presence, and recorded activity levels during surveys, in line with NRA (2009a) and CIEEM (2024) guidance

Buzzard

Buzzard is a common resident species in Ireland with a widespread distribution and increasing population size both in the long-term and short-term (Hardey *et al.,* 2013; Gilbert *et al.,* 2021). They nest in trees and sometimes on cliffs, usually with access to open land, including farmland, moorland and wetland.

Buzzard was observed on four occasions during the VP surveys. Buzzard is therefore present within and adjacent to the Proposed Development, but not to any significant level in the context of this species' wider population status. As such, due to the low level of activity, and its conservation status, buzzard is not included for further consideration as an IEF.

Kestrel

Whilst a common and widespread raptor species in Ireland, kestrel is included on the BoCCI Red List due to its widespread decline. Although the species' short-term population trend is stable and its short-term breeding distribution trend is increasing, its range is decreasing in the long-term. Kestrels typically forage over farmland, wetlands, moorland and roadside verges, and nest in trees, buildings and cliff faces. During winter they are largely resident within the breeding territory, although some move down to lowland areas. The desk study identified 25 observations of kestrel within the OSI grid squares within which the Proposed Development is located, most recently in 2024 (NBDC, 2025).

Kestrel was observed on 181 occasions during the VP surveys. Flightlines were also identified within the 500 m boundary of the wind farm site of the Proposed Development. There were observations of this species during the winter transect surveys and I-WeBS efforts. Breeding activity surveys yielded no nests, but multiple individuals were recorded hunting during the 2023 breeding season which suggests this species was breeding either within or in close proximity to the Proposed Development.

Kestrels are active within the Proposed Development during both breeding and wintering periods, with mainly foraging/hunting territories within the receiving environment of the Proposed Development. Due to this and the conservation status of this species, kestrel is included for further consideration as an IEF of **Local (High Value) Importance**.

Peregrine

Peregrine is an Annex I species of the EC Birds Directive and is on the BoCCI Green List, with an increasing population in the short- and long-term in Ireland. Peregrines breed on coastal and inland cliffs and can also be found in cities, and hunt over a range of habitats including farmland and wetland. Wintering habitat shows some movement away from its breeding areas.

The desk study recorded four records of peregrine within the OSI grid squares within which the Proposed Development is located, most recently in 2018 (NBDC, 2025). Consultation with NPWS

confirmed active nests within the grid squares that overlap with the proposed site boundary. Peregrine was observed on one occasion during the winter season 2023/2024 VP surveys and once as an incidental sighting during hen harrier breeding survey in 2023.

Activity levels were very low during the peregrine survey efforts. Despite the low activity, due to the likely presence of active nests within the wider receiving environment and the suitable habitat for hunting within and adjacent to the Proposed Development, peregrine is included for further consideration as an IEF of **Local (High Value) Importance** under the precautionary principle.

Hen harrier

Hen harrier is an Annex I species of the EC Birds Directive and the BoCCI Amber List, with a decreasing short-term population trend in Ireland. Breeding birds are confined largely to heather moorland and young forestry plantations where they typically nest on the ground, whilst in winter they are found in more coastal and lowland areas throughout Ireland.

The desk study recorded seven observations of hen harrier within the OSI grid squares within which the Proposed Development is located, most recently in 2022 (NBDC, 2025). Hen harriers were observed on 21 occasions during VP surveys. Four sightings of hen harriers were observed during breeding hen harrier surveys in 2023, including one female and three males.

Dusk roost surveys yielded no sightings of hen harrier roosting in suitable habitat within the Proposed Development.

Considering the suitable foraging habitat present within the Proposed Development, the occurrence of the species within the Proposed Development, the conservation status of the species and that the Proposed Development is c.3.5 km from West Clare Uplands IBA (designated for its hen harrier population, which could potentially also use the Proposed Development based on SNH (2016) guidance), hen harrier is included for consideration as an IEF of *up to* **International Importance** on a precautionary basis.

Merlin

Merlin is an Annex I species of the EC Birds Directive and is included on the BoCCI Amber List. Merlin is a rare breeding species in Ireland, typically nesting on the ground on moorland, mountain, and blanket bog, but also nesting in woodland (e.g., forestry plantation) adjacent to moorland. This species is much more widely distributed in winter. Merlin has undergone moderate decrease in its breeding population in the short- and long-term in Ireland (Gilbert *et al.*, 2021).

The desk study recorded five observations of merlin within the OSI grid squares within which the Proposed Development is located, most recently in 2011 (NBDC, 2025). Four individuals were recorded in winter 2023/24 during VP surveys. Plucking post evidence was recorded on site, suggesting the Proposed Development formed part of a wintering territory (i.e., used for foraging). Targeted surveys for breeding merlin and other surveys suitable for recording this species (e.g., VP

surveys, other surveys for breeding raptors) did not record any merlin activity during the breeding season.

Although the activity level recorded was very low, considering the wintering foraging activity recorded and the suitability of habitats within the Proposed Development for breeding, merlin is included for further consideration as an IEF of **Local (High Value) Importance**.

8.7.4.3 WADERS AND WATERFOWL

Only four species were recorded utilising the lake adjacent to the Proposed Development (gadwall, wigeon, teal and mallard) while conducting I-WeBS. The remaining species presented were recorded within the 5 km survey area for I-WeBS.

Brent goose

Brent goose is an Amber-listed (BoCCI) species with an increasing short-term and long-term population trend in Ireland. Ten individuals were recorded during I-WeBS efforts in 2023/2024, and eight individuals were recorded during I-WeBS efforts in 2024/2025. Brent goose is thus considered to be an IEF of **Local (High Value) Importance** requiring impact assessment due to its conservation status and the lake and adjacent wet grassland located within the footprint of the Proposed Development.

Cormorant

Cormorant is an Amber-listed species (BoCCI) with a fluctuating short-term and increasing long-term population trend in Ireland. Four individuals were recorded during I-WeBS efforts in 2023/2024 and 46 individuals were recorded during I-WeBS efforts in 2024/2025. None were recorded within the Proposed Development. It is considered to be an IEF of **County Importance** requiring impact assessment due to the extent of suitable habitat within the receiving environment of the Proposed Development (Lough Keogh), and as it is listed as an SCI of the Mid-Clare Coast SPA which is located within the ZoI of the Proposed Development.

Curlew

Curlew is a Red-listed (BoCCI) species with populations undergoing short-term and long-term population decline. It is a widely distributed but uncommon breeding species, favouring rough pastures, meadows and heather. In winter it uses a variety of coastal and inland wetland habitats and damp grassland. 38 individuals were recorded during I-WeBS efforts in 2023/2024, and 118 individuals were recorded during I-WeBS efforts in 2024/2025. As such, it is considered to be an IEF of **Local (High Value) Importance** requiring impact assessment due to its conservation status and the lake located within the footprint of the Proposed Development.

Gadwall

Gadwall (*Mareca strepera*) is an Amber-listed (BoCCI) species with an increasing short-term and long-term population in Ireland. One individual was recorded during I-WeBS efforts in 2023/2024.

Gadwall is considered to be an IEF of **Local (High Value) Importance** requiring impact assessment due to its conservation status and the lake located within the footprint of the Proposed Development.

Golden plover

Golden plover is both an Annex I species and a Red-listed (BoCCI) species. Golden plover has a decreasing short-term population trend in Ireland. The species was observed during VP surveys in 30 November (30) 2023, and in January (70) and March (100) 2024. Eight individuals were recorded during I-WeBS efforts in 2023/2024. As such, Golden plover is considered to be an IEF of **Local (High Value) Importance** requiring impact assessment due to its conservation status and its presence within the receiving environment of the Proposed Development.

Greenshank

Greenshank (*Tringa nebularia*) is a Green-listed (BoCCI) species and an SCI of the Mid-Clare Coast SPA. It has a stable short-term and increasing long-term population in Ireland. Two individuals were recorded during I-WeBS efforts in 2023/2024, and one individual was recorded during I-WeBS efforts in 2024/2025. Greenshank is considered to be an IEF of **County Importance** requiring impact assessment under a precautionary basis due to its conservation status and the suitable habitat within the Proposed Development.

Little grebe

Little grebe a Green-listed (BoCCI) species and has an increasing short-term population in Ireland. Four individuals were recorded during I-WeBS efforts in 2023/2024, and ten individuals were recorded during I-WeBS efforts in 2024/2025. Little grebe is considered to be an IEF of **Local (High Value) Importance** requiring impact assessment due to the presence of suitable habitat in the form of the lake located within the footprint of the Proposed Development.

Mallard

Mallard is an Amber-listed (BoCCI) species with a stable short-term and long-term population in Ireland. Nest sites typically comprise dense vegetation near water, whilst overwintering occurs at a variety of coastal and inland wetland habitats. Eight individuals were recorded during I-WeBS efforts in 2023/2024, and 73 individuals were recorded during I-WeBS efforts in 2024/2025. Mallard is considered to be an IEF of **Local (High Value) Importance** requiring impact assessment due to its conservation status and the lake located within the footprint of the Proposed Development.

Oystercatcher

Oystercatcher is a Red-listed (BoCCI) with a stable short-term population in Ireland. They nest principally on shingle beaches, dunes, salt marshes and rocky shores around the coast, but also on some large inland lakes. In winter, they use all coastal habitats and particularly favour open sandy coasts. 183 individuals were recorded during I-WeBS efforts in 2023/2024, and 409 individuals were recorded during I-WeBS efforts in 2024/2025. Oystercatcher is considered to be an IEF of **Local (High**

Value) Importance requiring impact assessment due to its conservation status and the lake located within the footprint of the Proposed Development.

Redshank

Redshank is a Red-listed species (BoCCI) species with a stable short-term and increasing long-term population in Ireland. They nest on the ground in grassy tussock, in wet, marshy areas and occasionally heather. They winter all around the coasts of Ireland, Britain and many European countries, favouring mudflats, large estuaries and inlets, smaller numbers at inland lakes and large rivers. Six individuals were recorded during I-WeBS efforts in 2023/2024, and 11 individuals were recorded during I-WeBS efforts in 2024/2025. Redshank is considered to be an IEF of **Local (High Value) Importance** requiring impact assessment due its conservation status and its presence within the receiving environment of the Proposed Development.

Ringed plover

Ringed plover is an Amber-listed (BoCCI) species and is also an SCI of the Mid-Clare Coast SPA with a stable short-term population in Ireland. They mostly have a coastal breeding distribution, preferring to nest on exposed wide sandy or shingle beaches. Some breed inland, particularly in the west, where their preferred nesting habitat is on stony banks beside rivers and along lake shores. They winter around the entire coastline but are quite sparse along the north and southeast coasts. 33 individuals were recorded during I-WeBS efforts in 2023/2024, and 82 individuals were recorded during I-WeBS efforts in 2024/2025. Ringed plover is considered to be an IEF of **County Importance** requiring impact assessment due to its conservation status, its SCI status of the Mid-Clare Coast SPA, and the presence of potentially suitable nesting and foraging habitat in the vicinity of the Proposed Development.

Sanderling

Sanderling is a Green-listed (BoCCI) species with an increasing short-term and long-term population in Ireland and is also an SCI of the Mid-Clare Coast SPA. 12 individuals were recorded during I-WeBS efforts in December 2023, and one individual was recorded during I-WeBS efforts in January 2025. However, sanderling is a predominantly coastal species in Ireland and was not recorded in the vicinity of the Proposed Development. As such, due to the absence of suitable habitat within the ZoI of Proposed Development, sanderling is not included for further consideration as an IEF.

Snipe

Snipe is a Red-listed (BoCCI) species and has experienced a decrease in population size and breeding range in Ireland. It is an Annex II species under the EU Birds Directive. The species was recorded during VP and countryside bird survey (CBS) transect surveys. Due to its BoCCI status, presence on site and the extent of suitable habitat available to it within the Proposed Development, it is considered an IEF of **Local (High Value) Importance** for impact assessment.

Teal

Teal is an Amber-listed (BoCCI) species with a stable short-term and decreasing long-term population in Ireland. Teal was recorded during VP surveys in November (13) 2023 and one individual in March 2025. 15 individuals were recorded during I-WeBS efforts in 2023/2024, and 10 individuals were recorded during I-WeBS efforts in 2024/2025. Teal was also recorded within the relevant 10 km grid square (NBDC, 2025). It is considered to be an IEF of **Local (High Value) Importance** requiring impact assessment on a precautionary basis.

Tufted duck

Tufted duck is an Amber-listed (BoCCI) species with an increasing short-term population in Ireland. Two individuals were recorded during I-WeBS efforts in 2023/2024, and nine individuals were recorded during I-WeBS efforts in 2024/2025. Tufted duck is considered to be an IEF of **Local (High Value) Importance** requiring impact assessment due to its conservation status and the lake located within the footprint of the Proposed Development.

Turnstone

Turnstone is an Amber-listed (BoCCI) species with a fluctuating short-term population in Ireland. Turnstone does not breed in Ireland, with a breeding range all around shores of Scandinavia and Canada, but they winter all around the Irish coast. Five individuals were recorded during I-WeBS efforts in 2023/2024, and 21 individuals were recorded during I-WeBS efforts in 2024/2025. However, turnstone is a predominantly coastal species in Ireland with only one flightline recorded in the vicinity of the Proposed Development. As such, due to the absence of suitable habitat for turnstone within the ZoI of Proposed Development, turnstone is not included for further consideration as an IEF.

Whooper swan

Whooper swan is an Annex I species of the EC Birds Directive and is included on the BoCCI Amber List in Ireland (Gilbert *et al*., 2021). The whooper swans that occur in Ireland each winter nest in Iceland during the summer. Each year a small number of whooper swans stay in Ireland for the summer and there have been occasional breeding records on lakes in the midlands and north-west. In winter, they mostly use lowland open farmland around inland wetlands. Three whooper swan were recorded during I-WeBS efforts in October 2024 and as such it is considered to be an IEF of **Local (High Value) Importance** requiring impact assessment.

Wigeon

Wigeon is an Amber-listed (BoCCI) species with a decreasing short-term and long-term population in Ireland. In the breeding season, they usually breed in shallow freshwater marshes, under tussocks adjacent to lakes and lagoons or on lake islands. In winter, they occur on coastal marshes, freshwater and brackish lagoons, estuaries, and bays. Many occur on inland wetlands, lakes, rivers and turloughs. Eight individuals were recorded during I-WeBS efforts in 2023/2024. Considering this,

and the availability of suitable habitat within and adjacent to the Proposed Development, wigeon is considered to be an IEF of **Local (High Value) Importance** requiring impact assessment.

Woodcock

Woodcock is a Red-listed (BoCCI) bird species of conservation concern due to its long-term breeding population decline. During breeding, they nest on the ground in forests and woodland, usually well camouflaged amongst dead leaves and low vegetation. They have a wide distribution in winter, occurring in woodland, scrub and some open areas such as bracken and heather-covered hills. Woodcock was not recorded during the 2023 and 2024 breeding season and, although there is suitable breeding habitat present onsite, this species is not known to breed in the vicinity of the Proposed Development (Balmer *et al.*, 2013). The combination of wet grassland near forestry plantation provides ample suitable wintering habitat for this species. Woodcock was recorded in the winter VP efforts. Due to its conservation status and presence within the receiving environment of the Proposed Development, this species is considered to be an IEF of **Local (High Value) Importance** during winter only and is scoped in for impact assessment under the precautionary principle.

8.7.4.4 GULLS

Black-headed gull

Black-headed gull is an Amber-listed (BoCCI) species with an increasing short-term and long-term population in Ireland. They breed both on the coast and inland where they will often nest in colonies. This species usually nests on the ground in wetland areas, such as bogs and marshes, but will also use man-made lakes. In winter they are widespread both on the coast and inland. Black-headed gull was recorded once during VP surveys. 64 individuals were recorded during I-WeBS efforts in 2023/2024 and 507 individuals were recorded during I-WeBS efforts in 2024/2025. As such, due to its conservation status and presence within the receiving environment, black-headed gull is considered as an IEF of **Local (High Value) Importance** requiring detailed consideration in the impact assessment.

Herring gull

Herring gull is an Amber-listed (BoCCI) species when breeding and wintering, with a decreasing short-term and long-term population in Ireland. They breed in colonies around the coast of Ireland and also inland in Co. Donegal and Co. Galway. In winter, they are widespread along the coast and inland. Herring gull was observed on 128 occasions during VP surveys. 115 individuals were recorded during I-WeBS efforts in 2023/2024, and 171 individuals were recorded during I-WeBS efforts in 2024/2025. One individual was recorded during CBS efforts. As such, due to its conservation status and presence within the receiving environment, herring gull is considered as an IEF of **Local (High Value) Importance** requiring detailed consideration in the impact assessment.

Lesser black-backed gull

Lesser black-backed gull is an Amber listed (BoCCI) species when breeding and wintering. They breed colonially, often with other gull species such as herring gull, favouring offshore islands, islands in inland lakes, sand dunes and coastal cliffs. In winter the species is found in a wide variety of habitats both inland and along the south and east coasts. Lesser black-backed gull was recorded on 210 occasions during VP surveys, with two individuals recorded during CBS winter efforts. 14 individuals were recorded during I-WeBS efforts in 2023/2024, and 71 individuals were recorded during I-WeBS efforts in 2024/2025. As such, due to its conservation status and presence within the receiving environment, and its sensitivity to wind farm developments (Thaxter *et al.*, 2019), lesser black-backed gull is considered as an IEF of **Local (High Value) Importance** requiring detailed consideration in the impact assessment.

8.7.4.5 PASSERINES

Goldcrest

Goldcrest is an Amber-listed (BoCCI) species due its European conservation status but has a stable population in Ireland. Goldcrest is common and widely distributed in Ireland, being closely associated with coniferous forestry. Although it was recorded onsite, it is not included for further consideration as an IEF due to the availability of suitable habitats within the wider landscape, and as the species is common and widespread in Ireland.

Grey wagtail

Grey wagtail is a Red-listed (BoCCI) species with a decreasing short-term population in Ireland. They breed mainly along streams and rivers, frequently building its nest under a bridge. In winter, they are generally sedentary, although some birds move to coastal areas, especially those where large amounts of seaweed have washed up. Grey wagtail was recorded once during I-WeBS, c.4 km east of the Proposed Development. Although it was recorded during I-WeBS, it is not included for further consideration as an IEF due to the availability of suitable habitats within the wider landscape and the absence of any records within the Proposed Development.

Starling

Starling is an Amber-listed (BoCCI) species due to its European conservation status but has a stable population in Ireland. Starling was recorded during CBS efforts and is common and widely distributed in Ireland. Although it was recorded on site, it is not included for further consideration as an IEF due to the availability of suitable habitats within the wider landscape and as the species is common and widespread in Ireland.

Willow warbler

Willow warbler is an Amber-listed (BoCCI) species due its European conservation status but has a stable population in Ireland. Willow warbler was recorded during CBS efforts and is common and widely distributed in Ireland. Although it was recorded on site, it is not included for further

consideration as an IEF due to the availability of suitable habitats within the wider landscape and as the species is common and widespread in Ireland.

8.7.4.6 OTHER BIRD SPECIES

Records of a total of 86 bird species were identified in the two relevant 10 km squares (R08 and R18) on the NBDC database. Although some of these species were recorded within the Proposed Development or in the hinterland of the Proposed Development, during the Countryside Bird Survey transects during the breeding and wintering season, and during the I-WeBS surveys, no bird species (other than those described above) potentially comprise features exceeding Local (Low Value) Importance. Other bird species are therefore not included for further consideration as IEFs based on the availability of suitable habitats within the wider landscape, and as these species are common and widespread throughout the country.

8.7.4.7 COLLISION RISK MODELLING

Detailed Collision Risk Modelling (CRM) has been undertaken in order to identify the potential effects of the Proposed Development on target bird species through collisions with new operational wind turbines. CRM was undertaken using field data collected during the VP surveys described in Appendix A08-03, and in accordance with the following good practice guidance:

- Recommended bird survey methods to inform impact assessment of onshore wind farms (SNH, 2017);
- Wind farms and birds: Calculating a theoretical collision risk assuming no avoiding action (SNH, 2000);
- Developing field and analytical methods to assess avian collision risk at wind farms (Band *et al*., 2007);
- Avoidance Rates for the onshore SNH Wind Farm Collision Risk Model (SNH, 2019); and
- Calculation of collision risk for birds passing through rotor area (Band, 2011).

Detailed methodologies adopted within CRM are provided in Appendix A08-08. The overall CRM output from the first two stages is the number of bird collisions per annum. This is the product of the number of transits through the rotors per season and the probability of a bird passing through the rotor swept area colliding with the blade.

It has been well documented that many bird species demonstrate avoidance of wind turbines (SNH, 2019; Band, 2024). This includes macro-avoidance, where birds avoid the whole wind farm area, as well as micro-avoidance, where birds fly within the wind farm but avoid the turbines and blades. The documented level of avoidance for different species varies (SNH, 2019). Published avoidance rates for the bird species being assessed in relation to the Proposed Development are provided in Appendix A08-08. Incorporation of these avoidance rates forms part of the stage of the CRM to determine collision risk for the species assessed.

Based on the selection process described in Appendix A08-03, the following bird species were subject to detailed CRM:

- Herring gull;
- Golden plover;
- Kestrel;
- Lesser black-backed gull;
- Snipe; and
- Sparrowhawk.

To ensure potential collision impacts are fully assessed, CRM was undertaken for the turbine model identified for the Proposed Development: the Vestas V-117 4MW. The outputs (i.e., predicted number of collisions for a particular bird species) were calculated. Species fatality estimates per year and over the operational lifespan of the Proposed Development (proposed as 30 years) are used to inform the assessment of collision effects detailed in Section 8.9).

8.7.4.8 FUTURE BASELINE (THE 'DO-NOTHING' SCENARIO)

The 'future baseline' (i.e., without-development scenario) describes the bird populations as they would be in the opening year/year of operation, in the absence of the Proposed Development. They are influenced by future developments and factors that have a high degree of uncertainty, such as future land management and climate change. Where information exists on planned future developments, this has been taken into consideration during the assessment. Planned future developments within the ZoI of the Proposed Development, which have been considered in the context of the future baseline and the assessment of cumulative effects, are detailed in Section 8.9.5.

Long-term climatic predictions suggest that warmer, wetter, winters and drier summers will become more frequent, with more extreme weather events likely. Combined with changes in land management, increased urbanisation and biotic pressures (e.g., changes in species interactions, manifesting through pressures such as predation and competition), climate change may lead to an increase in the national, regional and local populations and distributions of some bird species (e.g., certain migratory species) but a decrease in other species (Pearce-Higgins, 2021). However, such changes are unlikely to be material during the intervening period between the time when the field surveys were undertaken to inform this assessment (i.e., in 2022 to 2025) and the opening year of operation of the Proposed Development.

The survey data informing this baseline remain valid and current for the purposes of this EIAR, consistent with EPA (2022) and CIEEM (2024) guidance on data validity. There are no committed or forecasted changes in land management proposals within the Proposed Development that will likely materially alter the baseline conditions in the absence of the Proposed Development. It is therefore

considered that the future baseline will be relatively similar to the current baseline as described in this EIAR chapter, and the value of the ornithological features that are relevant to the Proposed Development will be consistent with that presented herein.

8.7.4.9 RECEIVING ENVIRONMENT (THE BASELINE + TRENDS)

It is assumed in this report that the baseline environment in relation to bird species, as described herein, will be the receiving environment at the time of construction. Ongoing trends identified, including those associated with planned future developments within the ZoI of the Proposed Development (as detailed in Section 8.9.5), are expected to be reflected during the period to construction and early operation of the Proposed Development.

8.7.5 PLANT SPECIES

No flora of conservation concern were recorded within the Proposed Development boundary during habitat surveys and other survey efforts (Appendix A08-02). Desk study results showed no mapping of plant species designated for conservation (Flora (Protection) Order (NPWS, 2022)).

8.7.6 INVERTEBRATES

8.7.6.1 SURVEY RESULTS AND IMPORTANCE

Marsh fritillary is the only Irish butterfly species listed under Annex II of the EU Habitats Directive. Marsh fritillary has a wide distribution across Ireland, but the distribution is patchy, and it is still considered overlooked in some parts of its range. Colonies can be found in a variety of habitats including calcareous grassland, degraded bogs, wet heath, transition mires and fens up to 300 m (Regan *et al*., 2010).

The desk study identified 123 marsh fritillary records in the OSI grid squares within which the Proposed Development is located, with the most recent record reported in 2018 (NBDC, 2025). Marsh fritillary is present, according to the Protected Habitats and Species Map viewer, c.1.5 km east of the Proposed Development.

Methods and results for marsh fritillary surveys undertaken in 2022 and 2023 are detailed in Appendix A08-07. No evidence of marsh fritillary presence was recorded during the larval web survey undertaken in 2022. However, suitable habitat was recorded including presence of the host plant, devil's-bit scabious (*Succisa pratensis*).

Considering the recent desk study records of marsh fritillary in the wider landscape, and the availability of suitable habitat, it is considered that marsh fritillary could occur within and adjacent to the Proposed Development (especially with regard to the future baseline, as described below). Given the conservation status of this species, any occurrence in Ireland outside a Natura 2000 network would be assessed as having **County Importance**.

8.7.6.2 FUTURE BASELINE (THE 'DO-NOTHING' SCENARIO)

The species is classified as vulnerable due to a population decline of ≥ 30% (A2c) in the Irish Red List for Butterflies (Regan *et al.*, 2010). Its conservation status is classified as least concern in a European context (Van Swaay *et al.,* 2010). The updated Atlas of Butterflies 2010-2021 provided an updated status from the Butterfly Monitoring Scheme that the population trend between 2008-2020 was unknown (Harding & Lysaght, 2025).

According to Ireland's most recent Article 17 report (NPWS, 2019c) as required under the EU Habitats Directive 92/43/EEC, the species was assessed as having an 'Inadequate' conservation status with an 'Improving' conservation trend. There has been spread into areas where there have not been previous records.

Given the trends presented above, a scenario in which this Proposed Development does not take place would result in a continuation of current trends relating to marsh fritillary, in line with the improvement cited above in respect of future prospects (i.e., marsh fritillary could potentially colonise the suitable habitat present within and adjacent to the Proposed Development).

8.7.6.3 RECEIVING ENVIRONMENT (THE BASELINE + TRENDS)

Given the time between the baseline surveys (2022-2023) and the anticipated commencement of the construction of the Proposed Development, and the future baseline described above, the Proposed Development could potentially support a population of marsh fritillary when construction commences. This has been taken into consideration in assessing marsh fritillary as an IEF of **County Importance** on a precautionary basis.

8.7.7 AMPHIBIANS AND REPTILES

8.7.7.1 SURVEY RESULTS AND IMPORTANCE

Targeted surveys for reptiles and amphibians were undertaken in accordance with relevant good practice guidance (ARC, 2021a/2021b), following initial walkover surveys undertaken in 2022. Amphibian surveys comprised a preliminary habitat suitability survey followed by nocturnal activity surveys, undertaken in 2024. eDNA analysis was also undertaken for water samples collected at Lough Keagh in 2022. Reptile surveys comprised of an artificial refuge survey undertaken in 2022. Detailed survey methods and timings are provided in Appendix 08-07. Accounts for relevant species are provided below.

8.7.7.2 COMMON FROG

Common frog is one of only three native amphibian species found in Ireland. In addition to protection under the Wildlife Act, common frog is listed on the Annex V of the Habitats Directive and on the Conservation of Natural Habitats of Wild Fauna and Flora (92/43/EEC).

The desk study identified 13 common frog records in the OSI grid squares within which the Proposed Development is located, most recently in 2023 (NBDC, 2025). Common frog was recorded in multiple

locations across the Proposed Development and associated survey area during the nocturnal activity surveys. Suitable habitat for common frog was also identified within and adjacent to the Proposed Development, including water bodies suitable for breeding, and terrestrial habitats (e.g., wet grassland) suitable for sheltering and foraging.

Based on the activity recorded, the suitability of habitats within and adjacent to the Proposed Development, and the conservation status of this species, common frog is included for further consideration as an IEF of **Local (High Value) Importance**.

8.7.7.3 SMOOTH NEWT

Smooth newt is the only native species of tailed amphibian found in Ireland. Smooth newt is protected in Ireland under Schedule 5 of the Wildlife Act.

The desk study identified one smooth newt record in the OSI grid squares within which the Proposed Development is located, from 2014 (NBDC, 2025). Smooth newt was recorded within the red line boundary of the Proposed Development during the field surveys (Appendix A08-07). Suitable habitat was identified present within and (with connectivity) adjacent to the Proposed Development, including water bodies suitable for breeding, and terrestrial habitats (e.g., wet grassland) suitable for sheltering and foraging. eDNA assessment identified smooth newt presence at Lough Keagh.

Based on the activity recorded, the suitability of habitats within and adjacent to the Proposed Development, and the conservation status of this species, smooth newt is included for further consideration as an IEF of **Local (High Value) Importance**.

8.7.7.4 COMMON LIZARD

Common lizard is Ireland's only native species of reptile and is protected under the Wildlife Act.

The desk study identified eight common lizard records in the OSI grid squares within which the Proposed Development is located, most recently in 2020 (NBDC, 2025). Common lizard was not recorded during the field surveys undertaken in 2022. However, suitable habitat was identified within and adjacent to the Proposed Development, with connectivity between suitable on- and off-site habitats.

Although no activity was recorded during the field surveys, considering the presence of recent desk study records from the surrounding area, the suitability of habitats within and adjacent to the Proposed Development, and the time that has elapsed since the surveys were undertaken (i.e., in 2022), common lizard is included for further consideration as an IEF of **Local (High Value) Importance** on a precautionary basis.

8.7.7.5 FUTURE BASELINE (THE 'DO-NOTHING' SCENARIO)

Common frog

Common frog is a widespread and very abundant species in Ireland. The number of adults (approximately) is derived from the national survey conducted in 2010/2011: population density was

calculated as 15-44 adult frogs/ha, extrapolating to a national population estimate of c.165 M (104-310 M) (NPWS, 2019b). It is found throughout the country, has a broad habitat niche and is adaptable to changes in land practices. The species has colonised garden ponds in urban areas and drainage ditches in agricultural areas. Common frog was assessed as having a 'Favourable' conservation status and 'Stable' trend within the National Frog survey of Ireland 2010/11 (NPWS, 2019b). Despite the losses of ponds and natural wetland habitats, throughout Ireland common frog has adapted to other breeding sites, in particular artificial field margin ditches which are common and widespread. On this basis, the availability of suitable habitat is considered to have remained stable over both the short term and the long term (NPWS, 2019b). Its conservation status is classified as Least Concern in a European, Irish and global context (King *et al.,* 2011).

Smooth newt

Smooth newt is widely distributed across Europe. They occur in still or slow-moving water, so the preservation of ponds, ditches and wetlands is essential to their survival. While smooth newts were scarce in agricultural landscapes, the IWT survey revealed that man-made habitats, particularly garden ponds and quarries, are now significant components of this species' habitat. Smooth newt has been recorded as common in most of Ireland (IWT, 2013). Although not technically in decline, it has particular habitat needs, and its full distribution is not currently known. No population estimate is available for the smooth newt, but it is thought to be stable. The national survey of smooth newts undertaken by the IWT in 2012 following a pilot study in 2010 found that the smooth newt remains relatively widespread throughout Ireland.

Although locally distributed, this species can be abundant where it occurs (King *et al.,* 2011). Smooth newt has a conservation status of Least Concern in a European, Irish and global context (King *et al.,* 2011).

Common lizard

Common lizard is widespread in Ireland, with recent records from all counties, bar Laois and Westmeath (Meehan, 2007). There are records from sea level to mountains (Farren *et al.,* 2010; Marnell, 2002). While there is no population estimate available for Ireland, there is also no evidence of a population decline.

8.7.7.6 RECEIVING ENVIRONMENT (THE BASELINE + TRENDS)

Given the short period between the baseline surveys (2024) and the anticipated construction and operation of the Proposed Development, and based on the trends identified above, it is considered likely that the baseline environment in relation to amphibians, as identified above, will be the receiving environment at the time of construction and into the operational phase of the Proposed Development.

Given the time between the baseline surveys (2022) and the anticipated commencement of the construction of the Proposed Development, the Proposed Development could potentially support a

population of common lizard when construction commences. This has been taken into consideration in assessing common lizard as an IEF of **Local (High Value) Importance** on a precautionary basis.

8.7.8 TERRESTRIAL MAMMALS

The principal habitats within and adjacent to the Proposed Development of relevance to terrestrial mammals include improved agricultural grassland (e.g., providing foraging habitat) and coniferous and deciduous forestry, hedgerows and scrub (e.g., providing sheltering and breeding habitat). There is also wet grassland/wet heath and peatland mosaic habitats which potentially support various mammal species.

8.7.8.1 SURVEY RESULTS AND IMPORTANCE

Mammal surveys were undertaken in 2022-2024, focusing on recording signs of mammal activity within and adjacent to the Proposed Development, e.g., well-used pathways, prints/tracks, scat/spraints/droppings, signs of feeding (e.g., foraged pinecones, badger snuffle holes), particularly in places offering shelter and features or areas likely to be of particular value as foraging resources (NRA, 2009b). Camera traps were also deployed throughout the wind farm site in November and December 2022. Detailed survey methods and timings are provided in Appendix A08-05. Accounts for relevant species are provided below.

8.7.8.2 OTTER

Otters are legally protected under the Wildlife Act and are listed on Annex II and IV of the EU Habitats Directive. The desk study identified four otter records in the OSI grid squares within which the Proposed Development is located, most recently in 2010 (NBDC, 2025). No observations of otter were recorded during targeted surveys of the Proposed Development. However, evidence of otter activity (e.g., spraint, prints) was recorded during aquatic surveys on the Derrymore River and the Ballinphonta River. Suitable otter habitat was identified within and adjacent to the Proposed Development, including water bodies suitable for foraging and commuting, and adjacent woodland and scrub suitable for sheltering. No SACs within the ZoI of the Proposed Development list otter as a QI.

Although no activity was recorded within the Proposed Development during the field surveys, considering the presence of desk study records and field survey observations within the surrounding area, the suitability of habitats within and adjacent to the Proposed Development, and the conservation status of this species, otter is included for further consideration as an IEF of **County Importance** on a precautionary basis.

8.7.8.3 BADGER

Badgers are legally protected under the Wildlife Act. The desk study identified 68 badger records in the OSI grid squares within which the Proposed Development is located, most recently in 2017 (NBDC, 2025). A tunnel system was recorded within 50 m of the Proposed Development during the field surveys (Appendix A08-05; ITM: 509811, 681195). Although suitable as a badger sett, no

evidence of badger was identified around the entrance or the immediate area. This tunnel system cannot therefore be ruled out as a badger sett but may be in use by fox or other mammals rather than badger. Evidence of badger activity recorded during the field surveys comprised evidence along the road providing access to the Proposed Development (Appendix A08-05; ITM: 510049, 681795), with no evidence recorded within the Proposed Development. Suitable foraging habitat in the form of grassland and arable fields was recorded within and adjacent to the Proposed Development, whilst scrub and woodland within and adjacent to the Proposed Development comprised suitable habitat for badger setts.

Although relatively low levels of badger activity were recorded during the field surveys (with no confirmed badger setts identified), considering the presence of recent desk study records from the surrounding area, the suitability of habitats within and adjacent to the Proposed Development, and the conservation status of this species, badger is included for further consideration as an IEF of **Local (High Value) Importance** on a precautionary basis.

8.7.8.4 PINE MARTEN

Pine martens are legally protected under the Wildlife Act. The desk study identified 13 pine marten records in the OSI grid squares within which the Proposed Development is located, most recently in 2020 (NBDC, 2025). No sightings or evidence of pine marten were recorded during the surveys of the Proposed Development. However, suitable habitat in the form of woodland was identified within and adjacent to the Proposed Development.

Although no activity was recorded during the field surveys, considering the presence of recent desk study records from the surrounding area, the suitability of habitats within and adjacent to the Proposed Development, and the conservation status of this species, pine marten is included for further consideration as an IEF of Local **(High Value) Importance** on a precautionary basis.

8.7.8.5 RED SQUIRREL

Red squirrels are legally protected under the Wildlife Act. The desk study identified one red squirrel record from 2022 in the OSI grid squares within which the Proposed Development is located (NBDC, 2025). No sightings or evidence of red squirrel were recorded during the surveys of the Proposed Development. However, suitable habitat in the form of woodland was identified within and adjacent to the Proposed Development.

Although no activity was recorded during the field surveys, considering the presence of recent desk study records from the surrounding area, the suitability of habitats within and adjacent to the Proposed Development, and the conservation status of this species, red squirrel is included for further consideration as an IEF of **Local (High Value) Importance** on a precautionary basis.

8.7.8.6 IRISH HARE

Irish hares are legally protected under the Wildlife Act. The ecological and cultural value of the Irish hare in Ireland gives it intrinsic value. This led to the formation of the Irish Hare All-Ireland Species

Action Plan in 2005 (NPWS & EHS, 2005), which aims to maintain and increase the area and quality of suitable Irish hare habitat (Reid *et al*., 2007).

The desk study identified 20 Irish hare records in the OSI grid squares within which the Proposed Development is located, most recently in 2022. Irish hares were recorded on five occasions during camera trap deployments in 2022-2023. Habitats such as grassland and heathland within and adjacent to the Proposed Development were identified as being suitable for this species.

Considering the presence of Irish hare within the Proposed Development, the suitability of habitats within and adjacent to the Proposed Development, and the conservation status of this species, Irish hare is included for further consideration as an IEF of **Local (High Value) Importance**.

8.7.8.7 FUTURE BASELINE (THE 'DO-NOTHING' SCENARIO)

Whilst available information on population trends for Irish mammal species is limited, the most recent 'Red List' (Marnell *et al.,* 2019) judged most of Ireland's terrestrial mammal species to be of 'least concern'. Accounts for mammal species identified as IEFs in relation to the Proposed Development are provided below.

Otter

Otter was previously assessed as Near Threatened in Ireland (Marnell *et al.,* 2019) based on a 20-25% decline between 1980 and 2005 (Bailey & Rochford, 2006). However, more recent data showing population recovery and widespread distribution justified the subsequent improved assessment of least concern (Reid *et al.,* 2013; NPWS, 2019). The most recent national survey indicated a full recovery and an adult population size in the order of 16-22,000 individuals (Reid *et al.,* 2013).

The most recent distribution data show that otters are widespread throughout Ireland in a wide variety of habitat types. The overall status of otter is considered to be Favourable (NPWS, 2019b). A total of 44 SACs have been designated for otter, comprising river channels, coastline habitats, lakes and blanket bog systems (NPWS, 2019b).

Badger

Badger was previously assessed as being of least concern in Ireland and has remained at this classification (Marnell *et al.,* 2019). Despite localised removals for tuberculosis management, badgers remain widespread in a broad range of habitats. Irish badgers have a stable population, estimated in Northern Ireland as 33,500 (Reid *et al.,* 2008) and in the Republic of Ireland as 84,000 (Sleeman *et al.,* 2009).

Pine Marten

Pine marten was previously assessed as least concern (Marnell *et al.*, 2019). Expert opinion and survey data from 2005-07 (O'Mahony *et al.*, 2012), 2012 (Lawton *et al.*, 2020) and 2010-2015 (O'Mahony, 2016) confirms a range expansion and continued status of least concern.

The species was formerly widespread in Ireland but declined in the 17th century with the deforestation of the country. Pine martens declined further in the 19th and early 20th centuries due to persecution by gamekeepers and trappers. However, the species is now undergoing a phase of re-colonisation. It has greatly increased its range in recent decades and, although its population is still low, it is rising. The species' resurgence is largely attributed to the banning of strychnine and other poisons, the legal protection afforded to the species since 1976 under the Wildlife Act, and the steady increase in afforestation. There is ample habitat available across the country to allow pine marten to continue its spread and to enable further population growth. While some threats have been identified, none of them are considered sufficiently serious to undermine the continued recovery of the species. Therefore, the overall status of pine marten is assessed as Favourable, unchanged since the previous reporting period (NPWS, 2019c).

Red squirrel

Red squirrel was previously assessed as 'near threatened' due to a 20% decline in range in Ireland since the introduction of the grey squirrel (*Sciurus carolinensis*) (Marnell *et al.*, 2009). However, recent surveys have shown red squirrel has expanded its range once again in the midlands of Ireland, following the decline of grey squirrels in those areas (Lawton *et al.*, 2020). This recovery, plus the overall widespread distribution across the island of Ireland, justify a change of status to least concern.

The population of red squirrel was previously estimated at 40,000 individuals (NPWS & EHS, 2008). The current figure may be higher in accordance with the recent range expansion (NPWS, 2019c).

Irish hare

Comprehensive distribution and abundance data is not available for this species. Irish hare was previously assessed as least concern (Marnell *et al.,* 2019). Its widespread distribution and large population justify retention of this assessment.

The range for this species covers nearly the entire landmass of Ireland including some offshore islands. Despite natural inter-annual fluctuations in population density, the species is widespread and locally abundant. The overall status of Irish hare is Favourable (NPWS, 2019).

These national and regional trends indicate that, in the absence of the Proposed Development, populations of otter, badger, pine marten, red squirrel and Irish hare are expected to remain stable or increase within the receiving environment of the Proposed Development.

8.7.8.8 RECEIVING ENVIRONMENT (THE BASELINE + TRENDS)

Given the period between the baseline surveys (2022-2024) and the anticipated construction and operation of the Proposed Development, and based on the trends identified above, it is considered likely that the baseline environment in relation to the terrestrial mammal species identified above represents the receiving environment at the time of construction and into the operational phase of the Proposed Development. However, based on these trends and the suitability of habitats within

and adjacent to the Proposed Development, it is possible that the level of activity by certain species will increase, and that the Proposed Development may be colonised by otter, pine marten and red squirrel; albeit not to a disproportionate level compared with population changes across Ireland such that feature importance potentially exceeds that assessed herein. It is on this precautionary basis that otter, pine marten and red squirrel, together with badger and Irish hare, are included for further consideration as IEFs of **Local (High Value) Importance**.

8.7.9 BATS

Detailed bat surveys were undertaken in 2022-2024, as described in Appendix A08-04. To facilitate the evaluation of collision risk to the various bat species as a result of the Proposed Development, an overview of the typical flight behaviour of each bat species recorded at the Proposed Development is provided in Table 8-13. The abundance and sensitivity to collision of each bat species is also provided. The sensitivity to collision of each species is categorised based on physical and behavioural characteristics (SNH, 2019)

Table 8-13: Abundance and typical flight behaviour of relevant bat species in Ireland

Bat species	Abundance (Roche & Langton, 2024)	Flight behaviour	Sensitivity to collision
Common pipistrelle (*Pipistrellus pipistrellus*)	Most common and widely distributed	Rapid, twisting flight generally within 10 to 15 m of foliage.	**High**
Soprano pipistrelle (*Pipistrellus pygmaeus*)	Common and widely distributed	Rapid, twisting flight generally within 10 to 15 m of foliage.	**High**
Leisler's bat (*Nyctalus leisleri*)	Common and widely distributed	Relatively high-flying species of open habitats. Potentially within rotor sweep zone.	**High**
Nathusius's pipistrelle (*Pipistrellus nathusii*)	Less common and more localised	Forages over water and along forest tracks.	**High**
Brown long-eared bat (*Plecotus auritus*)	Common and widely distributed	Forage in woodland flying amongst the foliage, picking moths and other insects off leaves.	**Low**
Daubenton's bat (*Myotis daubentonii*)	Common and widely distributed	Strongly associated within watercourses; low, level flight a few centimetres above the surface of the water.	**Low**

Bat species	Abundance (Roche & Langton, 2024)	Flight behaviour	Sensitivity to collision
Natterer's bat (*Myotis nattereri*)	Less common and more localised	Low flying species within 10 to 15 m of foliage forages along woodland, mature hedgerow and pastureland.	**Low**
Unidentified myotis *(Myotis* species)[4]	-	Low flying species within 10 to 15 m of foliage forages along woodland, mature hedgerow and pastureland. Varying heights across species specific niches.	**Low**
Lesser horseshoe bat (*Rhinolophus hipposideros*)	Rare: Key populations in Co. Clare, Limerick and Kerry	Flying well below 10 m along linear features. Highly sensitive to light and artificial disturbances.	**Low**

8.7.9.1 SURVEY RESULTS AND IMPORTANCE

The methods and timings of bat surveys undertaken in 2022-2024 to inform the Proposed Development are detailed in Appendix A08-04. Surveys of the turbine locations within the Proposed Development site were undertaken using automated Anabat Express bat detectors, providing an accurate representation of bat species present and their activity during their most active periods. Transect surveys were also carried out to determine usage of the Proposed Development by bat species.

The results of the bat activity surveys indicate that the area of the Proposed Development is used regularly (High Activity [>50 passes per night]) by common pipistrelle, soprano pipistrelle, Leisler's bat, and *Myotis* species. Lesser horseshoe bat, an Annex II species, was recorded during bat activity surveys at negligible levels (i.e., one lesser horseshoe bat on a single occasion). A bespoke system to compare levels of bat activity was adopted for this assessment, based on professional judgement and peer reviewed research (Mathews *et al*., 2016). Further details are provided in Appendix A08-04.

Due to the frequency of records within and adjacent to the Proposed Development, and the conservation statuses of these species, common pipistrelle, soprano pipistrelle, Leisler's bat, brown long-eared bat, and *Myotis* species (including Natterer's bat, Daubenton's bat and potentially other *Myotis* species) are included for further consideration as IEFs of **Local (High Value) Importance**. Although only occurring at very low levels during the surveys, lesser horseshoe bat is also scoped in for further assessment due to its conservation status.

[4] Due to similarities in their calls, distributions and habitat preferences, it is not always possible to conclusively identify observations of bats belonging to the genus *Myotis* to species level. Such observations from the field surveys undertaken to inform the Proposed Development are therefore referred to as observations of unidentified *Myotis* species on a precautionary basis.

8.7.9.2 FUTURE BASELINE (THE 'DO-NOTHING' SCENARIO)

The 'future baseline' (i.e., without development scenario) describes the relevant bat species as they would be in the opening year/year of operation, in the absence of the Proposed Development. They are influenced by future developments and factors that have a high degree of uncertainty, such as future land management and climate change. Where information exists on planned future developments, this has been taken into consideration during the assessment.

Long-term climatic predictions suggest that warmer, wetter, winters and drier summers will become more frequent, with more extreme weather events likely. Combined with changes in land management, increased urbanisation and increased biotic pressures, climate change may lead to an increase in the national, regional and local populations and distributions of some bat species but a decrease in other species. However, such changes are unlikely to be material during the intervening period between the time when the field surveys were undertaken to inform this assessment (2022-2024) and the opening year of operation of the Proposed Development.

There are no committed or forecasted changes in land management proposals within the Proposed Development that will likely materially alter the baseline conditions in the absence of the Proposed Development. It is therefore assumed that the future baseline will, in general, be relatively similar to the current baseline, and the value of the IEFs (common pipistrelle, soprano pipistrelle, brown long-eared bat, Leisler's bat, *Myotis* species and lesser horseshoe bat) that are relevant to the Proposed Development will be consistent with that of the existing baseline conditions described.

8.7.9.3 DATA VALIDITY

A full suite of surveys was conducted in 2022 of the Proposed Development and in 2024 for the area around Turbine 4 due to design changes. Based on the CIEEM Advice Note on the Lifespan of Ecological Reports & Surveys (CIEEM, 2019), the majority of the bat data was collected in 2022 which is considered at the maximum age for data validity. Although there may have been some changes to the bat baseline, no significant changes to habitat type have occurred. As a result, the survey data are considered valid to inform the impact assessment of the turbines on bat populations.

8.7.9.4 RECEIVING ENVIRONMENT (THE BASELINE + TRENDS)

As the conservation status of all Irish bat species is considered to be stable, it is expected that the baseline levels of bat activity will not change significantly by the time of construction of the Proposed Development.

8.7.10 INVASIVE ALIEN SPECIES

The desk study yielded records of various high impact invasive species (Flora: Japanese knotweed, rhododendron, Himalayan knotweed, Spanish bluebell (*Hyacinthoides hispanica*), wireweed (*Sargassum muticum*), giant knotweed (*Fallopia sachalinensis*), Brazilian giant-rhubarb (*Gunnera manicata*); Fauna: fallow deer (*Dama dama*), raccoon (*Procyon lotor*), feral greylag goose (*Anser anser*), and zebra mussel (*Dreissena polymorpha*)).

No invasive plant species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations (S.I. 477 of 2011) were recorded during habitat surveys within the Proposed Development. However, invasive plant species were recorded during the aquatic surveys (Appendix A08-06, Section 8.7.10). These included Himalayan knotweed (*Persicaria wallichii*) and Himalayan balsam (*Impatiens glandulifera*) on the Kilcronan Stream and along the Illaunbaun respectively. The non-native terrestrial plant montbretia (*Crocosmia x crocosmiiflora*) was recorded from sites on the Glendine River, Drumbaun River and the Ballinphonta River. *Cotoneaster* sp. was also observed along an unnamed stream. None of these records overlap with the Proposed Development. Only one location (Ballinphonta River) with the montbretia is downstream of the Proposed Development hydrological pathway (Appendix A08-06).

Invasive alien plant species are therefore **included as an IEF** for further consideration of potential effects in connection with the Proposed Development.

No invasive non-native mammal species listed as a high impact species under the S.I. 477 or S.I. 374 legislation were recorded within the Proposed Development. Based on the lack of observations within the Proposed Development, and the anticipated risk of adverse effects associated with the Proposed Development, invasive alien animal species are not included as an IEF for further consideration of potential effects in connection with the Proposed Development.

8.7.11 AQUATIC ECOLOGY

8.7.11.1 WATER QUALITY

Relevant water quality data for the watercourses in the context of the Proposed Development are described below, with detailed survey methods and results provided in Appendix A08-06.

Glendine River

Two contemporary EPA biological monitoring stations were located on the Glendine River. The river achieved Q4 (good status) at Knockloskeraun Bridge (station RS28G020200, survey site C6) in 2021. In the tidal reaches, the river achieved Q3-4 (poor status) (brackish) at station RS28A030900 in 2021 at the N67 road crossing.

The freshwater reaches of Glendine River (Glendine (Clare)_010 river waterbody) achieved poor status in the 2013-2018 period and was considered 'at risk' of not achieving target good status water quality. The primary risk to water quality within the Annagh (Clare)_SC_010 sub-catchment is siltation (from forestry) and wastewater discharge (EPA, 2019a).

Lough Keagh

Lough Keagh achieved moderate status in the 2013-2018 period and was considered 'at risk' of not achieving target good status water quality. The primary risk to water quality within Lough Keagh is coniferous afforestation (EPA, 2019b).

8.7.11.2 FISH STOCK ASSESSMENT (ELECTRO-FISHING)

A catchment-wide electro-fishing survey of 21 sites in the vicinity of the Proposed Development was conducted in August 2022, following notification to Inland Fisheries Ireland and under DECC licence. The results of the survey are discussed below in terms of fish population structure, population size and the suitability and value of the surveyed areas as nursery and spawning habitat for salmonids, eel and lamprey species. A full description of the survey methods and results is presented in Appendix A08-06.

The watercourses in the vicinity of the Proposed Development were typically small, higher-gradient, upland spate channels draining upland areas of peatland. They supported a low diversity of fish species at generally low abundances. Such watercourses are typically unproductive in terms of fish (Wood & Budy, 2009; O'Grady, 2006; Amiro, 1993). Over half of the survey sites did not support fish at the time of survey. These survey sites provided poor quality habitat for salmonids, European eel and other fish species given their diminutive nature, historical modifications, siltation pressures, low or intermittent flows and/or high natural gradients (representing instream barriers) which precluded resident fish from accessing the upper reaches of some watercourses (e.g., Derrymore River).

However, a total of nine survey sites supported brown trout (*Salmo trutta*) at the time of survey, namely sites on the Illaunbaun Stream (A6), Fahanlunaghta Beg Stream (A8), Derrymore River (A9, A10), Glendine River (B1), Drumbaun River (C4) and Ballinphonta River (C2, C5 & C6). As would be expected for higher-gradient, spate systems, better quality salmonid habitat was largely confined to the lower reaches of watercourses such as the Derrymore River, Glendine River and Ballinphonta River. These sites also supported higher salmonid densities. Due to the widespread presence of this species surrounding the Proposed Development, brown trout is included for further consideration as an IEF of **Local (High Value) Importance**.

Despite some good habitat suitability in the Derrymore River and Ballinphonta River, and their known distribution within the Glendine River (Kelly *et al*., 2010, 2014; IFI 2020 data), no Atlantic salmon were recorded during the electro-fishing surveys. However, eDNA samples collected and analysed in August 2022 detected Atlantic salmon in both the Derrymore River (site A10) and Ballinphonta River (C6) (Appendix A08-06). Due to their presence in surrounding area, their recorded presence from eDNA analysis and the presence of suitable habitat in some of the surrounding watercourses, Atlantic salmon is included for further consideration as an IEF of **Local (High Value) Importance**.

No lamprey were recorded during the electro-fishing surveys and habitat suitability was poor or absent throughout the watercourses surveyed. This reflected the upland, higher-energy, spate nature of the watercourses which reduces the extent of fine gravels required for spawning (Dawson *et al*., 2015; Rooney *et al*., 2013; Lasne *et al*., 2010) and discourages the deposition of fine, organic-rich sediment ≥5 cm in depth generally required by larval *Lampetra* spp. (Aronsuu & Virkkala, 2014; Goodwin *et al*., 2008; Gardiner, 2003). Peat-dominated substrata (i.e., humic deposits), such as

those typically found in the vicinity of the Proposed Development, do not provide suitable burial/burrowing habitat complexity or structure for larvae (ammocoetes) given their invariably fine and flocculent nature (pers. obs.). Although located near the sea, the lower reaches of the Glendine River and Ballinphonta River were not suitable for anadromous sea lamprey or river lamprey (*Lampetra fluviatilis*) given poor fluvial accessibility due to instream barriers and natural gradients. Due to these constraints to the presence of lamprey species, they are not included for further consideration as an IEF.

On both a global and Irish scale, the European eel is listed as 'critically endangered' (Pike *et al*., 2020; King *et al.,* 2011). European eels were recorded at a total of seven sites during the electro-fishing surveys (i.e., sites A10, B5, C1, C2, C4, C5 & C6). Eels were typically present in very low numbers, although sites B5 and C6 on the lower reaches of the Glendine River and Ballinphonta River respectively supported significantly higher numbers of adult and, in particular, juvenile eel (elvers). This spatial abundance pattern is typically seen in European eel (Degerman *et al*., 2019; Moriarty, 2003). Due to the widespread recorded presence of eel surrounding the Proposed Development and the presence of suitable habitat, European eel is included for further consideration as an IEF of **Local (High Value) Importance**.

8.7.11.3 OTHER AQUATIC HABITATS AND SPECIES

No rare or protected macro-invertebrate species (according to national red lists) were recorded in the biological water quality samples taken from 21 rivers and watercourses sites and a single lake site in August 2022 (Appendix A08-06, Annex A). None of the survey sites achieved target good status (≥Q4) requirements of the European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 and the Water Framework Directive (2000/60/EC). The majority of survey sites achieved **≤Q3 (poor status)** in August 2022 (see Annex A). Eutrophication originating from coniferous afforestation (EPA 2019a, 2019b) and siltation (via peat escapement) are known to be the major pressures within the survey area and this was supported by observations made during the aquatic surveys.

No freshwater pearl mussel or white-clawed crayfish eDNA was detected in the Derrymore, Ballinphonta or Glendine River samples collected in August 2022, in keeping with the known distributions of these species in the west Clare area. However, low levels of crayfish plague eDNA were detected in the Derrymore River (A10) (previously unrecorded in the catchment).

The surveyed watercourses in the vicinity of the Proposed Development were typically small, higher-gradient, upland spate channels draining areas of peatland and afforestation. They supported a low diversity of fish and macro-invertebrate species, generally low fish abundances and biological water quality of ≤Q3-4 (moderate status). Over half of the survey sites were evaluated as **Local (Low Value) Importance** in terms of their aquatic ecology.

8.7.11.4 FUTURE BASELINE (THE 'DO-NOTHING' SCENARIO)

The 'future baseline' (i.e., without development scenario) describes the aquatic habitats, macro-invertebrate and fish populations as they would be at the commencement of operation, in the absence of the Proposed Development. They are influenced by future developments and factors that have a high degree of uncertainty, such as future land and water resource management and climate change.

Long-term climatic predictions suggest that warmer, wetter, winters and drier summers will become more frequent, with more extreme weather events likely. Combined with changes in land and water resource management, climate change could impact fish populations. However, such changes are unlikely to be material during the intervening period between the time when the field surveys were undertaken to inform this assessment and the opening year of operation.

8.7.12 SUMMARY

Table 8-14 summarises which features were identified for consideration as IEFs and the results of this consideration.

Table 8-14: Assessment of biodiversity feature importance and identification of IEFS

Ecological feature	Importance	IEF
Habitats (Marsh, Wet Grassland, Wet Heath, Upland Blanket bog, Cutover bog, Treeline, Hedgerow)	Local (High Value)	**Yes**
Lough Keagh [IE_SH_28_64] (L1)	County	**Yes**
Small Artificial Lake	County	**Yes**
Illaunbaun stream [28I03] (A6)	Local (High Value)	**Yes**
Derrymore river [28D03] (A9, A10)	Local (High Value)	**Yes**
Glendine river [28G02] (B5)	Local (High Value)	**Yes**
Drumbaun 28 river [28D20] (C4)	Local (High Value)	**Yes**
Ballinphonta river [28B03] (C1, C2, C5, C6)	Local (High Value)	**Yes**
Other habitats	Local (Low Value) or lower	No
Hen harrier	International	**Yes**
Merlin	Local (High Value)	**Yes**
Kestrel	Local (High Value)	**Yes**
Peregrine	Local (High Value)	**Yes**
Barn owl	Local (Low Value)	No

Ecological feature	Importance	IEF
Buzzard	Local (Low Value)	No
Sparrowhawk	Local (Low Value)	No
Curlew	Local (High Value)	**Yes**
Golden plover	Local (High Value)	**Yes**
Greenshank	Local (High Value)	**Yes**
Oystercatcher	Local (High Value)	**Yes**
Redshank	Local (High Value)	**Yes**
Ringed plover	County	**Yes**
Snipe	Local (High Value)	**Yes**
Turnstone	Local (Low Value)	No
Woodcock	Local (High Value)	**Yes**
Black-headed gull	Local (High Value)	**Yes**
Common gull	Local (High Value)	**Yes**
Great black-backed gull	Local (High Value)	**Yes**
Herring gull	Local (High Value)	**Yes**
Lesser black-backed gull	Local (High Value)	**Yes**
Brent goose	Local (High Value)	**Yes**
Cormorant	County	**Yes**
Gadwall	Local (High Value)	**Yes**
Little grebe	Local (High Value)	**Yes**
Mallard	Local (High Value)	**Yes**
Teal	Local (High Value)	**Yes**
Tufted Duck	Local (High Value)	**Yes**
Whooper swan	Local (High Value)	**Yes**
Wigeon	Local (High Value)	**Yes**
Passerines (e.g., grey wagtail, starling, willow warbler, grey wagtail)	Local (Low Value) or lower	No
Plant species	Local (Low Value) or lower	No
Invasive non-native plant species	N/A	**Yes***
Invasive non-native animal species	N/A	No

Ecological feature	Importance	IEF
Marsh fritillary	County	**Yes**
Amphibians and reptiles	Local (High Value)	**Yes**
Otter	County	**Yes**
Badger	Local (High Value)	**Yes**
Pine marten	Local (High Value)	**Yes**
Red squirrel	Local (High Value)	**Yes**
Irish hare	Local (High Value)	**Yes**
Lesser horseshoe bat	County	**Yes**
Other bat species	Local (High Value)	**Yes**
Aquatic species (Atlantic salmon, brown trout, European eel)	Local (High Value)	**Yes**
* Included as an IEF for the purposes of impact assessment and mitigation planning, reflecting legal and best practice obligations to prevent the introduction and spread of invasive non-native species within and adjacent to the Proposed Development.		

8.8 MITIGATION BY DESIGN

From the early design stages of the Proposed Development, an iterative process of a constraints-led design was employed, whereby ecological information was incorporated into the design process to avoid impacting potential IEFs (Table 8-14) where possible. The Proposed Development design has incorporated the following embedded mitigation measures to minimise the potential for significant effects on identified IEFs. Further information is provided in EIAR Chapter 4 – Consideration of Alternatives.

8.8.1 CONSTRUCTION METHODS

Good practice construction measures will be adopted to minimise potential construction and operation impacts on IEFs. These are detailed within the Outline Construction & Management Plan (oCEMP) and include measures to minimise working areas to avoid unnecessary habitat removal/alteration and disturbance, and measures to avoid/minimise the generation of additional noise, dust, light spill and vibration. In particular, removal of trees and dense vegetation such as hedgerows and scrub will be avoided wherever possible. oCEMP also includes measures to avoid pollution of waterbodies within and adjacent to the Proposed Development.

Measures described within the oCEMP to be implemented during the construction and operation stages of the Proposed Development, include:

- All plant and machinery will comply with specific noise legislation (Construction Plant and Equipment Permissible Noise Levels (Amendment) Regulations, 1996) and will be turned off when not in use;
- No removal of habitats or movement of construction machinery will occur outside of works areas during the construction stage, with the works footprint clearly marked;
- Retained trees and hedgerows will be protected in line with current guidance and on the advice of an appointed arboriculturist (NRA, 2006). Protection barriers will be installed around the root protection zones of retained trees and hedgerows. Where essential works are required within root protection zones, ground protection (e.g., cellweb membrane) will be installed (in consultation with a qualified arboriculturist) to minimise the risk of root damage;
- Works will avoid the use of artificial lighting in habitats (i.e., rough grassland, hedgerows, woodland) used by potentially sensitive nocturnal species such as bats wherever possible. Artificial lighting will be directed away from any sensitive habitats and/or features, or barriers preventing light spill onto such habitats/features will be installed where feasible and appropriate. Lighting during construction and operation will be designed in accordance with good practice guidance, such as Bat Conservation Trust (2023) guidance;
- Construction materials will be stored and stockpiled according to the strategies set out within outline Construction & Environment Management Plan. All edible and putrescible waste will be stored and disposed of in an appropriate and timely manner; and
- Excavations will be covered at night to prevent wildlife from getting trapped. If this is not possible, a method of egress such as a ladder will be provided.

In particular, embedded construction mitigation measures include the following measures to avoid impacts on aquatic habitats and species:

- Light spill onto watercourses will be avoided;
- Measures will be implemented to maintain a buffer of at least 15 m from minor watercourses and land drains (except where they are crossed by tracks or, in the case of minor land drains, where a lesser buffer is applied or where the drain is re-directed); and
- Excavated soil (e.g., from access road construction) will be reused on-site for berms, landscaping, and along road margins. Berms will be placed away from interceptor drains to avoid flow obstruction or siltation risk. Constructed drainage systems will manage runoff from various areas, reducing potential silt runoff during construction and operation. The Proposed Development will implement a Sustainable Drainage System (SuDS) with on-site flow retention, buffer zones, and silt removal techniques to promote environmentally responsible water management.

8.8.2 OPERATIONAL METHODS

Good practice measures described in relation to construction methods will also be adopted during operational maintenance. Specifically, operational maintenance (e.g., vegetation clearance to facilitate the continued functioning of access routes and essential infrastructure) will minimise the removal of suitable habitat and use existing access routes where possible. Good practice methods will be adopted to minimise the potential for disturbance (e.g., to minimise generation of additional noise, dust, light and vibration). Impacts on active bird nests will be avoided by undertaking any required vegetation maintenance in accordance with the methods described below (i.e., by timing works outside the peak bird breeding season, and accompanying works with ecological supervision where necessary).

Operational maintenance works will include measures to prevent any pollution from fuels, turbine fluids and silty water (e.g., from vehicle movements to facilitate operation, and from any turbine maintenance works which may be required) through the appropriate use of silt fences, cut-off drains and silt traps. Any pollution incidents will be reported immediately to the site manager and other external agencies as necessary. Any environmental incidents will be followed by appropriate remedial measures in consultation with relevant external agencies.

The Proposed Development includes embedded mitigation to minimise the risk of collisions and baropressure effects with regard to bats; notably by clearing linear tree/hedgerow features within 62 m, and forestry features within 90 m of turbine blade tips, to make habitats in the vicinity of operational turbines unfavourable for bats and thus discourage them from flying through/in close proximity to turbines

8.8.3 TIMING OF WORKS

To minimise the potential for impacts on IEFs, removal or alteration of suitable breeding habitat (e.g., dense vegetation, trees, rough grassland) and foraging habitat for breeding birds, reptiles and amphibians, mammals and other species will, wherever practicable, be undertaken outside of the most sensitive times of year; notably the peak breeding season for birds (i.e., outside of the period March 1st to August 31st inclusive, which will also cover sensitive periods for many other IEFs). Similarly, works with the potential to cause significant disturbance of sensitive breeding birds (e.g., through the generation of noise, dust, vibration and/or light spill, or through increased human activity) will also be undertaken outside of the peak breeding season where possible. Whilst undertaking works in late September to early February inclusive minimises the likelihood of effects on breeding birds, certain bird species may still nest during this period.

Although the majority of IEFs are more susceptible to works during this period, undertaking works at other times of year will be considered where appropriate (e.g., for sensitive wintering features such as the potential presence of hen harrier winter roosts, or wintering waterbirds using the lake).

If suitable nesting habitat needs to be removed or altered during the peak breeding season, or potentially disturbing works need to be undertaken in close proximity to the suitable nesting habitat during the peak breeding season, the works will be preceded by a nesting bird check during which a suitably experienced ornithologist will check the affected habitat for any active nests. This check will be undertaken within 48 hours prior to the commencement of the works.

If an active nest is encountered, an exclusion zone will be established within which works will be suspended until the nest is no longer active (to be confirmed by a suitably experienced ornithologist through ongoing nest monitoring). The size of the exclusion zone will be dependent on the species affected, the likely level of disturbance caused by the works relative to baseline disturbance levels on site, and the extent to which the nest site is screened from disturbance (e.g., by adjacent dense vegetation). Exclusion zones may range from 10 m (e.g., for common and widespread passerines) to several hundred metres (e.g., for raptors such as hen harrier and peregrine), with the size of the exclusion zone to be determined by the supervising experienced ornithologist in accordance with good practice guidance (e.g., Goodship & Furness, 2022).

8.8.4 ECOLOGICAL CLERK OF WORKS

Prior to works commencement, an Ecological Clerk of Works (ECoW) will be appointed to address issues relating to ecological features. Their responsibilities will include (but not be limited to):

- Oversee the management of ecological issues during the construction period and advise on ecological issues as they arise;
- Inform and educate site personnel of sensitive ecological features relevant to the Proposed Development and how impacts on IEFs could occur;
- Undertake pre-construction walkover surveys to identify any ecological features which may be affected by works; protected species (e.g., otter, badger, bats) and to include nesting bird checks of any suitable breeding habitat to be removed or subject to significant disturbance during mid-February to early September;
- Provide guidance to contractors to ensure legal compliance with respect to protected species on site; and
- Liaise with officers from consenting authorities and other relevant bodies and contractors with regular updates in relation to construction progress.

8.9 ASSESSMENT OF EFFECTS

8.9.1 ASSESSMENT SCOPE

Potential impacts on ecological features from the Proposed Development during its construction and operational phases are described in this section. The potential for impacts to adversely affect the identified IEFs is assessed in accordance with the process described in Section 8.6.2. This assessment

takes into consideration embedded mitigation within the Proposed Development design as described in Section 8.8. Where embedded mitigation measures are insufficient to avoid potentially significant effects on IEFs, further (i.e., secondary) mitigation measures will be required, as described in Section 8.8.

The assessment of effects is structured as follows:

- Assessment of effects in relation to designated sites of nature conservation interest;
- Assessment of effects in relation to IEFs (i.e., habitats and species); and,
- Assessment of potential effects in combination with other projects (i.e., cumulative assessments).

8.9.2 ASSESSMENT OF EFFECTS ON DESIGNATED SITES

8.9.2.1 NATURA IMPACT STATEMENT

In accordance with best practice guidance, and in compliance with Article 6(3) of the Habitats Directive, this EIAR is accompanied by a separate Screening for Appropriate Assessment Report.

As per EPA guidance, 'a biodiversity section of an EIAR should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement' but should 'incorporate their key findings as available and appropriate'. As such, this section provides a summary of the key assessment findings regarding relevant European sites with features of ecological interest.

Relevant European sites within the potential ZoI (i.e., 15 km) were initially screened for connectivity with the Proposed Development site. Connectivity with each European site was evaluated using a conceptual site model which identifies potential impact source-pathways between the Proposed Development site and the European site. The conceptual model (based on source-pathway-receptor connectivity) is a standard tool used in environmental assessment. In order for an effect to be likely, all three elements (source, pathway, and receptor) of this mechanism must be in place. All phases of the Proposed Development (i.e., construction, operation and decommissioning) were considered.

All European Sites were screened out from requiring further assessment owing to a lack of ecological connectivity between the sites and the Proposed Development, and therefore it is not considered that a Natura Impact Statement is required for the wind farm element of the Proposed Development.

8.9.2.2 WEST CLARE UPLANDS IBA

West Clare Uplands IBA is located approximately 3.5 km south of the Proposed Development red line boundary. This designated site is identified as being of importance for hen harrier, supporting a population of 12-18 breeding pairs in 2009 (BirdLife International, 2025). Hen harrier ranges can be up to 10 km from roosting sites, whilst good practice guidance cites a typical core foraging range of 2 km and maximum core foraging range of 10 km from the nest site during the breeding season (SNH,

2016). As such, hen harriers using the Proposed Development and adjacent land potentially belong to the population for which West Clare Uplands IBA is designated (albeit outside of typical core foraging ranges).

Hen harrier was recorded within and adjacent to the Proposed Development during detailed surveys undertaken during the wintering and breeding seasons. This comprised foraging activity and flights through (i.e., for commuting/dispersal), within and adjacent to the Proposed Development during the wintering and breeding seasons, with activity by at least one female and three males recorded. Activity was greatest in wet heath and wet grassland towards the south of the Proposed Development, with scattered activity elsewhere throughout the Proposed Development. Considering the level and type of hen harrier activity recorded, and the proximity to West Clare Uplands IBA, the Proposed Development is potentially within the foraging range (albeit outside of the core foraging range) of hen harriers breeding within the IBA and may be used as a foraging resource by breeding and wintering harriers as they disperse from the IBA. Therefore, impacts on hen harriers using the Proposed Development and adjacent land could potentially affect West Clare Uplands IBA.

Potential construction and operation effects on hen harriers are assessed in Section 8.8. Considering the distance between the Proposed Development and the IBA (i.e., with the Proposed Development lying outside of the core foraging ranges of hen harriers using the IBA), and the limited extent of suitable hen harrier habitat to be lost and/or fragmented during the construction phase (as stated in Table 8-16), habitat loss and fragmentation during the construction phase of the Proposed Development is **not considered to potentially have an adverse effect** on the integrity of West Clare Uplands IBA by significantly affecting its hen harrier population. Similarly, considering the distance between the Proposed Development and the IBA, the level of hen harrier activity recorded, and the proposed construction works (which incorporate the embedded mitigation measures specified in Section 8.8), disturbance and displacement during the construction phase of the Proposed Development is **not considered to potentially have an adverse effect** on the integrity of West Clare Uplands IBA by significantly affecting its hen harrier population.

8.9.3 CONSTRUCTION PHASE EFFECTS

The assessment of effects on IEFs during the construction of the Proposed Development is described below and summarised in Table 8-17, in accordance with the effect terminology described in Section 8.6.2. Potential effects identified during the construction phase of the Proposed Development are as follows:

- **Direct habitat loss and fragmentation**: permanent and temporary reductions to the extent, quality, and connectivity of the habitats present on site as a result of construction of access roads, turbines, substation buildings and other infrastructure;
- **Disturbance and displacement**: disturbance of protected and otherwise noteworthy species from additional noise, dust, light, vibration, and human activity, with the possibility of causing displacement;

- **Direct mortality of individuals**: fatalities or injuries to sensitive species caused by construction activities; and,
- **Pollution of habitats**: through construction-related activities such as pollutant sedimentation and the use, assembly and storage of machines and materials (risk of chemical and fuel spills); particularly regarding aquatic habitats.

8.9.3.1 HABITATS

Direct habitat loss or change is inevitable in the development of any wind farm, especially when the development of access roads, turbines, substation buildings and other associated construction activities is considered. This can result in reduced habitat heterogeneity and connectivity as well as reduced foraging, sheltering, breeding and commuting opportunities for protected and otherwise noteworthy species.

Direct habitat loss due to the development of wind farms tends to be relatively small in the context of the total development area (Drewitt & Langston, 2006). Permanent land take within the Proposed Development site will be limited to the area of the turbine bases, the substation and additional access routes. Additional temporary land take during construction will also include the construction compound, two borrow pits, three peat repository areas and the TDR. In addition, areas around the turbines will be cleared of trees and hedgerows as bat buffer areas. As described in Section 8.8, the Proposed Development design includes embedded mitigation to minimise construction impacts.

Habitats within the Proposed Development within which the turbines will be constructed and additional project infrastructure will be established predominantly comprise Wet grassland (GS4), Wet heath (HH3) and Wet heath mosaics and Conifer plantation (WD4). In the absence of secondary mitigation, the extents of habitat loss during the construction of the Proposed Development are as indicated in Table 8-15.

Table 8-15: Anticipated habitat loss during the construction of the Proposed Development in the absence of mitigation

Habitat type	Pre-construction extent within the Proposed Development (ha)	Extent of permanent habitat loss (ha)
BL3 Buildings and artificial surfaces	1.03	0.67
BL3/GA2 Buildings and artificial surfaces/Amenity grassland (improved)	0.53	-
ED1 Exposed sand, gravel or till	0.02	-
ED2 Spoil and bare ground	0.15	0.11
ED3 Recolonising bare ground	0.11	0.02

Habitat type	Pre-construction extent within the Proposed Development (ha)	Extent of permanent habitat loss (ha)
ED3/GS4 Recolonising bare ground/Wet grassland	0.04	0.02
ED4 Active quarries and mines	0.14	0.01
ED4/ED3 Active quarries and mines/Recolonising bare ground	0.23	0.03
ED4/FL8 Active quarries and mines/Other artificial lakes and ponds	0.08	0.02
FL1 Dystrophic lakes	0.40	-
FL8 Other artificial lakes and ponds	0.07	0.01
GA1/GS4 Improved agricultural grassland/Wet grassland	0.004	-
GM1 Marsh	0.10	-
GS4 Wet Grassland	8.63	2.08
GS4/HH3 Wet grassland/Wet Heath	2.92	0.4
HH3 Wet heath	7.77	0.07
HH3/ED3 Wet heath/Recolonising bare ground	0.12	0.05
HH3/GS4 Wet heath/Wet grassland	0.87	0.17
HH3/GS4/WS1Wet heath/Wet grassland/Scrub	0.34	0.01
HH3/PB2 Wet heath/Upland blanket bog	1.78	1.58
HH3/WD4 Wet heath/Conifer plantation	1.59	0.60
HH3/WS1 Wet heath/Scrub	1.04	0.17
PB2/HH3 Upland blanket bog/Wet heath	9.53	2.89
PB4/HH3 Cutover Bog/Wet heath	0.04	
WD4 Conifer plantation	27.77	14.79
WD4/HH3 Conifer plantation/Wet heath	0.82	0.17

Habitat type	Pre-construction extent within the Proposed Development (ha)	Extent of permanent habitat loss (ha)
WS1 Scrub	0.86	0.20
WS1/GS4 Scrub/Wet grassland	0.16	0.02
WS1/HH3 Scrub/Wet heath	0.08	-

Habitats within the Proposed Development are largely dominated by wet grassland, wet heath mosaics and conifer plantation with various other habitats. These habitats are generally of low ecological value[5], with habitats of greater ecological value (e.g., Depositing/lowland rivers (FW2), Dystrophic Lake (F1), Artificial Lake (FL8), Active quarries and mines (ED4)) generally unaffected by the Proposed Development.

As indicated in Table 8-15, the construction of the Proposed Development involves the removal of wet heath, and mosaics of these habitats. Notably, this includes the loss of 0.8 ha of wet heath (equating to 10% of this habitat within the Proposed Development), and the loss of 7.1 ha of wet heath and wet heath mosaics (equating to 36% of this habitat within the Proposed Development). These wet heath mosaic habitats are of some intrinsic ecological value and have the potential to support protected and notable species of flora and fauna (as discussed later in Section 8.9.3). Whilst the Proposed Development design includes embedded measures to minimise loss of this habitat during construction (as described in Section 8.8), considering the anticipated loss and fragmentation of heath and associated mosaic habitats, the construction of the Proposed Development is considered to potentially have a negative effect on heath and associated mosaic habitats at a Local level (slight effect). Effects are assessed as **not significant** in the context of the overall ecological value of the receiving environment and the scale of the Proposed Development.

Anticipated linear habitat loss is indicated in Table 8-16.

Table 8-16: Anticipated linear habitat loss during the construction of the Proposed Development in the absence of mitigation

Habitat type	Pre-construction linear extent within the Proposed Development (m)	Linear extent of permanent habitat loss (m)
BL1 Stone walls and other stonework	134	27
BL2 Earthbanks	4,141	1,202
BL2/BL1 Earthbanks/Stone walls and other stonework	435	379

[5]It is acknowledged that these habitats have been identified as being of value/potential value to species identified as IEFs in relation to the Proposed Development (e.g., breeding birds, pine marten, red squirrel). Effects on these features due to the loss and potential fragmentation of these habitats are discussed in the species-specific assessments in Section 8.9.3.

Habitat type	Pre-construction linear extent within the Proposed Development (m)	Linear extent of permanent habitat loss (m)
BL2/WL2 Earthbanks/Treelines	30	1
FW4 Drainage ditches	1,260	256
WL1 Hedgerows	700	82
WL1/BL2Hedgerows/Earthbanks	246	59
WL2 Treeline	82	82

As indicated in Table 8-16, the construction of the Proposed Development involves the removal of Hedgerows and Treelines. This includes the loss of 82 m of Hedgerow (equating to 12% of this habitat within the Proposed Development), and the loss of 82 m of Treeline (equating to 100% of this habitat within the Proposed Development). These features are of some intrinsic ecological value and have the potential to be of value to protected and notable species of fauna (as discussed later in Section 8.9.3).

Whilst the Proposed Development design includes embedded measures to minimise loss of this habitat during construction (as described in Section 8.8), considering the anticipated loss and fragmentation of linear features, the construction of the Proposed Development is considered to potentially have a negative effect on Hedgerows and Treeline habitats at a Local level (slight effect). Effects are assessed as **not significant** in the context of the overall ecological value of the receiving environment and the scale of the Proposed Development.

As the TDR route option has yet to be finalised, the two likely options were surveyed at the Nodes, where it was identified that vegetation clearance would be required to facilitate the transport of the Turbine components. Habitat losses at these locations were identified as BL3 Buildings and artificial surfaces (O.08 ha for Option 1 and 0.03 ha for Option 2), ED3 Recolonising bare ground (0.01 ha for Option 1), GA2 Amenity Grassland (0.0.26 ha for Option 1), GS4 Wet grassland (0.11 ha for both Options) and BL2 Earthbanks (85 m for both Options). The loss of these features is considered **not significant** in the context of the overall ecological value of the receiving environment and the scale of the Proposed Development.

8.9.3.2 INVASIVE NON-NATIVE PLANT SPECIES

Although no invasive non-native species were recorded within the Project Development or TDR areas, multiple species have been recorded within the grid squares overlapping with the Proposed Development. These include giant hogweed (*Heracleum mantegazzianum*), Japanese knotweed, giant knotweed, and common rhododendron. Invasive non-native species were also identified in the surrounding area, specifically: Himalayan knotweed and Himalayan balsam on the Kilcronan Stream and along the Illaunbaun respectively; montbretia from sites on the Glendine River, Drumbaun River and the Ballinphonta River; and *Cotoneaster* sp. along the Unnamed stream, Toreen (B2). On a

precautionary basis, pre-construction surveys and the adoption of appropriate control measures described in outline Construction & Environmental Management Plan to address the potential presence on invasive non-native species will be implemented. Considering the risk of adverse effects based on the occurrence of these species and proposed construction activities, this is considered to be sufficient to avoid causing the spread of these species. Potential effects will therefore be **not significant.**

8.9.3.3 BIRDS

8.9.3.4 RAPTORS

Raptor species identified as IEFs requiring assessment of construction effects comprise:

- **Hen harrier**: identified as an IEF of potential International Importance on a precautionary basis, owing to the proximity of the Proposed Development to the West Clare Uplands IBA.
- **Kestrel**: identified as an IEF of Local (High Value) Importance.
- **Merlin**: identified as an IEF of Local (High Value) Importance.
- **Peregrine**: identified as an IEF of Local (High Value) Importance.

As described in Section 8.8, the Proposed Development includes embedded mitigation to minimise loss and fragmentation of habitats such as wet grassland, wet heath and upland raised bog used by hen harrier, kestrel, merlin and peregrine, and by any other raptor species. Habitat loss will therefore be restricted to that specified in Table 8-15, with the majority of suitable habitat for these species retained. Anticipated habitat loss includes the loss of wet grassland (2.07 ha loss from 8.63 ha, representing a 24.04% reduction), wet heath mosaics[6] (7.40 ha loss from 19.77 ha, representing a 19.77% reduction), and conifer plantation (14.80 ha loss from 27.80 ha, representing a 53.3% reduction). Whilst this loss is relatively limited in the context of habitat retention within the Proposed Development and the availability of these habitats in the wider landscape, their loss would result in a reduction in the extent of suitable foraging habitat for breeding and wintering raptors, including some habitat loss towards the south of the Proposed Development in which higher levels of raptor activity were identified. Whilst the loss of these habitats would not create major barriers to raptor movements, retained suitable foraging habitat would become slightly more fragmented as a result of the Proposed Development.

Considering this anticipated loss of raptor foraging habitat (e.g., wet grassland, wet heath, upland raised bog, conifer plantation), in the absence of secondary mitigation the construction of the Proposed Development is considered to potentially have the following effects on raptors:

[6] This figure comprises an amalgamation of HH3, GS4/HH3, HH3/ED3, HH3/GS3/WS1, HH3/GS4, HH3/PB2, HH3/WD4, HH£/WS1, PB2/HH3 and WD4/HH3.

- A **significant negative effect** on breeding and wintering hen harrier (Moderate effect on a Very High sensitivity receptor) due to a Low magnitude effect on this potentially Internationally Important feature through direct habitat loss and fragmentation.
- The potential effect on breeding and wintering kestrel, merlin and peregrine is considered to comprise a Low magnitude effect on these Low sensitivity receptors through direct habitat loss and fragmentation. This effect is therefore considered **not significant**.

As described in Section 8.8, the Proposed Development includes embedded mitigation to minimise disturbance during construction; notably by avoiding/minimising the generation of additional noise, dust, light spill and vibration. In addition, Section 8.8 includes the adoption of good practice measures and ecological supervision to ensure the destruction or significant disturbance of any active nests or (with regard to hen harrier) winter roosts is avoided, including timing works outside the most sensitive periods, and the implementation of ecological supervision and exclusion zones (e.g., as detailed by Goodship & Furness (2022)) where required.

However, considering the extent and locations of construction works within the Proposed Development, and range of habitats used throughout the Proposed Development at different times of year (e.g., wintering season activity by hen harrier and merlin, breeding season activity by kestrel and hen harrier), in the absence of secondary mitigation, disturbance and displacement during the construction of the Proposed Development is considered to potentially have the following effects on raptors:

- A **significant negative effect** on breeding and wintering hen harrier (Moderate effect on a Very High sensitivity receptor) due to a Low magnitude effect on this potentially Internationally Important feature through disturbance and displacement.
- The potential effect on breeding and wintering kestrel, merlin and peregrine is considered to comprise a Low magnitude effect on these Low sensitivity receptors through disturbance and displacement. This effect is therefore considered **not significant**.

8.9.3.5 WADERS AND WATERFOWL

As described in Section 8.8, the Proposed Development includes embedded mitigation to minimise loss and fragmentation of habitats such as wet grassland which could be used by wintering and breeding waders and waterfowl. Habitat loss will therefore be restricted to that specified in Table 8-15, with the majority of suitable habitat for these species retained.

Whilst scoped in for detailed assessment on a precautionary basis, the majority of these species were either absent or infrequently recorded during the field surveys, and many would only be likely to use the lake which will be retained within the Proposed Development. There will be no loss of waterbodies used by waders and waterfowl.

Species observed using the Proposed Development included woodcock (in winter, when this species is relatively abundant and widespread throughout Ireland), golden plover and snipe. These species

were recorded infrequently and/or in very low numbers with regard to national and regional population estimates and qualifying populations for any relevant designated sites.

Anticipated habitat loss includes wet grassland, raised bog and conifer plantation. Wet grassland to be lost has been identified as being used by relatively low numbers of snipe and is suitable for other waders and waterbirds. Conifer plantation was identified as being used by wintering woodcock, which may also use grassland, heath and hedgerows. These areas are relatively small in the context of retained habitat within the Proposed Development (Table 8-15) and their availabilities in the wider landscape, with this loss resulting in a slight reduction in the extent and connectivity of suitable foraging and sheltering habitat for waders.

Considering the extent of anticipated habitat loss and fragmentation in the context of retained suitable habitat within the Proposed Development and in the wider landscape, the relatively low suitability of the habitat to be removed, and the low levels of activity recorded during field surveys to inform the Proposed Development, construction effects on waders and waterfowl through habitat loss and fragmentation are considered **not significant**.

As described in Section 8.8, the Proposed Development includes embedded mitigation to minimise disturbance during construction; notably by avoiding/minimising the generation of additional noise, dust, light spill and vibration. In addition, Section 8.8 includes the adoption of good practice measures and ecological supervision to ensure disturbance of larger wintering bird aggregations (e.g., using the lake) is avoided, including timing potentially disturbing works outside the most sensitive periods, and the implementation of ecological supervision and exclusion zones (e.g., as detailed by Goodship & Furness (2022)) where required.

Considering the extent and locations of construction works within the Proposed Development, the level of wader and waterfowl activity identified within and adjacent to the Proposed Development (as described above), and the suitability of the habitats within and adjacent to the Proposed Development for waders and waterfowl, construction effects on waders and waterfowl through disturbance and displacement are considered **not significant**.

8.9.3.6 GULLS

Black-headed gull, herring gull and lesser black-backed gull have been identified as IEFs of Local (High Value) Importance requiring assessment of construction effects.

Habitats to be removed during construction were identified as being subject to relatively low levels of gull activity, with the majority of observations being of gulls flying over the Proposed Development rather than using habitats which will be affected by construction. As described in Section 8.8, the Proposed Development includes embedded mitigation to minimise loss and fragmentation of habitats such as wet grassland which could be used by gulls for foraging. Habitat loss will therefore be restricted to that specified in Table 8-15, with the majority of suitable habitat for these species retained.

Considering the extent of anticipated habitat loss and fragmentation in the context of retained suitable habitat within the Proposed Development and in the wider landscape, the relatively low suitability of the habitat to be removed, and the low levels of gull use of habitats within the Proposed Development (e.g., for foraging, roosting) identified, construction effects on gulls through habitat loss and fragmentation are considered **not significant**.

As described in Section 8.8, the Proposed Development includes embedded mitigation to minimise disturbance during construction; notably by avoiding/minimising the generation of additional noise, dust, light spill and vibration. In addition, Section 8.8 includes the adoption of good practice measures and ecological supervision to ensure disturbance of larger bird aggregations is avoided.

Gull activity recorded at/near construction areas during field surveys predominantly comprised birds flying over the Proposed Development. Given the relatively low levels of this activity recorded during field surveys, and the anticipated nature of construction activities, there is not considered to be potential for significant disturbance of gulls flying over the Proposed Development (e.g., on migration, or between suitable foraging and breeding habitat). Given the low level of gull use of habitats within/near construction areas (e.g., for foraging, roosting) recorded during field surveys, the lack of potential for significant disturbance of gulls flying over the Proposed Development, and the embedded mitigation described in Section 8.8, construction effects on gulls through disturbance and displacement are considered **not significant**.

8.9.3.7 MARSH FRITILLARY

Marsh fritillary was identified as an IEF of potential County Importance on a precautionary basis, due to the presence of suitable habitat within the Proposed Development, and desk study records of this species in the wider area. However, no evidence in the form of larval webs or sightings of marsh fritillary was recorded within or adjacent to the Proposed Development.

As described in Section 8.8, the Proposed Development includes embedded mitigation to minimise loss and fragmentation of habitats suitable for marsh fritillary such as wet grassland during construction. Habitat loss will therefore be restricted to that specified in Table 8-15, with the majority of suitable habitat for this species retained. Despite this, habitat removal during construction will result in a local reduction in the extent and connectivity of suitable habitat for marsh fritillary, including habitat which could be colonised by marsh fritillary as part of the future baseline of the Proposed Development. On a precautionary basis, habitat loss and fragmentation during construction is considered to potentially have a **significant negative effect** on marsh fritillary. This will potentially comprise a Medium magnitude effect on this Medium sensitivity receptor.

As described in Section 8.8, the Proposed Development includes embedded mitigation to minimise disturbance during construction; notably by avoiding/minimising the generation of additional noise, dust, light spill and vibration. Section 2.4 also includes the adoption of precautionary working methods (e.g., pre-works checks, ecological supervision) of habitat suitable for IEFs including marsh fritillary. Considering this embedded mitigation, the potential level of marsh fritillary activity within

the ecological baseline of the Proposed Development, and the susceptibility of this species to disturbance, construction effects on marsh fritillary through pollution, disturbance and direct mortality are considered **not significant**.

8.9.3.8 AMPHIBIANS AND REPTILES

Common frog, smooth newt and common lizard were identified as IEFs of Local (High Value) Importance on a precautionary basis due to observations of common frog and smooth newt within the Proposed Development, and the presence of suitable habitat within the Proposed Development and desk study of records from the surrounding area for all three species.

As described in Section 8.8, the Proposed Development includes embedded mitigation during construction to minimise loss and fragmentation of suitable amphibian and reptile habitat, to minimise pollution of waterbodies suitable for amphibians and reptiles, and to avoid significant disturbance or direct harm. These measures include sensitive timing of works and ecological supervision to identify and avoid any potential disturbance or harm of reptiles and amphibians. Considering this embedded mitigation and the levels of amphibian and reptile activity recorded within and adjacent to the Proposed Development, construction effects on amphibians and reptiles through habitat loss and fragmentation, pollution, disturbance and direct mortality are considered **not significant**.

8.9.3.9 TERRESTRIAL MAMMALS

Otter

Otter was identified, on a precautionary basis, as an IEF of Local (High Value) Importance due to the presence of suitable habitat within and adjacent to the Proposed Development, and desk study records and field survey observations from the surrounding area (Appendix A08-05; Appendix A08-06)**.**

As described in Section 8.8, the Proposed Development includes embedded mitigation during construction to minimise loss, fragmentation and pollution of suitable otter habitat (e.g., aquatic habitat for foraging and commuting, and terrestrial habitat suitable for dens). Notably, good practice construction measures and ecological supervision will prevent pollution of watercourses and ensure suitable habitat for holts within/near works areas are identified (through pre-construction confirmatory surveys) and appropriate embedded mitigation is subsequently adopted (e.g., implementation of relevant exclusion zones). No significant habitat destruction, including any loss of breeding or resting places, for otter are anticipated during the construction of the Proposed Development. Considering this, and the embedded mitigation described above, construction effects on otter through habitat loss and fragmentation, and disturbance and displacement, are considered **not significant**.

Due to the lack of connectivity of the Proposed Development to watercourses, there is not potential for construction activity to result in the run-off of silt and other pollutants into land drains and minor watercourses suitable for otter. Such effects are therefore assessed as **not significant**.

Badger

Badger was identified as an IEF of Local (High Value) Importance due to the presence of suitable habitat within and adjacent to the Proposed Development, desk study records and field survey observations from the surrounding area, and the presence of a possible sett within the Proposed Development.

As described in Section 8.8, the Proposed Development includes embedded mitigation during construction to minimise loss and fragmentation of suitable badger habitat (e.g., woodland, scrub, farmland, grassland, hedgerows), and to avoid any harm to badgers (i.e., when occupying setts). Notably, good practice construction measures and ecological supervision will prevent any adverse impacts on badger setts (through pre-construction confirmatory surveys), with appropriate embedded mitigation subsequently adopted (e.g., implementation of relevant exclusion zones around any active setts). This will apply to the potential sett and associated tunnel system recorded south of turbine hardstand location T3. Three project elements fall within 50 m of this tunnel system (Access Track Verge, Access Track, Earthworks). As part of the embedded mitigation described in Section 8.8, pre-construction surveys will confirm if the tunnels are in use by badger before works commence, with appropriate measures implemented if required.

Embedded mitigation described in Section 8.8 will be adopted to minimise disturbance of badgers during construction. This will include the minimisation of light spill onto suitable badger habitat, and the pre-construction confirmatory surveys described above to identify any active setts within the potential zone of influence of construction works. Additional embedded mitigation measures (e.g., supervision, implementation of exclusion zones, precautionary working methods, obtaining and meeting the requirements of any derogation licences in consultation with NPWS) will be adopted if any such active sets are identified.

Considering the level of badger activity recorded within the ecological baseline of the Proposed Development, the scope for potential impacts during construction, and the embedded mitigation measures described above, construction effects on badger through habitat loss and fragmentation, and disturbance and displacement, and mortality, are considered **not significant**.

Pine Marten

Pine marten was identified as an IEF of Local (High Value) Importance on a precautionary basis due to the presence of suitable habitat within and adjacent to the Proposed Development, and desk study records from the surrounding area.

As described in Section 8.8, the Proposed Development incorporates embedded design measures and good practice methods during construction to minimise loss and fragmentation of suitable pine marten habitat (i.e., conifer plantation). Similar suitable habitat to that removed during construction is widespread in the surrounding landscape, and as such there will be no significant reduction in the local availability of suitable pine marten habitat. Section 8.8 also presents embedded mitigation measures to avoid significant disturbance and potential mortality during construction. This

embedded mitigation includes measures to minimise light spill onto suitable habitat, and precautionary working methods (e.g., pre-construction confirmatory surveys) in relation to works with the potential for impacts on pine martens potentially using suitable sheltering and breeding habitat.

Considering the scope for potential impacts during construction, this embedded mitigation, and the current ecological baseline (with no pine marten activity identified within the Proposed Development), construction effects on pine marten through habitat loss and fragmentation, disturbance and displacement, and mortality, are considered **not significant**.

Red Squirrel

Red squirrel was identified as an IEF of Local (High Value) Importance on a precautionary basis due to the presence of suitable habitat within and adjacent to the Proposed Development, and desk study records from the surrounding area.

As described in Section 8.8, the Proposed Development includes embedded mitigation during construction to minimise loss and fragmentation of suitable red squirrel habitat (i.e., conifer plantation). Whilst the Proposed Development will involve the removal of 14.80 ha of conifer plantation, this habitat loss is relatively small in the context of retained conifer plantation within the Proposed Development and wider landscape. Section 8.8 also presents embedded mitigation measures to avoid significant disturbance and potential mortality during construction. This includes measures to minimise light spill onto suitable habitat, and precautionary working methods (e.g., pre-construction confirmatory surveys) in relation to works with the potential for impacts on red squirrels potentially using suitable sheltering and breeding habitat.

Considering the scope for potential impacts during construction, this embedded mitigation, and the current ecological baseline (with no red squirrel activity identified within the Proposed Development), construction effects on red squirrel through habitat loss and fragmentation, disturbance and displacement, and mortality, are considered **not significant**.

Irish Hare

Irish hare was identified as an IEF of Local (High Value) Importance due to observations within the Proposed Development, the presence of suitable habitat within and adjacent to the Proposed Development, and desk study records from the surrounding area.

As described in Section 8.8, the Proposed Development includes embedded mitigation during construction to minimise loss and fragmentation of suitable Irish hare habitat. Whilst the Proposed Development will involve the removal of suitable habitat (e.g., grassland, heathland, bog) (as specified in Table 8-15), this habitat loss is relatively small in the context of retained suitable habitat within the Proposed Development and wider landscape. Section 8.8 also presents embedded mitigation measures to avoid significant disturbance of Irish hares potentially using suitable foraging and sheltering habitat (e.g., grassland, heathland, bog). Notably, the implementation of good practice construction measures and ecological supervision will minimise disturbance of suitable

habitat and ensure suitable habitat is identified (through pre-construction surveys) and appropriate embedded mitigation actions (e.g., sensitive timing of works, exclusion zones around areas where potential impacts are identified) are subsequently implemented.

Considering the scope for potential impacts during construction, this embedded mitigation, and the level of Irish hare activity recorded within the ecological baseline of the Proposed Development, construction effects on Irish hare through habitat loss and fragmentation, disturbance and displacement, and mortality, are considered **not significant**.

8.9.3.10 BATS

Bat species were identified as IEFs of Local (High Value) Importance due to their recorded levels of activity and the presence of suitable foraging and commuting habitat within and adjacent to the Proposed Development. These species comprised common pipistrelle, soprano pipistrelle, Leisler's bat, *Myotis* species, and brown long-eared bat. Due to its recorded presence within the Proposed Development, its conservation status and its potential sensitivity to wind farm development, lesser horseshoe bat is also assessed in this section on a precautionary basis. Considering the presence of suitable habitat and this species' conservation status, lesser horseshoe bat is identified as an IEF of *up to* County Importance.

As described in Section 8.8, the Proposed Development includes embedded mitigation during construction to minimise loss and fragmentation of suitable bat habitat (e.g., woodland, higher quality grassland, hedgerows). Habitat loss will therefore limited to that specified in Table 8-15 and Table 8-16, with the majority of suitable habitat for foraging and commuting bats retained. The extent of this habitat loss is relatively limited in the context of habitat retention within the Proposed Development and the availability of these habitats in the wider landscape. Nonetheless, in the absence of secondary mitigation this habitat loss will cause a local reduction in the availability of foraging and commuting habitat used by bat species. The construction of the Proposed Development is therefore considered to potentially have a **significant negative effect** on foraging and commuting bats (specifically common pipistrelle, soprano pipistrelle, Leisler's bat, *Myotis* species, and brown long-eared bat) through habitat loss and fragmentation. This will potentially comprise a Low magnitude effect on this Low sensitivity receptor. With regard to lesser horseshoe bat specifically, despite the very low activity levels within the ecological baseline of the Proposed Development, on a precautionary basis the construction of the Proposed Development is considered to potentially have a **significant negative effect** through habitat loss and fragmentation. This will potentially comprise a Low magnitude effect on this Medium sensitivity receptor.

As described in Section 8.8, the Proposed Development includes embedded mitigation to minimise disturbance during construction; notably by avoiding/minimising the generation of additional noise, dust, light spill and vibration. Measures to achieve this included sensitive timing of works, and avoiding light spill onto suitable foraging, commuting and roosting habitat. Notably, good practice construction measures and ecological supervision will be implemented to avoid disturbance or

potential destruction of roost sites. Whilst no bat roosts have been identified within the Proposed Development, pre-construction surveys will be undertaken to identify any potential roosts which may have become established since the surveys and the commencement of construction work. Embedded mitigation will subsequently be adopted as appropriate and prescribed by NPWS (e.g., appropriate timing of works to avoid sensitive periods, provision of bat boxes to replace identified tree roosts). Considering this embedded mitigation, the potential for impacts from construction activities, and the level of bat activity recorded within and adjacent to the Proposed Development, disturbance and direct mortality effects on bats during construction are considered to be **not significant**.

8.9.3.11 AQUATIC SPECIES AND HABITATS

Brown trout, European eel and Atlantic salmon were assessed as IEFs of Local (High Value) Importance due to their presence in watercourses near the Proposed Development.

The construction of the Proposed Development will not result in any direct habitat loss within adjacent watercourses or involve the creation of any potential barriers to fish movements along watercourses. The embedded mitigation measures described in Section 8.8 include further measures (e.g., clearly defined working areas to avoid any encroachment near sensitive habitats such as watercourses, maintaining a minimum 15 m buffer around all watercourses during construction)) to ensure avoidance of any works with the potential for loss or alteration of watercourses suitable for brown trout, European eel and/or Atlantic salmon. There is therefore no potential for the loss or fragmentation of suitable habitat for these species. Potential effects from habitat loss and fragmentation are assessed as **not significant**.

As described in Section 8.8, the Proposed Development includes embedded mitigation to minimise disturbance during construction; notably by avoiding/minimising the generation of additional noise, dust, light spill and vibration. Section 8.8 includes embedded measures to avoid any potential disturbance or pollution of aquatic habitats, containing measures to avoid pollutant run-off into watercourses during construction (e.g., maintenance of a minimum 15 m buffer around any watercourses during construction). Potential effects on brown trout, European eel and/or Atlantic salmon from disturbance, displacement and pollution are considered **not significant**.

8.9.3.12 SUMMARY OF CONSTRUCTION EFFECTS

Anticipated effects during the construction phase of the Proposed Development are summarised in Table 8-17.

Table 8-17: Summary of construction effects

IEF	Effect	Effect magnitude	Effect significance
Habitats (Marsh, Wet grassland, Wet	Habitat loss and fragmentation	Low	Not significant

IEF	Effect	Effect magnitude	Effect significance
heath, Upland blanket bog, Cutover bog, Treeline, Hedgerow)			
Habitats (Marsh, Wet grassland, Wet heath, Upland blanket bog, Cutover bog)	Disturbance, displacement and pollution	Negligible	Not significant
Hen harrier	Habitat loss and fragmentation	Low	**Long-term moderate negative effect (significant at a County/district level)**
Hen harrier	Disturbance, displacement and pollution	Low	**Short-term moderate negative effect (significant at a County/district level)**
Other raptors (merlin, peregrine, kestrel)	Habitat loss and fragmentation	Low	Not significant
Other raptors (merlin, peregrine, kestrel)	Disturbance, displacement and pollution	Low	Not significant
Waders and waterfowl	Habitat loss and fragmentation	Negligible	Not significant
Waders and waterfowl	Disturbance, displacement and pollution	Negligible	Not significant
Gulls	Habitat loss and fragmentation	Negligible	Not significant
Gulls	Disturbance, displacement and pollution	Negligible	Not significant
Invasive non-native plant species	Spread of invasive non-native species	Low	Not significant
Marsh fritillary	Habitat loss and fragmentation	Low	**Long-term slight negative effect (significant at a Local level)**
Marsh fritillary	Disturbance, displacement, pollution	Negligible	Not significant
Marsh fritillary	Direct mortality	Negligible	Not significant

IEF	Effect	Effect magnitude	Effect significance
Amphibians and reptiles	Habitat loss and fragmentation	Negligible	Not significant
Amphibians and reptiles	Disturbance, displacement, pollution	Negligible	Not significant
Amphibians and reptiles	Direct mortality	Negligible	Not significant
Otter	Habitat loss and fragmentation	Negligible	Not significant
Otter	Disturbance, displacement, pollution	Negligible	Not significant
Otter	Direct mortality	Negligible	Not significant
Badger	Habitat loss and fragmentation	Negligible	Not significant
Badger	Disturbance, displacement, pollution	Low	Not significant
Badger	Direct mortality	Low	Not significant
Pine marten	Habitat loss and fragmentation	Low	Not significant
Pine marten	Disturbance, displacement, pollution	Negligible	Not significant
Pine marten	Direct mortality	Negligible	Not significant
Red squirrel	Habitat loss and fragmentation	Low	Not significant
Red squirrel	Disturbance, displacement, pollution	Negligible	Not significant
Red squirrel	Direct mortality	Negligible	Not significant
Irish hare	Habitat loss and fragmentation	Negligible	Not significant
Irish hare	Disturbance, displacement, pollution	Negligible	Not significant
Irish hare	Direct mortality	Negligible	Not significant
Bats	Habitat loss and fragmentation	**Low**	**Long-term slight negative effect (significant at a Local level)**
Bats	Disturbance, displacement, pollution	Negligible	Not significant
Bats	Direct mortality	Negligible	Not significant
Aquatic species (Atlantic salmon,	Habitat loss and fragmentation	Negligible	Not significant

IEF	Effect	Effect magnitude	Effect significance
brown trout, European eel)			
Aquatic species (Atlantic salmon, brown trout, European eel)	Disturbance, displacement, pollution	Low	Not significant
Aquatic species (Atlantic salmon, brown trout, European eel)	Direct mortality	Negligible	Not significant

8.9.4 OPERATIONAL PHASE EFFECTS

The assessment of effects on IEFs during the operation of the Proposed Development is described below and summarised in Table 8-18, in accordance with the effect terminology described in Section 8.6.2. The Proposed Development has an anticipated lifespan of 30 years. Potential effects identified during the operational phase are as follows:

- **Direct habitat loss and fragmentation**: permanent and temporary reductions to the extent, quality, and connectivity of the habitats present on site to facilitate operational maintenance;
- **Disturbance and displacement**: disturbance of protected and/or priority species from additional noise, dust, light, vibration, and human activity, with the potential to cause displacement. This includes displacement due to the presence of operational turbines;
- **Direct mortality of individuals**: fatalities or injuries to sensitive species caused by operational activities; notably potential collisions with operational turbines and (for bats) barotrauma effects; and
- **Pollution of habitats**: through operational activities such as the use, assembly and storage of machines and materials (risk of chemical and fuel spills); particularly regarding aquatic habitats.

8.9.4.1 HABITATS

Habitat removal and alteration during the operational phase of the Proposed Development will be limited to small-scale management (e.g., to facilitate continued access and operational of Proposed Development infrastructure), with any works undertaken in accordance with the embedded mitigation described in Section 8.8. Any affected habitat will be allowed to reinstate naturally once the works have been completed. Effects from operational habitat loss and fragmentation are considered **not significant**.

Whilst anticipated to be relatively small in scale (relative to construction works), operational maintenance has the potential to cause disturbance and pollution of retained habitats. All

operational maintenance will be undertaken in accordance with the embedded mitigation measures described in Section 8.8 including measures to minimise noise, vibration and light spill. Measures to avoid pollution of watercourses will be adopted, as described in Section 8.8. Considering the scope for impacts from maintenance works, and the embedded mitigation during the operation of the Proposed Development, effects from operational habitat disturbance and pollution are considered **not significant**.

8.9.4.2 INVASIVE NON-NATIVE PLANT SPECIES

Although no invasive non-native species were recorded within the Project Development, such species have been recorded within the two 10 km grid squares overlapping with the Proposed Development, including giant hogweed, Japanese knotweed and giant knotweed. Invasive non-native species such as Himalayan knotweed and Himalayan balsam were identified on watercourses in the surrounding area. On a precautionary basis, pre-works surveys and the adoption of appropriate control measures described in outline Construction & Environmental Management Plan to address the potential presence of invasive non-native species will be undertaken as necessary during any operational maintenance works with the potential to cause their spread (e.g., small-scale vegetation clearance). Considering the limited scope for causing the spread of invasive non-native species during operation (i.e., based on operational maintenance activities, and the ecological baseline), and this embedded mitigation, potential effects from the spread of invasive non-native species during operation will be **not significant**.

8.9.4.3 BIRDS

Overview of Assessment of Operational Phase Effects

The assessment of operational phase effects on ornithological IEFs is presented below. Assessment of effects associated with direct mortality from collisions with operational turbines is informed by the detailed Collision Risk Modelling (CRM) study presented in Appendix A08-08, with detailed methods and results provided in that document and applied herein where appropriate. Based on their potential susceptibility to collisions with operational turbines, their conservation statuses, and their level of flight activity recorded within the wind farm area during detailed VP surveys, CRM was undertaken for the species detailed in Table 8-18 and Table 8-19.

Table 8-18: Collision Risk Modelling results for IEFs during the breeding season

Species	Estimated number years per collision	Estimated number of collisions during the operation of the Proposed Development
Kestrel	5.74	5.23
Herring gull	33.06	0.91
Lesser black-backed gull	3.88	7.73

Table 8-19: Collision Risk Modelling results for IEFs during the wintering season

Species	Estimated number years per collision	Estimated number of collisions during the operation of the Proposed Development
Kestrel	5.66	5.30
Golden plover	12.84	2.34
Snipe	218.67	0.14
Herring gull	28.17	1.06
Lesser black-backed gull	28.79	1.04

8.9.4.4 RAPTORS

As described in Section 8.8, the Proposed Development design includes embedded mitigation to minimise loss and fragmentation of suitable raptor habitat during its operation. Therefore, whilst vegetation removal to facilitate operational maintenance of the Proposed Development could cause a reduction in the availability and connectivity of foraging habitat used by raptors, any such habitat removal will be very small in scale; particularly in the context of retained suitable habitat within and adjacent to the Proposed Development. As such, effects on raptors due to habitat loss and fragmentation during the operational phase of the Proposed Development are considered **not significant**.

Disturbance and displacement of raptors can occur during wind farm operation due to avoidance of the land and airspace in the vicinity of operational turbines. Avoidance of observational wind farm airspace has been observed in hen harriers (Hötker *et al*., 2006), with Pearce-Higgins *et al.* (2009) reporting significant avoidance to at least 250 m from turbines by hen harriers, leading to a 53% reduction within 500 m of turbines. Whilst beneficial in the context of potential collision impacts (as discussed below), this displacement could result in the avoidance of suitable foraging habitat (e.g., wet heath, wet grassland) within and/or adjacent to (notably south of) the Proposed Development which has been identified as being used by hen harriers during the breeding and wintering seasons. The extent of suitable foraging habitat affected is relatively limited (8.19 ha of permanent loss), especially in the context of suitable habitat within the wider landscape. Nonetheless, considering this potential displacement out of suitable foraging habitat adjacent to operational turbines, there is potential for the operation of the Proposed Development to have a **significant negative effect** through disturbance and displacement. Based on the level of potential disturbance, and the hen harrier activity recorded within and adjacent to the Proposed Development, this comprises a Moderate effect on a Very High sensitivity receptor.

Similarly, there is potential for operational disturbance and displacement of other raptor species (e.g., merlin, peregrine, kestrel) to occur due to avoidance of the land and airspace in the vicinity of operational turbines. Evidence for relevant species is inconsistent, with reports of kestrel foraging activity continuing in line with baseline levels (Barrios & Rodriguez, 2004 & 2007), although Pearce-Higgins *et al.* (2009) reported equivocal evidence for weak avoidance by kestrel. Likewise, there is a lack of conclusive evidence for peregrine and merlin (Humphreys *et al.,* 2015a & 2015b). Considering the high level of kestrel activity recorded within and adjacent to the Proposed Development and the suitability of habitats for kestrel, the operation of Proposed Development is considered to potentially have a **significant negative effect** on breeding and wintering kestrel through disturbance and displacement. On a precautionary basis, this effect is considered to comprise a Medium magnitude effect on this Low sensitivity receptor.

Considering the ecological baseline for the Proposed Development regarding peregrine and merlin (i.e., with the Proposed Development and surrounds supporting relatively low levels of activity), the potential effect on breeding and wintering merlin and peregrine through disturbance and displacement from turbine operation is considered to comprise a Low magnitude effect on these Low sensitivity receptors. The effect is therefore considered **not significant**.

Due to their size and typical flight patterns, raptors can be particularly susceptible to impacts from collisions with new turbines which may result in injury or fatalities. Considering this, and the raptor activity within the Proposed Development, the potential for significant effects due to raptor collisions with operational turbines was subject to detailed consideration, as detailed within the Collision Risk Modelling Report (Appendix A08-08). Whilst all raptor species were considered for inclusion within CRM, only those with sufficient flight activity[7] were included within CRM. Kestrel was therefore included within CRM, whilst buzzard, hen harrier (which typically flies below the height of operational turbines (Whitfield & Madders, 2006; Ruddock & Whitfield, 2007; Wilson *et al.*, 2015)), peregrine and merlin were omitted. Any raptor species omitted from CRM did not exhibit flight activity within the Proposed Development at collision risk height at a level where their populations could be significantly affected by turbine collisions. Collision mortality effects on buzzard, hen harrier, peregrine, merlin and other raptor species during the operational phase are therefore considered **not significant**.

The results of CRM for kestrel during the breeding and wintering seasons are summarised in Table 8-18 and Table 8-19 respectively. Modelled kestrel collision fatalities during the breeding season are estimated as one bird per 5.74 years, equating to 5.23 birds over the operational lifespan of the Proposed Development. Modelled kestrel collision fatalities during the winter season are estimated as one bird per 5.66 years, equating to 5.30 birds over the operational lifespan of the Proposed Development. As such, assuming kestrel numbers remain consistent during the operational lifespan of the wind farm (see discussion of displacement above), modelled kestrel collision fatalities equate

[7] Defined as a minimum total of five flights or minimum of ten individuals of each target species recorded during each season of analysis (see Appendix A08-08 for further details).

to 10.53 birds over the operational lifespan of the Proposed Development. Recent kestrel population estimates are not available for the local area, but this species is considered locally widespread and common. Furthermore, the resultant increases in bird mortality would be relatively limited when compared against the annual background mortality for this species, with annual mortality reported to be 31% in adult kestrels and 68% in juvenile kestrels (BTO, 2025a)[8]. Considering the conservation status of this species and the modelled potential collision fatalities during its operational lifespan, the operation of Proposed Development is considered to potentially have a **significant negative effect** on breeding and wintering kestrel through operational collision mortality. On a precautionary basis, this effect is considered to comprise a Medium magnitude effect on this Low sensitivity receptor.

8.9.4.5 WADERS AND WATERFOWL

As described in Section 8.8, the Proposed Development design includes embedded mitigation to minimise loss and fragmentation of suitable wader and waterfowl habitat during its operation. Therefore, whilst vegetation removal to facilitate operational maintenance of the Proposed Development could cause a reduction in the availability and connectivity of habitat used by waders and waterfowl, any habitat removal will be very small in scale; particularly in the context of retained suitable habitat within and adjacent to the Proposed Development. There will be no loss of waterbodies suitable for use by wintering and breeding waders and waterfowl. As such, effects on waders and waterfowl due to habitat loss and fragmentation during the operational phase of the Proposed Development are considered **not significant**.

As described in Section 8.8, the Proposed Development design includes embedded mitigation to minimise disturbance during its operation (e.g., during small-scale vegetation clearance to facilitate access to and maintenance of Proposed Development infrastructure). This will include avoiding/minimising the generation of additional noise, dust, light spill and vibration. In addition, Section 8.8 includes the adoption of good practice measures and ecological supervision to ensure the destruction or significant disturbance of any active nests, or disturbance of larger aggregations, is avoided during such operational maintenance works. Measures will include timing works outside the most sensitive periods, and the implementation of ecological supervision and exclusion zones where required. Considering this, the limited scope for impacts, and the limited baseline activity recorded within the Proposed Development, effects on waders and waterfowl due to disturbance and displacement during operational maintenance are considered **not significant**.

Disturbance and displacement of waders and waterfowl can also occur due to the presence of operational turbines, as reported by Pearce-Higgins *et al.* (2009). However, activity within the ecological baseline of the Proposed Development by species which could be subject to such effects was relatively low and did not include breeding by species such as snipe and golden plover which

[8] These figures relate to UK kestrel populations. Considering the similarities in the ecologies of and pressures on kestrel populations in the UK and Ireland, these figures are considered to provide an indication of likely kestrel annual mortality in Ireland.

have been identified as potentially susceptible when breeding Pearce-Higgins *et al.* (2009). Suitable habitat which may be subject to disturbance from operational turbines is relatively limited in extent, especially in the context of suitable habitat in the wider landscape, into which the relatively low numbers of waders and waterfowl (as recorded within the ecological baseline) could disperse. Disturbance and displacement due to turbine operation is therefore considered insufficient to significantly affect the population statuses of any wader and waterfowl species. This effect is considered **not significant**.

Due to their size and typical flight patterns, waders and (especially) waterfowl can be susceptible to impacts from collisions with new turbines which may result in injury or fatalities. Considering this, and the levels of baseline activity within the Proposed Development for golden plover and snipe, the potential for significant effects due to wader collisions with operational turbines was subject to detailed consideration within the Collision Risk Modelling Report (Appendix A08-08). Whilst all wader and waterfowl species were considered for inclusion within CRM, only those with sufficient flight activity[9] were included. Golden plover and snipe were therefore the only wader and waterfowl species included within CRM. Any wader and waterfowl species omitted from CRM did not exhibit flight activity within the Proposed Development at collision risk height at a level where their populations could be significantly affected by turbine collisions. Collision mortality effects on other wader and waterfowl species during the operational phase are therefore considered **not significant**.

The results of CRM for golden plover and snipe during the wintering season are summarised in Table 8-19. Modelled golden plover collision fatalities are estimated as one bird per 12.84 years, equating to 2.34 birds over the operational lifespan of the Proposed Development. Modelled golden plover collision fatalities are estimated as one bird per 218.67 years, equating to 0.14 birds over the operational lifespan of the Proposed Development. This would therefore affect less than 1% of the county populations for these species, and these figures are very low in the context of reported annual background mortality rates of 27% for golden plover and 51% for snipe (BTO, 2025b/2025c[10]). Collision mortality due to operational turbines is therefore considered insufficient to significantly affect the population statuses of golden plover and snipe. These effects are considered **not significant**.

8.9.4.6 GULLS

As described in Section 8.8, the Proposed Development design includes embedded mitigation to minimise loss and fragmentation of suitable habitat for gulls during its operation. Therefore, whilst vegetation removal to facilitate operational maintenance of the Proposed Development could cause a reduction in the availability and connectivity of habitat used by gulls (e.g., for foraging, roosting),

[9] Defined as a minimum total of five flights or minimum of ten individuals of each target species recorded during each season of analysis (see Appendix A08-08 for further details).
[10] These figures relate to UK populations. Considering the similarities in the ecologies of and pressures on golden plover and snipe populations in the UK and Ireland, these figures are considered to provide an indication of likely annual mortality in Ireland.

any habitat removal will be very small in scale; particularly in the context of retained suitable habitat within and adjacent to the Proposed Development. There will be no loss of waterbodies suitable for use by gulls during the breeding or wintering seasons. As such, effects on gulls due to habitat loss and fragmentation during the operational phase of the Proposed Development are considered **not significant**.

As described in Section 8.8, the Proposed Development design includes embedded mitigation to minimise disturbance during its operation (e.g., during small-scale vegetation clearance to facilitate access to and maintenance of Proposed Development infrastructure). This will include avoiding/minimising the generation of additional noise, dust, light spill and vibration. In addition, Section 8.8 includes the adoption of good practice measures and ecological supervision to ensure disturbance (e.g., of gull aggregations) is avoided, including timing works outside the most sensitive periods, and the implementation of ecological supervision and exclusion zones where required. Considering this, the limited scope for impacts, and the limited baseline activity recorded within the Proposed Development, effects on gulls due to disturbance and displacement during operational maintenance are considered **not significant**.

Whilst not identified as being highly susceptible (especially when non-breeding), disturbance and displacement of gulls can potentially occur due to the presence of operational turbines. However, activity within the ecological baseline of the Proposed Development by gull species which could be subject to such effects was relatively low and did not include breeding activity. Suitable habitat which may be subject to disturbance from operational turbines is relatively limited in extent, especially in the context of suitable habitat in the wider landscape, into which the relatively low numbers of gulls (as recorded within the ecological baseline) could disperse. Disturbance and displacement due to turbine operation is therefore considered insufficient to significantly affect the population statuses of any gull species. This effect is considered **not significant**.

Whilst not typically identified as being as susceptible as other larger species (e.g., waterfowl, raptors), gulls can be subject to impacts from collisions with new turbines (Thaxter *et al.*, 2017). Considering this, and the levels of baseline activity within the Proposed Development for herring gull and lesser black-backed gull, the potential for significant effects due to gull collisions with operational turbines was subject to detailed consideration within the Collision Risk Modelling Report (Appendix A08-08). Whilst all wader and waterfowl species were considered for inclusion within CRM, only those with sufficient flight activity[11] were included. Herring gull and lesser black-backed gull were therefore the only gull species included within CRM. Any gull species omitted from CRM did not exhibit flight activity within the Proposed Development at collision risk height at a level where their populations could be significantly affected by turbine collisions. Collision mortality effects on other gull species during the operational phase are therefore considered **not significant**.

[11] Defined as a minimum total of five flights or minimum of ten individuals of each target species recorded during each season of analysis (see Appendix A08-08 for further details).

The results of CRM for herring gull and lesser black-backed gull during the breeding and wintering seasons are summarised in Table 8-18 and Table 8-19 respectively. Modelled herring gull collision fatalities during the breeding season are estimated as one bird per 33.06 years, equating to 0.91 birds over the operational lifespan of the Proposed Development. Modelled herring gull collision fatalities during the winter season are estimated as one bird per 28.17 years, equating to 1.06 birds over the operational lifespan of the Proposed Development. Modelled lesser black-backed gull collision fatalities during the breeding season are estimated as one bird per 3.88 years, equating to 7.73 birds over the operational lifespan of the Proposed Development. Modelled lesser black-backed gull collision fatalities during the winter season are estimated as one bird per 28.79 years, equating to 1.04 birds over the operational lifespan of the Proposed Development.

As such, assuming gull numbers remain consistent during the operational lifespan of the wind farm(as expected; Section 8.7.4), modelled herring gull collision fatalities equate to 1.97 birds over the operational lifespan of Proposed Development, whilst modelled lesser black-backed gull collision fatalities equate to 8.77 birds over the operational lifespan of Proposed Development. Recent herring gull and lesser black-backed gull population estimates are not available for the local area, but these species are considered locally widespread and common. This would therefore affect far less than 1% of the county populations for these species. These increases in bird mortality would be relatively limited when compared against the annual background mortality for these species, with annual mortality reported to be 12% in adult herring gulls and 9% in adult lesser black-backed gulls (BTO, 2025d/2025e)[12]. Collision mortality due to operational turbines is therefore considered insufficient to significantly affect the population statuses of herring gull and lesser black-backed gull. These effects are considered **not significant**.

8.9.4.7 MARSH FRITILLARY

Whilst no evidence of marsh fritillary was recorded within the Proposed Development, habitats within the Proposed Development site were potentially suitable for marsh fritillary (containing devil's-bit scabious, its larval food plant), and numerous nearby records of this species were identified during the desk study.

As described in Section 8.8 marsh fritillary habitat, and avoid significant disturbance of suitable habitat, during operational maintenance (e.g., during small-scale vegetation clearance to facilitate access to and maintenance of Proposed Development infrastructure). Removal or alteration of suitable habitat for this species during operational maintenance will be minimal. ECoW support (Section 8.8) during relevant maintenance activities will ensure that any suitable marsh fritillary habitat is identified prior to operational activities and appropriate measures (e.g., pre-works surveys and mitigation, in line with measures detailed in Section 8.8) are implemented to avoid harming this species. Considering the ecological baseline regarding this species, and these embedded mitigation

[12] These figures relate to UK populations. Considering the similarities in the ecologies of and pressures on gull populations in the UK and Ireland, these figures are considered to provide an indication of likely annual mortality in Ireland.

measures, effects on marsh fritillary during the operation of the Proposed Development (e.g., through habitat loss and fragmentation, disturbance and displacement, and direct mortality) are considered **not significant**.

8.9.4.8 AMPHIBIANS AND REPTILES

As described in Section 8.8, the Proposed Development includes embedded mitigation during the operational phase to minimise disturbance, and to minimise loss and fragmentation of suitable amphibian and reptile habitat resulting during operational maintenance (e.g., during small-scale vegetation clearance to facilitate access to and maintenance of Proposed Development infrastructure). These include measures to minimise pollution of waterbodies suitable for amphibians and reptiles, and measures to avoid significant disturbance or harm. Removal or alteration of suitable habitat for these species during the operational maintenance of the Proposed Development will be minimal. ECoW support (Section 8.8) during relevant maintenance activities will ensure that any suitable amphibian and reptile habitat is identified prior to operational activities and appropriate measures (e.g., precautionary working methods, including sensitive timing of works) are implemented to avoid harming any amphibians or reptiles. Considering the ecological baseline regarding these species, and these embedded mitigation measures, effects on amphibians and reptiles during the operation of the Proposed Development (e.g., through habitat loss and fragmentation, disturbance and displacement, and direct mortality) are considered **not significant**.

8.9.4.9 TERRESTRIAL MAMMALS

Otter, badger, pine marten, red squirrel and Irish hare were recorded using or potentially using a range of habitats within and adjacent to the Proposed Development; notably conifer plantation (for pine marten and red squirrel), watercourses and scrub (for otter), and agricultural fields, grassland and woodland edges (for badger).

As described in Section 8.8, the Proposed Development includes embedded mitigation during the operational phase (e.g., during small-scale vegetation clearance to facilitate access to and maintenance of Proposed Development infrastructure) to minimise the loss and fragmentation of suitable mammal habitat and avoid significant disturbance of potentially suitable habitat. Removal of suitable habitat for these species during the operation of the Proposed Development will be minimal, and light spill onto habitat used by nocturnal mammal species during operation will be avoided using the measures outlined in Section 8.8. ECoW support during relevant maintenance activities will ensure appropriate measures (e.g., precautionary working methods, sensitive timing of works) are implemented to avoid harm or disturbance. Considering the ecological baseline regarding these species, and these embedded mitigation measures, effects on otter, badger, pine marten, red squirrel and any other terrestrial mammal species during the operation of the Proposed Development are considered **not significant**.

8.9.4.10 BATS

Bat species were identified as being of Local (High Value) Importance due to their recorded levels of activity and the presence habitat of value for foraging and commuting within and adjacent to the Proposed Development. Relevant species comprised common pipistrelle, soprano pipistrelle, Leisler's bat, *Myotis* species, and brown long-eared bat. Despite the low activity levels recorded within the ecological baseline of the Proposed Development, due to its conservation status and potential sensitivity to wind farm development, lesser horseshoe bat is also assessed in this section on a precautionary basis.

As described in Section 8.8, the Proposed Development includes embedded mitigation during the operational phase to minimise the loss and fragmentation of suitable bat foraging and commuting habitat resulting from operational maintenance activities (i.e., (e.g., during small-scale vegetation clearance to facilitate access to and maintenance of Proposed Development infrastructure). Section 8.8 also includes measures to avoid disturbance of suitable habitat (e.g., rough grassland, heath, hedgerows, scrub and watercourses) during such operational maintenance. These embedded mitigation measures will ensure that any suitable bat habitat is identified prior to operational activities and appropriate measures (e.g., further surveys, precautionary working methods, sensitive timing of works) are implemented to avoid any harming or disturbance of bats. Considering this embedded mitigation, and the limited scope for impacts during operational maintenance, effects on foraging, roosting and commuting bats through habitat loss, fragmentation and disturbance during the operation of the Proposed Development are considered **not significant**.

Both direct collision with turbine blades and barotrauma resulting from close contact with blades have been reported as an issue for bats at operational wind farms (Cryan & Barclay, 2009). The susceptibilities of different bat species to such impacts depends on multiple factors; notably their tendency to fly at rotor blade height. A general assessment of vulnerability of bat species to collisions with wind turbines, based on best available scientific information, is provided in Table 8-20. SNH (2019) guidance provides a generic assessment of bat collision risk for UK species (including those relevant to the Proposed Development), based on species behaviour and flight categorisation as well as evidence of casualty rates in the UK and Europe. This bat species collision risk assessment is considered to represent best available information for use in an Irish context. This species collision risk categorisation is used in combination with relative abundance to indicate the potential vulnerability of bat populations. Relative abundances for Irish species were determined in accordance with guidance provided by Wray *et al.* (2010) in combination with available population data (e.g., Roche, 2014).

Table 8-20: Estimated turbine collision risk for relevant bat species

Relative abundance	Collision risk for bat species*		
	Low	Medium	High
Common (100,000 plus)	Brown long-eared bat		Common pipistrelle
			Soprano pipistrelle
Rare (10,000 – 100,000)	Daubenton's bat		Leisler's bat
	Natterer's bat		
	Whiskered bat[13]		
	Lesser horseshoe bat		

**Population vulnerability: yellow = low, orange = medium, red = high.*

In summary, of the bat species identified as IEFs in relation to the Proposed Development (, lesser horseshoe bat, *Myotis* species and), three species are of considered to be of high collision risk (common pipistrelle, soprano pipistrelle, and Leisler's bat), whilst three species are considered to be of low collision risk (brown long-eared bat, lesser horseshoe bat, and *Myotis* species). It should be noted that Leisler's bat, whilst fairly rare in Great Britain and Europe, is one of the most common bat species in Ireland, with an estimated population of 112,800-202,300 (2018-2023) (Roche and Langston, 2024).

The Proposed Development includes embedded mitigation to minimise the risk of collisions and baropressure effects; notably by clearing linear tree/hedgerow features within 62 m, and forestry features within 90 m of turbine blade tips to make habitats in the vicinity of operational turbines unfavourable for bats and thus discourage them from flying through/in close proximity to turbines. The current recommended guidance for this mitigation is dependent upon the turbine specification (including size), which is assumed to be the Vestas V177 4MW for the purpose of this assessment. Considering this turbine specification, bat activity levels recorded within the ecological baseline of the Proposed Development, and embedded mitigation described in Section 8.8, bat flight activity through operational turbines is considered to be insufficient for significant effects to arise.

With the adoption of the embedded mitigation, and the scope for impacts during the operational stage, effects on bats through mortality associated with turbine collisions and baropressure effects during the operation of the Proposed Development are considered **not significant**.

[13] Context regarding *Myotis* species is provided in Table 8-13. As one of the species which, together with Daubenton's bat and Natterer's bat, potentially comprises records within the Proposed Development baseline attributed to *Myotis* species, whiskered bat (*Myotis mystacinus*) is also included here for context.

8.9.4.11 AQUATIC SPECIES AND HABITATS

Brown trout, European eel and Atlantic salmon were assessed as IEFs of Local (High Value) Importance due to their presence in watercourses near the Proposed Development.

The operational phase of the Proposed Development will not result in any direct habitat loss within adjacent watercourses. Operational effects from habitat loss and fragmentation are considered **not significant**.

As described in Section 8.8, embedded mitigation within the operational phase of the Proposed Development includes measures to avoid potential impacts to aquatic habitats and species from run-off and pollutants. This embedded mitigation also includes measures to avoid disturbance of aquatic habitats, including the prevention of light spill onto such habitats. Considering these embedded mitigation measures, and the potential for effects based on anticipated operational maintenance activities, operational effects from disturbance, displacement and pollution, and direct mortality, are considered **not significant**.

8.9.4.12 SUMMARY OF OPERATIONAL EFFECTS

Anticipated effects during the operational phase of the Proposed Development are summarised in Table 8-21.

Table 8-21: Summary of operational effects

IEF	Effect	Effect magnitude	Effect significance
Habitats	Habitat loss and fragmentation	Negligible	Not significant
Habitats	Disturbance, displacement and pollution	Negligible	Not significant
Hen harrier	Direct mortality	Negligible	Not significant
Hen harrier	Habitat loss and fragmentation	Negligible	Not significant
Hen harrier	Disturbance and displacement	Medium	**Long-term moderate negative effect (significant at a County/district level)**
Kestrel	Direct mortality	Medium	**Long-term moderate negative effect (significant at a Local level)**
Kestrel	Habitat loss and fragmentation	Negligible	Not significant
Kestrel	Disturbance and displacement	Medium	**Long-term moderate negative effect (significant at a Local level)**

IEF	Effect	Effect magnitude	Effect significance
Other raptors	Direct mortality	Negligible	Not significant
Other raptors	Habitat loss and fragmentation	Negligible	Not significant
Other raptors	Disturbance and displacement	Low	Not significant
Waders and waterfowl	Direct mortality	Low	Not significant
Waders and waterfowl	Habitat loss and fragmentation	Negligible	Not significant
Waders and waterfowl	Disturbance and displacement	Negligible	Not significant
Gulls	Direct mortality	Low	Not significant
Gulls	Habitat loss and fragmentation	Negligible	Not significant
Gulls	Disturbance and displacement	Negligible	Not significant
Invasive non-native plant species	Spread of invasive non-native species	Low	Not significant
Marsh fritillary	Habitat loss and fragmentation	Negligible	Not significant
Marsh fritillary	Disturbance, displacement, pollution	Negligible	Not significant
Marsh fritillary	Direct mortality	Negligible	Not significant
Amphibians and reptiles	Habitat loss and fragmentation	Negligible	Not significant
Amphibians and reptiles	Disturbance, displacement, pollution	Negligible	Not significant
Amphibians and reptiles	Direct mortality	Negligible	Not significant
Otter	Habitat loss and fragmentation	Negligible	Not significant
Otter	Disturbance, displacement, pollution	Negligible	Not significant
Otter	Direct mortality	Negligible	Not significant
Badger	Habitat loss and fragmentation	Negligible	Not significant
Badger	Disturbance, displacement, pollution	Negligible	Not significant
Badger	Direct mortality	Negligible	Not significant
Pine marten	Habitat loss and fragmentation	Negligible	Not significant

IEF	Effect	Effect magnitude	Effect significance
Pine marten	Disturbance, displacement, pollution	Negligible	Not significant
Pine marten	Direct mortality	Negligible	Not significant
Red squirrel	Habitat loss and fragmentation	Negligible	Not significant
Red squirrel	Disturbance, displacement, pollution	Negligible	Not significant
Red squirrel	Direct mortality	Negligible	Not significant
Irish hare	Habitat loss and fragmentation	Negligible	Not significant
Irish hare	Disturbance, displacement, pollution	Negligible	Not significant
Irish hare	Direct mortality	Negligible	Not significant
Bats	Habitat loss and fragmentation	Negligible	Not significant
Bats	Disturbance, displacement, pollution	Negligible	Not significant
Bats	Direct mortality (including turbine collisions)	Negligible	Not significant
Bats	Habitat loss and fragmentation	Negligible	Not significant
Fish	Disturbance, displacement, pollution	Negligible	Not significant
Fish	Direct mortality	Negligible	Not significant

8.9.5 DECOMMISSIONING PHASE EFFECTS

Potential effects on ecological features associated with the decommissioning phase of the Proposed Development are as follows:

- Direct habitat loss: permanent and temporary reductions to the extent, quality and connectivity of the habitats present; and
- Disturbance and displacement: disturbance of protected and/or priority species from additional noise, dust, light, vibration, and human activity, with the potential to cause displacement.

8.9.5.1 HABITATS AND SPECIES

No other potential impacts other than those detailed above for construction and operation of the proposed scheme are considered likely to occur during decommissioning. Turbine design enables decommissioning to be a relatively straightforward process, during which cranes will disassemble each turbine, and turbine sections will then be removed. The upper sections of the foundations projecting above ground will be removed, and the remainder of the foundations and hardstanding

areas covered over with topsoil and left to regenerate naturally. Underground cables will be cut back at the turbine termination, and will either be recycled or left buried in-situ. Site materials will be disposed of in accordance with current waste legislation.

Although no invasive non-native species were recorded within the extent of the proposed scheme or TDR areas, a number of such species are recorded from within the grid squares overlapping the Site. On a precautionary basis, surveys prior to any ground-works or vegetation management and the adoption of appropriate control measures aimed at addressing the presence/potential presence of any such species will avoid potential significant adverse effects resulting from the inadvertent introduction or spread of non-native invasive.

8.9.5.2 ORNITHOLOGY

Removal of habitat during the decommissioning of the Proposed Development will be limited in extent, anticipated to involve areas similar to those anticipated during the construction phase, which are relatively small compared with retained suitable habitat within the extent of the proposed scheme and across the wider landscape. Any habitat removal will be undertaken in accordance with mitigation measures embedded within the CEMP, ensuring impacts would be short-term and temporary, with any habitat removed during decommissioning subsequently reinstated. As such, potential effects on ornithological IEFs associated with habitat loss and fragmentation during decommissioning of the Proposed Development are considered insignificant.

Decommissioning works are likely to cause a short-term increase in disturbance impacts within the extent of the Proposed Development through elevated levels of noise, vibration and human presence. This could potentially lead to increased energetic stress and reduced condition (with potential implications for breeding and wintering success/survival) amongst certain bird species. However, such impacts will be experienced on a temporary basis only and will not be expected to affect the status of any bird populations within the likely ZoI, and the adoption of mitigation measures embedded within the CEMP for the Proposed Development will ensure short-term impacts on sensitive species (for examples, breeding raptors or wintering waterbird aggregations) are avoided. Extensive areas of suitable foraging and breeding habitat will remain within and adjacent to the extent of the Proposed Development during decommissioning, into which any temporarily displaced birds can disperse. Disturbance effects on all ornithological IEFs during decommissioning of the Proposed Development are therefore considered insignificant.

8.9.5.3 AQUATIC SPECIES

Fish

Watercourses associated with the Proposed Development have been assessed as being of value to brown trout, European eel and Atlantic salmon. The decommissioning phase of the Proposed Development will not result in direct habitat loss within adjacent watercourses. Consequently, the effects of temporary habitat loss and fragmentation during decommissioning are assessed as being insignificant with regard to fish species.

As with other IEFs, mitigation embedded within the CEMP will ensure the avoidance of impacts on aquatic habitats and species arising from run-off or pollution events. Consequently, it is not considered that decommissioning of the Proposed Development will result in significant adverse effects on fish or other aquatic receptors.

8.9.6 CUMULATIVE EFFECTS AND OTHER INTERACTIONS

As described in EIAR Chapter 21, a planning search was carried out to identify proposed, permitted and constructed projects in the wider receiving environment which could potentially contribute to cumulative effects with the Proposed Development. Cumulative effects are defined by CIEEM (2024) as: "Additional changes caused by a proposed development in conjunction with other developments or the combined effect of a set of developments taken together".

Wind farm projects within 20 km of the Proposed Development and other projects within 10 km considered for cumulative effects were identified using various online plans and resources. These distances were based on the typical distances at which impacts on biodiversity features from projects can occur, and on the IEFs relevant to the Proposed Development, with a greater distance considered for wind farm projects due movement patterns of birds when on migration and moving between nesting, foraging and roosting areas (e.g., based on SNH (2016) guidance).

Many consented applications pertain to one-off residential dwellings or farm buildings/structures along the regional roads. Considering their scale, these applications are highly unlikely to have cumulative effects upon the IEFs identified in relation to the Proposed Development. Therefore, only developments of a certain size and nature have been considered further for cumulative assessment.

As per SNH (2018) guidance on Assessing the Cumulative Impacts of Onshore Wind Energy Developments, cumulative effects arising from projects may be:

- Additive (i.e., multiple independent additive model);
- Antagonistic (i.e., the sum of impacts is less than in a multiple independent additive model); or
- Synergistic (i.e., the cumulative impact is greater than the sum of the multiple individual effects).

8.9.6.1 WIND FARM PROJECTS WITH POTENTIAL CUMULATIVE EFFECTS

Other proposed, permitted and constructed wind farms within 20 km of the Proposed Development were considered for their potential to give rise to cumulative effects. The proximity and status (i.e., operational, permitted or pending) of these wind farm projects have been taken into consideration within this assessment.

Seven wind farm developments were identified as requiring assessment of cumulative effects in relation to the Proposed Development, as summarised in Table 8-22.

Table 8-22: Wind Farm developments considered for cumulative effects

Wind farm project	Status	Distance from Proposed Development (km)	No. of turbines	Blade tip height (m)	Max. rotor diameter (m)
Boolinrudda	Pending Application for 10-year extension	5.6	7	126	102
Bootliagh	Approved application for 10-year extension	12.0	12	90	Unknown
Cahermurphy	Appealed	9.4	10	170	Unknown
Slieveacurry	Refused	0.4	8	175	150
Slieveacurry	Refused	0.4	8	175	Unknown
Lissycasey	Refused	15.3	11	131	Unknown
Boolynaglerag h	Extension Refused	16.5	7	126	102
Crossmore	Conditional. Change to existing Consented Proposals	20.8	7	125	115
Kiltumper	Refused	13.2	10	170	Unknown
Sorrell Island (Glenmore)	Approved	12.7	11	131	Unknown
Gortaheera CM2	Refused	10.9	4	131	Unknown
Gortbofarna	Extend period of Planning Permission	9.7	1	44.15	Unknown

Each additional turbine erected in the landscape can potentially increase the scope for cumulative effects on habitats and species. Effects are likely to be more pronounced for highly mobile species which rely on larger continuous areas in which they forage and commute (e.g., birds, bats).

8.9.6.2 OTHER PROJECTS WITH POTENTIAL CUMULATIVE EFFECTS

Existing or proposed projects in the vicinity of the Proposed Development have the potential to cumulatively impact on ecological features; particularly through increased habitat fragmentation,

disturbance, barrier effects, and intensification of collision or displacement effects. In this case, such developments include solar farms, quarries and residential developments. Developments considered for cumulative effects are detailed in Table 8-23.

Table 8-23: Non wind farm developments considered for cumulative effects

Project	Planning/ Project Reference	Nearest Distance to the Proposed Development Site (km)	Description	Scoped in/out for cumulative assessment
Solar Farm	18717 Clare County Council	7.88	5 MW solar farm comprising approximately 22,200 photo-voltaic panels on ground mounted frames within a site area of c. 11.8 hectares, 2 no. single storey delivery station, security fencing, CCTV, new road access on the Ballingaddy East Road (L5124) and all associated ancillary development works.	Application was refused 21/01/2020. This development is therefore scoped out.
Construction of Dairy	21672 Clare County Council	2.72	Construction of a dairy with a wastewater treatment system, slatted cubicle unit and associated site works.	Due to the lack of potential impacts on Aquatic receptors, associated with the Illaunbaun Proposed Development, this development is scoped out.
Domestic wastewater system	2360508 Clare County Council	5.89	Domestic wastewater treatment system consisting of packaged wastewater treatment system, pump sump, rising main and polishing filter including all associated works above and below ground.	Due to the lack of potential impacts on Aquatic receptors, associated with the Illaunbaun Proposed Development, this development is scoped out.
Glamping Site, Lahinch	16855 Clare County Council	4.13	Glamping site comprising to refurbish and re-roof existing outbuilding as reception office, and to construct a glamping services building with Services, M+F Showers / Toilets, Kitchen / Wash Up / Dining / Reception areas, 10 no. individual glamps, 3 no. camper van pitches, pond and	Due to the lack of potential impacts on Aquatic receptors, associated with the Illaunbaun Proposed Development, this development is scoped out.

Project	Planning/ Project Reference	Nearest Distance to the Proposed Development Site (km)	Description	Scoped in/out for cumulative assessment
			landscaping, public road entrance and access road with parking, a wastewater treatment system and associated site works.	
Battery Storage Facility adjacent to existing 38KV electricity substation	18223 Clare County Council	5.58	To construct a battery storage compound adjacent to an existing 38KV electricity substation. The proposed works will involve the construction of new palisade fencing, bunded concrete plinths, up to 21 no. battery storage units and associated equipment, transformers and all ancillary site works.	Conditional approval with 4 conditions. The development is scoped out due to its distance from the Proposed Development, lack of connectivity and nature of the proposals.
Residential	188004 Clare County Council	9.13	To carry out the following development which will consist of: (i) Provision of 18 no. residential units; (ii) hard landscaping including the provision of shared surface area, adjustments to existing footpaths and installation of street lighting and street furniture; (iii) soft landscaping including planting and trees; (iv) new boundary treatments to adjacent lands: (v) upgrading and re-routing of foul sewers and surface water drainage; and (vi) all associated site works.	Conditional Approval 2018. The development is Scoped out due to its distance from the Proposed Development, lack of connectivity and nature of the proposals.
Residential	198012 Clare County Council	3.51	The construction of a new housing estate development consisting of 27 no. residential units. The construction of vehicular and pedestrian access points to the site. On-site sewage	Conditional Approval 2019. The development is Scoped out due to its distance from the Proposed Development, lack of

Project	Planning/ Project Reference	Nearest Distance to the Proposed Development Site (km)	Description	Scoped in/out for cumulative assessment
			treatment with connection to main sewer. Alterations to ground levels to accommodate the development. Varied boundary treatments and landscaping works. Surface water management will include attenuation and overflow. All ancillary site works. In accordance with the Habitats Directive, Appropriate Assessment Screening has been carried out on the project. An Environment Impact Assessment (EIA) screening determination has been made and concludes that there is no real likelihood of significant effects on the environment arising from the Proposed Development.	connectivity, nature of the proposals and results of lack of impacts assessed.
Residential	20175 Clare County Council	5.07	Construct 16 No. semi-detached 3-bedroom houses, 10 No. semi-detached 4-bedroom houses and 1 No. detached 4-bedroom house together with all associated site development works and connections to public services.	Conditional Approval 2021. The development is Scoped out due to its distance from the Proposed Development, lack of connectivity and nature of the proposals.
Residential	22796 Clare County Council	6.58	Housing development at land (0.93 hectares) Liscannor, Co Clare. The construction of 15 No residential dwellings. All associated infrastructure and services including 1 No vehicular access point onto Holland Drive, 2 No pedestrian access points onto Lower Quay, parking, lighting, amenity open	Conditional Approval 2023. The development is Scoped out due to its distance from the Proposed Development, lack of connectivity and nature of the proposals.

Project	Planning/ Project Reference	Nearest Distance to the Proposed Development Site (km)	Description	Scoped in/out for cumulative assessment
			space, boundary wall, drainage and all ancillary works.	
Residential	21146 Clare County Council	5.53	Construction of the following 28 houses, all ancillary site works and connection to public services. A Natura Impact Statement (NIS) has been prepared and accompanies this application.	From examination of the online planning file, it appears that this Application was refused 10/03/2022. This development is therefore scoped out.
Residential	2460474 Clare County Council	9.55	Alter house types approved under P23-60560 to 20 No. Semi-detached two storey dwellinghouses and 1 No. detached bungalow together with all associated site development works and connections to public services.	Conditional Approval 2025. The development is Scoped out due to its distance from the Proposed Development, lack of connectivity and nature of the proposals.
Utilities. Milltown Malbay Urban Wastewater Treatment Plant	N/A	4.3	N/A	Due to the lack of potential impacts on Aquatic receptors, associated with the Illaunbaun Proposed Development and the location of these works downstream, this development is scoped out.
Utilities. Liscannor Urban Wastewater Treatment Plant	191001 Clare County Council	7	Construction of a new wastewater treatment plant to a greenfield site in the townland of Corcomroe, comprising of inlet screening works, 2 no. primary	Due to the lack of potential impacts on Aquatic receptors, associated with the Illaunbaun

Project	Planning/ Project Reference	Nearest Distance to the Proposed Development Site (km)	Description	Scoped in/out for cumulative assessment
			settlement tanks, stormwater and sludge holding tanks, site lighting, 2.4 m high boundary fencing and a scheme identification sign with access provided via an existing junction onto the public road network. All associated site development and site excavation works above and below ground for the wastewater treatment plant; and (2) the construction an underground wastewater terminal pump station in greenfield lands adjacent to John P Holland Park, Liscannor, comprising of an underground concrete pump sump, valve chamber and storage tank, above ground control and wet kiosks, landscaping, site lighting, 1.2 m high boundary fencing with access provided via a new entrance onto the R478. All associated site development and site excavation works above and below ground for the pump station.	Proposed Development and the location of these works downstream, this development is scoped out.
Utilities. Lahinch. Urban Wastewater Treatment Plant	N/A	5.8	N/A	Due to the lack of potential impacts on Aquatic receptors, associated with the Illaunbaun Proposed Development and the location of these works downstream, this development is scoped out.

Project	Planning/ Project Reference	Nearest Distance to the Proposed Development Site (km)	Description	Scoped in/out for cumulative assessment
Utilities. Ennistymon Urban Wastewater Treatment Plant	N/A	6.5	N/A	Due to the lack of potential impacts on Aquatic receptors, associated with the Illaunbaun Proposed Development and the location of these works downstream, this development is scoped out.
Utilities. Inagh Urban Wastewater Treatment Plant	88024 Clare County Council	9.5	Development which will provide for the upgrade of the Inagh wastewater treatment plant and will generally comprise the following: construction of a new by-pass channel at the inlet works, construction of a new stormwater holding tank, construction of new sludge drying reed beds, construction of a new return pumping station and all ancillary site development works including hard and soft landscaping.	Due to the lack of potential impacts on Aquatic receptors, associated with the Illaunbaun Proposed Development and the location of these works downstream, this development is scoped out.
Utilities. Kilmurry Ibrickane Urban Wastewater Treatment Plant	N/A	11.3	N/A	Due to the lack of potential impacts on Aquatic receptors, associated with the Illaunbaun Proposed Development and the location of these works downstream, this development is scoped out.

Project	Planning/ Project Reference	Nearest Distance to the Proposed Development Site (km)	Description	Scoped in/out for cumulative assessment
Commercial	18864 Clare County Council	-	Construction of a Ballroom/Function Room building; Leisure Facility building including restaurant; 53 no dwellings to be used for short term tourist accommodation; minor alterations to Doughmore house; a gatehouse; additional car parking and cycle parking. The development will also provide for the dismantling and removal of the existing Marquee Structure, all associated ground works, ancillary works and enabling works and connection to existing services and facilities. The proposal will be developed on undeveloped lands previously part of planning permission P03/937 and associated permissions which have been part implemented, which provided for the construction of the existing Trump International Golf Links and Hotel and associated facilities. The development will be on a site of approx. 9.76 ha (c.10 ha). This application is accompanied by Natura Impact Statement (NIS) and an Environmental Impact Assessment Report (EIAR).	Incomplete Application therefore scoped out.
Solar	22591 Clare County Council	-	10-year planning permission for a solar array at Ballyglass, Coolderry, Dromintobin North, Reanabrone, and Oakfield (townlands) Ardnacrusha, Co Clare. The development will consist of c265,000 m2 of solar panels on ground	Conditional approval with 13 conditions. The development is scoped out due to its distance from the Proposed Development, lack of

Project	Planning/ Project Reference	Nearest Distance to the Proposed Development Site (km)	Description	Scoped in/out for cumulative assessment
			mounted frames, 8 no. single storey control cabins with associated electrical transformer units and hardstand areas, 2 no. ring main units, underground cabling within the solar array site and within the L70382 public road to connect solar array field parcels, security fencing, CCTV, access tracks (upgrade of existing and new), upgrades to four existing agricultural field entrances on the R463, l3046 and L70382 and creation of new entrance on L70382, temporary construction compound, landscaping and all associated ancillary apparatus and development works. The solar array will connect to the national grid and will have an operational lifespan of 35 years. A Natura Impact Statement (NIS) has been prepared in respect of the Proposed Development and will be submitted to the planning authority with the application.	connectivity and nature of the proposals.

8.9.6.3 ASSESSMENT OF CUMULATIVE EFFECTS ON HABITATS

The constraints-led design approach for the Proposed Development has minimised the requirement for habitat removal, with habitat removal typically involving habitats of relatively low ecological value and/or which are widespread regionally and in the local area (as detailed in Table 8-15 and Table 8-16). Whilst embedded mitigation will be adopted to minimise loss and fragmentation of important habitats, as detailed in Section 8.8. Whilst the Proposed Development will involve the permanent loss of habitats of greater ecological value including heath and mosaics with other habitats, bog, scrub, hedgerow, tree lines and drainage ditches, the majority of these habitats are being retained within the Proposed Development, and these habitats are relatively widespread in the wider landscape. Considering the extent of this habitat removal, even in the context of other projects identified above within the potential ZoI of the Proposed Development, cumulative impacts effects associated with habitat loss are considered **not significant**.

8.9.6.4 ASSESSMENT OF CUMULATIVE EFFECTS ON BIRDS

The likelihood of cumulative effects on bird species depends on factors including their known susceptibilities to wind farm impacts (as discussed in Section 8.9), and their typical patterns of movement and dispersal. For relatively sedentary species which are generally considered less susceptible to wind farm impacts (e.g., collision fatalities and displacement due to turbine operation), the potential for an incremental increase in impact magnitude associated with each turbine erected in the wider landscape is much reduced. For species with larger home ranges and/or which migrate longer distances (e.g., raptors, waders, waterfowl), there is greater potential for turbines to act cumulatively in resulting in effects through collision mortality, displacement and barrier effects. Considering the nearest wind farm development (excluding those for which permission was refused) included in this cumulative assessment is c.5.6 km from the Proposed Development (Table 8-22), potential cumulative effects with other wind farm developments are only anticipated for highly mobile species which are likely to range far from the Proposed Development boundary as part of their territories, dispersal or migrations.

Raptors

Hen harrier was identified as an IEF of *up to* International Importance on a precautionary basis due to the presence of foraging adults within and adjacent to the Proposed Development during the breeding and wintering seasons, which could potentially belong to the qualifying population for West Clare Uplands IBA. Regarding cumulative effects associated with collision mortality, due to the very low levels of flight activity recorded within the wind farm airspace at collision risk height recorded during field surveys to inform the Proposed Development, hen harrier was not included within detailed CRM. Furthermore, hen harrier is known to typically fly below the height of operational turbines (Whitfield & Madders, 2006; Ruddock & Whitfield, 2007; Wilson *et al.*, 2015)), reducing its potential susceptibility to collision impacts with the Proposed Development and other projects. Considering the lack of potential for collision mortality effects from the Proposed Development, the relatively low susceptibility of this species to turbine collisions, and the distance from other wind farm developments (Table 8-22) in the context of known hen harrier movement

patterns (Hardey *et al.*, 2013; SNH, 2016), potential cumulative collision mortality effects on hen harrier are considered **not significant**.

Potentially significant effects from the Proposed Development alone were identified on hen harrier arising from habitat loss and fragmentation during construction, and through disturbance and displacement during construction and operation. As described in Table 8-22, the nearest wind farm project (excluding those for which permission was refused) is located c.5.6 km from the Proposed Development. Whilst this lies within the maximum hen harrier foraging range during the breeding season (10 km), it lies outside the typical core foraging range during the breeding season (2 km) and the typical distance between alternative nest sites (1 km) (SNH, 2016). This wind farm project and others within 10 km (i.e., two projects >9 km from the Proposed Development, as stated in Table 8-22) could therefore potentially interact with the Proposed Development to affect hen harriers identified using the Proposed Development and adjacent land, as they travel across their maximum foraging ranges during the breeding season. However, these wind farm projects do not have the potential to affect habitat within the core foraging ranges of hen harriers for which the Proposed Development and surrounds also comprises core foraging habitat (given the separation distance far exceeds 2 km), nor are they sufficiently near to contain alternative nest sites for hen harriers using the Proposed Development and surrounds (given the separation distance far exceeds 1 km). The potential for these other wind farm projects to significantly affect the hen harrier population on which the Proposed Development has, in isolation, been identified as potentially having significant effects is therefore limited. Non-wind farm projects identified in Table 8-23 are also outside of the core foraging range of any hen harriers using the Proposed Development and surrounds, with those nearest the Proposed Development appearing to involve limited removal of hen harrier habitat or potential for other effects (e.g., disturbance, displacement).

Whilst, as described above, the potential for the Proposed Development to interact with other projects in affecting the hen harriers identified as using the Proposed Development and surrounds is limited, consideration must also be given to how these projects cumulatively affect hen harrier populations across the wider landscape; notably through habitat loss and fragmentation, and through disturbance and displacement. When considered together, these projects have the potential to reduce the availability of suitable hen harrier habitat in the wider landscape, and to displace hen harriers from a greater area of otherwise suitable habitat (i.e., due to disturbance during construction and (especially) operational avoidance of wind farm areas) than that attributable to the Proposed Development alone. Considering this, on a precautionary basis, cumulative effects on hen harrier through habitat loss and fragmentation during construction, through disturbance and displacement during construction, and through operational displacement, are considered potentially **significant negative effects**.

Kestrel was also identified as potentially being subject to significant negative effects from the Proposed Development alone. On a precautionary basis, potentially significant negative effects on breeding and wintering kestrel were identified due to operational collision mortality, and operational disturbance and displacement. Regarding operational collision mortality, kestrel is a relatively sedentary species with home range sizes varying from <1 km^2 to >10 km^2 (Hardey *et al.*,

2013). In the context of nearby wind farm developments (c.5.6 km from the Proposed Development; see description for hen harrier above), there is considered to be limited potential for kestrels using the Proposed Development and surrounds to also be affected by other wind farm developments given this separation distance. The significant collision mortality effect on kestrel from the Proposed Development alone was identified on a precautionary basis, with collision fatalities likely to be low in the context of baseline mortality for this species (BTO, 2025a). Considering these factors, and that kestrel is a relatively common and widespread species in the local area, there is not considered to be potential for significant cumulative effects on kestrel through operational collision mortality.

Regarding potential cumulative effects on kestrel through operational disturbance and displacement, due to the sedentary nature of this species (as described above), there is limited potential for kestrels using the Proposed Development and surrounds to also be subject to disturbance and displacement effects from the projects identified in Table 8-22 and Table 8-23. Similarly, non-wind farm projects identified in Table 8-23 are at a distance from the Proposed Development such that, given the sedentary nature of this species, their potential to affect kestrels also using the Proposed Development and surrounds is limited. As described for hen harrier above, consideration must also be given to how these projects cumulatively affect kestrel populations across the wider landscape through disturbance and displacement. When considered together, these projects have the potential to displace kestrels from a greater area of otherwise suitable habitat (i.e., due to operational avoidance of wind farm areas) than that attributable to the Proposed Development alone. However, kestrel is a relatively common and widespread species locally, with large areas of suitable retained habitat in the wider landscape; especially when viewed in the context of typical kestrel home ranges. Considering this, and the limited scope for impacts from the identified projects within the potential ZoI of the Proposed Development, cumulative effects on kestrel through disturbance and displacement are considered **not significant**.

Regarding other raptor species (e.g., merlin, peregrine), very low levels of flight activity were recorded during field surveys to inform the Proposed Development, with no other raptor species identified requiring detailed CRM due to the lack of potential for significant effects. Considering this, and the distance from other wind farm projects (with the nearest wind farm development being located c.5.6 km from the Proposed Development), potential cumulative effects on other raptor species due to collisions with operational turbines are considered **not significant**.

Similarly, effects on other raptor species (e.g., merlin, peregrine) from the Proposed Development alone through habitat loss and fragmentation during construction, and operational displacement from the vicinity of turbines, were assessed as being not significant. Considering this, the relatively low levels of activity recorded by these species during field surveys to inform the Proposed Development, and the distance and type of other projects identified in Table 8-22 and Table 8-23 (with the nearest wind farm development located c.5.6 km from the Proposed Development), potential cumulative effects on other raptor species through habitat loss and fragmentation during construction, and operational displacement from the vicinity of turbines, are assessed as being **not significant**.

Other bird species

Other bird species identified as IEFs include waders (notably golden plover and snipe), waterfowl, and gulls (notably herring gull and lesser black-backed gull). Activity by these species in the context of their local population statuses was typically low, with embedded mitigation within the Proposed Development (Section 8.8) considered sufficient to avoid potential significant effects on these species. Many bird species recorded within the ecological baseline of the Proposed Development are relatively sedentary and considered less susceptible to wind farm impacts from collision mortality, disturbance and displacement. More vulnerable species (e.g., due to their flight characteristics and movement patterns) such as waterfowl were typically recorded in very low numbers or were absent from the Proposed Development and immediate surrounds.

Of the other bird species identified as IEFs, golden plover, snipe, herring gull and lesser black-backed gull required more detailed consideration due to their level of flight activity through the wind farm airspace; notably for golden plover, herring gull and lesser black-backed gull. Detailed CRM for those species identified a Low magnitude non-significant effect due to operational collisions, which equated to 2.34, 1.97 and 8.77 birds during the operational lifespan of the Proposed Development for golden plover, herring gull and lesser black-backed gull respectively. The nearest wind farm development considered during the cumulative effect assessment is c.5.6 km from the Proposed Development, with a further two wind farm developments within 10 km of the Proposed Development. Considering the local population statuses of these species, the modelled collision fatalities and baseline mortality rates for these species (as discussed in Section 8.9.4), and the distance and the proximity and scale of wind farm developments in the wider landscape (with a potential 20 turbines within 10 km of the Proposed Development), potential cumulative effects on golden plover, snipe, herring gull and lesser blacked gull, as well as other bird species (except raptor species described above) through operational collision mortality are assessed as being **not significant**. Considering the limited use of habitats on site by these species (e.g., for foraging, roosting), and the proximity and scale of developments considered for cumulative effects, potential cumulative effects on these species are assessed as being **not significant**.

8.9.6.5 ASSESSMENT OF CUMULATIVE EFFECTS ON OTHER SPECIES

The constraints-led design approach for the Proposed Development has minimised the potential for effects on protected and notable species through habitat loss and fragmentation, disturbance and displacement, and direct mortality. Embedded mitigation detailed in Section 8.8 also includes measures to avoid and/or minimise potential effects on these species.

Certain species requiring detailed assessment (e.g., plant species, marsh fritillary, reptiles and amphibians) are relatively sedentary and are therefore less likely to be subject to significant cumulative effects. In addition, these species were included as IEFs for further consideration on a precautionary basis (e.g., based on the presence of suitable habitat and desk study records), with significant populations not identified within or in close proximity to the Proposed Development site. Whilst terrestrial mammals (namely otter, badger, pine marten, red squirrel, and Irish hare) were also included as IEFs on a precautionary basis, these species were either not recorded or recorded at

low activity levels in areas to potentially be affected by the Proposed Development. Large areas of suitable habitat for these species will be retained within and adjacent to the Proposed Development and in the wider landscape. Considering the embedded mitigation described in Section 8.8, the scope for effects on these species and the availability of suitable habitat in the surrounding landscape, cumulative effects on plant species, marsh fritillary, reptiles and amphibians, terrestrial mammals and aquatic species are considered **not significant**.

Regarding potential cumulative effects on bats, the constraints-led design approach has minimised the risk of disturbance, displacement and reduced habitat extent/connectivity. This is based on the extent of habitat removed as part of the embedded mitigation, leaving the majority of suitable habitat intact to support habitat connectivity. Significant cumulative effects through these impact pathways are considered **not significant**.

8.10 MITIGATION MEASURES FOR BIODIVERSITY

This section describes the mitigation measures which will be implemented to avoid the potentially significant effects on IEFs identified in Section 8.9. These measures will be implemented in addition to the embedded mitigation measures described in Section 8.8 which were taken into consideration during the assessment of effects.

The mitigation measures described below are designed to avoid and minimise the risk of effects arising from each phase of the Proposed Development. These measures are designed to avoid, reduce, or mitigate effects on IEFs identified in Section 8.9. In doing so, these measures will also benefit other ecological features (i.e., habitats and species) including the IEFs identified in Section 8.7.

A Species and Habitats Management Plan (SHMP) has been produced to accompany this application and should be read in conjunction with Section 8.10. This provides a framework for the conservation of ecological features, to avoid potential significant adverse effects and ensure the Proposed Development is managed in the interests of biodiversity. Considering the potentially significant effects identified in Section 8.9, the SHMP focuses on hen harrier and habitats identified as potentially being subject to significant effects. In addressing these features, potentially significant effects on kestrel, marsh fritillary and bats will also be addressed. Detailed measures are prescribed in the SHMP and referred to below as appropriate.

8.10.1 CONSTRUCTION PHASE MITIGATION MEASURES

The assessment of effects undertaken in Section 8.9.3 identified the following significant effects on ecological features during the construction of the Proposed Development:

- Direct loss and fragmentation of habitats, including habitats used (or potentially used) by hen harrier, bats and marsh fritillary, including cumulative effects on hen harrier;
- Disturbance and displacement of hen harrier, including cumulative effects.

The following supplementary and/or additional measures are proposed to avoid residual significant effects on the identified IEFs.

Sensitive habitats will be enhanced and managed in direct proportion with the type and extent of habitat loss during construction (Table 8-12 and Table 8-13). The design and management of this habitat will take into consideration the suitability of this habitat for the IEFs identified as potentially subject to significant construction effects in this EIAR chapter. The locations of habitat reinstatement and enhancement measures will account for the risk of introducing additional operational effects (e.g., turbine collisions), with creation of features which could bring sensitive species (e.g., raptors, bats) into proximity with wind turbines avoided. Detailed habitat re-instatement and creation is described in the SHMP for the Proposed Development, including management approaches such as livestock management, rush management, nutrient management, expanding areas of scrub and hedgerows, prevention of gorse/willow scrub encroachment onto valuable open habitats such as grassland, and avoidance of potential deleterious management such as burning and herbicide use. This includes the creation and/or enhancement of the following habitats identified as being important in the context of the Proposed Development: wet heath and bog, grassland, scrub and hedgerows. The total study area in which habitats will be managed comprises 13.64 ha of managed habitats. This significantly exceeds the habitat loss anticipated within the Proposed Development, providing a 20% increase in habitat extent for hen harrier. Details of habitat management regimes are specified in the SHMP.

In particular, habitat creation and enhancement will focus on delivering suitable foraging habitats for wintering and breeding season habitats for foraging hen harrier. Habitat management will also be sympathetic to other IEFs identified as potentially being subject to significant effects during construction; namely marsh fritillary and bats.

8.10.2 OPERATIONAL PHASE MITIGATION MEASURES

The assessment of effects undertaken in Section 8.9.4 identified the following potentially significant effects on ecological features during the operation of the Proposed Development:

- Disturbance and displacement of hen harrier and kestrel, including cumulative effects on hen harrier;
- Kestrel collision fatalities.

As described in Section 8.10.1, habitats will be created in direct proportion with the type and extent of habitat loss during construction (Table 8-12 and Table 8-13). These habitats will also be suitable for hen harrier and kestrel during the operation of the Proposed Development, providing a larger area of more suitable foraging habitat than that present pre-development. Managed areas will, due to their increased suitability, have a significantly higher carrying capacity for hen harrier and kestrel compared with pre-development levels, making them suitable to support birds displaced by turbine operation. Habitats will be subject to management throughout the operation of the Proposed Development, in line with the measures summarised in Section 8.10.1 and detailed in the SHMP, to ensure they continue to be suitable for hen harrier and kestrel.

Considering the relatively low levels of anticipated kestrel collision fatalities due to operational turbines (as assessed in Section 8.9.4; estimated as 10.53 kestrels over the operational lifespan of

the Proposed Development), this increased breeding productivity of managed habitats is expected to be sufficient to offset collision fatalities. As an additional secondary mitigation measure on a precautionary basis, given the apparent scarcity of suitable kestrel nesting sites within the Proposed Development, five artificial kestrel nest boxes will be installed in appropriate locations near suitable foraging habitat and away from operational turbines and other potential impact sources. This measure is expected to increase local kestrel breeding productivity.

8.10.2.1 DECOMMISSIONING PHASE MITIGATION MEASURES

Decommissioning of the Proposed Development has potential to result in the spread of invasive non-native plant species. However, the adoption of measure detailed within the CEMP for the Proposed Development will allow for associated impacts be avoided. These measures will including the following:

- Any habitat temporarily cleared during the decommissioning phase will be subject to frequent and ongoing monitoring post-clearance to identify the spread or growth of invasive non-native plant species as well as subsequent remediation measures to be implemented as necessary to avoid any associated adverse effects; and,
- At the end of the first year following the decommissioning of the Proposed Development, a reassessment of the Proposed Development footprint will be undertaken to assess the habitats and species present and inform any further management requirements. This will ensure that the Proposed Development footprint is suitable for Important Ecological Features and other wildlife in the long-term

8.11 ASSESSMENT OF RESIDUAL EFFECTS

The following features were identified as IEFs and were therefore subject to detailed assessment of effects within this EIAR chapter:

- Habitats, specifically Wet grassland, Wet heath, Upland blanket bog, Hedgerow, Treeline and Cutover bog;
- Raptors, specifically hen harrier, kestrel, merlin and peregrine;
- Waders and waterfowl, including golden plover and snipe;
- Gulls, including herring gull and lesser black-backed gull;
- Invasive non-native plant species;
- Terrestrial invertebrates, specifically marsh fritillary;
- Terrestrial mammals, specifically, otter, badger, pine marten, red squirrel and Irish hare;
- Bats, specifically common pipistrelle, soprano pipistrelle, Leisler's bat, brown long-eared bat, *Myotis* species and lesser horseshoe bat;
- Aquatic species, specifically Atlantic salmon, brown trout and European eel.

As described in the assessment of effects presented in Section 8.9, taking into consideration embedded mitigation within the Proposed Development design, but in the absence of any secondary mitigation, the following effects were assessed as being potentially significant:

- Hen harrier: habitat loss and fragmentation during the construction phase, disturbance and displacement during the construction phase, and disturbance and displacement during the operational phase, with potential for cumulative effects through all three impact pathways;
- Kestrel: collision fatalities during the operational phase, disturbance and displacement during the operational phase;
- Marsh fritillary: habitat loss and fragmentation during the construction phase; and
- Bats: habitat loss and fragmentation during the construction phase.

Secondary mitigation measures are proposed in Section 8.10, to provide habitat suitable for hen harrier, kestrel, marsh fritillary and bats. Following the implementation these secondary mitigation measures, no significant residual effects on IEFs, including bird populations, are anticipated.

8.12 ENHANCEMENTS

Further to required secondary mitigation to avoid significant residual effects (as described above), the SHMP for the Proposed Development includes biodiversity enhancement measures for habitats and species. These include measures targeted for hen harrier, but will also benefit other IEFs such as kestrel, marsh fritillary and bats, along with providing enhancements for varied species including amphibians, reptiles, birds and terrestrial mammals. Relevant measures include habitat creation in excess of that to be removed within the Proposed Development, and the prohibition of deleterious practices such as burning, herbicide application and shooting in managed areas. The management of habitats including wet grassland, hedgerows and scrub will benefit varied species, through measures including rush management, nutrient management, and livestock management. Detailed approaches are provided in the SHMP.

8.13 MONITORING

As specified in the SHMP for the Proposed Development, a post-construction monitoring schedule has been devised. This will ensure the mitigation and enhancement measures specified in this EIAR chapter are satisfying their aims (i.e., that habitat extents/conditions and IEF population sizes are attaining those expected based on the ecological baseline for the Proposed Development and the mitigation and enhancement measures implemented). This monitoring will also inform any changes to mitigation and enhancement approaches should the need arise.

Specific monitoring to be undertaken during the operation of the Proposed Development regarding habitats and species will be as follows. This monitoring schedule will be reviewed on completion of the fifth year of monitoring, and revised if necessary, based on previous morning results.

- **Habitat monitoring**: habitats within and adjacent to the Proposed Development will be monitored by suitably experienced ecologists to ensure that they are delivering the maximum

benefit to the target species identified in this report. Monitoring will take place in years 1, 2, 3, 5, 10 and 15 post-construction;

- **Terrestrial species**: periodic monitoring will be undertaken to understand the distributions and abundances of IEFs and other wildlife during the operation of the Proposed Development. This will include monitoring of marsh fritillary, reptiles and amphibians, and terrestrial mammals (otter, badger, pine marten, red squirrel and Irish hare). This monitoring will take place in years 1, 2, 3, 5, 10 and 15 post-construction;
- **Bats**: although potential impacts to bats, particularly as a result of collision and/or baropressure are assessed as not significant, detailed monitoring is proposed to detect any significant changes in bat activity relative to pre-construction surveys, and to record any collision fatalities. Bat activity will be measured within monitoring years continuously between April and October at each turbine location, in combination with carcass searches (see discussion below in relation to birds). This monitoring will take place in years 1, 2, 3, 5, 10 and 15 post-construction;
- **Bird populations:** bird population monitoring will take place throughout the construction of the Proposed Development and in years 1, 2, 3, 5, 10 and 15 post-construction by suitably experienced ornithologists. This monitoring will be undertaken in accordance with best practice survey methods (Gilbert *et al*., 1998; Hardey *et al*., 2013; O'Donoghue, 2019) and focus on recording the following information (depending on the importance of the IEF in question, i.e., which emphasis on hen harrier and kestrel):
- The number and locations of active nests and breeding foraging territories within/adjacent to the Proposed Development;
    - The level and distribution of foraging activity at different times of year; and
    - The number and locations of winter roost sites.
- **Bird mortality:** detailed collision fatality monitoring will be undertaken to confirm the accuracy of the CRM predictions and to guide any additional mitigation requirements. Carcasses of birds likely to be associated with turbine collisions will be searched for at relevant times of year to ensure breeding and wintering species are accounted for. All feather spots and bird carcasses will be photographed and logged in an annual fatality search report, which will be submitted to the relevant planning authority and other stakeholders as determined by planning conditions. Mitigation measures will be reviewed in light of the findings of this collision fatality monitoring and updated as needed. This monitoring will take place n years 1, 2, 3, 5, 10 and 15 post-construction by suitably experienced ecologists.

8.14 SUMMARY

Table 8-24: Summary table

Potential Effect	Construction / Operation	Beneficial / Adverse / Neutral	Extent (Site / Local / National / Transboundary)	Short term / Long term	Direct / Indirect	Permanent / Temporary	Reversible / Irreversible	Significance of Effect (according to defined criteria)	Proposed mitigation	Residual Effects (according to defined criteria)
Direct habitat loss and fragmentation	Construction	Adverse	Local	Long Term	Direct	Permanent	Irreversible	Negligible - Long-term moderate negative effect (significant at a County/district level): hen harrier, marsh fritillary, bats	Good practice working methodologies as described in CEMP, habitat creation and enhancements (as detailed in SHMP)	Not significant
Disturbance and displacement	Construction	Adverse	County	Short Term	Direct and Indirect	Temporary	Reversible	Negligible - short-term moderate negative effect (significant at a County/dist	Good practice working methodologies as described in CEMP, habitat creation and enhancements (as detailed in SHMP)	Not significant

Potential Effect	Construction / Operation	Beneficial / Adverse / Neutral	Extent (Site / Local / National / Transboundary)	Short term / Long term	Direct / Indirect	Permanent / Temporary	Reversible / Irreversible	Significance of Effect (according to defined criteria)	Proposed mitigation	Residual Effects (according to defined criteria)
								rict level): hen harrier		
Direct mortality of individuals	Construction	Adverse	Local	Short Term	Direct	Permanent	Irreversible	Negligible	Good practice working methodologies as described in CEMP	Not significant
Pollution	Construction	Adverse	Local	Short Term	Direct and Indirect	Potentially temporary 9999999933	Potentially reversible	Negligible - Low	Good practice working methodologies as described in CEMP	Not significant
Direct habitat loss and fragmentation	Operation	Adverse	Local	Long Term	Direct	Temporary	Reversible	Negligible - Low	Good practice working methodologies as described in CEMP	Not significant
Disturbance and displacement	Operation	Adverse	County	Long Term	Direct and Indirect	Temporary	Reversible	Negligible - Long-term moderate negative effect (significant at a	Good practice working methodologies as described in CEMP, habitat creation and enhancements	Not significant

Potential Effect	Construction / Operation	Beneficial / Adverse / Neutral	Extent (Site / Local / National / Transboundary)	Short term / Long term	Direct / Indirect	Permanent / Temporary	Reversible / Irreversible	Significance of Effect (according to defined criteria)	Proposed mitigation	Residual Effects (according to defined criteria)
								County/district level): hen harrier, kestrel	(as detailed in SHMP)	
Direct mortality of individuals	Operation	Adverse	Local	Short Term	Direct	Permanent	Irreversible	Negligible - Medium (significant at a Local level): kestrel	Good practice working methodologies as described in CEMP, habitat creation and enhancements (as detailed in SHMP)	Not significant
Pollution of habitats	Operation	Adverse	Local	Short Term	Direct	Potentially temporary	Potentially reversible	Negligible	Good practice working methodologies as described in CEMP	Not significant

8.15 REFERENCES

Amiro, P.G. (1993) Habitat measurement and population estimation of juvenile Atlantic salmon. In R.J. Gibson and R.E. Cutting [ed.]. Production of juvenile Atlantic salmon in natural waters. Can. Spec. Publ. Fish. Aquat. Sci. 118. P 81-97.

ARC (2021a) Amphibian monitoring survey protocol. Amphibian and Reptile Conservation Trust https://amphibian-survey.arc-trust.org/pages/protocol.

ARC (2021b) Reptile monitoring survey protocol. Amphibian and Reptile Conservation Trust. https://reptile-survey.arc-trust.org/pages/protocol.

Aronsuu, K. & Virkkala, P. (2014) Substrate selection by subyearling European river lampreys (Lampetra fluviatilis) and older larvae (Lampetra spp.). Ecology of Freshwater Fish, 23: 644–655.

Bailey, M. & Rochford, J. (2006) Otter Survey of Ireland 2004/2005. Irish Wildlife Manuals, No. 23. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Band, W. (2011) Calculation of collision risk for birds passing through rotor area.

Band, W. (2024) Using a collision risk model to assess bird collision risks for onshore wind farms. NatureScot Research Report 909.

Band, W., Madders, M., & Whitfield, D. (2007) Developing field and analytical methods to assess avian collision risk at wind farms. In: de Lucas, M., Janss, G.F.E. & Ferrer, M. (eds.) Birds and Wind Farms: Risk Assessment and Mitigation. Pp. 259- 275. Quercus, Madrid.

Barrios, L., & Rodriguez, A. (2004) Behavioural and environmental correlates of soaring-bird mortality at onshore wind turbines. Journal of applied ecology, 41(1), 72-81.

Barrios, L., & Rodriguez, A. (2007) Spatiotemporal patterns of bird mortality at two wind farms of Southern Spain. Birds and wind farms, 229-239.

Bat Conservation Ireland (2012) Wind Turbine/Wind Farm Development Bat Survey Guidelines. Version 2.8, December 2012. Bat Conservation Ireland.

Bat Conservation Trust (2023) Guidance Note 08/23: Bats and Artificial Lighting at Night. Institution of Lighting Professionals: https://theilp.org.uk/publication/guidance-note-8-bats-and-artificial-lighting/.

Bibby, C.J., Burgess, N.D., Hill, D.A. & Mustoe, S. (2000) Bird Census Techniques. Second Edition. Academic Press, London.

BirdLife International (2025) Site factsheet: West Clare Uplands: https://datazone.birdlife.org/site/factsheet/west-clare-uplands [accessed 23/05/2025].

Birdwatch Ireland (2012) CBS Manual: Guidelines for Countryside Bird Survey Participants. https://birdwatchireland.ie/app/uploads/2019/03/CBS.pdf.

Birdwatch Ireland (2019) I-WeBS Counter Manual: Guidelines for Irish Wetland Bird Survey counters. https://birdwatchireland.ie/app/uploads/2019/03/CBS.pdf.

Brewin, J., Hoodless, A.N., Heward, C.J. & Hopgood, A. (2022) Conserving Our Woodcock: Research-based measures to help the UK's resident population. Game & Wildlife Conservation Trust, Fordingbridge.

Brown, A. F., & Shepherd, K. B. (1993) A method for censusing upland breeding waders. Bird Study, 40(3), 189-195.

BTO (2025a) BTO BirdFacts: Kestrel Falco tinnunculus. British Trust for Ornithology: https://www.bto.org/learn/about-birds/birdfacts/kestrel [accessed 29/07/2025].

BTO (2025b) BTO BirdFacts: Golden plover Pluvialis apricaria. British Trust for Ornithology: https://www.bto.org/learn/about-birds/birdfacts/golden-plover [accessed 29/07/2025].

BTO (2025c) BTO BirdFacts: Snipe Gallinago gallinago. British Trust for Ornithology: https://www.bto.org/learn/about-birds/birdfacts/snipe [accessed 29/07/2025].

BTO (2025d) BTO BirdFacts: Herring gull Larus argentatus. British Trust for Ornithology: https://www.bto.org/learn/about-birds/birdfacts/herring-gull [accessed 29/07/2025].

BTO (2025e) BTO BirdFacts: Lesser black-backed gull Larus fuscus. British Trust for Ornithology: https://www.bto.org/learn/about-birds/birdfacts/lesser-black-backed-gull [accessed 29/07/2025].

CEN (2003) Water Quality – Sampling of Fish with Electricity. European Standard. Document CEN EN 14011:2000.

Cheal, F., Davis, J. A., Growns, J. E., Bradley, J. S., & Whittles, F. H. (1993) The influence of sampling method on the classification of wetland macroinvertebrate communities. Hydrobiologia, 257(1), 47-56.

CIEEM (2017a) Guidelines for Ecological Report Writing. Chartered Institute of Ecology and Environmental Management.

CIEEM (2017b) Guidelines for Preliminary Ecological Appraisal (2nd Ed). Chartered Institute of Ecology and Environmental Management.

CIEEM (2019) Advice Note on the lifespan of surveys and reports. Chartered Institute of Ecology and Environmental Management.

CIEEM (2024) Guidelines for Ecological Impact Assessment in The UK and Ireland Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management.

Clare County Council (2017) Clare Biodiversity Action Plan 2017-2023. Clare County Council.

Clare County Council (2023) Clare County Development Plan 2023-2029. Clare County Council.

Collins, J. ed. (2016) Bat surveys for professional ecologists: good practice guidelines. 3rd Ed. Bat Conservation Trust.

Collins, J. ed. (2023) Bat surveys for professional ecologists: good practice guidelines. 4th Ed. Bat Conservation Trust.

Crowe, O. (2019) Status of rare breeding birds in the Republic of Ireland 2013 - 2018. Unpublished report to the National Parks and Wildlife Service, Dublin, Ireland.

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

Dawson, H.A., Quintella, B.R., Almeida, P.R., Treble, A.J. and Jolley, J.C. (2015) 'The ecology of larval and metamorphosing lampreys', Lampreys: Biology, Conservation and Control Volume 1, 75-137.

Degerman, E., Tamario, C., Watz, J., Nilsson, P. A., & Calles, O. (2019) Occurrence and habitat use of European eel (Anguilla anguilla) in running waters: lessons for improved monitoring, habitat restoration and stocking. Aquatic ecology, 53(4), 639-650.

DEHLG (2010) Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government.

Drewitt, A. & Langston, R. (2006) Assessing the impacts of wind farms on birds. In: Wind, Fire and Water: Renewable Energy and Birds, 148, 29–42.

EPA (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports. Environmental Protection Agency.

EPA (2019a) WFD Cycle 2 - Catchment Mal Bay Subcatchment Annagh (Clare)_SC_010. Available at: https://catchments.ie/wpcontent/files/subcatchmentassessments/28_5%20Annagh[Clare]_SC_010%20Subcatchment%20Assessment%20WFD%20Cycle%202.pdf

EPA (2019b) WFD Cycle 2 - Catchment Mal Bay Subcatchment Inagh [Ennistymon]_SC_010. Available at: https://catchments.ie/wpcontent/files/subcatchmentassessments/28_1%20Inagh[Ennistymon]_SC_010%20Subcatchment%20Assessment%20WFD%20Cycle%202.pdf

EU Birds Directive (Council Directive (2009/147/EC); Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (Codified version).

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

European Commission (2001) Assessment of Plans and Projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC. Office for Official Publications of the European Communities.

European Commission (2006) Nature and biodiversity cases: Ruling of the European Court of Justice. Office for Official Publications of the European Communities, Luxembourg.

European Commission (2007) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the Commission. Office for Official Publications of the European Communities, Luxembourg.

European Commission (2013) Interpretation manual of European Union Habitats – EUR28. European Commission, DG Environment, Nature ENV B.3.

European Commission (2018) Managing Natura 2000 Sites - The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC. Office for Official Publications of the European Communities. https://doi.org/10.2779/02245.

Farren, A. Prodohl, P.A., Laming, P. & Reid N. (2010) Distribution of the common lizard (Zootoca vivipara) and landscape favourability for the species in Northern Ireland. Amphibia-Reptilia 31: 387-394.

Feeley, H. B., Baars, J. R., Kelly-Quinn, M., & Nelson, B. (2020) Ireland Red List No. 13: Stoneflies (Plecoptera). National Parks and Wildlife Service.

Fossitt (2000) A Guide to Habitats in Ireland. The Heritage Council.

Gardiner, R. (2003) Identifying lamprey. A field key for sea, river and brook lamprey. Conserving Natura 2000 Rivers, Conservation techniques No. 4. Peterborough. English Nature.

Gilbert, G., Stanbury, A. & Lewis, L. (2021) Birds of Conservation Concern in Ireland 2020 –2026. Irish Birds 9: 523—544.

Gilbert, G., Gibbons, D.W. & Evans, J. (2011) Bird Monitoring Methods. The Royal Society for the Protection of Birds, Sandy, England.

Goodship, N.M. & Furness, R.W. (2022) Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283.

Goodwin, C.E., Dick, J.T.A. & Elwood, R.W. (2008) A preliminary assessment of the distribution of the sea lamprey (Petromyzon marinus L), river lamprey (Lampetra fluviatilis (L.)) and brook lamprey (Lampetra planeri (Bloch)) in Northern Ireland. Biology and Environment: Proceedings of the Royal Irish Academy 109B, 47-52.

Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. & Thompson, D. (2013) Raptors: A Field Guide for Surveys and Monitoring.

Harding, J. & Lysaght, L. (Eds.) (2025) An Atlas of Butterflies in Ireland 2010-2021. The National Biodiversity Data Centre, Waterford.

Heward, C. J., Hoodless, A. N., Conway, G. J., Aebischer, N. J., Gillings, S., & Fuller, R. J. (2015) Current status and recent trend of the Eurasian Woodcock Scolopax rusticola as a breeding bird in Britain. Bird Study, 62(4), 535-551.

Highways Agency (1999) The Good Roads Guide: Nature Conservation Advice in Relation to Otters Design Manual for roads and Bridges (DMRB Vol 10 S. 4 Part 4 HA 81/99).

Hoodless, A.N., Lang, D., Aebischer, N.J. Fuller, R.J. & Ewald, J.A. (2009) Densities and population estimates of breeding Eurasian Woodcock Scolopax rusticola in Britain in 2003. Bird Study 56: 15–25.

Hötker, H., Thomsen, K.-M. & Jeromin, H. (2006) Impacts on Biodiversity of Exploitation of Renewable Energy Sources: The Example of Birds and Bats – Facts, Gaps in Knowledge, Demands for Further Research, and Ornithological Guidelines for the Development of Renewable Energy Exploitation. Michael-Otto-Institut im NABU, Bergenhusen.

Humphreys, E.M., Marchant, J.H., Wilson, M.W. & Wernham, C.V. (2015a) Merlin (Falco columbarius): SWBSG Species Dossier 11. Report by BTO Scotland to SWBSG as part of Project 1403. Updated by SWBSG March 2017.Humphreys, E.M., Marchant, J.H., Wilson, M.W. and Wernham, C. V. (2015b) Peregrine (Falco peregrinus): SWBSG Species Dossier 12. Report by BTO Scotland to SWBSG as part of Project 1403. Updated by SWBSG March 2017.Inland Fisheries Ireland data for Water Framework Directive Fish Ecological Status 2008-2021. Available at https://opendata-ifigis.hub.arcgis.com/datasets/IFIgis::water-framework-directive-fish-ecological-status-2008-2021/.

Irish Wind Energy Association (2012) Best Practice Guidelines for the Irish Wind Energy Industry.

IWT (2013) IWT National Smooth Newt Survey 2013 report. Author: Sean Thomas Meehan. Irish Wildlife Trust.

Kelly, F.L., Harrison, A., Connor, L., Wightman, G., Matson, R., Hanna, G., Feeney, R., Morrissey, E., O'Callaghan, R., Wogerbauer, C., Rocks, K., Hayden, B. & Stafford, T. (2010) Sampling Fish for the Water Framework Directive – Rivers 2009. Shannon International River Bason District Rivers. Central and Regional Fisheries Boards.

Kelly, F.L., Matson, R., Connor, L., Feeney, R., Morrissey, E., Coyne, J. & Rocks, K. (2014) Water Framework Directive Fish Stock Survey of Rivers in the Shannon International River Basin District. Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24, Ireland.

Kelly, J., Tosh, D., Dale, K., & Jackson, A. (2013a) The economic cost of invasive and non-native species in Ireland. Invasive Species Ireland.

Kelly, J., Tosh, D., Dale, K., & Jackson, A. (2013b) The economic cost of invasive and non-native species in Ireland and Northern Ireland. A report prepared for the Northern Ireland Environment Agency and National Parks and Wildlife Service as part of Invasive Species Ireland, 86.

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.Lawton C., Hanniffy, R., Molloy, V., Guilfoyle, C., Stinson, M. & Reilly, E. (2020) All-Ireland Squirrel and Pine Marten Survey 2019. Irish Wildlife Manuals, No. 121. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.Lusby, J., Corkery, I., McGuiness, S., Fernández Bellon, D., Toal, L., Norriss, D.W., Breen, D., O'Donaill, A., Clarke, D., Irwin, S., Quinn, J.L., O'Halloran, J. (2017) Breeding ecology and habitat selection of Merlin Falco columbarius in forested landscapes, Bird Study 64, 445-454.Lasne, E., Sabatié, M.R., Tremblay, J., Beaulaton, L., Roussel, J.M. (2010) A new sampling technique for larval lamprey population assessment in small river catchments. Fisheries Research, 106, 22-26.

Lusby, J. & O'Clery, M. (2014) Barn Owls in Ireland: information on the ecology of barn owls and their conservation in Ireland. Kilcoole. BirdWatch Ireland.

Madden, B., Hunt, J, & Norriss, D. (2009) The 2002 survey of Peregrine Falco peregrinus breeding population in the Republic of Ireland. Irish Birds 8: 543-548 (2009).

Marnell, F. (2002) 'The distribution and habitat of the common lizard, Lacerta vivipara Jacquin, in Ireland', Bulletin of the Irish Biogeographical Society, 26, 75-82.

Marnell, F., Kelleher, C. & Mullen, E. (2022) Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

Marnell, F., Kingston, N. & Looney, D. (2009) Ireland Red List No. 3: Terrestrial Mammals, National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Marnell, F., Looney, D. & Lawton, C. (2019) Ireland Red List No. 12: Terrestrial Mammals. National Parks and Wildlife Service, Department of the Culture, Heritage and the Gaeltacht, Dublin, Ireland.

Matson, R., Delanty, K., Shephard, S., Coghlan, B., & Kelly, F. (2018) Moving from multiple pass depletion to single pass timed electrofishing for fish community assessment in wadeable streams. Fisheries Research, 198, 99-108.

Mathews, F., Richardson, S., Lintott, P.R., Hosken, D., (2016) Understanding the Risk to European Protected Species (bats) at Onshore Wind Turbine Sites to Inform Risk Management. Department for Environment Food and Rural Affairs Science and Research Projects.

McGuinness, S. (2015) Bird Sensitivity Mapping for Wind Energy Developments and Associated Infrastructure in the Republic of Ireland.

Moriarty, C. (2003) The yellow eel. In Eel Biology, pp. 89-105). Springer, Tokyo.

National Biodiversity Data Centre (2025) The National Biodiversity Data Centre, available: https://biodiversityireland.ie [Accessed July 2025].

Nature Scot (2021) Bats and onshore wind turbines – survey, assessment and mitigation.

NPWS (2019a) The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS Report.

NPWS (2019b) The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report.

NPWS (2019c) The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments. Unpublished NPWS report.

NPWS (2022) Flora (Protection) Order, 2022. National Parks and Wildlife Service.

NPWS & EHS (2005) All Ireland Species Action Plans. National Parks and Wildlife Service and Environment & Heritage Service.

NPWS & EHS (2008) All-Ireland Species Action Plan: Red Squirrel. National Parks and Wildlife Service/Environment and Heritage Service.

NPWS & VWT (2022) Lesser horseshoe bat Species Action Plan 2022-2026. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

NRA (2005) Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. National Roads Authority.

NRA (2006) Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes. National Roads Authority.

NRA (2008) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes. National Roads Authority.

NRA (2009a) Guidelines for Assessment of Ecological Impacts of National Road Schemes. National Roads Authority.

NRA (2009b) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority.

OPR (2021) OPR Practice Note PN01 Appropriate Assessment Screening for Development Management.

O'Donoghue, B. (2019) Survey Guide – Hen Harrier Roost Type and Guidelines to Roost Watching. Irish Hen Harrier Winter Survey.

O'Flynn, C., Kelly, J., & Lysaght, L. (2014) Ireland's invasive and non-native species—trends in introductions. National Biodiversity Data Centre Series, 2.

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.

O'Mahony, D. (2016) Pine marten (Martes martes), in Lysaght, L. and Marnell, F. (2016) Atlas of Mammals in Ireland 2010-2015, 100-101, Waterford: National Biodiversity Data Centre.

O'Mahony, D., Turner, P, O'Reilly, C. (2012) Pine marten (Martes martes) distribution and abundance in Ireland: A cross-jurisdictional analysis using non-invasive genetic survey techniques. Mammalian Biology, 77 (5), 351-357.

Pearce-Higgins, J.W. (2021) Climate Change and the UK's Birds. British Trust for Ornithology Report, Thetford, Norfolk.

Pearce-Higgins et al. (2009) The distribution of breeding birds around upland wind farms. Journal of Applied Ecology 2009, 46, 1323-1332.

Percival, S.M. (2007) Predicting the effects of wind farms on birds in the UK: the development of an objective assessment method. Pp. 137–152 in De Lucas, M.; Janss, G.F.e.; Ferrer, M. (eds): Birds and wind farms: risk assessment and mitigation. Quercus, Madrid.

Pike, C., Crook, V. & Gollock, M. (2020) Anguilla anguilla. The IUCN Red List of Threatened Species 2020: e.T60344A152845178. https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T60344A152845178.en

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.

Reid, N., Dingerkus, K., Montgomery, W. I., Marnell, F., Jeffrey, R., Lynn, D., Kingston, N. and McDonald, R. A. (2007) 'Status of hares in Ireland', Irish Wildlife Manuals No. 30, National Parks and Wildlife Service, Ireland, Department of Environment, Heritage and Local Government.

Reid, N., Etherington, T.R, Wilson, G., Mc Donald, R.A. and Montgomery W.I. (2008) Badger survey of Northern Ireland 2007/08, prepared by Quercus and Central Science Laboratory for the department of Agriculture and Rural Development (DARD), Northern Ireland, UK.

Reid, N., Hayden, B., Lundy, M.G., Pietravalle, S., McDonald, R.A. & Montgomery, W.I. (2013) National Otter Survey of Ireland 2010/12. Irish Wildlife Manuals No. 76. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Reynolds et al. (2010) A technical manual for monitoring white-clawed crayfish, Austropotambius pallipes in Irish lakes. Irish Wildlife Manuals, Department of Arts, Heritage and Gaeltacht.

Roche (2024) Lesser horseshoe bat population estimate. Unpublished report to National Parks & Wildlife Service.

Roche, N. & Langton, S. (2024) Population estimates, trends and background information for six Irish bat species. Article 17 reporting 2018-2023: Supporting document. Unpublished report to National Parks & Wildlife Service.Ruddock, M., Wilson-Parr, R., Lusby, J., Connolly, F., J. Bailey, & O'Toole, L. (2024). The 2022 National Survey of breeding Hen Harrier in Ireland. Report prepared by Irish Raptor Study Group (IRSG), BirdWatch Ireland (BWI), Golden Eagle Trust (GET) for National Parks & Wildlife Service (NPWS). Irish Wildlife Manuals, No. 147. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.Rooney, S.M., O'Gorman, N.M., Greene, F. and King, J.J. (2013) 'Aspects of brook lamprey (Lampetra planeri Bloch) spawning in Irish waters', Biology and Environment: Proceedings of the Royal Irish Academy, 113(1), 13-25.

Scottish Natural Heritage (2000) Wind farms and birds: Calculating a theoretical collision risk assuming no avoiding action. Scottish Natural Heritage, Inverness.

Scottish Natural Heritage (2016) Assessing Connectivity with Special Protection Areas (SPAs). Volume 3.

Scottish Natural Heritage (2017) Recommended bird survey methods to inform impact assessment of onshore windfarms.

Scottish Natural Heritage (2018) Assessing the cumulative impacts of onshore wind farms on birds.

Scottish Natural Heritage (2019) Avoidance Rates for the onshore SNH Wind Farm Collision Risk Model. Scottish Natural Heritage. https://www.nature.scot/wind-farm-impacts-birds-use-avoidance-rates-snh-wind-farm-collision-risk-model.

Shawyer, C.R. (2011) Barn owl Tyto alba survey methodology and techniques for use in ecological assessment: developing best practice in survey and reporting. IEEM, Winchester, 8(8.2), pp.8-3.

Sleeman, D.P., Davenport, J., More, S.J., Clegg, T.A., Collins, J.D., Martin, S.W., Williams, D.H., Griffin, J.M. and O'Boyle, I., (2009) How many Eurasian badgers Meles meles L. are there in the Republic of Ireland? European Journal of Wildlife Research, 55, pp.333-344.Smith, G.F., O'Donoghue, P., O'Hora, K. & Delaney, E. (2011) Guidance for Habitat Survey and Mapping. The Heritage Council. Thaxter, C.B. et al. (2017) Bird and bat species' global vulnerability to collision mortality at wind farms revealed through a trait-based assessment. Proc. R. Soc. B 284:20170829.

Thaxter, C G., Ross-Smith., V, H., Willem, B., Clark, N, A., Conway, G, J., Masden, E, A., Clewley, G, D., Barber, L, J., Burton, N, H, K. (2019) Avian vulnerability to wind farm collision through the year: Insights from lesser black-backed gulls (Larus fuscus) tracked from multiple breeding colonies. Journal of Applied Ecology.

TII (2017) Barn Owl Surveying Standards for National Road Projects, Dublin: Transport Infrastructure Ireland: https://www.tiipublications.ie/library/RE-ENV-07005-01.pdf.

van Swaay, C., Wynhoff, I., Verovnik, R., Wiemers, M., López Munguira, M., Maes, D., Sasic, M., Verstrael, T., Warren, M. & Settele, J. (2010) Euphydryas aurinia. The IUCN Red List of Threatened Species. Version 2014.2.

Whitfield, D. P. & Madders, M. (2006). Upland raptors and the assessment of wind farm impacts. Ibis, 148, 43-56.

Wilson, D., Fernandez-Bellon, D., Irwin, S. & O'Halloran, J. (2015) The interactions between Hen Harriers and wind turbines. Windharrier. Final Project Report. January 2015. School of Biological, Earth & Environmental Sciences, University College Cork.

Wilson-Parr, R. & O'Brien, I. (Eds.) (2019) Irish Raptor Study Group Annual Review 2018.

Wood, J. & Budy, P. (2009) The role of environmental factors in determining early survival and invasion success of exotic brown trout. Transactions of the American Fisheries Society, 138(4), pp.756-767.

Wray, S., Wells, D., Long, E. & Mitchell-Jones, T. (2010) Valuing Bats in Ecological Impact Assessment, In Practice, 23-26.

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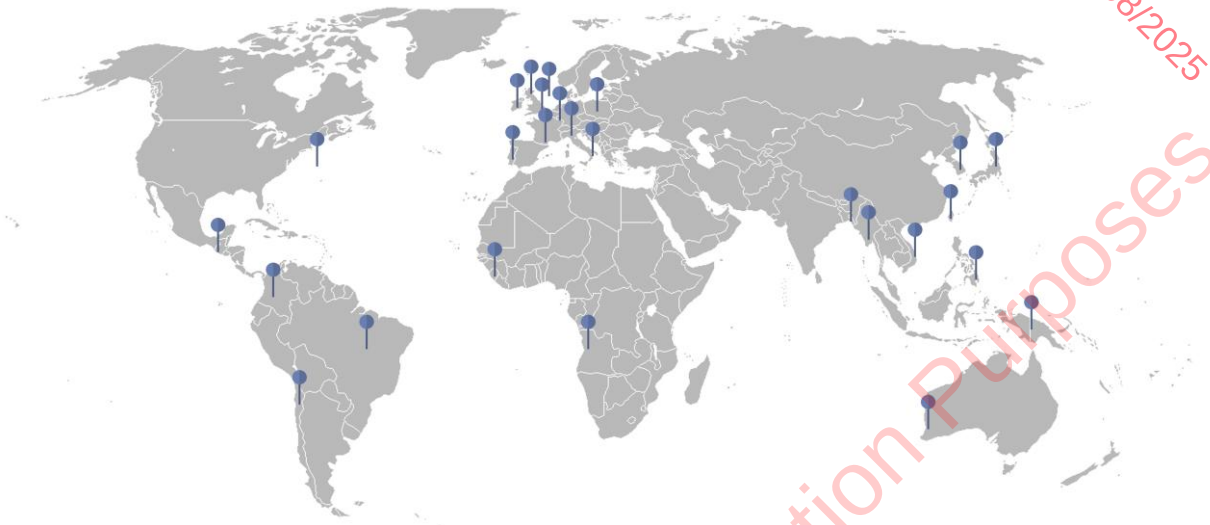

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