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8 ORNITHOLOGY

8.1 Introduction

8.1.1 Purpose of this Chapter

This chapter of the EIAR for the Proposed Development assesses potential effects on ornithological features; specifically on bird populations and their habitats within and adjacent to the Proposed Development, and on relevant ornithological qualifying and supporting interests of nearby designated sites.

This chapter has been informed by available literature and best practice guidance, a desk-based review of relevant designated sites and records of specially protected and notable bird species, and data collected during detailed field surveys of the Proposed Development and adjacent land undertaken between November 2021 and September 2023 inclusive.

The key objectives of the assessment presented in this EIAR chapter are:

- To assess the current ornithological baseline of the Proposed Development site and the likely Zone of Influence, including determination of the importance of the ornithological features present;
- To evaluate the potential significance of effects from the Proposed Development on ornithological features, including from potential impacts during the construction, operational and decommissioning stages, and potential impacts in combination with other plans and projects; and
- To identify mitigation and enhancement measures to avoid significant adverse effects from the Proposed Development on ornithological features and, where possible, achieve a positive effect on bird populations.

This chapter is supported by **Appendix 8.1 Ornithology Collision Risk Modelling Report** which details the methods and findings of collision risk modelling of turbine collision effects on Key Ornithological Features. This has been used to inform **Section 8.6** of this chapter.

This chapter should be read with reference to the following documents:

- Part 4 of the Planning Application, **Appropriate Assessment Reporting**; and **Species and Habitat Management Plan**.

8.1.2 Description of the Proposed Development

The Proposed Development comprises an 11-turbine wind farm on a site located within forested and agricultural lands. It also comprises a Grid Connection Route (GCR) for connection to the national grid, and temporary accommodating works along a Turbine Delivery Route (TDR) to the wind farm, to facilitate the delivery of large components from the port of delivery. The GCR and TDR are both assessed in this EIAR and form part of the planning application.

The key components that are described throughout the EIAR are listed below:

- The wind farm which consists of 11 wind turbines (4 turbines across the Eastern Development Area (Eastern DA) and 7 turbines across the Western Development Area (Western DA));
- The grid connection route and underground cables (also referred to as GCR and UGC); and,
- The turbine delivery route (TDR).

The term 'Proposed Development' collectively describes the above three components. Further information about the Proposed Development is presented in **EIAR Chapter 5: Project Description**.

8.1.3 Legislation, Policy and Guidance

8.1.3.1 Legislative Context

This EIAR chapter has been prepared in reference to the following legislation:

- 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 Convention on Wetlands of International Importance Especially as Waterfowl Habitat 1971 (the "Ramsar Convention");
- 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");
- 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");
- The European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) (the "Habitats Regulations") which transposes the Birds Directive and Directive 92/43/EC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (the "Habitats Directive"); and
- The Wildlife Act 1976 (as amended) (the "Wildlife Act").

Further information outlining the relevance of this legislation to this EIAR chapter is provided below.

The Birds Directive

The Birds Directive relates to the conservation of all species of naturally occurring birds in their wild state in the territory of the EU Member States to which the treaty applies. Under the Birds Directive, the most suitable areas for the conservation of Annex I species are to be designated as Special Protection Areas (SPAs), as part of the European Natura 2000 network. Maintaining a coherent network of protected sites with overarching

conservation objectives is required in order to fulfil the commitment made by governments to maintain environmental protections and continue to meet their international legal obligations.

The Ramsar Convention

The Ramsar Convention is an intergovernmental treaty focused on the conservation and sustainable use of wetland, primarily as habitat for waterbirds. Under the convention, each ratified country is required to identify and designate sites (Ramsar sites) that meet the criteria for identifying a wetland of international importance (i.e., containing representative, rare or unique wetland types). The convention also encourages international co-operation to promote appropriate use of wetlands and their resources.

The Bonn Convention

The Bonn Convention was adopted in 1979 and came into force in 1985. Contracting parties work together to conserve migratory species and their habitats by providing strict protection for endangered migratory species (listed in Appendix I of the Convention), by concluding multilateral agreements for the conservation and management of migratory species which require or would benefit from international cooperation (listed in Appendix II), and by undertaking cooperative research activities.

The Bern Convention

The principal aims of the Bern Convention 1979 are to ensure the conservation and protection of wild plant and animal species and their natural habitats (listed in Appendices I and II of the Convention), to increase cooperation between contracting parties, and to regulate the exploitation of those species (including migratory species) listed in Appendix III. To this end, the Bern Convention imposes legal obligations on contracting parties, protecting over 500 wild plant species and more than 1,000 wild animal species.

The EIA Directive

The EIA Directive aims to ensure that projects that are likely to have significant effects on the environment are identified and assessed within an appraisal process before they are progressed. The directive includes a list of projects that are assessed to have significant effects on the environment and are thus required to undergo an impact assessment. This assessment includes a description of the projects, including an estimate, by type and quantity, of expected effects, residues, and emissions resulting from the operation of the proposals.

The Habitats Regulations

These regulations provide for the implementation in Ireland of the Habitats Directive and the Birds Directive. They provide, among other things, for: the appointment and functions of authorised officers; identification, classification, and other procedures relative to the designation of European sites; conservation objectives and measures, plans, and other activities for, or affecting, the protection of European sites; Appropriate Assessment (AA) as referred to in Article 6(3) of the Habitats Directive and Natura Impact Statements (NIS); and the protection of wild fauna and flora.

The Wildlife Act

The Wildlife Act (as amended) is the principal national legislation for the protection of wildlife and the control of activities that may adversely affect wildlife. This legislation also seeks to conserve a representative sample of important ecosystems and regulate game resources. It makes licences mandatory for certain activities which may interfere with ecosystems and regulates the possession, trade, and movement of wildlife. Areas of importance for wildlife may be protected under the Act, either as Nature Reserves for Fauna, or by way of management agreements.

8.1.3.2 Policy Framework

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

- Project Ireland 2040: National Planning Framework;
- The Biodiversity Sectoral Climate Change Adaptation Plan;
- Clare County Development Plan 2023-2029;
- Tipperary County Development Plan 2022-2028;
- Limerick Development Plan 2022-2028;
- Climate Action Plan 2023 (CAP23) – Changing Ireland for the Better;
- National Biodiversity Plan 2017-2021;
- Clare Biodiversity Action Plan 2017-2023; and
- Limerick City Council Biodiversity Plan.

Further information outlining the relevance of this policy to this EIAR chapter is provided below.

Project Ireland 2040: National Planning Framework

The National Planning Framework under Project Ireland 2040, produced by the Department of Housing Planning and Local Government, provides an overarching framework for the social, economic, and cultural development of the country. It is a national document that guides at a high-level strategic planning and development for the country over the next 20 years so that population growth is economically, socially, and environmentally sustainable. This includes the provision of more renewable energy developments such as the Proposed Development. It ensures that any proposed developments consider biodiversity and the future sustainability of the environment.

The Biodiversity Sectoral Climate Change Adaptation Plan (2019)

This plan sets out a long-term goal for adaptation to climate change, including flood risk management, along with a set of objectives and adaptation actions aimed at achieving those objectives. Such objectives include the enhancement of knowledge and understanding of the impacts of climate change, adapting flood risk management practice, and aligning adaptation to the impact of climate change across sectors of Government policy.

Clare County Development Plan 2023-2029

The Clare County Development Plan 2023-2029 sets out an overall strategy for the proper planning and sustainable development of the functional area of Clare County Council over a six-year period. The Development Plan comprises a written statement indicating the development objectives (including mandatory objectives) for County Clare, supported by maps. Clare County Council is required to prepare and adopt a County Development Plan every six years, with review of the existing Development Plan and commencement of preparation of the new Development Plan required no later than four years after Development Plan adoption.

Tipperary County Development Plan 2022-2028

The Tipperary County Development Plan 2022-2028 guides sustainable physical, economic and social development across Tipperary whilst protecting the environment and guiding and supporting the move to a low-carbon society. It identifies the social, economic and environmental character of Tipperary, provides guidance on the growth of towns, villages and rural areas, and informs the nature of future investment. The Plan serves to inform decisions on public services, infrastructure and amenities, and influences many facets of daily economic and social life regarding the availability and locations of services and employment.

Limerick Development Plan 2022-2028

The Limerick Development Plan 2022-2028 sets out numerous policy objectives for planning, including sections on natural heritage and biodiversity, and water protection. Within the Limerick Development Plan, it is a policy of the council to:

- Protect and conserve Limerick's natural heritage and biodiversity; in particular, areas designated as part of the Natura 2000 network, such as SPAs and Special Areas of Conservation (SACs), in accordance with relevant EU Directives and national legislation and guidelines;
- Maintain the conservation value of all Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) for the benefit of existing and future generations;
- Ensure that projects and plans likely to have significant effects on European sites (either individually or in combination with other plans or projects) are subject to an appropriate assessment and are not permitted under the Limerick Development Plan unless they comply with Article 6 of the Habitats Directive. The council will, through the planning enforcement process where applicable, seek to restore the ecological functions of designated sites where they have been damaged (e.g., through inappropriate development);
- Protect ground and surface water resources and take account of the requirements of the Water Framework Directive when dealing with planning and land use issues; and
- Implement the measures prescribed in the Limerick Groundwater Protection Plan when assessing planning applications and their consequences for ground water.

Climate Action Plan 2023 – Changing Ireland for the Better

CAP23 is the first Climate Action Plan to be prepared under the Climate Action and Low Carbon Development Amendment Act 2021 (the “Climate Act”), which commits Ireland to a legally binding target of net-zero greenhouse gas emissions no later than 2050, and a reduction of 51% by 2030. Among the critical measures in the plan is to increase the proportion of renewable electricity to up to 80% by 2030, making wind farm projects imperative to achieving this aim.

National Biodiversity Plan 2017-2021

In 1996 the Irish Government ratified the convention on Biological Diversity and launched a series of National Biodiversity Plans; most recently the 3rd National Biodiversity Plan 2017-2021. This plan contains the following seven objectives:

- Mainstream biodiversity into the decision-making process across all sectors;
- Strengthen the knowledge basis for conservation management and sustainable use of biodiversity;
- Increase awareness and appreciation of biodiversity and ecosystem services;
- Conserve and restore biodiversity and ecosystem services in the wider countryside;
- Conserve and restore biodiversity and ecosystem services in the marine environment;
- Expand and improve on the management of protected areas and species; and
- Strengthen international governance for biodiversity and ecosystem services.

This plan operates across statutory and non-statutory policy realms.

Clare Biodiversity Action Plan 2017-2023

The Clare County Biodiversity Action Plan 2017-2023 identifies and translates those actions of the National Biodiversity Plan 2017-2021 relevant to County Clare, such that they can be implemented at a county level. The Biodiversity Action Plan will run in parallel with the Clare County Development Plan and build upon its biodiversity goals and objectives across County Clare.

Limerick City Biodiversity Plan

The primary aim of the Limerick City Biodiversity Plan is to maintain, protect and enhance the biodiversity of Limerick City for future generations and to educate and promote the importance of Limerick City’s biodiversity for all. The key targets of the plan involve protecting and creating wildlife corridors, and utilising rooftops and other suitable land for biodiversity enhancement measures. In addition, the plan aims to prevent the spread of invasive species, and includes protecting key wetland habitats throughout the city as a key priority.

8.1.3.3 Guidance and Resources

This EIAR chapter has been prepared in accordance with current key industry standard guidance including the following:

- Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater Coastal and Marine version 1.2 (CIEEM, 2018);
- Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022);
- Best Practice Guidelines for the Irish Wind Energy Industry (Irish Wind Energy Association, 2012);
- Wind energy development and Natura 2000 (European Commission, 2011);
- Bird Sensitivity Mapping for Wind Energy Developments and Associated Infrastructure in the Republic of Ireland (McGuinness et al., 2015);
- Recommended bird survey methods to inform impact assessment of onshore wind farms (Scottish Natural Heritage, 2017); and
- The Birds of Conservation Concern in Ireland (BoCCI) Red and Amber Lists (Gilbert et al., 2021).

8.1.4 Statement of Authority

This EIAR chapter has been prepared by experienced RSK Biocensus and Inis Environmental Consultants Ltd (INIS) ornithologists, based on field data collected by skilled INIS ornithologists who are experienced in undertaking ornithological field surveys in relevant habitats and for relevant species. The contributors to this chapter are listed below:

Andrew Whitfield MA BA CEnv CEcol (Associate Consultant): Andrew has over 30 years of experience in undertaking and co-ordinating ecological and environmental impact assessments across a wide variety of infrastructure projects. These include projects of varying type and scale, ranging from new nuclear power generation facilities and housing developments to major road and rail construction schemes. Andrew has undertaken Habitat 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. Andrew has extensive experience of undertaking Phase 1 habitat surveys and breeding and wintering bird surveys, and has given evidence at approximately 20 planning inquiries/hearings in the UK, Ireland and Africa. Andrew led the quality review of this EIAR chapter.

Howard Williams BSc CEnv CBiol MRSB MIFM (Principal Ecologist and CEO, INIS): Chartered Environmentalist and Chartered Biologist who has authored and managed Ecological Impact Assessments (EIA), Construction Environmental Management Plans and Article 6 Appropriate Assessments for over 50 wind farm projects. Howard is an expert in the field of avian ecology and has extensive knowledge and experience of prescribing management for a range of terrestrial and aquatic protected species. Howard was involved in the technical review of this EIAR chapter.

Dr Alex Copland BSc PhD (Principal Ecologist, INIS): 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 advice during the production of this EIAR Chapter and authored the accompanying Appendix 8.1.

Peter O Connor BA MSc (Lead GIS Specialist, INIS): lead GIS Specialist experienced in overseeing the completion of mapping for multiple windfarm projects. Peter has experience in conducting Viewshed Analysis in support of selected Vantage Points for ornithological surveys, involving the use of Digital Terrain Models and Digital Elevation Models in addition to bespoke Viewshed Analysis plugins for QGIS. Peter also has experience with field data capture and integration into project mapping (e.g., for habitats and species), including for figures supporting EIAR chapters and associated reports. Peter led the production of figures, calculations and all other GIS inputs to this EIAR chapter.

Esther McMorrow Donnellan MSc BA (Ecologist, INIS): ecological consultant with extensive ornithological survey experience including Vantage Point surveys, Countryside Bird Survey transect surveys and breeding wader surveys. Esther has authored numerous ecological reports including survey reports, EclA, Natura Impact Statements (NIS) and Environmental Impact Assessment (EIA) Reports. Esther co-authored this EIAR chapter.

Cillian Burke BSc (Assistant Ecologist, INIS): ecologist with a BSc (Hons) in Environmental Science from the University of Galway. Cillian 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 AA Screening Reports, NIS, EclA and Biodiversity Net Gain (BNG) Reports. Cillian co-authored this EIAR chapter.

Nick Henson MSc CEnv MCIEEM (Associate Director, RSK Biocensus): Nick has a wealth of experience from over 18 years as an ecological consultant, with a technical specialism in ornithology. His expertise includes ornithological impact assessment for a range of projects including wind farms, with which he has extensive experience of providing technical advice and leadership in the UK and Ireland. Nick led the technical review of this EIAR chapter.

George Wilkinson BSc MSc MCIEEM (Senior Ornithologist, RSK Biocensus): George has over five years of consultancy experience and over 15 years of birdwatching experience. His work has primarily focused on ornithological surveys, impact assessment and habitat management in the UK, during which he has frequently led ornithological 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 co-authored this EIAR chapter.

Mr James O'Connell BSc (Hons) (Ecologist, INIS): James was awarded a BSc (Hons) in Wildlife Biology from IT Tralee. James regularly conducts ornithological surveys for various projects across Ireland. He has a broad range of ecological survey experience including Vantage Point surveys, transect surveys, habitat classification and bat surveys. James led a wide a range of ornithological field surveys to inform this EIAR chapter.

Chris McKiernan BSc (Hons) (Ecologist, INIS): Chris has over three years of experience of carrying out professional ornithology surveys in Ireland on a variety of projects. They received a BSc in Ecology and Environmental Biology from UCC in 2020 and is a Qualifying member of CIEEM. Chris was heavily involved in carrying out and coordinating ornithological field surveys to inform this EIAR chapter, including Vantage Point surveys, transect surveys, breeding and wintering raptor surveys, and surveys for wintering waterbirds.

Emily Marsh BSc (Hons) PGDip MSc (Ecologist, INIS): Emily has an MSc in Sustainable Resource Management awarded jointly from the University of Galway and University of Limerick, a Postgraduate Diploma in Climate Change Science & Policy from University of Bristol, and a BSc (Hons) in Environmental & Earth System Science from University College Cork. Emily's expertise is primarily in ornithological surveys, terrestrial mammal surveys and habitat assessment. She is experienced in delivering ecological fieldwork and reporting for renewable energy projects in accordance with industry best practice standards. Emily completed ornithological survey work informing this EIAR chapter including Vantage Point surveys and surveys for breeding and wintering raptors.

Darren McCartney BSc (Ecologist and GIS Specialist, INIS): Darren has worked in both the field ecology and GIS teams at INIS and is a Qualifying member of CIEEM. He has experience of undertaking ornithological field surveys in relevant habitats and completed various surveys to inform this EIAR chapter including Vantage Point surveys, transect surveys, surveys for breeding waders, surveys for breeding and wintering raptors, and surveys for wintering waterbirds. As a member of the INIS GIS team, Darren also contributed to figure production and habitat calculations for this EIAR chapter, and digitised incoming survey data.

Michael Whelan (Consultant Ornithologist): Micheal is a field ecologist based in Co. Offaly, and has been working for INIS since 2018. Michael has substantial experience of many relevant ornithological survey types, and led varied surveys to inform this EIAR chapter including Vantage Point surveys, transect surveys, surveys for breeding waders, surveys for breeding and wintering raptors, and surveys for wintering waterbirds.

8.2 Consultation

Consultees and their responses are listed in full in EIAR **Chapter 3: Scoping, Consultations, Community Engagement and Key Issues**. Regarding potential impacts on ornithological features, the following bodies were consulted in relation to the Proposed Development:

- An Bord Pleanála pre-application consultation;
- National Parks and Wildlife Service (NPWS): sensitive data request issued 24/02/2023, response received 06/03/2023; and
- NPWS Development Applications Unit (DAU): request for recommendations and observations issued 21/02/2023, response received 30/03/2023. The DAU made no comment on this referral.

8.3 Methodology

This section describes the methods for determining the ‘ornithological baseline’ of the Proposed Development (i.e., the bird populations present within and in close proximity to the Proposed Development footprint prior to development), and the methods for identifying and assessing potential effects from the Proposed Development (including potential effects from collisions with new wind turbines). The study area (i.e., the area within desk-based reviews and/or field surveys were undertaken for a particular ornithological feature) was proportionate to the feature in question, based on professional experience and relevant best practice guidance (notably SNH (2016)). These methods were informed by the best practice guidance described in **Section 8.1.3.3**.

8.3.1 Determining the Zone of Influence

A preliminary Zone of Influence (Zol) was defined for this assessment, within which ornithological features (e.g., designated sites, important habitats and populations of specific species) were considered for potential impacts. This involved detailed consideration of the Proposed Development, including the loop-in grid connection and Turbine Delivery Route (TDR) and its potential source-pathway-receptor model (i.e., based on its geographical location and potential scope for impacts), and best practice guidance on potential impacts and the known movement patterns of relevant species (e.g., SNH (2016)). As such, a preliminary Zol of 15 km was adopted.

The proximity of the Proposed Development to European sites and nationally designated sites is of importance when identifying potential likely significant effects. As described above, a conservative 15km Zol was adopted to ensure comprehensive assessment of potential impact pathways. When identifying potential impact pathways, the complete list of all Qualifying Interests (QIs) and Special Conservation Interests (SCIs) of European sites and nationally designated sites in Ireland (i.e., potential receptors) was considered, in accordance with Irish departmental guidance on AA:

“For projects, the distance could be much less than 15km, and in some cases less than 100m, but this must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in combination effects” (DoEHLG, 2010, p. 32).

Following the guidance set out by the National Roads Authority (NRA) (2009) and the Office of the Planning Regulator (2021), and current guidance specific to ornithological features (McGuinness et al., 2015; SNH, 2017), the Proposed Development has been evaluated based on an identified Zol with regards to the potential source-impact-receptor model for the development. The likely Zol for mobile species (e.g., birds) and static species and habitats is considered differently. Mobile species have a ‘range’ outside of the designated sites for which they are QIs and SCIs. The ranges of mobile QI and SCI species vary considerably, from several metres, to hundreds of kilometres (e.g., in the case of migratory wetland birds). Whilst static species and habitats are generally considered to have Zols in close proximity to the development, they can be significantly affected at considerable distances from an effect source; for example, where an aquatic QI habitat or species is located many kilometres downstream from a pollution source.

Hydrological linkages between developments and statutory designated sites (and their QIs/SCIs) can occur over significant distances; however, any effect will be site-specific depending on the receiving aquatic environment and the nature of the potential impact. A reasonable worst-case ZoI for water pollution from a development is considered to be the hydrological pathway from the development until it reaches the first lentic water body (e.g., lake) or transitional water body (e.g., estuary), as the depositional nature of these waterbodies would limit the transport capacity of any potential influences from the development to downstream designated sites.

8.3.2 Determining the Ornithological Baseline

8.3.2.1 Desk Study

A search of the following information sources was undertaken and updated throughout the assessment process to ensure current data were incorporated into the assessment:

- NPWS website (accessed between 02/10/2023 and 01/11/2023);
- National Biodiversity Data Centre (NBDC) website; (area searched include R56 and R57 10 km grid squares within which the Proposed Development is located, accessed on 02/10/2023, see **Appendix 8.2** for NBDC data); and
- BirdWatch Ireland (BWI) website (accessed between 03/10/2023 and 17/10/2023).

A search was made via NPWS for any statutory designated sites for nature conservation value (e.g., SPAs, Ramsar sites) with features of ornithological interest, and any other relevant protected and priority habitats. A search was also made for non-statutory designated sites with features of ornithological interest., Important Bird Areas (IBAs) have also been considered alongside 'European sites' due to their importance to the conservation of bird populations at an international level.

NBDC records for the area in which the Proposed Development is located were consulted for observations of protected birds in the R56 and R57 10km grid squares (NBDC, 2023) (see **Appendix 8.2**). A data request was also sent to NPWS GIS in February 2023 for a full inventory of all protected and rare bird species recorded within the R56 and R57 10km squares overlapping with the Proposed Development and receiving environment. No bird species records were included within the response.

Bird Sensitivity to Wind Energy by Birdwatch Ireland (McGuinness et al., 2015) was consulted via the NBDC records (for 10km grid squares R56 and R57) and subsequently used to inform the identification of species requiring detailed assessment of effects.

8.3.2.2 Field Surveys

Detailed ornithological field surveys of the Proposed Development and adjacent land within the study area were undertaken between 2021 and 2023 inclusive to identify the bird populations present, and to gather supporting data to enable detailed impact assessment (e.g., through collision risk modelling). Suitable Breeding raptor surveys Breeding wader surveys and IWeBs were conducted within 2km, 500m and 5km respectively to identify any possible proximity to the Proposed Development sites footprint as per best practice guidance methodology (SNH, 2017). Bird transects were

conducted within the windfarm project red line boundary. Watercourse surveys for Kingfisher (*Alcedo atthis*), Dipper (*Cinclus cinclus*) and Grey Wagtail (*Motacilla cinerea*) were conducted along the proposed Grid Connection pathways. Survey dates, timings and conditions are detailed in **Appendix 8.3**. Field surveys undertaken to inform this EIAR chapter were as follows:

- Countryside Bird Survey (CBS) transect surveys during the breeding seasons (i.e., April to September inclusive) 2022 and 2023, and during the winter season (i.e., October to March inclusive) 2022/23.
- Vantage Point (VP) surveys during the breeding seasons 2022 and 2023, and during the winter seasons 2021/22 and 2022/23;
- Breeding Woodcock (*Scolopax rusticola*) surveys during the breeding seasons 2022 and 2023
- Breeding wader surveys during the breeding seasons 2022 and 2023;
- Breeding raptor surveys (notably for Hen Harrier (*Circus cyaneus*)) during the breeding seasons 2022 and 2023;
- Breeding Barn Owl (*Tyto alba*) surveys during the breeding seasons 2022 and 2023;
- Breeding Kingfisher, Dipper and Grey Wagtail surveys during the breeding season 2023;
- Wintering Wetland Bird Surveys (WeBS) during the winter season 2022/23;
- Wintering Red Grouse (*Lagopus lagopus*) surveys during the winter season 2022/23; and
- Wintering Hen Harrier roost surveys during the winter season 2022/23.

All surveys for sensitive breeding and wintering birds (e.g., raptors, waders) were undertaken accordance with reference to current legislation and best practice guidance (notably Hardey et al., 2013) regarding the avoidance of disturbance and were conducted by suitably experienced ornithologists.

The survey approach adopted was based on best practice guidance and professional judgement, in reference to known bird-habitat associations and best practice survey methods for target species. The geographical scope of the field surveys was determined in reference to Scottish Natural Heritage (SNH) and CIEEM guidance (SNH, 2016; SNH, 2017; CIEEM, 2018).

Target species

Certain bird species were identified as ‘target species’ for consideration in relation to the Proposed Development, with survey methods designed to aid recording of these target species. Selection of target species took into consideration:

- Their known or likely presence within or in close proximity to the Proposed Development;
- Their likely sensitivity to the Proposed Development; particularly their potential collision risk and susceptibility to disturbance (Nairn & Partridge, 2013; Thaxter et al., 2017);
- Their level of legislative protection and conservation concern; and

- Their relevance to any nearby designated sites (e.g., as QIs/SCIs).

The following species were identified as target species for this assessment. As such, all observations of these species during the field surveys described below were recorded and mapped, with emphasis on accurate recording of flight lines and heights, wintering aggregations and breeding territories/nest locations. Where these species were recorded during surveys targeting other species (e.g., observations of raptors during wintering wetland bird surveys), these are referred to as ‘incidental sightings’. Target species were:

- All species of waterfowl;
- All species of raptor;
- All species of owl;
- All species of grouse;
- All species of wader; and
- All species of gull.

8.3.2.3 *Breeding Season*

8.3.2.3.1 *Countryside Bird Surveys*

A total of four transect routes were surveyed during the breeding seasons 2022 and 2023. These four transect routes (see **Appendix 8.4, Figure 8-1 & Figure 8-2**). There was a change in transect locations from breeding 2022 season, this change in transect locations and numbers accounted for the change in site layout since the breeding season 2022. One visit of transects 1, 2 and 4 was undertaken in May 2022 and one visit for each transect (1-4) was undertaken in June 2022. One visit for each transect was undertaken in April and May 2023 (**Appendix 8.5, Table 8-29, and Table 8-31**).

The methodology followed the current best practice standard line transect methodology for surveying birds (CBS, 2012). All birds were recorded on standardised recording sheets in four distance categories from the transect route: 0-25 m, 25-100 m, >100 m, and in flight.

The conservation status of each species recorded during the field surveys was assessed using the Birds of Conservation Concern in Ireland (BoCCI) list (Gilbert et al., 2021) in addition to relevant national and international legal designations (see **Section 8.1.2**).

8.3.2.3.2 *Vantage Point Surveys*

During the breeding season 2022, 11 VPs were surveyed per month (VP1-11). These 11 VPs provided coverage of all the lands within the Proposed Development site plus a minimum 500 m buffer around all proposed turbines (see **Appendix 8.4, Figure 8-3**). Surveys from these 11 VPs were undertaken in accordance with best practice survey guidance (SNH, 2017).

Four VP surveys per month (VP3, VP4, VP6 and VP7) were undertaken during the breeding season 2023, with all surveys conducted in accordance with best practice survey guidance (SNH, 2017) (see **Appendix 8.4, Figure 8-4**). This change in VP locations and numbers accounted for the change in site layout since the breeding season

2022 survey period; the viewsheds coverage were not impacted as a result of the VP location changes and 100% viewshed coverage was maintained.

SNH (2017) guidance recommends a minimum of 72 hours per VP location divided between seasons (36 hours per breeding season and 36 hours per winter season) per year. In accordance with SNH (2017) guidance, VPs were surveyed for an average duration of 36 hours per VP per breeding season in both 2022 and 2023.

The availability of suitable weather conditions for completing surveys (i.e., with good visibility and little wind or rain) was considered within survey scheduling. To ensure the avian flight data presented herein were all collected in optimal weather conditions (as required by best practice guidance), it was sometimes necessary to survey a VP twice in one month to compensate for months in which surveying in optimal conditions was not possible (as indicated in **Table 8.1** below). This scheduling falls well within the tolerances of best practice industry standards (SNH, 2017) for such survey work.

Vantage Point survey effort undertaken during the breeding seasons 2022 and 2023 is detailed in **Table 8.1** below.

Table 8.1: VP survey hours, breeding seasons 2022 and 2023

VP	Breeding season 2022							Breeding season 2023						
	Apr	May	Jun	Jul	Aug	Sep	Total	Apr	May	Jun	Jul	Aug	Sep	Total
1	6	6	6	6	6	6	36	-	-	-	-	-	-	-
2	6	6	6	3	9	3	33	-	-	-	-	-	-	-
3	6	3	9	6	6	6	36	0	10	8	6	8	4	36
4	6	6	3	6	6	6	33	0	10	6	9	3	9	37
5	6	6	6	6	6	6	36	-	-	-	-	-	-	-
6	6	6	6	6	6	6	36	0	6	4	8	15	3	36
7	6	6	6	12.5	3	9	42.5	0	6	12	6	8	4	36
8	6	6	6	6	6	6	36	-	-	-	-	-	-	-
9	6	6	1	6	6	6	31	-	-	-	-	-	-	-
10	6	6	6	6	6	6	36	-	-	-	-	-	-	-
11	6	6	2	6	3	6	29	-	-	-	-	-	-	-
Total	66	63	57	69.5	63	66	384.5	0	32	30	29	34	20	145

8.3.2.3.3 Breeding Woodcock Surveys

Breeding Woodcock surveys were carried out in May and June 2022 and in May and June 2023. These surveys were informed by the best practice guidelines provided by Hoodless et al. (2009), Heward et al. (2015) and Brewin et al., (2022). Breeding Woodcock surveys were undertaken within a study area comprising suitable habitat within the Proposed Development and a 500 m buffer. All Woodcocks seen or heard were recorded and mapped, with emphasis on recording any activity suggesting breeding within or near the Proposed Development (e.g., roding males).

8.3.2.3.4 *Breeding Wader Surveys*

To assess the presence of breeding wader species within the Proposed Development plus a 500 m buffer, excluding TDR and the loop-in grid connection, all suitable peatland and wetland habitat was surveyed within the Proposed Development and buffer. This involved survey visits in April, May and June 2022, and in April, May and June 2023. These were undertaken in accordance with relevant best practice guidance (Brown & Shepherd, 1993), during which the observer walked within 100m of all suitable breeding habitat. All wader species and other wetland birds (e.g., wildfowl, rails, gulls and terns) were recorded, along with any other species of conservation interest, with emphasis on recording any breeding wader activity within 500 m of the Proposed Development.

8.3.2.3.5 *Breeding Raptor Surveys*

In addition to VP survey coverage of the Proposed Development during the breeding seasons 2022 and 2023 to record target species including breeding raptors, raptor hinterland surveys were conducted in April, May, June and July 2022, and in April, May, June, July and August 2023. Based on best practice disturbance buffers and core foraging zones for these species (SNH, 2016; Goodship & Furness, 2022), these surveys covered all suitable raptor breeding habitat within a 2km buffer around the Proposed Development turbines. The surveys were conducted in accordance with best practice guidelines (Gilbert et al., 1998; Hardey et al., 2013). All raptors seen or heard were recorded and mapped, with emphasis on recording any activity suggesting breeding. Focal species during these surveys included:

- Merlin (*Falco columbarius*): target habitat surveyed included immature forestry, post-thicket forestry, forestry plantations, heath/bog, wet grassland and scrub;
- Hen Harrier: target habitat surveyed included heath/bog, post-thicket forestry, clear fell forestry and farmland; and
- Kestrel (*Falco tinnunculus*) and Peregrine (*Falco peregrinus*): target habitat surveyed included ruins, derelict housing, active quarries, tree holes/hollows, modern and traditional agricultural buildings, sheds and clear fell areas.

8.3.2.3.6 *Breeding Barn Owl Surveys*

Detailed surveys for breeding Barn Owl were undertaken in April, June, July and August 2022, and in April, June, July and August 2023. These surveys followed *Barn Owl Surveying Standards for National Road Projects* (TII, 2017) and other relevant best practice guidance (Shawyer, 2011; Lusby & O'Clery, 2014).

Buildings were initially noted for potential suitability for breeding Barn Owls during a walkover survey throughout the Proposed Development and a 1 km buffer from the windfarm project elements (Roads, Buildings, Turbines), with any buildings and other artificial habitats (e.g., quarries) identified as having high suitability for nesting and roosting Barn Owls subject to further surveys (SNH, 2017). No other suitable features were identified. The walkover survey involved checking for signs of occupation by Barn Owls such as pellets, feathers and dropping ('whitewash'). Consideration was also given to the extent and distribution of suitable Barn Owl foraging habitat (e.g., rough grassland).

High suitability buildings were surveyed nocturnally to observe Barn Owl activity in April, June, July and August 2022, and in April, June, July and August 2023, with any Barn Owl activity (notably any activity suggestive of breeding) recorded and mapped.

8.3.2.3.7 *Breeding Kingfisher, Dipper and Grey Wagtail Surveys*

To record Kingfisher and other riparian bird species, a standard transect survey methodology was used (Cummins et al. 2010a; Crowe et al. 2008). Rivers that intersected with elements of or were within the receiving environment of the Proposed Development were divided into 500m sections during monthly visits between April and June 2023. The receiving environment is any habitat or feature that is likely to interact with an element of the Proposed Development. Observers recorded all riparian bird species seen or heard while walking along banks, with any relevant behaviours recorded (e.g., behaviour suggesting nearby breeding). Suitable nesting opportunities were also recorded and mapped.

8.3.2.4 *Winter Season*

8.3.2.4.1 *Countryside Bird Surveys*

A total of 16 transect surveys were undertaken during the winter season 2022/23. Four visits were undertaken for each transect route, with the relevant survey visits of each transect outlined in **Appendix 8.5 (Table 8-29, Table 8-30 and Table 8-31)**. These transect routes extended throughout the Proposed Development and a 500m buffer and were consistent with those surveyed during the breeding season 2022. The methodology was based on the standard line transect methodology for surveying birds (CBS, 2012), adopting modifications described by Bibby et al. (2000) and Atkinson et al. (2006) for application during winter. All birds were recorded on standardised recording sheets in four distance categories from the transect route: 0-25 m, 25-100 m, >100 m, and in flight.

The conservation status of each species recorded during the field surveys was assessed using the BoCCI list (Gilbert et al., 2021) in addition to relevant national and international legal designations (see **Section 8.1.2**).

8.3.2.4.2 *Vantage Point Surveys*

During the winter season 2021/22, seven VP surveys were carried out per month (VP1-7). These seven VPs were undertaken in accordance with best practice survey guidance (SNH, 2017) and together provided coverage of all the lands under consideration plus a minimum 500m buffer around the Proposed Development turbines (see **Appendix 8.4, Figure 8-5**). All bird records were allocated to the following height bands: 0-10 m, 10-20 m, 20-30 m, 30-40 m, 40-50 m, 50-200 m, >200 m.

During the winter season 2022/23, 12 VP surveys were carried out per month (VP1-12). These 12 VPs provided the necessary viewshed coverage of all the lands under consideration plus a minimum 500m buffer around the Proposed Development turbines (see **Appendix 8.4, Figure 8-6 and Figure 8-7**). These 12 VPs were undertaken in accordance with best practice survey guidance (SNH, 2017). As mentioned in **Section 8.3.2.3.2**, the change in VP locations and numbers accounted for the change in the site

layout since the previous winter season. The viewsheds coverage were not impacted as a result of the VP location changes and 100% viewshed coverage was maintained.

Following SNH (2017) guidance, an average of six hours per VP during the breeding seasons 20221/22 and 2022/23 was surveyed, generating an average of 36 hours per VP per winter season.

Vantage Point survey effort undertaken during the winter seasons 2021/22 and 2022/23 is detailed in **Table 8.2** below.

Table 8.2: VP survey hours, winter seasons 2021/22 and 2022/23

VP	Winter season 2021/22							Winter season 2022/23						
	Oct	Nov	Dec	Jan	Feb	Mar	Total	Oct	Nov	Dec	Jan	Feb	Mar	Total
1	6	6	6	6	6	6	36	6	6	6	3	6	6	33
2	6	6	6	6	6	6	36	6	5.5	6	6	6	6	35.5
3	6	6	6	6	6	6	36	6	6	6	6	6	6	36
4	6	6	6	6	6	6	36	6	6	6	6	6	6	36
5	6	6	6	6	6	6	36	6	6	6	6	6	6	36
6	6	6	6	6	6	6	36	6	6	6	6	6	6	36
7	6	6	6	6	6	6	36	6	6	6	6	6	6	36
8	-	-	-	-	-	-	-	6	6	6	6	6	6	36
9	-	-	-	-	-	-	-	6	6	6	6	6	6	36
10	-	-	-	-	-	-	-	6	6	6	6	6	6	36
11	-	-	-	-	-	-	-	6	6	6	6	6	6	36
12	-	-	-	-	-	-	-	6	6	6	6	6	6	36
Total	42	42	42	42	42	42	252	72	71.5	72	69	72	72	428.5

8.3.2.4.3 Wintering Wetland Bird Surveys

To provide supplementary information on the presence of wintering waterbirds within the potential Zol of the Proposed Development, wetland bird surveys were undertaken throughout the winter season 2022/23 in line with Bibby et al. (2000) 'wait and see' approach, covering areas of suitable peatland and wetland habitat within a study area of 5 km (SNH, 2016) from the Proposed Development turbines. This range is applied as a professional standard to best represent the extent of wetland species that may be impacted by windfarm developments based on professional experience and the extent of wintering bird species sensitivity distances. Specifically, these surveys were carried out monthly from October 2022 to March 2023. Survey methods followed relevant guidance (Bibby et al., 2000; I-WeBS, 2006; SNH, 2016), with all waterbirds (e.g., waders, wildfowl, rails, gulls and terns) recorded. Other species of conservation interest were also noted, along with details of any observed flight paths to provide information on connectivity between the Proposed Development and the wider landscape.

8.3.2.4.4 *Wintering Red Grouse Surveys*

To provide supplementary information on the presence of Red Grouse within the potential ZoI of the Proposed Development, Red Grouse surveys were undertaken in January and February 2023. A pair of observers, 250m apart, walked four transects across a 1km² area at a steady pace in suitable weather conditions (e.g., clear, dry weather) in accordance with best practice methodology (Cummins et al., 2010b). Where terrain allowed, transects were walked at 125m, 375m, 625m and 875m across the square in an east-west or north-south direction. At 250m, 500m and 750m along alternate transects, the call of a male Red Grouse was played (for no more than 30 seconds) to see whether any birds in the area would respond. The three main types of responses sought were:

- Call back (assumed response of territorial males);
- Flush (bird would fly off either towards or away from the observer); and
- Call back and flush (bird would call and fly off either towards or away from the observer).

8.3.2.4.5 *Wintering Hen Harrier Roost Surveys*

Whilst the winter VP surveys were suitable for recording detailed Hen Harrier activity within the Proposed Development, best practice guidance recommends that data for Hen Harrier should be collected for roosting sites within 2km of wind farm sites (SNH, 2017). In addition, Hen Harriers have a typical foraging range of up to 10 km (SNH, 2016).

Supplementary Hen Harrier roost watch surveys were therefore undertaken during the winter season 2022/23; specifically for five days per month from October 2022 to March 2023 inclusive (i.e., for a total of 30 days). Fieldwork methodology followed SNH (2005) and O'Donoghue (2019) guidance. Suitable Hen Harrier roost locations within 2km of Proposed Development turbines were identified during daytime walkover surveys and were subsequently observed around dusk. Any observations of Hen Harriers and other relevant target species were recorded and mapped, with emphasis on recording any behaviour suggestive of roosting (e.g., birds approaching and/or landing at a potential roost).

8.3.3 **Assessment Methodology**

8.3.3.1 *Potential Effects Associated with Wind Farm Development*

As stated within SNH guidance, wind farms present the following potential risks to ornithological features (Drewitt & Langston, 2006; Band et al., 2007):

- Direct habitat loss and alteration: the construction and (typically to a lesser extent) operational maintenance and decommissioning of wind farm infrastructure have the potential to result in the permanent and temporary loss and alteration of habitat used by birds, potentially resulting in reduced habitat extent, quality and connectivity;
- Disturbance and displacement: the construction, operational and decommissioning stages of the wind farm have the potential to cause disturbance of birds using habitats within and near to the wind farm. This may cause birds to

avoid the wind farm and its surrounding area (i.e., displacement), and can result in barrier effects, in which birds are deterred from using normal routes to/from feeding and roosting grounds; and

- Death/injury: the operation of wind turbines can result in fatalities and injuries through collisions with turbines and interactions with other wind farm infrastructure.

For each of these risks, detailed knowledge of bird distribution and flight activity within and adjacent to the Proposed Development gained from the field surveys has been used to assess the potential effects of the Proposed Development on birds. Effects are assessed with regard to the construction phase, the operational phase, the decommissioning phase and cumulatively in consideration with other plans and projects.

8.3.3.2 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 wind turbines. CRM was undertaken using field data collected during the VP surveys described in **Section 8.3.2**, and in accordance with the following best 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, 2018); and
- Calculation of collision risk for birds passing through rotor area (Band, 2011).

Detailed methodologies adopted within CRM are provided in the EIAR **Appendix 8.1 Collision Risk Modelling Report**. The overall collision risk model 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 birds demonstrate avoidance of wind turbines. 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), and published avoidance rates for the bird species being assessed in relation to the Proposed Development are provided in EIAR **Appendix 8.1**. 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 EIAR **Appendix 8.1**, the following bird species were subject to CRM:

- Buzzard (*Buteo buteo*);

- Hen Harrier;
- Kestrel; and
- Golden Plover (*Pluvialis apricaria*).

To ensure potential collision impacts are fully assessed, CRM was undertaken for the three possible turbine models identified for the Proposed Development: the Nordex N149, Vestas V150-6MW and Nordex N133. The outputs (i.e., predicted number of collisions for a particular bird species) were calculated for all three models. Predicted collisions are therefore presented in this report as a range, from the minimum predicted number of collisions (assuming the selection of the Nordex N133) to the maximum predicted number of collisions (assuming the selection of the Vestas V150). Full details of outputs for all three turbine models are provided in EIAR **Appendix 8.1**.

8.3.3.3 Assessment of the Importance of Ornithological Features

The importance of the ornithological features relevant to this assessment was evaluated based on the methodology set out in Chapter 3 of the 'Guidelines for Assessment of Ecological Impacts of National Roads Schemes' (NRA, 2009). Together, these guidelines and the CIEEM (2018) guidelines provide a basis for determining whether a particular feature is of importance at the following geographic scales:

- International importance (i.e., important in a European or wider international context);
- National importance (i.e., important in an Irish context);
- County/district importance (i.e., important in the context of County Clare); and
- Local importance (Higher or Lower) (i.e., locally important populations/assemblages of bird species and/or protected and/or priority species/habitats).

The evaluation criteria for these scales of importance are provided in **Table 8.3** below.

Table 8.3: Evaluation criteria for assessing the importance of ornithological features

Level of importance	Evaluation criteria
International importance	<p>Special Protection Area (SPA) or proposed Special Protection Area (pSPA).</p> <p>Land that is functionally linked to a European site of ornithological importance to the extent that it is essential to maintaining the coherence of the Natura 2000 Network.</p> <p>Ramsar site supporting populations of birds that form qualifying features of reason for the designation of the site.</p> <p>Resident or regularly occurring populations (assessed to be important at the international level) of bird species listed in Annex I and/or referred to in Article 4(2) of the Birds Directive.</p> <p>Important Bird Area (IBA) supporting bird populations of international importance.</p>
National importance	<p>Natural Heritage Area (NHA) or Statutory Nature Reserve designated for its ornithological interests.</p>

Level of importance	Evaluation criteria
	Resident or regularly occurring populations of birds assessed to be important at the national level, including species 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 included on the BoCCI Red List (Gilbert et al., 2021).
County/district importance	Resident or regularly occurring populations of birds assessed to be important at the county level, including 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 included on the Red or Amber Lists (Gilbert et al., 2021).
Local importance (Higher value)	Resident or regularly occurring populations of birds assessed to be important at the local level, including species 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 included on the BoCCI Red or Amber Lists (Gilbert et al., 2021), or populations of species that are assessed as uncommon in the local area.
Local importance (Lower value)	Populations of species that are common in the local area including those included on the BoCCI Green List (Gilbert et al., 2021).

Features assessed as being of less than Local importance were considered to be of ‘Negligible’ importance and were scoped out of the detailed assessment of effects, since these would not be a material consideration for planning and any effects on these features would not be significant in the context of the local (or higher level) population statuses of these species or species assemblages.

The importance of an ornithological feature (using the geographical scale of importance defined above) can be assessed based on the following factors:

Conservation Status

The assessment of the importance of the bird populations identified took into consideration the conservation statuses of the species recorded. Species afforded special statutory protection or included on lists of species of conservation interest were evaluated. These included:

- EC Birds Directive Annex I species; and
- BoCCI Red and Amber Listed species (Gilbert et al., 2021).

Species Abundance

The assessment of the importance of bird populations identified took into consideration their sizes relative to international, national, and regional population estimates for the species in question. International population estimates used for this analysis were as presented by the International Union for the Conservation of Nature (IUCN) and Wetlands International¹. Importance at a national level was assessed against available national

¹ As detailed by Wetlands International. Available at [Waterbird Population Estimates \(wetlands.org\)](https://www.wetlands.org/) (accessed 21/08/2023).

population estimates such as those published by Crowe et al. (2014) and those available online². Assessment of county or local importance was based on professional judgement and using county population estimates where available (as presented in the appropriate county bird report).

Species Diversity

The assessment of the importance of the populations identified took into consideration the sizes of ornithological species assemblages (i.e., the number of species) recorded within and adjacent to the Proposed Development at different times of year.

Relevant Designated Sites for Features of Ornithological Interest

The importance of the bird populations identified was assessed in the context of relevant designated sites for features of ornithological interest. Specifically, where species recorded during field surveys were deemed to potentially belong to populations of nearby European sites (in reference to SNH (2016) guidance), if the populations of those species recorded within/in close proximity to the Proposed Development exceeded 1% of the cited population estimates for those species for the relevant European sites (e.g., SPAs), the populations recorded were assessed as being potentially significant in the context of the European sites. As such, any adverse effects on those populations recorded within/in close proximity to the Proposed Development could potentially result in effects on ornithological features of international importance, and therefore cause adverse effects on the integrity of European sites.

8.3.3.4 Identification of Key Ornithological Features

The assessment methodology followed a precautionary screening approach regarding the identification of Key Ornithological Features (KOF). Within this chapter, a KOF is defined as a species occurring within the Zone of Influence of the Proposed Development, upon which likely significant effects are anticipated and assessed. In accordance with NRA (2009) and CIEEM (2018) guidelines, a KOF is an important feature which is “both of sufficient value to be material in decision making and likely to be affected significantly”. For this assessment, KOFs have been identified as receptors with a value of Local importance (Higher value) or greater, which may be subject to significant effects from the Proposed Development, either directly or indirectly.

8.3.3.5 Methodology for Assessing Effects

The assessment of potential effects from the Proposed Development on ornithological features has taken 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);

² See [Factsheet \(europa.eu\)](https://factsheet.europa.eu) (accessed 23/10/2023).

- 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: i.e., the likelihood of the ornithological feature being significantly affected by a potential effect source, considered on a scale of negligible, low, medium or high;
- The magnitude of change: i.e., the extent of change in the baseline conditions of the ornithological feature as a result of the Proposed Development, 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: i.e., the number of times an activity may occur to influence the resulting effect;
- Extent: i.e., the spatial or geographical area over which the impact/effect may occur under a suitably representative range of conditions; and
- Reversibility: an irreversible effect is one from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by 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 accordance with CIEEM (2018) guidelines, the significance of an effect on an ornithological 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 the potential to affect 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 habitat to maintain its population on a long-term basis.

Considering the relevance of CIEEM (2018) and EPA (2022) guidance to this assessment, the terminology adopted regarding the significance of effects takes into consideration the effect significance definitions of both guidance documents. Definitions for the level of significance outlined in EPA (2022) are presented in **Table 8.4** below, and are related to the equivalent CIEEM (2018) significance level in **Table 8.5**.

Table 8.4: EPA guidelines for determining significance of ecological effects

Effect significance following EPA guidelines	Definition
Profound	An effect which obliterates sensitive characteristics. Total/near total loss of a bird population due to mortality or displacement. Total/near total loss of productivity in a bird population due to disturbance. Guide: >80% of population lost through additive mortality.
Very significant	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 bird population due to mortality, displacement, or disturbance. Guide: 21-80% of population lost through additive mortality.
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 bird population due to mortality, displacement, or disturbance. Guide: 6-20% of population lost through additive mortality.
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 bird population due to mortality, displacement, or disturbance. Guide: 1-5% of population lost through additive mortality.
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 bird population due to mortality, displacement, or disturbance. Reduction barely discernible, approximating to the “no change” situation. Guide: <1% population lost through additive mortality.

Table 8.5: Comparison of equivalent CIEEM and EPA effect significance criteria

Significance following CIEEM (2018) criteria	Equivalent significance using the EPA (2022) criteria
Significant effect on a feature of International importance	Profound effect
Significant effect on a feature of National importance	Very significant
Significant effect on a feature of County importance	Moderate effect
Significant effect on a feature of Local (Higher) importance	Slight effect
Significant effect on a feature of Local (Lower) importance	Not significant

As outlined above, a significant effect at the international level under the CIEEM guidelines would equate to a profound effect using the EPA guidelines. 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 the effect is “significant” or “not significant”.

8.3.3.6 Mitigation Hierarchy

In accordance with CIEEM’s guidelines (2018), a sequential process has been adopted to avoid, mitigate, and offset negative ornithological impacts and effects, otherwise known as the ‘mitigation hierarchy’. To inform the Proposed Development, avoidance, mitigation, offsetting, and enhancement measures have been identified within the impact assessment process. These principles underpin any EclA and are adapted from CIEEM (2018) guidance as follows:

- **Avoidance:** seek options that avoid harm to ornithological features (for example, by locating on an alternative site);
- **Mitigation:** negative effects on ornithological features should be avoided or minimised through mitigation measures, either through the design of the Proposed Development or through subsequent measures that can be guaranteed (e.g., planning conditions or obligations);
- **Offsetting:** where there are significant negative effects on ornithological features despite the mitigation proposed, these should be offset by appropriate compensatory measures; and
- **Enhancement:** seek to provide benefits for ornithological features over and above requirements for avoidance, mitigation, or offsetting.

Wherever possible, strategies of avoidance have been implemented to minimise any impacts on ornithological features. If avoidance is not possible, mitigation and offsetting measures will be required, as described in **Section 8.7** of this chapter.

8.3.3.7 Determining the Sensitivity of Biodiversity Receptors

Guidance from Percival (2007) and NRA (2009) has been used to evaluate the sensitivity of bird species to the Proposed Development (see **Table 8.6**).

Table 8.6: Bird sensitivity rating equivalency (combined from Percival, 2007 & NRA, 2009)

Sensitivity of receptor	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	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,

Sensitivity of receptor	Percival (2007) criteria	NRA resource evaluation	NRA criteria	Combined criteria
			Article 4(2) of the Birds Directive.	listed in Annex I and/or referred to in Article 4(2) of the Birds Directive.
High	<p>Other non-cited species which contribute to integrity of SPA.</p> <p>Ecologically sensitive species (<300 breeding pairs in UK) and less common birds of prey.</p> <p>Species listed on Annex 1 of the EU bird's directive.</p> <p>Regularly occurring relevant migratory species which are rare or vulnerable.</p>	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.	<p>Other non-cited species which contribute to integrity of SPA</p> <p>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.</p> <p>Species listed on Annex 1 of the EU Bird's Directive.</p> <p>Regularly occurring relevant migratory species which are rare or vulnerable.</p> <p>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).</p>
Medium	<p>Species present in regionally important numbers (>1% of regional population).</p> <p>Species occurring within SPAs but not crucial to the integrity of the site.</p> <p>Species identified as priority species in Ireland and therefore subject to special conservation measures.</p>	County Importance	<p>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;</p> <p>County important populations of species.</p> <p>Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.</p>	<p>Species present in regionally important numbers (>1% of regional population).</p> <p>Species occurring within SPAs but not crucial to the integrity of the site.</p> <p>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;</p> <p>County important populations of species.</p> <p>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.</p>

Sensitivity of receptor	Percival (2007) criteria	NRA resource evaluation	NRA criteria	Combined criteria
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 Importance (High Value)	Locally important populations of priority species or habitats or natural heritage features identified in the Local Biodiversity Action Plan, 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 experienced population decline/range contraction.
Negligible	Species that remain common and widespread.	Local Importance (Low Value)	N/A.	Species that remain common and widespread. Green Listed Species.

8.3.4 Constraints and Limitations

In accordance with best practice guidance for wind farm developments (SNH, 2017), the Proposed Development was surveyed year-round. To facilitate analysis of usage patterns by bird species at different times of year, surveys undertaken in October to March inclusive have been broadly categorised as ‘winter season’ surveys, whilst surveys undertaken in April to September inclusive have been broadly categorised as ‘breeding season’ surveys. It is recognised that species are likely to differ in their patterns of seasonal use of the Proposed Development, with some species likely to exhibit breeding behaviour outside of April to September inclusive, whilst species present during April to September were not necessarily breeding within or in close proximity to the Proposed Development. This has been taken into consideration within this chapter. Whilst no surveys are referred to specifically as passage surveys, as these surveys were undertaken year-round and using appropriate methods, these surveys were suitable to record passage bird activity within the Proposed Development and appropriate buffers.

Whilst desk study data are 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 since they were collected (CIEEM, 2019), after which it may be necessary for further field surveys to be undertaken.

The information provided in this EIAR chapter accurately and comprehensively describes the ornithological baseline of the Proposed Development and provides a prediction of the likely ornithological effects of the Proposed Development, along with prescriptions for mitigation and enhancement 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.

Whilst a single season of wintering Hen Harrier roost surveys was carried out, extensive VP survey effort was undertaken at the Proposed Development during two winter seasons, and extensive Hen Harrier survey effort was also undertaken during two breeding seasons. Considering this, and the suitability of the habitats present, this survey effort is considered appropriate to record the ornithological baseline of the Proposed Development regarding breeding and wintering Hen Harrier.

8.4 Ornithological Baseline

8.4.1 Overview

The receiving environment of the Proposed Development supports a wide variety of typical bird species of open countryside and farmland, including birds of prey and wader species. These include resident species, summer and winter migrants (including summer breeders) and species present during spring and autumn passage.

The composition of the baseline bird population of the Proposed Development and adjacent land, presented herein, is based on the results of the detailed field surveys undertaken between 2021 and 2023 as described in **Section 8.3.2**. Full field survey details are provided in **Appendix 8.3**. Full field survey data, including detailed flight observation data from VP surveys, are provided in **Appendix 8.5**.

Desk study and field survey results are detailed below, including relevant designated sites (**Section 8.4.2**) and accounts for the species identified during the desk study and field surveys as being relevant to the Proposed Development (**Section Error! Reference source not found.**).

8.4.2 Designated Sites

8.4.2.1 European Sites

Relevant European sites of nature conservation importance, including SPAs, SACs and Ramsar sites, are summarised in **Table 8.7** below. These European sites and their hydrological catchments are detailed in the **Appropriate Assessment Reporting**.

A precautionary approach was adopted when identifying relevant European sites, assessing all European sites within a 15 km radius of the Proposed Development as well as more distant sites where potential hydrological linkage exists (see **Section 8.3.1**) (OPR, 2021).

As presented in **Table 8.7** below, 23 European sites were identified for assessment in relation to the Proposed Development: specifically four SPAs and 19 SACs. The distance from the nearest element of the Proposed Development and (where this distance differs significantly) the Proposed Development turbines is stated below.

Table 8.7: Proximity of relevant European sites to the Proposed Development, including Grid Connection and TDR

No.	European site	Distance from Proposed Development	Distance from Proposed Development turbines	Hydrological connectivity (yes/no)
1	Lower River Shannon SAC (002165)	0 m (from closest point of TDR)	7.2 km	TDR spans the SAC via the Killaloe Bypass
2	River Shannon and River Fergus Estuaries SPA (004168)	380 m (from closest point of TDR)	9.1 km	Yes, SPA is located 17.3 km downstream from grid connection
3	Glenomra Wood SAC (001013)	1.3 km	4.5 km	No
4	Danes Hole, Poulnalecka SAC (000030)	2.0 km	2.1 km	No
5	Lough Derg (Shannon) SPA (004165)	2.1 km	12.6 km	No
6	Slieve Bernagh Bog SAC (002312)	3.5 km	4.1 km	No
7	Slievefelim to Silvermines Mountains SPA (004058)	3.8 km	>15 km	No
8	Ratty River Cave SAC (002316)	4.3 km	4.4 km	No
9	Kilkishen House SAC (002319)	5.1 km	5.1 km	No
10	Clare Glen SAC (000930)	5.7 km	>15 km	No
11	Silvermines Mountains West SAC (002258)	6.9 km	>15 km	No
12	Glenstal Wood SAC (001432)	7.8 km	>15 km	No
13	Keeper Hill SAC (001197)	8.5 km	>15 km	No

No.	European site	Distance from Proposed Development	Distance from Proposed Development turbines	Hydrological connectivity (yes/no)
14	Tory Hill SAC (000439)	10.8 km	>15 km	No
15	Poulnagordon Cave (Quin) SAC (000064)	11.3 km	11.4 km	No
16	Askeaton Fen Complex SAC (002279)	11.7 km	>15 km	No
17	Slieve Aughty Mountains SPA (004077)	11.8 km	11.9 km	No
18	Lough Gash Turlough SAC (000051)	12.1 km	13 km	No
19	Silvermine Mountains SAC (000939)	12.2 km	>15 km	No
20	Newgrove House SAC (002157)	13.3 km	13.4 km	No
21	Curraghchase Woods SAC (000174)	13.6 km	>15 km	No
22	Bolingbrook Hill SAC (002124)	13.7 km	>15 km	No
23	Old Domestic Building (Keevagh) SAC (002010)	14.1 km	14.2 km	No

The Proposed Development does not overlap with any European sites, with the exception of Lower River Shannon SAC, for which the TDR spans over the SAC via the Killaloe Bypass. No TDR works will be required at this section of the TDR, and Lower River Shannon SAC is approximately 3.4 km from the Proposed Development turbines. The nearest SPA, River Shannon and River Fergus Estuaries SPA, is located approximately 380 m from the TDR, and approximately 6.4 km from the Proposed Development turbines. As such, European sites were carried forward for consideration as Key Ornithological Features.

There are no Ramsar sites within 15 km of the Proposed Development, with the nearest Ramsar site (Ballyallia Lough, site number: 845) located approximately 18.9 km from the Proposed Development. Considering this distance, and the scope for impacts from the Proposed Development, no Ramsar sites were carried forward for further assessment.

8.4.2.2 Nationally Designated Sites

NHAs are nationally designated sites of nature conservation importance protected under the Wildlife (Amendment) Act 2000. 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.

As presented in **Table 8.8** below, nine NHAs and 33 pNHAs were identified for assessment in relation to the Proposed Development. No other relevant nationally designated sites were identified.

The Proposed Development turbines and Grid Connection do not overlap with any NHA or pNHA boundaries. One NHA, Inner Shannon Estuary – South Shore is located approximately 5.2 m from the TDR, no works are proposed at this section. The Gortacullin Bog NHA, is located approximately 60 m west of the nearest element of the Proposed Development (Hardstand of T11). The next nearest NHA or pNHA, Lough Derg pNHA, is located approximately 867 m north and upstream of the Turbine Delivery Route. The remaining nearby nationally designated sites are all more than 1 km from the nearest element of the Proposed Development. As such, nationally designated sites were carried forward for consideration as Key Ornithological Features.

Table 8.8: Proximity of relevant nationally designated sites to the Proposed Development, including Grid Connection and TDR

No.	Name	Distance from nearest element of Proposed Development	Distance from Proposed Development turbines	Hydrological connectivity (yes/no)
1	Inner Shannon Estuary – South Shore pNHA (004 077)	5.2 m (from closest point of TDR)	10.3 km	Yes (18.2 km downstream via Grid Connection)
2	Gortacullin Bog NHA (002401)	8.7 m	108.2 m	Yes (west of Proposed Development boundary)
3	Lough Derg pNHA (000011)	867.4 m	12.6 km	No
4	Fergus Estuary and Inner Shannon, North Shore pNHA (002165)	1.1 km (from closest point of TDR)	9.1 km	Yes (18.6 km downstream via Grid Connection)
5	Glenomra Wood pNHA (SAC)	1.3 km	4.5 km	No

No.	Name	Distance from nearest element of Proposed Development	Distance from Proposed Development turbines	Hydrological connectivity (yes/no)
	code: 001013)			
6	Doon Lough NHA (000337)	1.6 km	1.6 km	No
7	Loughmore Common Turlough pNHA (000438)	1.9 km	15 km	No
8	Cloonlara House pNHA (000028)	2.2 km	9.3 km	No
9	Woodcock Hill Bog NHA (002402)	2.3km	4 km	No
10	Danes Hole, Poulnaleck a pNHA (000030)	2.3 km	2.4 km	No
11	Castle Lake pNHA (000239)	2.3 km	2.4 km	No
12	Castleconnell (Domestic Dwelling, Occupied) pNHA	2.6 km	11.6 km	No
13	Knockalishreen Marsh pNHA (002001)	3.3 km	7.2 km	No
14	Lough Cullaunyhe	5.5 km	5.6 km	No

No.	Name	Distance from nearest element of Proposed Development	Distance from Proposed Development turbines	Hydrological connectivity (yes/no)
	eda pNHA (001017)			
15	Cloonloun More Bog NHA (002307)	5.7 km	5.8 km	No
16	Clare Glen pNHA (SAC code: 000930)	5.7 km	>15 km	No
17	Garrannon Wood pNHA (001012)	6.8 km	8.2 km	No
18	Derrygaree n Heath pNHA (000931)	6.9 km	2 km	No
19	Bleanbeg Bog NHA (002450)	7.0 km	>15 km	No
20	Rosroe Lough pNHA (000324)	7.1 km	7.2 km	No
21	Glenstal Wood pNHA (001432)	7.7 km	>15 km	No
22	Fin Lough (Clare) pNHA (001010)	8.4 km	8.5 km	No
23	Keeper Hill pNHA (001197)	8.6 km	>15 km	No
24	Dromore & Bleach Loughs	9.1 km	>15 km	No

No.	Name	Distance from nearest element of Proposed Development	Distance from Proposed Development turbines	Hydrological connectivity (yes/no)
	pNHA (001030)			
25	Ballyvorheen Bog pNHA (001849)	9.3 km	>15 km	No
26	Skoolhill pNHA (001996)	9.4 km	>15 km	No
27	Loughanilloon Bog NHA (001020)	10.2 km	10.3 km	No
28	Ballycar Lough pNHA (000015)	10.5 km	10.6 km	No
29	Tory Hill pNHA (000439)	10.8 km	> 15 km	No
30	Adare Woodlands pNHA (000429)	10.8 km	>15 km	No
31	Dromsallaugh Bog pNHA (001850)	10.9 km	>15 km	No
32	Poulnagordon Cave (Quin) pNHA (000064)	11.3 km	11.4 km	No
33	Ayle Lower Bog NHA (000993)	11.5 km	11.6 km	No
34	Grageen Fen And	11.6 km	>15 km	No

No.	Name	Distance from nearest element of Proposed Development	Distance from Proposed Development turbines	Hydrological connectivity (yes/no)
	Bog NHA (002186)			
35	Silvermine Mountains pNHA (000939)	12.2 km	>15 km	No
36	Lough O'Grady pNHA	12.3 km	12.4 km	No
37	Lough Gash Turlough pNHA (000051)	12.9 km	13 km	No
38	Lough Gur pNHA (000437)	13.5 km	>15 km	No
39	Dromoland Lough pNHA (001008)	13.6 km	13.7 km	No
40	Curraghchase Woods pNHA (000174)	13.6 km	>15 km	No
41	Old Domestic Building (Keevagh) pNHA (002010)	14.1 km	14.2 km	No
42	Mauherslieve Bog NHA (002385)	14.9 km	>15 km	No

8.4.2.3 Important Bird Areas

Important Bird Areas (IBAs) are internationally recognised sites of significant importance to bird species. These sites are monitored and designated by organisations (e.g.,



BirdWatch Ireland) in partnership with BirdLife International. They include International, Regional and Sub-Regional categories.

As indicated in **Table 8.9** below, three IBAs were identified within the potential Zol of the Proposed Development. These overlap with other European sites (see **Section 8.4.2.1**). No other relevant IBAs were identified.

The Proposed Development turbines and Grid Connection do not overlap with any IBA boundaries. The nearest IBA, Shannon and Fergus Estuaries IBA, is located approximately 2.1km from the Proposed Development. Based on their proximity and the scope for impacts from the Proposed Development, IBAs were carried forward for consideration as Key Ornithological Features on a precautionary basis.

Table 8.9: Proximity of relevant Important Bird Areas to the Proposed Development

No.	Name	Distance from the Proposed Development	Distance from Proposed Development turbines	Hydrological connectivity (yes/no)
1	Shannon and Fergus Estuaries	7.9 km	11.6 km	Yes (downstream of Proposed Development)
2	Slieve Aughty Mountains	11.9 km	12 km	No
3	Lough Derg (Shannon)	12.1 km	13.1 km	No

8.4.3 Species Accounts

8.4.3.1 Buzzard

Buzzard is a common resident species in Ireland with a widespread distribution and increasing population size both in 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 76 occasions during the breeding season 2022 and 2023 VP and CBS transect surveys. Buzzard was observed on 61 occasions during the winter season 2021/22 and 2022/23 VP and CBS transect surveys. Buzzard was also recorded 1.1km east of T7 during a breeding raptor survey. Frequent buzzard activity was therefore recorded, including flights within the Proposed Development and territories overlapping with the Proposed Development and extending into adjacent suitable habitat. As such, Buzzard is included for further consideration as a Key Ornithological Feature.

8.4.3.2 Sparrowhawk

Sparrowhawk (*Accipiter nisus*) is a common and widespread resident species in Ireland. It is widespread in woodland, farmland, larger parks and gardens, where it nests in trees. The short-term population trend and long-term breeding range for this species appear stable. The desk study identified 24 observations of Sparrowhawk within the OS grid squares within which the Proposed Development is located, most recently on 05/05/2015 (NBDC, 2023). Sparrowhawk was observed on eight occasions during the breeding season 2022 and 2023 VP and CBS transect surveys. Sparrowhawk was observed on three occasions during the winter season 2021/22 VP surveys. Behaviours observed included foraging over forestry and perching in forestry. All sightings occurred outside of the Proposed Development boundary.

Sparrowhawk was observed on 19 occasions during winter season 2022/23 VP surveys, including activity within and adjacent to the Proposed Development; notably near T3 and the IPP connection route. Sparrowhawk was observed on two occasions during the winter season 2022/23 CBS transect surveys. Due to the relatively low level of activity recorded, the distribution of this activity and the conservation status of this species, Sparrowhawk is not included for further consideration as a Key Ornithological Feature.

8.4.3.3 Merlin

Merlin is a rare breeding species, typically nesting on the ground on moorland, mountain and blanket bog, but also nesting in woodland (e.g., forestry plantation) adjacent to moorland. The species is much more widely distributed in winter. The desk study did not identify any records of Merlin within 10km of the Proposed Development during the last ten years. One individual was observed hunting small passerines during the breeding season 2022 VP surveys approximately 94m west of the IPP connection route. No Merlin were identified during breeding Merlin surveys, although plucked feathers suggestive of Merlin feeding activity were recorded near the Proposed Development boundary (see **Appendix 8.4, Figure 8-9**). Despite no activity within the Proposed Development and low levels of nearby activity recorded during the breeding season 2022 VP surveys, considering the conservation status of this species, Merlin is included for further consideration as a Key Ornithological Feature on a precautionary basis.

8.4.3.4 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 in cliff faces. During winter they are largely resident within the breeding territory, although some move down to lowland areas. The desk study identified 28 observations of Kestrel within the OS grid squares within which the Proposed Development is located, most recently on 14/12/2017 (NBDC, 2023).

Kestrel sightings were observed on 129 occasions during the breeding season 2022. The majority of these were located outside of the Proposed Development boundary, together representing an estimated four territories adjacent to the Proposed Development. One territory includes the Gortacullin Bog NHA, located along the western boundary of the Eastern DA. The other three territories are all located east of the Eastern DA and IPP connection route.

Two confirmed Kestrel nest sites were identified during breeding Kestrel suitability surveys (see **Appendix 8.4, Figure 8-10**). One nest located near VP8 included a male and female Kestrel, and at least two chicks were also observed being fed by the parents; the nest site is located approximately 1.1km east of the Eastern DA boundary. Observations of the other nest included one adult flying to and from the nest site, located approximately 2.8km from the Eastern DA boundary.

A total of four additional high suitability Kestrel nest sites were identified during the 2022 and 2023 breeding Kestrel surveys, although no nesting activity by Kestrels was observed at these locations. The locations of these suitable nest sites are as follows:

- Suitable nest located along the IPP connection route, approximately 240m east of the Western DA boundary;
- Two suitable nests located north and east of the Eastern DA, the closest occurring approximately 1km from the Proposed Development boundary;

- One suitable nest site located within the footprint of the Western DA, approximately 424m east of T4, within the footprint of proposed site roads.

Thirty-five observations of Kestrel were recorded during the breeding season 2023 VP surveys. High levels of activity were recorded within the Western DA footprint, with a single significant territory occupied between T3 and T5. Another territory was recorded along the western and southern boundaries of the Eastern DA. Thirteen Kestrel observations were recorded during the breeding Kestrel surveys undertaken in 2023.

Fifty-two observations of Kestrel were recorded during winter season 2021/22 VP surveys. Activity was registered within both DAs, adjacent to T2, T4 and T5 and between T10 and T11. Territories were also recorded outside of the Proposed Development boundary, including the western boundaries of Eastern DA and southwestern boundary of the Western DA.

Eighty-two Kestrel registrations were recorded during winter season 2022/23 VP surveys. Flightline activity shows activity within the Western DA, particularly in close proximity to T3, T5 and T7 and surrounding areas, activity has also been recorded within the footprint of T11, in close proximity to T10 and within the footprint of the proposed IPP connection route. Four territories were recorded east of the Eastern DA and proposed IPP connection route, with other territories including the Gortacullin Bog NHA and the northern and western boundaries of the Western DA.

Kestrels are highly active within the Proposed Development during both breeding and wintering periods, with multiple territories (including active nest sites) confirmed adjacent to the Proposed Development. Due to this, and the conservation status of this species, /Kestrel is included for further consideration as a Key Ornithological Feature.

8.4.3.5 *Peregrine*

Peregrine is included on Annex I of the EC Birds Directive and 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 eight observations of Peregrine within the OS grid squares within which the Proposed Development is located, most recently on 13/11/2017 (NBDC, 2023). Peregrine was observed on three occasions during the breeding season 2022 VP surveys, approximately 790m north of T7 and 2.1km east of T9. Activity levels were relatively low, with none recorded within the Proposed Development boundary (see **Appendix 8.4, Figure 8-11**). One Peregrine was observed approximately 2.1km north of the Proposed Development during a breeding raptor survey. Considering this, and the suitable habitat within and adjacent to the Proposed Development, Peregrine is included for further consideration as a Key Ornithological Feature on a precautionary basis.

8.4.3.6 *Hen Harrier*

Hen Harrier is included on Annex I 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 22 observations of Hen Harrier within the OS grid squares within which the Proposed Development is located, most recently on 04/05/2021 (NBDC, 2023).

Twenty-five Hen Harrier observations were recorded during the breeding season 2022 VP surveys. Eighteen Hen Harrier sightings were recorded during the breeding season 2023 VP surveys. High levels of activity recorded during these breeding seasons included multiple territories, including within the footprint of the Proposed Development and north of the Proposed Development boundary, the IPP connection route and Gortacullin Bog NHA located west of the Eastern DA (see **Appendix 8.4, Figure 8-14**).

A total of 63 Hen Harrier observations were recorded during breeding Hen Harrier surveys in 2022 and 2023. Territories were identified overlapping with the Eastern and Western DAs, north and northeast of the Western DA, the Gortacullin Bog NHA and IPP connection route (see **Appendix 8.4, Figure 8-14**). Observations included juveniles and breeding birds exhibiting behaviour including food passes between adults, hunting, diving, calling, perching and carrying prey to potential nest sites.

Three active Hen Harrier nest sites were recorded in 2022:

- 616m north of T3;
- 356m north of T7; and
- 1km west of T11.

Two active Hen Harrier nest sites were recorded in 2023:

- 970m west of T11; and
- 487m south of T8.

Twelve sightings of Hen Harrier were recorded during the winter season 2021/22 VP surveys, with no flight activity recorded within the Proposed Development. Four main wintering areas were recorded; east and west of the IPP connection route, on the northern boundary of the Western DA, approximately 862m southwest of the Western DA and approximately 642m west of the Eastern DA (see **Appendix 8.4, Figure 8-15**).

Four Hen Harrier observations were recorded during the winter season 2022/23 VP surveys. One male was recorded flying over the footprint of the IPP connection route, whilst another male sighting was recorded approximately 624m west of the IPP connection route. One female was recorded approximately 309m west of T11, and a ringtail (immature) Hen Harrier was recorded hunting over heath and forestry approximately 614m north of the Proposed Development boundary, circling over Knockanuarha Mountain (see **Appendix 8.4, Figure 8-15**).

Wintering Hen Harrier roost surveys undertaken during the winter season 2022/23 returned 11 observations comprising ten observations of males and one observation of a female. Key areas used for foraging included land just south of Gortacullin Bog NHA, and north of the Western DA. One female was observed within the Western DA

(approximately 176m west of T5), and one male was observed hunting over the footprint of T7 (see **Appendix 8.4, Figure 8-15**). No roosts were identified during these surveys.

As reflected by the findings of these surveys, suitable Hen Harrier breeding habitat exists within and in close proximity to the Proposed Development (notably heath and forestry plantations).

Considering the level of breeding and wintering activity recorded within and adjacent to the Proposed Development, in particular the presence of active nests and frequently used foraging habitat, and the conservation status of this species, Hen Harrier is included for consideration as a Key Ornithological Feature.

8.4.3.7 *White-tailed Eagle*

White-tailed Eagle (*Haliaeetus albicilla*) is included on the BoCCI Red List and has undergone historical breeding decline in Ireland (Gilbert et al., 2021). The species has experienced mixed breeding success in Ireland since its recent reintroduction at Mountshannon and Portumna.

White-tailed Eagle was observed on four occasions during the winter season 2021/22 VP surveys, with all observations recorded in November 2021. Sightings were identified approximately 335m north of the Western DA and within the Gortacullin Bog NHA, adjacent to the Eastern DA. These sightings were all associated with the immediately preceding re-introduction, and it is understood these birds have all dispersed far from the Proposed Development. No other sightings of this species were recorded within or adjacent to the Proposed Development. Considering this, and the limited suitability of the Proposed Development site for this species, White-tailed Eagle is not included for further consideration as a Key Ornithological Feature.

8.4.3.8 *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 may inhabit. The desk study identified 11 Barn Owl records in the OS grid squares within which the Proposed Development is located, most recently on 01/08/2017 (NBDC, 2023). A total of six high suitability potential nest sites were identified during the breeding Barn Owl surveys, with no Barn Owls recorded at any of these sites. One of these locations was along the IPP connection route, with the other high suitability potential nest sites located outside the Proposed Development boundary. Rough grassland within and adjacent to the Proposed Development comprised suitable foraging habitat. No Barn Owls were observed during any field surveys. Considering this, and the suitability of the nesting and foraging habitat within the Proposed Development relative to that within the wider landscape, Barn Owl is not included for further consideration as a Key Ornithological Feature.

8.4.3.9 *Red Grouse*

Red Grouse is included on the BoCCI Red List, with a moderate short-term breeding population decline and a significant long-term breeding population decline in Ireland.

They nest on the ground in mountainous areas, moorland and lowland blanket bogs and raised bogs, where they are closely associated with heather (required for food, shelter and nesting). The desk study identified eight observations of Red Grouse within the OS grid squares within which the Proposed Development is located, most recently on 04/02/2022 (NBDC, 2023).

No Red Grouse were recorded during the wintering surveys targeting this species. Three Red Grouse observations were recorded incidentally during breeding wader and raptor surveys undertaken in 2023. These sightings were as follows:

- An adult male flushed from heather approximately 637m north of T7;
- A pair (i.e., male and female) flying over suitable breeding habitat approximately 469m north of T7; and
- One calling from suitable breeding habitat approximately 932m north of T6.

Gortacullin Bog NHA, which is located approximately 10m from the Eastern DA, has been previously identified as providing suitable habitat for Red Grouse (NPWS, 2004). The field survey observations confirm Red Grouse presence in this area and their likelihood of using habitat within the NHA. Together, these observations indicate the presence of 1-2 Red Grouse territories in suitable habitat north of the Proposed Development. Considering this, and the conservation status of this species, Red Grouse is included for consideration as a Key Ornithological Feature.

8.4.3.10 Woodcock

Woodcock is included on the BoCCI Red List due to its widespread breeding population decline in Ireland. Breeding Woodcock are found in woodland including conifer plantation, scrub, bracken and heathland, where they nest on the ground. Woodcock has a wider distribution in winter, occurring in various types of woodland, scrub and some open areas (bracken and heather-covered hills). The desk study identified eight Woodcock records from within the OS grid squares within which the Proposed Development is located, most recently on 31/12/2011 (NBDC, 2023).

The breeding Woodcock surveys undertaken in 2022 and 2023 recorded a total of 21 Woodcock observations, with a total of 14 Woodcock registrations during the breeding season 2022 (see **Appendix 8.4, Figure 8-8**). Seven Woodcock registrations were recorded during the breeding season 2023 (see **Appendix 8.4, Figure 8-8**). These included calling males.

All observations during the 2022 breeding season occurred within a conifer plantation approximately 685m north of the Western DA. Observations suggesting Woodcock breeding in three territories in 2023 were as follows:

- Five were both seen and heard in conifer plantation on the northern boundary of the Western DA and at the southern boundary of the Eastern DA;
- One was seen in conifer plantation south of the Eastern DA; and
- One was heard in conifer plantation along the northern boundary of the Western DA.

Conifer plantation within and adjacent to the Proposed Development was highly suitable for Woodcock, both for breeding and wintering. Considering this, the level of breeding activity recorded and the conservation status of this species, Woodcock is included for further consideration as a Key Ornithological Feature.

8.4.3.11 Golden Plover

Golden Plover is included on the BoCCI Amber List and is a designated SCI of the nearby River Shannon and River Fergus Estuaries SPA. Whilst the short-term population trend of the species is stable, its breeding range in Ireland has decreased in the long-term. The desk study did not return any records of Golden Plover. They typically breed in heather moors, blanket bogs and acidic grasslands, with a limited distribution to the uplands of northwest counties in Ireland. Throughout the winter, Golden Plovers are regularly found in large, densely-packed flocks, and in a variety of habitats, both coastal and inland. Their distribution is widespread in Ireland.

A peak count of 146 Golden Plovers was observed during the winter season 2022/23 VP surveys, with all activity recorded on 10th October 2022. Flightline activity suggests most activity occurs outside of the Proposed Development boundary, within the Gortacullin Bog NHA, although some activity was recorded near the footprint of T11. No Golden Plovers were observed during the breeding seasons 2022 and 2023. Land within and in close proximity to the Proposed Development comprised low quality breeding and wintering habitat only. However, considering the numbers recorded in flight (e.g., near T11), and the conservation status of this species (notably its relevance to the nearby River Shannon and River Fergus Estuaries SPA), Golden Plover is included for further consideration as a Key Ornithological Feature on a precautionary basis.

8.4.3.12 Curlew

Curlew (*Numenius arquata*) is included on the BoCCI Red List and is a designated SCI of the River Shannon and River Fergus Estuaries SPA. Irish Curlew populations are 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. The desk study identified 27 records of Curlew in the OS grid squares within which the Proposed Development is located, most recently on 25/09/2020 (NBDC, 2023).

Curlew was observed twice during the breeding season 2022 VP surveys, including a sighting approximately 1.6km east of the IPP connection route. No Curlews were observed in the breeding season 2023 or winter season 2022/23. Whilst there are areas of suitable breeding habitat located within the Proposed Development site, no evidence of breeding activity was recorded. Due to the low frequency of sightings throughout the survey period, and the extent and suitability of habitat within and adjacent to the Proposed Development, Curlew is not included for further consideration as a Key Ornithological Feature.

8.4.3.13 Snipe

Snipe (*Gallinago gallinago*) is included on the BoCCI Red List due to its long and short-term population decline. Snipe nests on the ground, usually concealed in a grassy

tussock, in or near wet or boggy terrain. They forage across a variety of wetland and damp habitats, with particularly high concentrations found on the fringes of lowland lakes. The desk study identified 22 records of Snipe, most recently on 31/12/2011 (NBDC, 2023).

Ten Snipe sightings were observed during the winter season 2021/22 VP surveys, all of which were recorded outside the Proposed Development boundary. Eleven Snipe observations were recorded during the winter season 2022/23 VP surveys, with all observations recorded outside the Proposed Development boundary, including observations just north of T11 and approximately 321m east of the IPP connection route. One Snipe was recorded during the winter season 2022/23 CBS transect surveys (along Transect 3). Five Snipe were observed during the 2023 breeding wader surveys, including one observation partially within the Proposed Development boundary approximately 267m west of T8. The remaining observations were recorded outside of the Proposed Development boundary. Both breeding and wintering habitat is available within and adjacent to the Proposed Development in the form of wet grassland and wet heathland. Based on the Snipe activity recorded, and the conservation status of this species, Snipe is included for further consideration as a Key Ornithological Feature.

8.4.3.14 Lapwing

Lapwing (*Vanellus vanellus*) included on the BoCCI Red List and is a designated SCI of the River Shannon and River Fergus Estuaries SPA. The long and short-term population and distribution trends for this species are decreasing. They breed on open farmland, favouring fields that are relatively bare (particularly when cultivated in the spring). They have a widespread winter distribution, using coastal and inland habitats including wetland, pasture and farmland. The desk study identified 15 observations of Lapwing within the relevant 10km grid squares, most recently on 31/12/2011 (NBDC, 2023).

Lapwing was observed twice during the 2022/23 wintering wetland bird surveys (see **Appendix 8.4, Figure 8-16**). These sightings were recorded near Clonlea Lough approximately 4.1km north of the Proposed Development boundary. No Lapwings were recorded during the breeding seasons in 2022 and 2023. Considering the lack of Lapwing activity recorded within or in close proximity to the Proposed Development, and the limited suitability of habitat within the Proposed Development, Lapwing is not included for further consideration as a Key Ornithological Feature.

8.4.3.15 Redshank

Redshank (*Tringa totanus*) is included on the BoCCI Amber List and is a designated SCI of the River Shannon and River Fergus Estuaries SPA. Its short-term population trend appears to be stable, whilst populations are increasing in the long-term. This species nests on the ground in grassy tussocks in wet, marshy areas and occasionally heather. Redshank winters all around the coasts of Ireland, favouring mudflats, large estuaries and inlets, with smaller numbers wintering at inland lakes and large rivers. The desk study identified three observations of Redshank within the relevant 10km grid squares, most recently on 31/12/2011 (NBDC, 2023).

Redshank was observed once during the 2022/23 wintering wetland bird surveys, along the banks of the Ardnacrusha Headrace Canal adjacent to the Turbine Delivery Route

(see **Appendix 8.4, Figure 8-16**). Whilst suitable breeding habitat was present within and adjacent to the Proposed Development, no Redshank sightings were recorded during the Breeding seasons 2022 and 2023. Considering this level of activity during the breeding and winter season, Redshank is not included for further consideration as a Key Ornithological Feature.

8.4.3.16 Gulls

Lesser Black-backed Gull (*Larus fuscus*) is included on the BoCCI Amber List. Lesser Black-backed Gull has experienced a short-term and long-term population and distribution increase. They breed colonially, often with other gull species such as Herring Gull (*Larus argentatus*), 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. The desk study returned no recent records of this species (NBDC, 2023).

Lesser Black-backed Gull was observed on 53 occasions during the breeding season 2022 VP surveys. VP flightline activity indicates the majority of sightings occurred outside of the Proposed Development. Lesser Black-backed Gull was also observed on three occasions during the winter season 2022/23 VP surveys, all of which were outside the Development Site boundary. Six observations were recorded during the 2022/23 wintering wetland bird surveys, approximately 5.2km north of the Proposed Development boundary (see **Appendix 8.4, Figure 8-16**). Considering the level of Lesser Black-backed Gull activity (notably the low level of flight activity over the Proposed Development Turbines), and the suitability of the habitats present, Lesser Black-backed Gull is not included for further consideration as a Key Ornithological Feature.

Black-headed Gull (*Chroicocephalus ridibundus*) is included on the BoCCI Red List and is a designated SCI of the River Shannon and River Fergus Estuaries SPA. Black-headed Gull populations are increasing in the short-term and long-term, and its short-term breeding range is increasing, although its long-term breeding range is decreasing. They breed both on the coast and inland where they will often nest in colonies, using wetland areas such as bogs, marshes and artificial lakes. In winter, they are widespread at the coast and inland. The desk study identified 30 records of Black-headed Gull within the relevant 10 km grid squares, most recently on 31/12/2011 (NBDC, 2023).

The species was observed on 12 occasions during the breeding season 2022 VP surveys, with all observations recorded outside the Proposed Development boundary. Black-headed Gull was recorded once during the breeding season 2023 VP surveys. The species was observed on 20 occasions during the 2022/23 wintering wetland bird surveys, with all sightings confined to one area along the banks of the Ardnacrusha Headrace Canal, adjacent to the turbine delivery route (see **Appendix 8.4, Figure 8-16**). Considering the suitability of habitat within and in close proximity to the Proposed Development Boundary, and the low level of activity recorded during the breeding and winter seasons, Black-headed Gull is not included for further consideration as a Key Ornithological Feature.

Herring Gull is included on the BoCCI Amber List. No relevant records were identified during the desk study (NBDC, 2023). The species breeds in colonies around the coast of Ireland and is widespread in winter on the coast and inland. Herring Gull was registered

on eight occasions during the breeding season 2022 VP surveys. No Herring Gulls were recorded during the winter season 2022/23 or the breeding season 2023. Due to the limited suitability of the habitat within and adjacent to the Proposed Development, and the low level of activity recorded during the field surveys, Herring Gull is not included for further consideration as a Key Ornithological Feature.

8.4.3.17 Other Waterbirds

Other waterbird species recorded during the 2022/23 wintering wetland bird surveys included Grey Heron (*Ardea cinerea*), Little Egret (*Egretta garzetta*), Mallard (*Anas platyrhynchos*), Moorhen (*Gallinula chloropus*), Mute Swan (*Cygnus olor*), Whooper Swan (*Cygnus cygnus*), Wigeon (*Mareca penelope*), Tufted Duck (*Aythya fuligula*), Cormorant (*Phalacrocorax carbo*), Coot (*Fulica atra*) and Great Crested Grebe (*Podiceps cristatus*). Mallard and Grey Heron were also observed during the winter season 2021/22 VP surveys. Activity recorded for these species is summarised below.

Little Egret is resident along coasts and rivers throughout Ireland, but still scarce in the midlands and north-west of the country. They breed near lakes, marshes, flooded fields and estuaries, and overwinter in a variety of wetland habitats including shallow lakes, riverbanks, lagoons, coastal estuaries and rocky shoreline. The desk study identified eight records of Little Egret within the relevant 10km grid squares, most recently on 19/01/2016 (NBDC, 2023). Little Egret was observed once during the winter season 2022/23 VP surveys approximately 1.2km west of the Western DA. Two Little Egrets were observed during 2022/23 wintering wetland bird surveys foraging along the Ardnacrusha Headrace Canal, adjacent to the Turbine Delivery Route, approximately 7.9km east of the Eastern DA. Based on the low level of activity recorded and the conservation status of this species, Little Egret is not included for further consideration as a Key Ornithological Feature.

Mallard is included on the BoCCI Amber List. Nest sites typically comprise dense vegetation near water, whilst overwintering occurs at a variety of coastal and inland wetland habitats. The desk study identified 37 records of Mallard within the relevant 10km grid squares, most recently on 19/01/2016 (NBDC, 2023). Four observations of Mallard were recorded during winter season 2021/22 VP surveys, whilst eight observations of Mallard were recorded during the winter season 2022/23 VP surveys. A total of 61 Mallard observations were recorded north of the Proposed Development during the 2022/23 wintering wetland bird surveys (see **Appendix 8.4, Figure 8-16**). Mallard was also observed on 11 occasions during the breeding season 2022 VP and CBS transect surveys, including low levels of flight activity partially within the Western DA, north of the Western DA and west of the Eastern DA. Based on the relatively low levels of activity recorded within and near the Proposed Development, and the conservation status of this species, Mallard is not included for further consideration as a Key Ornithological Feature.

Whooper Swan is included on Annex I of the EC Birds Directive and the BoCCI Amber List and is a designated SCI of the River Shannon and River Fergus Estuaries SPA. Very low numbers remain during summer, with the vast majority of birds overwintering lowland open farmland around inland wetlands, feeding in grassland and stubble. The desk study identified seven records of Whooper Swan within the relevant 10km grid squares, most recently on 31/12/2011 (NBDC, 2023). Whooper Swan was infrequently observed during

wintering VP and wetland bird surveys, at least 2.3km from the Proposed Development, with counts of up to seven birds recorded. No Whooper Swans were recorded during the breeding seasons 2022 and 2023. Due to the low level of Whooper Swan activity recorded, and the lack of observations within the Proposed Development and nearby land, Whooper Swan is not included for further consideration as a Key Ornithological Feature.

Additional species observed during Winter 2022/23 wintering wetland bird surveys outside of the Proposed Development boundary only comprised Mute Swan, Wigeon, Tufted Duck, Cormorant, Great Crested Grebe and Coot. Whilst of relevance to the nearby River Shannon and River Fergus Estuaries SPA, these species were all recorded in relatively low numbers and/or distantly from the Proposed Development. As such, none of these species are included for further consideration as a Key Ornithological Feature.

8.4.3.18 *Passerines and Other Bird Species*

Many of the species recorded within and adjacent to the Proposed Development were passerines (i.e., songbirds) typical of the habitats present; namely conifer plantation, agricultural grassland (used for cattle-rearing/hill farming) and hedgerows. The majority of these were common and widespread species included on the BoCCI Green List. BoCCI Red Listed species recorded included Meadow Pipit (*Anthus pratensis*) and Grey Wagtail. BoCCI Amber Listed species recorded included Skylark (*Alauda arvensis*), Willow Warbler (*Phylloscopus trochilus*), Swallow (*Hirundo rustica*), Goldcrest (*Regulus regulus*), Greenfinch (*Chloris chloris*), House Sparrow (*Passer domesticus*) and Starling (*Sturnus vulgaris*). Full details of BoCCI Red, Amber and Green Listed passerines recorded within and adjacent to the Proposed Development are provided in **Appendix 8.5**.

Whilst these species vary in their population trends, Meadow Pipit, Starling, Skylark and Greenfinch have all experienced significant recent population decreases associated with increasing habitat fragmentation, loss and degradation from various sources.

Meadow Pipits typically breed in bogs, uplands and areas of scrub and pasture, and are either sedentary or move to lowland areas in winter. The desk study identified 52 observations of Meadow Pipit from the OS grid squares within which the Proposed Development is located, most recently on 31/12/2011 (NBDC, 2023). A total of 82 observations were recorded during breeding and winter season transect surveys. Due to the high levels of activity of this species within the Proposed Development during the breeding and winter seasons, Meadow Pipit is included for further consideration as a Key Ornithological Feature.

Skylarks typically breed in cultivated areas, ungrazed grasslands and upland heaths, and winter in stubble fields, grasslands and coastal areas. The desk study identified no records of Skylark. A total of seven observations were recorded during the breeding season 2022 and 2023 CBS transect surveys, and no observations were recorded in winter. As such, Skylark is not included for further consideration as a Key Ornithological Feature.

Willow Warbler is one of the commonest breeding birds in Ireland, with the highest densities found in stands of willows along the edges of bogs and marshes. The desk

study identified 54 observations of Willow Warbler from the OS grid squares within which the Proposed Development is located, most recently on 13/05/2020 (NBDC, 2023). A total of 80 observations were recorded during breeding CBS transect surveys. Due to the level of breeding activity recorded within the Proposed Development, Willow Warbler is included for further consideration as a Key Ornithological Feature.

Starlings are residents of woodland, farmland, towns and cities, nesting in trees and manmade structures. The desk study identified 60 observations of Starling from the OS grid squares within which the Proposed Development is located, most recently on 31/12/2011 (NBDC, 2023). A total of 36 observations were recorded during breeding season CBS transect surveys, whilst 126 observations were recorded during Winter 2022/23 transect surveys. Considering the level of activity recorded within the Proposed Development, and the availability of suitable habitat, Starling is included for further consideration as a Key Ornithological Feature.

Raven (*Corvus corax*) is a widespread resident species (especially in upland areas) with an increasing breeding distribution in Ireland. The desk study identified 27 observations of Raven from the OS grid squares within which the Proposed Development is located, most recently on 28/12/2022 (NBDC, 2023). Raven was observed on 90 occasions during the breeding season 2022 and 2023 VP and CBS transect surveys. In addition, Raven was observed on 111 occasions during the winter season 2021/22 and 2022/23 VP and CBS transect surveys. Considering the level of activity recorded within the Proposed Development, and the availability of suitable habitat, Raven is included for further consideration as a Key Ornithological Feature.

Grey Wagtail is included on the BoCCI Red List. Grey Wagtails typically breed along streams and rivers, frequently nesting under bridges, and remain in the same area or move to coastal areas in winter. The desk study identified 30 observations of Grey Wagtail for the OS grid squares within which the Proposed Development is located (NBDC, 2023). Three Grey Wagtails were observed during Kingfisher, Dipper and Grey Wagtail surveys, with all three individuals observed together flying out from under a bridge, lingering, calling and flying into a stone shed acting as a potential nesting site. A total of three sites of high nesting potential were observed during the surveys: two along the Owengarney river (EPA Code: 27O01) approximately 3.7km and 7.1km west of the Western DA, and one along the Mountrice River (EPA Code: 25M03) approximately 55m from the IPP connection route. Considering the level of activity recorded, the locations of these individuals and suitable habitat, and the scope for effects from the Proposed Development, Grey Wagtail is not included for consideration as a Key Ornithological Feature.

Kingfisher is included on Annex I of the EC Birds Directive and the BoCCI Amber List. Whilst its short-term breeding distribution is increasing, its long-term range is decreasing, and the short-term and long-term population trends for the species are both decreasing. Kingfishers favour slow-flowing rivers and streams with abundant fish prey and suitable nesting habitat in the form of vertical exposed sandy/earth banks. They are a very sedentary species in winter, rarely moving far from their territories. The desk study identified 15 records of Kingfisher from the OS grid squares within which the Proposed Development is located (NBDC, 2023). Two Kingfishers were identified during breeding Kingfisher, Dipper and Grey Wagtail surveys in April and May 2023: one observed flying

approximately 7.1km from the Western DA, and one heading upstream on the Owengarney River (EPA Code: 27O01) carrying food approximately 3.7km from the Western DA (**Appendix 8.4, Figure 8-12**). No Kingfishers were recorded within the Proposed Development site. Due to the low numbers of individuals observed, the locations of these individuals and the scope for effects from the Proposed Development, Kingfisher is not included for consideration as a Key Ornithological Feature.

Dipper has an increasing short-term population and distribution and decreasing long-term population and distribution in Ireland. It breeds along fast-flowing streams and rivers with plenty of exposed rocks. In Ireland, the majority of breeding pairs are found in uplands. The nest is typically sited in a hole in the riverbank, behind a waterfall or under a bridge. In winter the species is largely sedentary, with their movements largely dependent on weather conditions. Juveniles disperse soon after fledging. The desk study identified 11 observations of Dipper within the OS grid squares within which the Proposed Development is located, most recently on 31/12/2011 (NBDC, 2023). Two observations of Dipper were registered during Kingfisher, Dipper and Grey Wagtail surveys during the breeding season 2023. Both observations were sighted on the Owengarney River (EPA Code: 27O01), where one Dipper was observed flying and perching and another was observed flying downstream (**Appendix 8.4, Figure 8-12**). No Dippers were recorded within the Proposed Development site. Due to the low numbers of individuals observed, the distance of the sightings in relation to the Proposed Development, and the scope for effects from the Proposed Development, Dipper is not included for consideration as a Key Ornithological Feature.

8.4.4 Future Baseline

The 'future baseline' (i.e., without development scenario) describes the ornithological features 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 bird species (e.g., certain migratory 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 and the opening year of operation (2030) 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 ornithological features that are relevant to the Proposed Development will be consistent with that of the existing baseline conditions described.

8.4.5 Summary of Key Ornithological Features

Considering the desk study and field survey results described above, and the scope for impacts from the Proposed Development, the following Key Ornithological Features have been identified for the purposes of this assessment:

- **Internationally designated sites:**
 - SACs, SPAs, IBAs: International importance.
- **Nationally designated sites:**
 - NHAs, pNHAs: National Importance.
- **Raptors:**
 - Hen Harrier (year-round): National importance.
 - Kestrel (year-round): County/district importance.
 - Buzzard, Peregrine and Merlin (year-round): Local importance (Higher value).
- **Red Grouse** (year-round): County/district importance;
- **Woodcock** (year-round): County/district importance.
- **Waders:** Golden Plover (winter), Snipe (year-round): Local importance (Lower value).
- **Passerines:**
 - Meadow Pipit, Starling and Raven (year-round), Willow Warbler (breeding): Local importance (Higher value).

8.4.6 Sensitivities of Key Ornithological Features

Bird species vary in their typical sensitivity to windfarm projects depending on the extent of habitat loss, changes in agricultural activities within the surrounding environment, and specific elements (e.g., underground/overhead cables, substation location, road/vegetation changes, turbine operation). Most bird species have additional pressures that are not affiliated with windfarm projects as a source but are considered to understand cumulative impacts where potential overlap of impact sources is possible, in accordance with the precautionary principle. Sensitivities for relevant species are outlined below.

Causes for the recent decline of Kestrel in Ireland are likely centred around prey availability, agricultural changes and reduced feeding opportunities (Wilson-Parr & O'Brien, 2019), as well secondary rodenticide poisoning. Whilst Buzzard and Peregrine populations have been less severely affected, both remain susceptible to loss of foraging and nesting habitat. Threats and pressures faced by Merlin include forest planting on open ground and changes in cultivation practices. Merlins are sensitive to habitat loss, particularly the intensification of agriculture in upland areas which may impact on prey-rich foraging habitats. The impact of upland afforestation is less clear, as Merlins have adapted to nest in such forested landscapes, although it seems likely that such landscapes reduce the density and availability of prey. Merlins are also sensitive to

disturbance during the breeding season. Pressures and threats faced by Hen Harrier include planting of forestry on open ground and changes to cultivation practices.

Red Grouse populations in Ireland continue to be threatened by habitat loss, degradation and fragmentation. These issues are associated with a range of practices including drainage, peat extraction, afforestation, conversion to grassland and development of key habitat (Cummins et al., 2010b).

Fuller et al. (2005) listed disturbance, reduction of the field layer by deer, increasing dryness of woodland and changes in surrounding land management as threatening Woodcock populations. Lowland breeding waders such as Snipe and Golden Plover are sensitive to habitat loss or fragmentation through afforestation, habitat loss from peat extraction, ground-based predation, destruction from agricultural machinery and flooding.

Detailed information on relevant passerine sensitivities is provided by the BTO (2011). Changes in grazing regimes can influence the breeding abundance of Meadow Pipit, whilst climate change may cause the species to be increasingly restricted to suitable areas for breeding as Meadow Pipit abundance is negatively correlated with temperature. Pressures on the Willow Warbler include climate change, changes in habitat over a large area, winter and migratory issues and decreased breeding success. It is believed that changes in the management of agricultural farmland and habitat loss are causing a reduction in first-year overwinter survival rates of Starling, thereby impacting the overall population. Ravens are threatened by the spread of intensive farming practices which leads to habitat destruction (e.g., woodland removal), degradation and disturbance (Hagemeijer & Blair, 1997).

8.5 Embedded Mitigation

From the early design stages of the Proposed Development, an iterative process of a constraints-led design was employed, whereby ecological information (e.g., identified breeding locations for sensitive bird species) was incorporated into the design process to avoid impacting potentially important ornithological features where possible. The Proposed Development design has incorporated the following embedded mitigation measures to minimise the potential for significant effects on ornithological features. Further information is provided in EIAR **Chapter 5 Project Description**.

8.5.1 Construction Methods

Best practice construction measures will be adopted to minimise potential construction and decommissioning impacts on bird populations. These are detailed within the Construction Environmental Management Plan (CEMP) (see EIAR **Appendix 5.1**) 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. The CEMP also includes measures to avoid pollution of waterbodies within and adjacent to the Proposed Development. 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. Works will aim to avoid the use of artificial lighting in habitat (i.e., heath, rough grassland, hedgerows and tree lines) used by potentially sensitive nocturnal species such

as Woodcock. Removal of trees and dense vegetation (i.e., hedgerows and scrub) will be avoided wherever possible.

8.5.2 Operational Methods

Best practice measures described in relation to construction methods will also be adopted during operational maintenance. Specifically, operational maintenance will minimise the level of removal of suitable bird habitat and use existing access routes where possible. Best practice methods will be adopted to minimise the potential for disturbance (e.g., to minimise generation of additional noise, dust, light and vibration). In particular, effects on active bird nests will be avoided by undertaking any required vegetation maintenance in accordance with methods described in **Section 8.5.3** below (i.e., by timing works outside the peak bird breeding season).

8.5.3 Timing of Works

To minimise the potential for impacts on nesting birds, removal or alteration of suitable nesting habitat (e.g., dense vegetation, trees, rough grassland) will, wherever possible, be undertaken outside of the peak breeding season (i.e., outside of the period mid-February to early September inclusive). 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. It should be recognised that whilst undertaking works in late September to early February inclusive minimises the likelihood of effects on breeding birds, certain species may still nest during this period.

If suitable nesting habitat needs to be removed or altered during the peak breeding season, works to the habitat 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 5m (e.g., for breeding passerines) to several hundred metres (e.g., for breeding raptors), with the size of the exclusion zone to be determined by the supervising ecologist in accordance with best practice guidance (e.g., Goodship & Furness, 2022).

8.5.4 Ecological Clerk of Works

Prior to works commencement, an Ecological Clerk of Works (ECoW) will be appointed to address issues relating to birds and other sensitive habitats and species (as detailed in EIAR **Section 5.3.3.1**). Their responsibilities will include (but not be limited to):

- Undertake a pre-construction walkover survey to ensure that significant effects on breeding and non-breeding birds will be avoided;
- Undertake nesting bird checks on any vegetation that needs to be removed within the breeding season;

- Inform and educate site personnel of sensitive ornithological features within the Proposed Development site and how effects on these features could occur;
- Oversee management of ornithological issues during the construction and decommissioning period and advise on ornithological issues as they arise;
- Provide guidance to contractors to ensure legal compliance with respect to protected bird species on site; and
- Liaise with officers from consenting authorities and other relevant bodies and contractors with regular updates in relation to construction and/or decommissioning progress.

8.6 Assessment of Effects

8.6.1 Assessment Scope

Potential impacts on breeding and non-breeding bird populations and other ornithological features (e.g., relevant designated sites) from the Proposed Development during its construction, operation, and decommissioning phases are described in this section.

The potential for these impacts to adversely affect the Key Ornithological Features described in **Section 8.4** is then assessed in accordance with the process described in **Section 8.3.3.5**. This assessment takes into consideration embedded mitigation within the Proposed Development design as described in **Section 8.5**. Where embedded mitigation measures are insufficient to avoid potentially significant effects on bird populations, further mitigation measures will be required, as described in **Section 8.7**.

This assessment of effects is structured as follows:

- Assessment of effects in relation to designated sites of ornithological interest;
- Assessment of effects in relation to bird species; and
- Assessment of potential effects associated with other proposed development projects (i.e., cumulative assessment).

8.6.2 Assessment of Effects on Designated Sites

8.6.2.1 *Natura Impact Statement*

In accordance with best practice guidance, and in compliance with Article 6(3) of the Habitats Directive, this EIAR chapter is accompanied by the following supporting documents:

- **Screening for Appropriate Assessment Report;** and
- **Natura Impact Statement.**

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 ornithological interest.

Relevant European sites within the potential Zol (i.e., 15km) were initially screened for connectivity with the Proposed Development. Connectivity with a European site was evaluated using a conceptual site model which identifies potential impact source-pathways between the Proposed Development 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.

The SNH guidance document ‘Assessing Connectivity with Special Protection Areas (SPAs)’ (2016) was consulted during the assessment of connectivity between European sites and suitable habitat for qualifying bird populations within the wider landscape (i.e., potential Functionally Linked Land). This guidance takes into consideration the typical distances specific species may travel beyond European site boundaries, and outlines information on dispersal and foraging ranges of relevant species.

Based on this initial examination of potential connectivity, the following European sites identified within the potential 15km Zol (**Section 8.4.2.1**) were screened out for further assessment due an absence of potential impact pathways relevant to ornithological features:

- Lower River Shannon SAC (002165);
- Glenomra Wood SAC (001013);
- Danes Hole, Poulnalecka SAC (000030);
- Slieve Bernagh Bog SAC (002312);
- Ratty River Cave SAC (002316);
- Kilkishen House SAC (002319);
- Clare Glen SAC [000930];
- Silvermines Mountains West SAC [002258];
- Glenstal Wood SAC [001432];
- Keeper Hill SAC [001197];
- Tory Hill SAC [000439];
- Poulmagordon Cave (Quin) SAC (000064);
- Askeaton Fen Complex SAC [002279];
- Slieve Aughty Mountains SPA (004168);
- Lough Gash Turlough SAC (000051);
- Silvermine Mountains SAC [000939];
- Newgrove House SAC (002157);
- Curraghchase Woods SAC [000174];
- Bolingbrook Hill SAC [002124]; and
- Old Domestic Building (Keevagh) SAC (002010).

As such, three European sites were scoped in for further assessment in relation to potential Proposed Development impacts on ornithological features:

- River Shannon and River Fergus Estuaries SPA [004077];

- Lough Derg (Shannon) SPA [004165]; and
- Slievefelim to Silvermines Mountains SPA [004058].

The assessment for effects on these European sites is provided below. Based on the distance between these internationally designated sites and the scope for effects from the Proposed Development, there is no potential for significant adverse effects on the integrities of any other SPAs.

Whilst four SACs are located relatively near to the Proposed Development site (namely Danes Hole, Poulnalecka SAC, Glenomra Wood SAC, Lower River Shannon SAC, and Ratty River Cave SAC), these European sites are designated for their habitats and non-avian species populations of international importance. These European sites do not have any qualifying or interest features of ornithological significance. As such, no significant effects on the integrities of these European sites are possible through effects on ornithological features specifically. These European sites are addressed in detail in relation to impacts on habitats and non-avian species in EIAR **Chapter 7** and in the **Natura Impact Statement**. Embedded mitigation described in **Section 8.5** will also reduce the likelihood of any adverse effects on the integrities of these European sites.

Based on their distances from the Proposed Development, and the scope of impacts from the Proposed Development, there is no potential for adverse effects on any other European sites regarding features of ornithological interest.

8.6.2.1.1 River Shannon and River Fergus Estuaries SPA

River Shannon and River Fergus Estuaries SPA is approximately 6.4km from the Proposed Development turbines. Detailed information on the qualifying features of this SPA is provided in the EIAR **Appendix 7.2**. This designation applies to estuaries forming the largest estuarine complex in Ireland. The European site qualifies on account of regularly supporting over 20,000 waterbirds during the non-breeding season, and due to its important wintering populations of numerous waterbird species including Whooper Swan, Light-bellied Brent Goose (*Branta bernicla hrota*), Shelduck (*Tadorna tadorna*) and Golden Plover. Additional SCI features include the wintering population of Black-Headed Gull. As the Proposed Development falls within the potential ranges for foraging and migration for many of the SCI bird species for the SPA, effects on these species which could potentially affect the functional integrity of the SPA must be considered.

As detailed in **Section 8.4.3**, eight SCI species for the SPA were recorded during the field surveys undertaken between 2021 and 2023 to inform the Proposed Development: Cormorant, Whooper Swan, Wigeon, Golden Plover, Lapwing, Curlew, Redshank and Black-headed Gull. Seven of these eight species (i.e., all except Golden Plover) were recorded in very low numbers and/or distantly from the Proposed Development. As such, the Proposed Development is not considered to be of significant value to these species, either in isolation or with regard to River Shannon and River Fergus Estuaries SPA. Similarly, field survey results indicated that land within/in close proximity to the Proposed Development site was not used by significant numbers of waterbirds with regard to the designated waterbird assemblage of the SPA.

Golden Plover was recorded within and adjacent to the Proposed Development in higher numbers, with the peak count of 146 Golden Plovers recorded equating to 2.58% of the

cited SPA population for River Shannon and River Fergus Estuaries SPA. However, this species was only recorded during a single survey visit (10th October 2022), with no other individuals recorded within or in close proximity to the Proposed Development during the two years of surveys undertaken. As such, 'significant' use of the Proposed Development site by Golden Plover has not been confirmed, and it is considered probable that the site is only visited occasionally by this species. Golden Plover activity was confined to flights over the Proposed Development and adjacent land, with no use of the Proposed Development for roosting or foraging recorded. Considering this, and the embedded mitigation within the Proposed Development design, there is no potential for adverse effects on the integrity of River Shannon and River Fergus Estuaries SPA through habitat loss, fragmentation or disturbance effects on Golden Plover.

Considering the flight activity recorded within and in close proximity to the Proposed Development by up to 146 Golden Plover (equating to 2.58% of the cited SPA population for River Shannon and River Fergus Estuaries SPA), CRM was undertaken on a precautionary basis to identify any potential for significant effects from collision fatalities (see **Section 8.6.3.2.6**). Based on the field data collected between 2021 and 2023 inclusive, modelled Golden Plover collision fatalities from Proposed Development turbines are estimated as 0.04 birds per year, equating to one Golden Plover collision every 24.46 to 27.63 years. Considering this figure in the context of the cited SPA population (5,664 Golden Plovers), and typical background mortality rates for this species, this is not considered to represent sufficient collisions such that adverse effects on the SPA population are possible, even if all Golden Plovers flying over the Proposed Development form part of the SPA population. Similarly, considering the level of flight activity recorded (i.e., 146 birds during one survey visit over a two-year survey period), significant effects on Golden Plovers flying within/near the Proposed Development through other means (e.g., disturbance, displacement and/or barrier effects) are not considered to be potentially significant. As such, there is not considered to be potential for adverse effects on the integrity of River Shannon and River Fergus Estuaries SPA through impacts (including potential collision injuries/fatalities) on Golden Plover from the Proposed Development.

Other Proposed Development elements extend nearer to River Shannon and River Fergus Estuaries SPA, with the nearest, the TDR, extending to 380 m from the SPA. However, the scope for effects from these elements (as described fully in EIAR **Chapter 5**) is low, involving no significant loss of suitable habitat for any species forming qualifying features for River Shannon and River Fergus Estuaries SPA. In addition, the embedded mitigation measures described in **Section 8.5** will be adopted to minimise potential habitat loss and disturbance during all stages of the Proposed Development.

In summary, potential effects on the integrity of River Shannon and River Fergus Estuaries SPA, and any other European sites regarding their features of ornithological interest, from the Proposed Development are considered not significant.

8.6.2.1.2 Lough Derg (Shannon) SPA

Lough Derg (Shannon) SPA is designated for its important breeding and wintering waterbird populations: specifically breeding Cormorant and Common Tern (*Sterna hirundo*), wintering Goldeneye (*Bucephala clangula*) and Tufted Duck (*Aythya fuligula*),

and its wintering waterbird aggregation. Lough Derg (Shannon) SPA is approximately 12.1km from the Proposed Development turbines, whilst is relatively distant in the context of typical movement patterns for relevant waterbird species (SNH, 2016). In addition, no significant use of the Proposed Development site or flight routes through the Proposed Development turbines by qualifying species were recorded during the detailed field surveys for breeding and wintering birds undertaken to inform this assessment. Whilst other Proposed Development elements extend nearer to Lough Derg (Shannon) SPA, with the nearest, the TDR, extending to 2.1km from the SPA at its nearest point, considering this distance and the scope for effects from the TDR, there is no potential for significant effects from the TDR on this designated site. The potential for effects will be minimised further by the embedded mitigation measures described in **Section 8.5**. As such, there is no potential for the Proposed Development to have any significant adverse effects on the integrity of Lough Derg (Shannon) SPA.

8.6.2.1.3 *Slievefelim to Silvermines Mountains SPA*

Slievefelim to Silvermines Mountains SPA is designated for its important breeding population of Hen Harrier. As Slievefelim to Silvermines Mountains SPA is over 15km from the Proposed Development turbines, based on best practice guidance (SNH, 2016), the Proposed Development turbines are outside of the likely foraging range (up to 10km) of any Hen Harriers associated with Slievefelim to Silvermines Mountains SPA. As such, there is no potential for significant impacts on Slievefelim to Silvermines Mountains SPA during the construction, operation and decommissioning phases of the Proposed Development. Whilst other Proposed Development elements extend nearer to Slievefelim to Silvermines Mountains SPA, with the nearest, the TDR, extending to 3.8km from the SPA at its nearest point, considering this distance and the scope for effects from the TDR, there is no potential for significant effects from the TDR on this designated site. The potential for effects will be minimised further by the embedded mitigation measures described in **Section 8.5**. As such, there is no potential for the Proposed Development to have any significant adverse effects on the integrity of Slievefelim to Silvermines Mountains SPA.

8.6.2.2 *Nationally Designated Sites*

Based on their proximity to the Proposed Development, their ornithological interest features, and the potential scope for impacts from the Proposed Development, the following nationally designated sites (i.e., NHAs and pNHAs) were included for further assessment regarding potential effects on ornithological features (their approximate distances from the Proposed Development are provided in brackets):

- Gortacullin Bog NHA (10m);
- Woodcock Hill Bog NHA (1.3km);
- Doon Lough NHA (1.7km);
- Knockalisheen Marsh pNHA (400m);
- Garrannon Wood pNHA (1.7km); and
- Fergus Estuary and Inner Shannon, North Shore pNHA (1.9km).

Assessment of effects on ornithological features of these six confirmed and proposed nationally designated sites is provided below. Based on the features for which they are designated, their proximity to the Proposed Development and/or the scope for impacts from the Proposed Development, no other confirmed or proposed nationally designated sites require detailed assessment of effects regarding features of ornithological interest.

8.6.2.2.1 *Gortacullin Bog NHA*

Gortacullin Bog NHA is of national importance for its peatland raised bog habitat. The site contains blanket bog on its lower central and eastern slopes, with wet heath occupying drier areas on slightly higher ground. There is a large flush in the north of the site, whilst regenerating cutover bog with scrub woodland occurs in the south-centre.

Gortacullin Bog NHA qualifies on account of its peatland habitats. Whilst it is not designated for any features of ornithological interest, designated peatland habitats within Gortacullin Bog NHA have been used by Red Grouse and are suitable for other notable bird species including Hen Harrier. As such, development impacts on this designated site could potentially affect the notable bird populations that use it.

Gortacullin Bog NHA is located approximately 10m west of the Proposed Development. There will be no works within this designated site, and therefore there will be no permanent or temporary loss of habitat (e.g., peatland) within Gortacullin Bog NHA. As described in **Section 8.5**, the Proposed Development design includes embedded mitigation measures to minimise the potential for disturbance and other effects on adjacent land (e.g., through pollution, dust and hydrological impacts) during construction and operation; notably those measures detailed within the CEMP (EIAR **Appendix 5.1**). In addition, detailed assessment of effects has been undertaken in relation to Red Grouse, Hen Harrier and all other Key Ornithological Features which potentially use habitat within Gortacullin Bog NHA (see **Section 8.6.3**).

Considering its lack of ornithological qualifying features, potential effects on the integrity of Gortacullin Bog NHA from the Proposed Development regarding features of ornithological interest are considered not significant. Detailed assessment of effects and any identified requirement for additional mitigation and enhancement measures will ensure that effects on notable bird species (namely Red Grouse and Hen Harrier) that also use Gortacullin Bog NHA do not significantly affect the conservation status of the bird populations using this nationally designated site.

8.6.2.2.2 *Other Nationally Designated Sites*

The other five confirmed and proposed nationally designated sites scoped in for assessment of effects are located between approximately 400m and 1.9km from the Proposed Development. These sites are designated or proposed for designation primarily for their nationally important habitats including bog, heath, marsh and open water. Whilst not forming qualifying features, considering the habitats present, these sites are potentially used by notable bird species including Red Grouse, Hen Harrier and wintering waterfowl.

There will be no permanent or temporary habitat loss within these sites, and embedded mitigation measures during construction and operation (see **Section 8.5**) will ensure that

significant disturbance effects on habitats within these sites are avoided. Detailed assessment of effects has been undertaken in relation to Red Grouse, Hen Harrier and all other Key Ornithological Features which potentially use habitats within these sites.

Considering their lack of qualifying ornithological features, potential effects on the integrities of these confirmed and proposed nationally designated sites from the Proposed Development are considered not significant. Detailed assessment of effects and any identified requirement for additional mitigation and enhancement measures will ensure that effects on notable bird species (particularly Hen Harrier, Red Grouse and wintering waterfowl) that also potentially use these sites do not significantly affect the conservation statuses of the bird populations using these confirmed and proposed nationally designated sites.

8.6.2.3 *Important Bird Areas*

Based on their proximity to the Proposed Development, their ornithological interest features and the potential scope for impacts from the Proposed Development, one IBA was included for further assessment regarding potential effects on ornithological features: Shannon and Fergus Estuaries IBA, located approximately 2.1km from the Proposed Development. This IBA overlaps with the River Shannon and River Fergus Estuaries SPA, detailed assessment of which has been undertaken (see **Section 8.6.2.1.1**). Considering the absence of potential adverse effects from the Proposed Development on the SPA, there is no potential for adverse effects on Shannon and Fergus Estuaries IBA. Potential effects on any IBAs from the Proposed Development are considered not significant.

8.6.2.4 *Cumulative Effects on Designated Sites*

Projects (including wind farm developments) considered for cumulative effects on ornithological features are detailed in **Section 8.6.3.4**. The potential for these plans and projects to give rise to cumulative effects with the Proposed Development on any European site is assessed in detail in the **Natura Impact Statement**.

Thirteen operational and proposed wind farm developments were identified for cumulative effects assessment in relation to the Proposed Development (see **Table 8.15**), along with a range of other developments including solar farms, quarries and residential developments. As detailed in **Section 8.6.2.1.1**, one European site requires detailed assessment of potential adverse effects on features of ornithological interest from the Proposed Development; River Shannon and River Fergus Estuaries SPA. As described, no significant activity by any QI or SCI waterbird species of River Shannon and River Fergus Estuaries SPA was recorded within the Proposed Development, and no potentially significant flight routes over the Proposed Development turbines or nearby land by these species were identified. Waterbird activity within the Proposed Development site was relatively low, and far below numbers which could potentially be significant in the context of the SPA's wintering waterbird aggregation. The level of QI/SCI species activity and activity by waterbird assemblage species within the Proposed Development site was such that, even in the context of nearby plans and projects, the Proposed Development does not have the potential to give rise to significant adverse effects on ornithological features. As such, potential cumulative effects on the integrities

of any European sites regarding their features of ornithological interest from the Proposed Development are considered not significant. Similarly (as described in **Section 8.6.2.3**), cumulative effects on any IBAs from the Proposed Development are considered not significant.

Considering the lack of qualifying ornithological features for relevant confirmed and proposed nationally designated sites (e.g., Gortacullin Bog NHA), there is no potential for significant effects on the integrities of any confirmed and proposed nationally designated sites from the Proposed Development. Detailed assessment of cumulative effects within this EIAR chapter and any identified requirement for additional mitigation and enhancement measures will ensure that effects on notable bird species (e.g., Red Grouse, Hen Harrier, wintering waterfowl) that also potentially use these sites do not significantly affect the conservation statuses of the bird populations using these confirmed and proposed nationally designated sites.

8.6.3 Assessment of Effects on Bird Species

8.6.3.1 Construction Effects

The assessment of effects on bird species during the construction of the Proposed Development is described below and summarised in **Table 8.11**, in accordance with the effect terminology described in **Section 8.3.3**. 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 for birds; and
- **Disturbance and displacement:** disturbance of nesting, flying, sheltering and foraging birds (e.g., from additional noise, dust, light, vibration and human activity), with the potential to cause displacement of birds into land outside of the Proposed Development.

Direct habitat loss or change is inevitable in the development of any wind farm, especially when the establishment of access roads, turbines, substation buildings and other associated construction and decommissioning is considered. This can result in reduced habitat heterogeneity and connectivity as well as reduced feeding, nesting, roosting and commuting opportunities for protected and priority bird species including those identified within this EIAR chapter.

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 temporary storage areas and the TDR. As described in **Section 8.5.1**, the Proposed Development design includes embedded mitigation to minimise construction effects.

As described in EIAR **Chapter 7 Biodiversity**, habitats within the Proposed Development within which the turbines will be constructed and additional project infrastructure will be established comprise transitional woodland-shrub, conifer plantation, agricultural land



and peat bog. In the absence of mitigation, the extents of habitat loss during the construction of the Proposed Development are as indicated in **Table 8.10** below.

Table 8.10: Anticipated habitat loss during the construction of the Proposed Development in the absence of mitigation

Habitat type	Pre-construction extent within the Proposed Development Site (ha/m)	Extent of permanent land take (ha/m)
Proposed Development with Nordex N133 habitat loss		
BL3 Buildings and artificial surfaces	16.697 ha	3.195 ha
BL3/ ED2 Buildings and artificial surfaces/ Spoil and bare ground	0.113 ha	-
BL3/ ED3 Buildings and artificial surfaces/ Recolonising bare ground	0.095 ha	-
BL3/ GA1 Buildings and artificial surfaces/ Improved agricultural grassland	0.917 ha	-
BL3/ GA2 Buildings and artificial surfaces/ Amenity Grassland	11.620 ha	0.0945 ha
BL3/GA2/WD5 Buildings and artificial surfaces/ Amenity Grassland/ Scattered trees and parkland	0.632 ha	-
BL3/ GS4 Buildings and artificial surfaces/ Wet grassland	0.251 ha	-
BL3 /WS1 Buildings and artificial surfaces/ Scrub	0.188 ha	-
BL3 /WS2 Buildings and artificial surfaces/ Immature Woodland	0.891 ha	-
ED2 Spoil and bare ground	0.380 ha	0.0867 ha
ED2/GM1 Spoil and bare ground/ Marsh	0.703 ha	
ED3 Recolonising bare ground	0.364 ha	0.0627 ha
GA1 Improved agricultural grassland	51.406 ha	0.1301 ha
GA1/GS4 Improved agricultural grassland/ Wet Grassland	0.266 ha	-
GA1/WS1 Improved agricultural grassland/ Scrub	2.637 ha	-
GM1 Marsh	0.340 ha	-
GS1/GS3 Dry calcareous and neutral grassland/ Dry-humid acid grassland	0.035 ha	-
GS2 Dry meadows and grassy verges	0.786 ha	0.008 ha
GS2/HD1 Dry meadows and grassy verges/ Dense bracken	0.066 ha	-
GS3 Dry-humid acid grassland	5.764 ha	0.0627 ha

Habitat type	Pre-construction extent within the Proposed Development Site (ha/m)	Extent of permanent land take (ha/m)
GS3/GS4 Dry-humid acid grassland/ Wet grassland	1.039 ha	0.1301 ha
GS3/GS4/HH1 Dry-humid acid grassland/ Wet grassland/ Dry siliceous heath	0.033 ha	-
GS3/HH1 Dry-humid acid grassland/ Dry siliceous heath	0.590 ha	0.0001 ha
GS3/WS1 Dry-humid acid grassland/ Scrub	5.302 ha	0.0880 ha
GS4 Wet grassland	30.020 ha	0.7169 ha
GS4/HH2 Wet grassland/ Dry calcareous heath	0.199 ha	-
GS4/HH3 Wet grassland/ Wet heath	0.154 ha	-
GS4/HH3/PB2 Wet grassland/ Wet heath/ Lowland blanket bog	0.075 ha	-
GS4/PB2 Wet grassland/ Lowland blanket bog	0.299 ha	0.0119 ha
GS4/WS1 Wet grassland/ Scrub	3.064 ha	0.0092 ha
HD1 Dense bracken	0.122 ha	-
HD1/WS1 Dense bracken/ Scrub	0.593 ha	-
HH3 Wet heath	14.058 ha	3.6067 ha
HH3/WD4 Wet heath/Conifer plantation	3.044 ha	0.1585 ha
HH3/WS1 Wet heath/Scrub	1.110 ha	0.3514 ha
WD1 (Mixed) broadleaved woodland	2.156 ha	0.3376 ha
WD2 Mixed broadleaved woodland/ conifer plantation	1.984 ha	0.0240 ha
WD3 (Mixed) conifer woodland	1.168 ha	0.0091 ha
WD4 Conifer plantation	62.186 ha	21.1474 ha
WD4/WS1 Conifer plantation/Scrub	2.740 ha	0.1731 ha
WL2 Treeline	0.133 ha	-
WN6 Wet willow-alder-ash woodland	1.374 ha	0.0032 ha
WS1 Scrub	13.234 ha	1.4054 ha
WS1/WD2 Scrub/ Mixed broadleaved woodland/ conifer plantation	0.023 ha	0.0026 ha
WS1/WS2 Scrub/ Immature woodland	1.436 ha	0.0050 ha
WS2 Immature woodland	0.584 ha	-
WS3 Ornamental/non-native shrub	0.431 ha	-
WS5 Recently-felled woodland	10.460 ha	2.30 ha

Habitat type	Pre-construction extent within the Proposed Development Site (ha/m)	Extent of permanent land take (ha/m)
BL1 Stone walls and other stonework	1029.05 m	174.61 m
BL2 Earth banks	4935.04 m	329.17 m
BL2/WL1 Earth banks/ Hedgerows	791.96 m	176.86 m
BL2/WL1/WL2 Earth banks/ Hedgerows/ Treelines	251.86 m	-
BL2/WL2 Earth banks/ Treelines	329.27 m	-
FW1 Eroding/upland rivers	97.63 m	-
FW4 Drainage ditches	3553.18 m	211.67 m
WL1 Hedgerows	7836.29 m	764.55 m
WL1/WL2 Hedgerows/ Treelines	7094.51 m	21.29 m
WL2 Treelines	5461.43 m	300.24 m
Proposed Development with Nordex N149 habitat loss		
BL3 Buildings and artificial surfaces	16.697 ha	3.1927 ha
BL3/ ED2 Buildings and artificial surfaces/ Spoil and bare ground	0.113 ha	-
BL3/ ED3 Buildings and artificial surfaces/ Recolonising bare ground	0.095 ha	-
BL3/ GA1 Buildings and artificial surfaces/ Improved agricultural grassland	0.917 ha	-
BL3/ GA2 Buildings and artificial surfaces/ Amenity Grassland	11.620 ha	0.0945 ha
BL3/GA2/WD5 Buildings and artificial surfaces/ Amenity Grassland/ Scattered trees and parkland	0.632 ha	-
BL3/ GS4 Buildings and artificial surfaces/ Wet grassland	0.251 ha	-
BL3 /WS1 Buildings and artificial surfaces/ Scrub	0.188 ha	-
BL3 /WS2 Buildings and artificial surfaces/ Immature Woodland	0.891 ha	
ED2 Spoil and bare ground	0.380 ha	0.0867 ha
ED2/GM1 Spoil and bare ground/ Marsh	0.703 ha	-
ED3 Recolonising bare ground	0.364 ha	0.0627 ha
GA1 Improved agricultural grassland	51.406 ha	0.1301 ha
GA1/GS4 Improved agricultural grassland/ Wet Grassland	0.266 ha	-

Habitat type	Pre-construction extent within the Proposed Development Site (ha/m)	Extent of permanent land take (ha/m)
GA1/WS1 Improved agricultural grassland/ Scrub	2.637 ha	-
GM1 Marsh	0.340 ha	-
GS1/GS3 Dry calcareous and neutral grassland/ Dry-humid acid grassland	0.035 ha	-
GS2 Dry meadows and grassy verges	0.786 ha	0.0083 ha
GS2/HD1 Dry meadows and grassy verges/ Dense bracken	0.066 ha	-
GS3 Dry-humid acid grassland	5.764 ha	1.2098 ha
GS3/GS4 Dry-humid acid grassland/ Wet grassland	1.039 ha	0.0355 ha
GS3/GS4/HH1 Dry-humid acid grassland/ Wet grassland/ Dry siliceous heath	0.033 ha	-
GS3/HH1 Dry-humid acid grassland/ Dry siliceous heath	0.590 ha	0.0001 ha
GS3/WS1 Dry-humid acid grassland/ Scrub	5.302 ha	0.0880 ha
GS4 Wet grassland	30.020 ha	0.7184 ha
GS4/HH2 Wet grassland/ Dry calcareous heath	0.199 ha	-
GS4/HH3 Wet grassland/ Wet heath	0.154 ha	-
GS4/HH3/PB2 Wet grassland/ Wet heath/ Lowland blanket bog	0.075 ha	-
GS4/PB2 Wet grassland/ Lowland blanket bog	0.299 ha	0.0119 ha
GS4/WS1 Wet grassland/ Scrub	3.064 ha	0.0092 ha
HD1 Dense bracken	0.122 ha	-
HD1/WS1 Dense bracken/ Scrub	0.593 ha	-
HH3 Wet heath	14.058 ha	3.6422 ha
HH3/WD4 Wet heath/Conifer plantation	3.044 ha	0.1585 ha
HH3/WS1 Wet heath/Scrub	1.110 ha	0.3514 ha
WD1 (Mixed) broadleaved woodland	2.156 ha	0.4075 ha
WD2 Mixed broadleaved woodland/ conifer plantation	1.984 ha	0.0240 ha
WD3 (Mixed) conifer woodland	1.168 ha	0.0091 ha
WD4 Conifer plantation	62.186 ha	24.7314 ha
WD4/WS1 Conifer plantation/Scrub	2.740 ha	0.1731 ha
WN6 Wet willow-alder-ash woodland	1.374 ha	0.0032 ha

Habitat type	Pre-construction extent within the Proposed Development Site (ha/m)	Extent of permanent land take (ha/m)
WS1 Scrub	13.234 ha	1.6888 ha
WS1/WD2 Scrub/ Mixed broadleaved woodland/ conifer plantation	0.023 ha	0.0026 ha
WS1/WS2 Scrub/ Immature woodland	1.436 ha	0.0050 ha
WS2 Immature woodland	0.584 ha	-
WS3 Ornamental/non-native shrub	0.431 ha	-
WS5 Recently-felled woodland	10.460 ha	2.3587 ha
BL1 Stone walls and other stonework	1029.05 m	174.61 m
BL2 Earth banks	4935.04 m	460.36 m
BL2/WL1 Earth banks/ Hedgerows	791.96 m	176.73 m
BL2/WL1/WL2 Earth banks/ Hedgerows/ Treelines	251.86 m	-
BL2/WL2 Earth banks/ Treelines	329.27 m	-
FW1 Eroding/upland rivers	97.63 m	102.64 m
FW4 Drainage ditches	3553.18 m	211.67 m
WL1 Hedgerows	7836.29 m	894.75 m
WL1/WL2 Hedgerows/ Treelines	7094.51 m	21.29 m
WL2 Treelines	5461.43 m	300.24 m
Proposed Development with Vestas V150 habitat loss		
BL3 Buildings and artificial surfaces	16.697 ha	3.2495 ha
BL3/ ED2 Buildings and artificial surfaces/ Spoil and bare ground	0.113 ha	-
BL3/ ED3 Buildings and artificial surfaces/ Recolonising bare ground	0.095 ha	-
BL3/ GA1 Buildings and artificial surfaces/ Improved agricultural grassland	0.917 ha	-
BL3/ GA2 Buildings and artificial surfaces/ Amenity Grassland	11.620 ha	0.0945 ha
BL3/GA2/WD5 Buildings and artificial surfaces/ Amenity Grassland/ Scattered trees and parkland	0.632 ha	-
BL3/ GS4 Buildings and artificial surfaces/ Wet grassland	0.251 ha	-
BL3 /WS1 Buildings and artificial surfaces/ Scrub	0.188 ha	-

Habitat type	Pre-construction extent within the Proposed Development Site (ha/m)	Extent of permanent land take (ha/m)
BL3 /WS2 Buildings and artificial surfaces/ Immature Woodland	0.891 ha	-
ED2 Spoil and bare ground	0.380 ha	0.0867 ha
ED2/GM1 Spoil and bare ground/ Marsh	0.703 ha	
ED3 Recolonising bare ground	0.364 ha	0.0627 ha
GA1 Improved agricultural grassland	51.406 ha	0.1301 ha
GA1/GS4 Improved agricultural grassland/ Wet Grassland	0.266 ha	-
GA1/WS1 Improved agricultural grassland/ Scrub	2.637 ha	-
GM1 Marsh	0.340 ha	-
GS1/GS3 Dry calcareous and neutral grassland/ Dry-humid acid grassland	0.035 ha	-
GS2 Dry meadows and grassy verges	0.786 ha	0.0083 ha
GS2/HD1 Dry meadows and grassy verges/ Dense bracken	0.066 ha	-
GS3 Dry-humid acid grassland	5.764 ha	1.2103 ha
GS3/GS4 Dry-humid acid grassland/ Wet grassland	1.039 ha	0.0355 ha
GS3/GS4/HH1 Dry-humid acid grassland/ Wet grassland/ Dry siliceous heath	0.033 ha	
GS3/HH1 Dry-humid acid grassland/ Dry siliceous heath	0.590 ha	0.0001 ha
GS3/WS1 Dry-humid acid grassland/ Scrub	5.302 ha	0.0880 ha
GS4 Wet grassland	30.020 ha	0.7169 ha
GS4/HH2 Wet grassland/ Dry calcareous heath	0.199 ha	-
GS4/HH3 Wet grassland/ Wet heath	0.154 ha	-
GS4/HH3/PB2 Wet grassland/ Wet heath/ Lowland blanket bog	0.075 ha	-
GS4/PB2 Wet grassland/ Lowland blanket bog	0.299 ha	0.0119 ha
GS4/WS1 Wet grassland/ Scrub	3.064 ha	0.0092 ha
HD1 Dense bracken	0.122 ha	-
HD1/WS1 Dense bracken/ Scrub	0.593 ha	
HH3 Wet heath	14.058 ha	3.6068 ha

Habitat type	Pre-construction extent within the Proposed Development Site (ha/m)	Extent of permanent land take (ha/m)
HH3/WD4 Wet heath/Conifer plantation	3.044 ha	0.1585 ha
HH3/WS1 Wet heath/Scrub	1.110 ha	0.3514 ha
WD1 (Mixed) broadleaved woodland	2.156 ha	0.4114 ha
WD2 Mixed broadleaved woodland/ conifer plantation	1.984 ha	0.0240 ha
WN6 Wet willow-alder-ash woodland	1.374 ha	0.0032 ha
WD3 (Mixed) conifer woodland	1.168 ha	0.0091 ha
WD4 Conifer plantation	62.186 ha	25.2511 ha
WD4/WS1 Conifer plantation/Scrub	2.740 ha	0.1731 ha
WS1 Scrub	13.234 ha	1.6119 ha
WS1/WD2 Scrub/ Mixed broadleaved woodland/ conifer plantation	0.023 ha	0.0026 ha
WS1/WS2 Scrub/ Immature woodland	1.436 ha	0.0050 ha
WS2 Immature woodland	0.584 ha	-
WS3 Ornamental/non-native shrub	0.431 ha	-
WS5 Recently-felled woodland	10.460 ha	-
BL1 Stone walls and other stonework	1029.05 m	174.61 m
BL2 Earth banks	4935.04 m	461.45 m
BL2/WL1 Earth banks/ Hedgerows	791.96 m	176.73 m
BL2/WL1/WL2 Earth banks/ Hedgerows/ Treelines	251.86 m	-
BL2/WL2 Earth banks/ Treelines	329.27 m	-
FW1 Eroding/upland rivers	97.63 m	105.46 m
FW4 Drainage ditches	3553.18 m	211.67 m
WL1 Hedgerows	7836.29 m	901.27 m
WL1/WL2 Hedgerows/ Treelines	7094.51 m	21.29 m
WL2 Treelines	5461.43 m	300.24 m

As such, the Proposed Development will result in the permanent loss of habitats including conifer plantation, wet heath, wet grassland, scrub, recently-felled woodland and improved agricultural grassland. The extent of the loss of these habitats will be relatively small in the context of the areas of these habitats retained within the Proposed Development site and the surrounding landscape. The potential effects of habitat loss and other construction effects on Key Ornithological Features are described below.

8.6.3.1.1 *Hen Harrier*

The population of Hen Harrier recorded is assessed as being of National importance. Two to three active nests were recorded during the two years of detailed surveys, ranging from approximately 350 m to 1 km from the nearest Proposed Development Turbine (see **Appendix 8.4, Figure 8.14**). These nests were in heath and open forestry plantation. Regular foraging activity was also recorded within and adjacent to the Proposed Development in heath, forestry plantation and scrub during the breeding and winter seasons.

As described in **Section 8.5**, the Proposed Development design includes embedded mitigation to minimise loss and fragmentation of suitable Hen Harrier habitat during construction. Habitat loss will therefore be restricted to the habitat areas described in **Table 8.10** above. This includes loss of habitat of value to breeding and wintering Hen Harriers. Larger areas of suitable Hen Harrier habitat will be retained within the Proposed Development and the wider area (containing all identified nest sites and the majority of used foraging habitat). Despite this habitat retainment, considering the potential loss of suitable nesting habitat and active foraging habitat (including that within the core foraging range of active nests), in the absence of additional mitigation the construction of the Proposed Development is considered to potentially have a significant negative effect on breeding and wintering Hen Harrier at a National level (moderate effect on a high sensitivity receptor) through direct habitat loss and fragmentation. This significant effect will be avoided through additional mitigation and enhancement measures (see **Section 8.7.1**) and the dedicated Species and Habitats Management Plan.

As described in **Section 8.5**, the Proposed Development design 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 8.5** includes the provision of best practice measures and ecological supervision to ensure the destruction or significant disturbance of any active Hen Harrier nests and 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 (with regard to baseline Hen Harrier activity; notably the locations of nest sites), and the reduced extent of available habitat into which disturbed Hen Harriers would be displaced (as described above), in the absence of additional mitigation the construction of the Proposed Development is considered to potentially result in a slight impact on a high sensitivity receptor at a National level (breeding and wintering Hen Harrier) through disturbance and displacement, resulting in a significant negative effect. This significant effect will be avoided through additional mitigation and enhancement measures (see **Section 8.7.1**) and the dedicated Species and Habitats Management Plan.

8.6.3.1.2 *Kestrel*

The population of Kestrel recorded is assessed as being of County/district level importance. Multiple breeding territories were recorded adjacent to the Proposed Development, and land within and adjacent to the Proposed Development is important to foraging Kestrels during the breeding and winter seasons.

As described in **Section 8.5**, the Proposed Development design includes embedded mitigation to minimise loss and fragmentation of suitable Kestrel habitat during construction. Habitat loss will therefore be restricted to the habitat areas described in **Table 8.10** above. This includes loss of habitat of value to foraging Kestrels during the breeding and winter seasons. The majority of Kestrel habitat will be retained within the Proposed Development and the wider area (containing all identified nest sites). Despite this habitat retainment, considering the potential loss of foraging habitat (including that within the core foraging range of active nests), in the absence of additional mitigation the construction of the Proposed Development is considered to potentially have a significant negative effect on breeding and wintering Kestrel at a County/district level (moderate effect on a medium sensitivity receptor) through direct habitat loss and fragmentation. This significant effect will be avoided through additional mitigation and enhancement measures (see **Section 8.7.1**); notably those prescribed within the Species and Habitats Management Plan, which includes creation and enhancement of suitable foraging habitat for Kestrel.

As described in **Section 8.5**, the Proposed Development design 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 8.5** includes the provision of best practice measures and ecological supervision to ensure the destruction or significant disturbance of any active Kestrel nests is avoided, including timing works outside the most sensitive periods, and the implementation of ecological supervision and exclusion zones where required. However, considering the extent and locations of construction works within the Proposed Development (with regard to baseline Kestrel activity), and the reduced extent of available habitat into which disturbed Kestrel would be displaced (as described above), in the absence of additional mitigation the construction of the Proposed Development is considered to potentially have a significant negative effect on breeding and wintering Kestrel at a County/district level (slight effect on a medium sensitivity receptor) through disturbance and displacement. This significant effect will be avoided through additional mitigation and enhancement measures (see **Section 8.7.1**) and the Species and Habitats Management Plan.

8.6.3.1.3 *Other Raptors*

Populations of Buzzard, Peregrine and Merlin are assessed as being of Local importance (Higher value) due to the level of flight activity (notably foraging) recorded within and adjacent to the Proposed Development, and the conservation statuses of these species.

As described in **Section 8.5**, the Proposed Development design includes embedded mitigation to minimise loss and fragmentation of suitable raptor habitat during construction. Habitat loss will therefore be restricted to the habitat areas described in **Table 8.10** above. This includes the loss of habitat of value to foraging raptors (e.g., grassland, scrub, heath) but does not include the locations of any known raptor nest sites. The majority of suitable raptor nesting and foraging habitat will be retained within the Proposed Development, and wider areas of suitable habitat will be retained adjacent to the Proposed Development. Despite this habitat retainment, considering the potential loss of nest sites and suitable foraging habitat, in the absence of additional mitigation the construction of the Proposed Development is considered to potentially have a significant negative effect on Buzzard, Peregrine and Merlin at a Local level (slight effect on low

sensitivity receptors) through direct habitat loss and fragmentation. This significant effect will be avoided through additional mitigation and enhancement measures (see **Section 8.7.1**) and the Species and Habitats Management Plan.

As described in **Section 8.5**, the Proposed Development design 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 8.5** includes the provision of best practice measures and ecological supervision to ensure the destruction or significant disturbance of any active raptor nests 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 (with regard to baseline raptor activity), and the reduced extent of available habitat into which disturbed raptors would be displaced (as described above), in the absence of additional mitigation the construction of the Proposed Development is considered to potentially have a significant negative effect on Buzzard, Peregrine and Merlin at a Local level (slight effect on low sensitivity receptors) through disturbance and displacement. This significant effect will be avoided through additional mitigation and enhancement measures (see **Section 8.7.1**).

8.6.3.1.4 *Red Grouse*

The population of Red Grouse is assessed as being of County/district level importance, including 1-2 breeding territories in heather-dominated habitat (e.g., heath, bog, plantation edge) as near as approximately 400m north of the nearest Proposed Development Turbine (T7) (see **Appendix 8.4, Figure 8.13**). This habitat is also suitable for wintering Red Grouse. Red Grouse has also been identified as being relevant to the nearby Gortacullin Bog NHA (see **Section 8.6.2.2.1**).

As described in **Section 8.5**, the Proposed Development design includes embedded mitigation to minimise loss and fragmentation of suitable Red Grouse habitat during construction. Habitat loss will therefore be restricted to the habitat areas described in **Table 8.10** above. Whilst this includes the loss of suitable Heather-dominated habitat (e.g., heath, bog, plantation edge), no Red Grouse observations were recorded in this habitat during the detailed field surveys undertaken between 2021 and 2023 inclusive, and much larger areas of suitable Red Grouse habitat (including that within which breeding territories were recorded) will be retained within and adjacent to the Proposed Development. This retained suitable habitat includes land within the adjacent Gortacullin Bog NHA. Despite this habitat retainment, considering the potential loss of suitable habitat and the resulting effect on habitat availability and connectivity, in the absence of additional mitigation the construction of the Proposed Development is considered to potentially have a significant negative effect on Red Grouse at a County/district level (slight effect on a medium sensitivity receptor) through direct habitat loss and fragmentation. This significant effect will be avoided through additional mitigation and enhancement measures (see **Section 8.7.1**) and the dedicated Species and Habitats Management Plan.

As described in **Section 8.5**, the Proposed Development design 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 8.5** includes the provision of best practice measures and ecological supervision to ensure the destruction or significant disturbance of any active Red Grouse nests is avoided, including timing works outside the most sensitive periods, and the implementation of ecological supervision and exclusion zones where required. However, considering the extent and locations of construction works within the Proposed Development (with regard to baseline Red Grouse activity; notably the locations of breeding territories), and the reduced extent of available habitat into which disturbed Red Grouse would be displaced (as described above), in the absence of additional mitigation the construction of the Proposed Development is considered to potentially have a significant negative effect on breeding and wintering Red Grouse at a County/district level (slight effect on a medium sensitivity receptor) through disturbance and displacement. This significant effect will be avoided through additional mitigation and enhancement measures (see **Section 8.7.1**) and the dedicated Species and Habitats Management Plan.

8.6.3.1.5 Woodcock

The population of Woodcock is assessed as being of County/district level importance, with multiple breeding territories recorded in conifer plantation adjoining suitable heathland habitat. These included territories in close proximity to Proposed Development turbines, notably towards the north-west of the Western DA.

As described in **Section 8.5**, the Proposed Development design includes embedded mitigation to minimise loss and fragmentation of suitable Woodcock habitat during construction. Permanent and temporary land take will therefore be restricted to the habitat areas described in **Table 8.10** above. This includes the loss of highly suitable breeding and wintering habitat for Woodcock (notably conifer plantation). Wider areas of suitable Woodcock habitat will be retained within and adjacent to the Proposed Development (including identified breeding territories). Despite this habitat retainment, considering the potential loss of highly suitable breeding and wintering habitat, in the absence of additional mitigation the construction of the Proposed Development is considered to potentially have a significant negative effect on breeding and wintering Woodcock at a County/district level (moderate effect on a medium sensitivity receptor) through direct habitat loss and fragmentation. This significant effect will be avoided through additional mitigation and enhancement measures (see **Section 8.7.1**) and the Species and Habitats Management Plan.

As described in **Section 8.5**, the Proposed Development design 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 8.5** includes the provision of best practice measures and ecological supervision to ensure that the destruction or significant disturbance of any active Woodcock nests is avoided, including timing works outside the most sensitive periods, and the implementation of ecological supervision and exclusion zones where required. However, considering the extent and locations of construction works within the Proposed Development (with regard to baseline Woodcock activity; notably the locations of breeding territories), and the reduced extent of available habitat into which disturbed Woodcock would be displaced (as described above), in the absence of additional mitigation the construction of the Proposed Development is considered to potentially have a significant negative effect on

breeding and wintering Woodcock at a County/district level (slight effect on a medium sensitivity receptor) through disturbance and displacement. This significant effect will be avoided through additional mitigation and enhancement measures (see **Section 8.7.1**); notably the enhancement of conifer plantation and heath within the Species and Habitats and Management Plan.

8.6.3.1.6 *Waders*

Relatively low levels of Snipe activity were recorded within and adjacent to the Proposed Development. Considering the level and type of Snipe activity, and the embedded mitigation described in **Section 8.5** (notably the extent of retained suitable habitat within and adjacent to the Proposed Development), effects on Snipe during construction are considered not significant.

Golden Plover has been scoped in for further assessment on the basis of winter flight activity in the vicinity of proposed turbines. No significant use of the habitats within or in close proximity to the Proposed Development (e.g., for nesting, foraging or roosting) was identified. Considering the level and type of activity recorded, effects on Golden Plover and any other wader species (with the exception of Woodcock described above) during construction are considered not significant.

8.6.3.1.7 *Passerines*

Populations of breeding and wintering passerines (specifically Meadow Pipit, Starling, Raven, and Willow Warbler) are assessed as being of Local (higher level) importance. These species were recorded breeding and wintering in habitats including rough grassland, scrub and woodland.

As described in **Section 8.5**, the Proposed Development design includes embedded mitigation to minimise habitat loss and fragmentation during construction. Habitat loss will therefore be restricted to the habitat areas described in **Table 8.10** above. This includes permanent and temporary loss of habitat of value to breeding and wintering passerines including Meadow Pipit, Starling, Raven and Willow Warbler. Whilst the majority of suitable habitat will be retained within the Proposed Development, and wider areas of suitable habitat will be retained adjacent to the Proposed Development, this on-site habitat removal will result in permanent and temporary reductions in the availability of suitable habitat used by important breeding and wintering passerine populations, and will potentially cause increased fragmentation of suitable passerine habitat within the Proposed Development and consequently the local area. As such, in the absence of additional mitigation, the construction of the Proposed Development is considered to potentially have a significant negative effect on breeding and wintering passerines at a Local level (slight effect on a low sensitivity receptor) through direct habitat loss and fragmentation. This significant effect will be avoided through additional mitigation and enhancement measures (see **Section 8.7.1**).

As described in **Section 8.5**, the Proposed Development design 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 8.5** includes the provision of best practice measures and ecological supervision to ensure the destruction or significant disturbance of any active nests is avoided. However,

considering the extent and locations of construction works within the Proposed Development, and the reduced extent of available habitat into which disturbed birds would be displaced (as described above), in the absence of additional mitigation, the construction of the Proposed Development is considered to potentially have a significant negative effect on breeding and wintering passerines at a Local level (slight effect on a low sensitivity receptor) through disturbance and displacement. This significant effect will be avoided through additional mitigation and enhancement measures (see **Section 8.7.1**).

8.6.3.1.8 Summary

Table 8.11: Construction effect characterisation for Key Ornithological Features

KOF	Effect	Effect magnitude	Effect significance
Hen Harrier	Direct habitat loss and fragmentation	Medium	Long-term moderate negative effect (significant at a National level)
	Disturbance and displacement	Small	Short-term slight negative effect (significant at a National level)
Kestrel	Direct habitat loss and fragmentation	Medium	Long-term moderate negative effect (significant at a County/district level)
	Disturbance and displacement	Small	Short-term slight negative effect (significant at a County/district level)
Other raptors	Direct habitat loss and fragmentation	Small	Long-term slight negative effect (significant at a Local level)
	Disturbance and displacement	Small	Short-term slight negative effect (significant at a Local level)
Red Grouse	Direct habitat loss and fragmentation	Small	Long-term slight negative effect (significant at a County/district level)
	Disturbance and displacement	Small	Short-term slight negative effect (significant at a County/district level)
Woodcock	Direct habitat loss and fragmentation	Medium	Long-term moderate negative effect (significant at a County/district level)
	Disturbance and displacement	Small	Short-term slight negative effect (significant at a County/district level)
Waders	Direct habitat loss and fragmentation	Negligible	Not significant

KOF	Effect	Effect magnitude	Effect significance
	Disturbance and displacement	Negligible	Not significant
Passerines	Direct habitat loss and fragmentation	Small	Long-term slight negative effect (significant at a Local level)
	Disturbance and displacement	Small	Short-term slight negative effect (significant at a Local level)

8.6.3.2 Operational Effects

The assessment of effects on ornithological features during the operation of the Proposed Development is described in this section and summarised in **Table 8.13**. The Proposed Development has an anticipated lifespan of 35 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 for birds to facilitate operational maintenance;
- **Disturbance and displacement:** disturbance of nesting, flying, sheltering and foraging birds (e.g., from additional noise, light, vibration, visual disturbance and human activity) potentially resulting in displacement of birds; and
- **Turbine collisions:** bird collisions with turbines whilst flying within the Proposed Development, resulting in fatalities and injuries.

Assessment of operational effects through turbine collisions for Key Ornithological Features is informed by species-specific CRM where appropriate. CRM methods are summarised in **Section 8.3.3.2**, with full details presented in EIAR **Appendix 8.1**. The results of CRM for Key Ornithological Features are summarised in **Table 8.12** and referred to in the relevant sections below.

Species were selected for inclusion in CRM based on the following factors:

- Their level and type of flight activity through the proposed turbines at collision height;
- Their likely sensitivity to the Proposed Development (particularly their potential collision risk and/or susceptibility to disturbance from new wind turbines);
- Their level of legislative protection and conservation concern; and
- Their relevance to any nearby designated sites (e.g., SPAs, IBAs).

Four Key Ornithological Features were therefore selected for inclusion in CRM: specifically, Buzzard, Hen Harrier, Kestrel and Golden Plover. Full details of the species selection process for inclusion in CRM are provided in EIAR **Appendix 8.1**.

Table 8.12: Collision risk modelling results for relevant Key Ornithological Features

KOF	Breeding season		Winter season	
	Estimated collision fatalities per year	Estimated operation duration for one collision fatality to occur (years)	Estimated collision fatalities per year	Estimated operation duration for one collision fatality to occur (years)
Buzzard	0.06-0.07	13.93-15.94	0.03	32.11-36.75
Hen Harrier	0.01	76.15-87.42	-	-
Kestrel	0.23-0.26	3.83-4.42	0.05-0.06	15.02-18.27
Golden Plover	-	-	0.04	24.46-27.63

8.6.3.2.1 Hen Harrier

The population of Hen Harrier recorded is assessed as being of National importance. Two to three active nests were recorded during the two years of detailed surveys, ranging from approximately 350m to 1km from the nearest Proposed Development Turbine (see **Appendix 8.4, Figure 8-14**). These nests were in heath and bog near forestry plantation. Regular foraging activity was also recorded within and adjacent to the Proposed Development in heath, bog, scrub, forestry plantation and scrub, both during the breeding and winter seasons.

As described in **Section 8.5**, the Proposed Development design includes embedded mitigation to minimise loss and fragmentation of suitable Hen Harrier 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 habitats used by breeding and wintering Hen Harrier, any vegetation removal will be small in scale; particularly in the context of retained suitable habitat within and adjacent to the Proposed Development. As such, effects on breeding and wintering Hen Harrier due to habitat loss and fragmentation during the operational phase are considered not significant.

As described in **Section 8.5**, the Proposed Development design includes embedded mitigation to minimise disturbance during its operation; notably by avoiding/minimising the generation of additional noise, dust, light spill and vibration. In addition, **Section 8.5** includes the provision of best practice measures and ecological supervision to ensure the destruction or significant disturbance of any active Hen Harrier nests or 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. Considering the limited scale of operational disturbance and the embedded mitigation described in **Section 8.5**, effects on breeding and wintering Hen Harrier due to disturbance and displacement during the operational phase are considered not significant.

Hen Harriers typically fly near to the ground (i.e., below the area swept by turbine blades), reducing their susceptibility to turbine collisions compared with many other similarly-sized raptor species. However, considering the high level of baseline Hen Harrier activity at the Proposed Development, the potential for significant effects due to Hen Harrier collisions with operational turbines (i.e., resulting in fatalities and injuries) was subject to detailed

consideration within CRM (see EIAR **Appendix 8.1**). The results of CRM for Hen Harrier are summarised in **Table 8.12**. Modelled Hen Harrier collision fatalities are estimated as 0.01 birds per year, equating to one Hen Harrier collision every 76.15 to 87.42 years. As such, when assessed in the context of the Hen Harrier population recorded within the Proposed Development and adjacent land, collision impacts on Hen Harrier during the operational phase are considered not significant.

8.6.3.2.2 *Kestrel*

The population of Kestrel recorded is assessed as being of County/district level importance. Multiple breeding territories were recorded adjacent to the Proposed Development, and land within and adjacent to the Proposed Development is important to foraging Kestrels during the breeding and winter seasons. This included frequent flight activity through Proposed Development turbines.

As described in **Section 8.5**, the Proposed Development design includes embedded mitigation to minimise loss and fragmentation of suitable Kestrel 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 habitats used by breeding and wintering Kestrel (notably for foraging), any vegetation removal will be small in scale; particularly in the context of retained suitable habitat within and adjacent to the Proposed Development. As such, effects on breeding and wintering Kestrel due to habitat loss and fragmentation during the operational phase are considered not significant.

As described in **Section 8.5**, the Proposed Development design includes embedded mitigation to minimise disturbance during its operation; notably by avoiding/minimising the generation of additional noise, dust, light spill and vibration. In addition, **Section 8.5** includes the provision of best practice measures and ecological supervision to ensure the destruction or significant disturbance of any active Kestrel nests is avoided, including timing works outside the most sensitive periods, and the implementation of ecological supervision and exclusion zones where required. Considering the limited scale of operational disturbance and the embedded mitigation described in **Section 8.5**, effects on breeding and wintering Kestrel due to disturbance and displacement during the operational phase are considered not significant.

Due to their size and typical flight patterns, Kestrels can be particularly susceptible to impacts from collisions with new turbines which may result in injury or fatalities. Considering this, and the levels of baseline Kestrel activity within the Proposed Development, the potential for significant effects due to raptor collisions with operational turbines was subject to detailed consideration within CRM (see EIAR **Appendix 8.1**). The results of CRM for Kestrel are summarised in **Table 8.12**. Modelled Kestrel collision fatalities during the breeding season are estimated as 0.23 to 0.26 birds per year, equating to one Kestrel collision every 3.83 to 4.42 years. Modelled Kestrel collision fatalities during the winter season are estimated as 0.05 to 0.06 birds per year, equating to one Kestrel collision every 15.02 to 18.27 years. Recent population estimates Kestrel are not available for the local area, but they are considered locally widespread and common and collision fatalities over the operational lifespan of the Proposed Development would likely equate to less than 1% of the county population. The resultant

increases in bird mortality would not be significant 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, 2023). As such, when assessed in the context of the Kestrel population recorded within the Proposed Development site and adjacent land, and the regional and national status of this species, collision impacts on Kestrel during the operational phase are considered not significant.

8.6.3.2.3 Other Raptors

Populations of Buzzard, Peregrine and Merlin are assessed as being of Local importance (Higher value) due to the level of flight activity (notably foraging) recorded within and adjacent to the Proposed Development, and the conservation statuses of these species.

As described in **Section 8.5**, 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 habitats used by breeding and wintering raptors, any vegetation removal will be small in scale; particularly in the context of retained suitable habitat within and adjacent to the Proposed Development. As such, effects on breeding and wintering raptors due to habitat loss and fragmentation during the operational phase are considered not significant.

As described in **Section 8.5**, the Proposed Development design includes embedded mitigation to minimise disturbance during its operation; notably by avoiding/minimising the generation of additional noise, dust, light spill and vibration. In addition, **Section 8.5** includes the provision of best practice measures and ecological supervision to ensure the destruction or significant disturbance of any active raptor nests 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. Considering the limited scale of operational disturbance and the embedded mitigation described in **Section 8.5**, effects on breeding and wintering raptors due to disturbance and displacement during the operational phase are considered not significant.

Due to their size and typical flight patterns, raptor species can be particularly susceptible to impacts from collisions with new turbines which may result in injury or fatalities. Considering this, and the levels of baseline raptor activity within the Proposed Development, the potential for significant effects due to raptor collisions with operational turbines was subject to detailed consideration within CRM (see EIAR **Appendix 8.1**). Based on the lack of flight activity within the flight risk volume of the proposed turbines, no CRM was required for Peregrine or Merlin.

The results of CRM for Buzzard are summarised in **Table 8.12**. Modelled Buzzard collision fatalities during the breeding season are estimated as 0.06 to 0.07 birds per year, equating to one Buzzard collision every 13.93 to 15.94 years. Modelled Buzzard collision fatalities during the winter season are estimated as 0.03 birds per year, equating to one Buzzard collision every 32.11 to 36.75 years. When assessed in the context of the Buzzard populations recorded within the Proposed Development and receiving environment, and the regional and national status of this species, collision impacts on Buzzard during the operational phase are considered not significant.

8.6.3.2.4 Red Grouse

The population of Red Grouse is assessed as being of County/district level importance, including 1-2 breeding territories in Heather-dominated habitat (e.g., heath, plantation edge) as near as approximately 400m north of the nearest Proposed Development turbine (T7) (see **Appendix 8.4, Figure 8-16**). This habitat is also suitable for wintering Red Grouse. Red Grouse has also been identified as being relevant to the nearby Gortacullin Bog NHA (see **Section 8.6.2.2.1**).

As described in **Section 8.5**, the Proposed Development design includes embedded mitigation to minimise loss and fragmentation of suitable Red Grouse 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 habitats used by breeding and wintering Red Grouse, any vegetation removal will be small in scale; particularly in the context of retained suitable habitat within and adjacent to the Proposed Development. As such, effects on Red Grouse due to habitat loss and fragmentation during the operational phase are considered not significant.

As described in **Section 8.5**, the Proposed Development design includes embedded mitigation to minimise disturbance during its operation; notably by avoiding/minimising the generation of additional noise, dust, light spill and vibration. In addition, **Section 8.5** includes the provision of best practice measures and ecological supervision to ensure that the destruction or significant disturbance of any active Red Grouse nests is avoided. Considering the limited scale of operational disturbance and the embedded mitigation described in **Section 8.5**, effects on Proposed Development due to disturbance and displacement during the operational phase are considered not significant.

Due to their typical flight patterns, gamebirds such as grouse are not generally considered to be susceptible to significant impacts from collisions with new wind turbines (Thaxter et al., 2017), and Red Grouse flight activity recorded over proposed turbine locations was insufficient to justify detailed CRM. Collision impacts on Red Grouse during the operational phase are considered not significant.

8.6.3.2.5 Woodcock

The population of Woodcock is assessed as being of County/district level importance, with multiple breeding territories recorded in conifer plantation adjoining suitable heathland habitat. These included territories in close proximity to Proposed Development Turbines, notably towards the north-west of the Western DA.

As described in **Section 8.5**, the Proposed Development design includes embedded mitigation to minimise loss and fragmentation of suitable Woodcock 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 habitats used by breeding and wintering Woodcock, any vegetation removal will be small in scale; particularly in the context of retained suitable habitat within and adjacent to the Proposed Development. As such, effects on breeding and wintering Woodcock due to habitat loss and fragmentation during the operational phase are considered not significant.

As described in **Section 8.5**, the Proposed Development design includes embedded mitigation to minimise disturbance during its operation; notably by avoiding/minimising the generation of additional noise, dust, light spill and vibration. In addition, **Section 8.5** includes the provision of best practice measures and ecological supervision to ensure the destruction or significant disturbance of any active Woodcock nests is avoided. Considering the limited scale of operational disturbance and the embedded mitigation described in **Section 8.5**, effects on breeding and wintering Woodcock due to disturbance and displacement during the operational phase are considered not significant.

Whilst displaying Woodcock may fly at heights which would potentially bring them into contact with turbine blades, Woodcock flight activity recorded over proposed turbine locations was insufficient to justify detailed CRM. Collision impacts on Woodcock during the operational phase are considered not significant.

8.6.3.2.6 *Waders*

Low levels of activity by Golden Plover, Snipe and other wader species were recorded within and adjacent to the Proposed Development. Considering the level and type of wader activity recorded, effects on waders due to habitat loss and fragmentation, and disturbance and displacement, during the operational phase are considered not significant.

Considering their typical flight heights, wintering Golden Plover have the potential to collide with new turbines. CRM for Golden Plover was therefore undertaken on a precautionary basis (see EIAR **Appendix 8.1**). The results of CRM for Golden Plover are summarised in **Table 8.12**. Modelled Golden Plover collision fatalities are estimated as 0.04 birds per year, equating to one Golden Plover collision every 24.46 to 27.63 years. This would affect less than 1% of the county population and when assessed in the context of the Golden Plover population recorded within the Proposed Development and adjacent land, collision impacts on Golden Plover during the operational phase are considered not significant. This is further justified when considered in the context of the annual background rates of mortality for the species, which for adult birds is 27% (based on the mortality rates taken from the BTO Bird Facts website).

8.6.3.2.7 *Passerines*

Populations of breeding and wintering passerines (specifically Meadow Pipit, Starling, Raven and Willow Warbler) are assessed as being of Local (higher level) importance. These species were recorded breeding and wintering in habitats including rough grassland, scrub and woodland.

As described in **Section 8.5**, the Proposed Development design includes embedded mitigation to minimise habitat loss and fragmentation 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 habitats used by breeding and wintering passerines, any vegetation removal will be small in scale; particularly in the context of retained habitat within and adjacent to the Proposed Development. As such, effects on breeding and wintering passerines due to habitat loss and fragmentation during the operational phase are considered not significant.

Regarding effects from operational disturbance due to additional noise, vibration, light, and human activity, relevant passerine species are considered to be relatively tolerant to such disturbance and are likely to quickly habituate to new levels of 'background' disturbance during the operation of the Proposed Development. In addition, as described in **Section 8.5**, the Proposed Development design includes embedded mitigation to minimise disturbance during its operation; notably by avoiding/minimising the generation of additional noise, dust, light spill and vibration. In addition, **Section 8.5** includes the provision of best practice measures and ecological supervision to ensure the destruction or significant disturbance of any active nests is avoided. Considering the limited scale of operational disturbance, the low sensitivity of relevant passerine species and the embedded mitigation described in **Section 8.5**, effects on breeding and wintering passerines due to disturbance and displacement during the operational phase are considered not significant.

Due to their size and typical flight patterns, passerine species such as those relevant to the Proposed Development are not considered to be susceptible to significant impacts from collisions with new wind turbines (Thaxter et al., 2017). As such, CRM was not undertaken for these species. Collision impacts on breeding and wintering passerines during the operational phase are considered not significant.

8.6.3.2.8 Summary

Table 8.13: Operational effect characterisation for Key Ornithological Features

KOF	Effect	Effect magnitude	Effect significance
Hen Harrier	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
	Turbine collisions	Negligible	Not significant
Kestrel	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
	Turbine collisions	Minor	Not significant
Other raptors	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
	Turbine collisions	Negligible	Not significant
Red Grouse	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant

KOF	Effect	Effect magnitude	Effect significance
	Turbine collisions	Negligible	Not significant
Woodcock	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
	Turbine collisions	Negligible	Not significant
Waders	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
	Turbine collisions	Negligible	Not significant
Passerines	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
	Turbine collisions	Negligible	Not significant

8.6.3.3 Decommissioning Effects

The assessment of effects on ornithological features during the decommissioning phase of the Proposed Development is described below and summarised in **Table 8.14**. Potential effects identified during the decommissioning phase are as follows:

- **Direct habitat loss:** permanent and temporary reductions to the extent, quality and connectivity of the habitats present for birds; and
- **Disturbance and displacement:** disturbance of nesting, flying, sheltering and foraging birds (e.g., from additional noise, dust, light, vibration and human activity), potentially causing displacement.

Removal of habitat during the decommissioning of the Proposed Development will be limited in extent, anticipated to involve small areas of relatively low-quality habitat similar to the temporary losses anticipated during the construction phase. Any habitat removal will be undertaken in accordance with the embedded mitigation measures outlined described in **Section 8.5** and detailed in EIAR **Chapter 5**, ensuring impacts would be short-term and temporary, with any removed habitat during decommissioning subsequently reinstated. As such, likely effects on all Key Ornithological Features from habitat loss and fragmentation during the decommissioning of the Proposed Development are deemed not significant.

Decommissioning works are likely to cause a short-term increase in disturbance at the Proposed Development (e.g., due to increased noise, vibration and human presence). This could potentially lead to increased energetic stress and reduced condition (with potential implications for breeding success) in 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 Zol, and the adoption of embedded

mitigation measures described in **Section 8.5** will ensure short-term impacts on sensitive species (e.g., breeding raptors, wintering waterbird aggregations) are avoided. Extensive areas of suitable foraging and breeding habitat will remain within and adjacent to the Proposed Development during decommissioning, into which any temporarily displaced birds can disperse. Disturbance effects on all Key Ornithological Features during the decommissioning of the Proposed Development are therefore considered not significant.

8.6.3.3.1 Summary

Table 8.14: Decommissioning effect characterisation for Key Ornithological Features

KOF	Effect	Effect magnitude	Effect significance
Hen Harrier	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Kestrel	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Other raptors	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Red Grouse	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Woodcock	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Waders	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Passerines	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant

8.6.3.4 Cumulative Effects

As described in EIAR **Chapter 20 Impact Interactions and Cumulative Effects**, a planning search was carried out to identify permitted and constructed projects in the wider receiving environment which could potentially contribute to cumulate effects with the Proposed Development. Cumulative effects are defined by CIEEM (2018) as: *“Additional changes caused by a proposed development in conjunction with other developments or the combined effect of a set of developments taken together”*.

Detailed methods for identifying relevant plans and projects for consideration of cumulative effects are specified in EIAR **Chapter 2** and **Chapter 20**. In summary, an initial ‘long list’ of projects was compiled for consideration, with planning research conducted in relation to all relevant projects within the 10km of the Proposed Development site and all wind farms within 20km of the Proposed Development site. In-

depth planning history searches were conducted to obtain this information³, and hard copies of any documentation that was not readily available for review online were reviewed at Clare County Council Offices.

Many consent 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 ornithological features identified in relation to the Proposed Development. Therefore, only developments of a particular size and nature have been considered further for cumulative assessment. Relevant wind farm projects and other projects subject to consideration of cumulative effects are discussed in **Sections 8.6.3.4.1** and **8.6.3.4.2** below.

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

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

8.6.3.4.1 Wind Farm Projects with Potential Cumulative Effects

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

Seven wind farm developments were identified within 20km of the Proposed Development site as requiring assessment of cumulative effects in relation to the Proposed Development, as summarised in **Table 8.15** below. Two of these wind farm developments are currently operational: Parteen Turbine and Vision Care Turbine, each comprising a single turbine.

³ Planning searches were conducted until 04/12/23 after which the EIAR was being closed out.

Table 8.15: Wind farm developments considered for cumulative effects

Wind farm	Status	Distance from Proposed Development	No. of turbines	Blade tip height	Max. rotor diameter
Knockshanvo	Pre-planning	0.5 km N	9	179.5-185 m	149-163 m
Ballyclar	Pre-planning	4.7 km S	12	150-158 m	NA
Carrownagowan	Granted	5.1 km NE	19	169 m	136 m
Fahybeg Onshore Wind Farm	Planning (appealed)	6.0 km E	8	169-176.5 m	131-138 m
Lackareagh	Pre-planning	6.4 km NE	7	N/A	N/A
Parteen Turbine	Operational	9.4 km SE	1	N/A	53 m
Vision Care Turbine	Operational	13.7 km NE	1	N/A	Radius 40 m

Each additional turbine erected in the landscape can potentially increase the cumulative risk of collision for birds foraging and commuting through a landscape. For many species (e.g., passerines), their ecology (particularly their movement patterns) mean that they will not experience an incremental increase in collision risk for each turbine erected. For species with larger home ranges and/or commuting long distances (e.g., raptors, waders), there is greater potential for individuals to experience a cumulative collision risk. Information from recovery of ringed and tagged birds indicates that losses associated with collision with road traffic and buildings, along with hunting and predation fatalities, are the most significant source of bird mortality (Wernham et al., 2002).

8.6.3.4.2 Other Plans and Projects with Potential Cumulative Effects

Existing or proposed projects in the vicinity of the Proposed Development have the potential to cumulatively impact on ornithological features; particularly through increased fragmentation of the landscape, increased habitat disturbance, barrier effects, and intensification of collision or displacement impacts on sensitive bird species. In this case, such developments include solar farms, quarries and residential developments. Developments within 10km of the Proposed Development site considered for cumulative effects are detailed in EIAR **Chapter 2, Table 2.2**. These primarily comprise solar and residential developments, the nearest of which is approximately 4km from the Proposed Development turbines.

8.6.3.4.3 Assessment of Cumulative Effects on Bird Populations

Observations of bird flightlines during the breeding and wintering VP surveys indicate that the Proposed Development is not situated along any regular commuting routes for bird species which would be susceptible to cumulative effects. However, field surveys identified significant levels of activity within the Proposed Development by bird species which also have core foraging ranges extending outside of the Proposed Development site: notably raptors such as Hen Harrier, which has a core foraging range of 2km and a maximum foraging range of 10km (SNH, 2016). Significant levels of activity by Kestrel

were also recorded, although this species is typically more sedentary (as reflected by the activity recorded with the Proposed Development site during the field surveys), making it less susceptible to cumulative effects with nearby wind farm developments.

Considering this baseline bird activity within and adjacent to the Proposed Development site, the potential for cumulative effects with nearby wind farm developments must be considered. Of the seven operational and proposed wind farm developments within 20km of the Proposed Development, only one is located within 2km of the Proposed Development turbines: Knockshanvo Wind Farm (approximately 0.5km north of the Proposed Development turbines). The next nearest wind farm development, Ballyclar Wind Farm, is approximately 4.7km south of the Proposed Development turbines.

Knockshanvo Wind Farm is the only proposed wind farm development within the likely core foraging range of Hen Harrier and Kestrel populations which are also potentially subject to significant effects from the Proposed Development. Whilst detailed ornithological data for the proposed Knockshanvo Wind Farm are not currently available, this development potentially involves the removal or alteration of suitable habitat (e.g., conifer plantation, grassland, heath) used by breeding and wintering Hen Harrier and Kestrel, as near as 0.5km from the Proposed Development. In addition, whilst located outside of the likely core foraging ranges of Hen Harrier and Kestrel, other proposed wind farm projects within 10km of the Proposed Development (e.g., Ballyclar Wind Farm) could contribute to the loss and fragmentation of habitat used by these species. As such, in the absence of additional mitigation, the Proposed Development could potentially give rise to significant cumulative effects on Hen Harrier (potential for a moderate effect on a high sensitivity receptor) and Kestrel (potential for a moderate effect on a medium sensitivity receptor) in combination with other wind farm developments through habitat loss and fragmentation. These significant effects will be avoided through additional mitigation and enhancement measures (see **Section 8.7.1**) and the dedicated Species and Habitats Management Plan.

In addition, considering these proposed and operational wind farm projects within the potential foraging ranges of target species (notably Hen Harrier and Kestrel), the potential for cumulative effects through turbine collisions must be considered. Notably, potential cumulative effects in combination with the proposed Knockshanvo Wind Farm must be considered; this development will comprise nine new turbines approximately 0.5km north of the Proposed Development site at its nearest point.

Regarding Hen Harrier, this species is generally considered to be less susceptible than other similarly-sized raptors to collision effects due to its typically lower flight heights (i.e., often below the minimum height swept by turbine blades). Modelled Hen Harrier collision fatalities from the Proposed Development alone are estimated as 0.01 birds per year, equating to one Hen Harrier collision every 76.15 to 87.42 years (see **Table 8.12**). These estimated collision fatalities are sufficiently low that there is no potential for them to contribute to significant cumulative operational collision fatality effects on Hen Harrier with the proposed Knockshanvo Wind Farm or any other wind farm projects. Regarding Kestrel, modelled collision fatalities from the Proposed Development alone during the breeding season are estimated as 0.23 to 0.26 birds per year, equating to one Kestrel collision every 3.83 to 4.42 years. Modelled Kestrel collision fatalities during the winter season are estimated as 0.05 to 0.06 birds per year, equating to one Kestrel collision

every 15.02 to 18.27 years (see **Table 8.12**). Whilst recent population estimates for Kestrel are not available for the local area, this species is considered locally widespread and common. If collision fatalities from the proposed Knockshanvo Wind Farm are similar to or lower than those from the Proposed Development (as is anticipated based on the habitats present and the scope of the proposed Knockshanvo Wind Farm), the combined collision fatalities are still considered to equate to less than 1% of the county population, and these resultant increases in Kestrel mortality are considered unlikely to be significant when compared with annual background mortality for this species, with annual mortality reported to be 31% in adult Kestrels and 68% in juvenile Kestrels (BTO, 2023). As such, when assessed in the context of the Kestrel population recorded within the Proposed Development site and adjacent land, and the regional and national status of this species, cumulative operational collision fatality effects on Kestrel with the proposed Knockshanvo Wind Farm or any other wind farm projects are considered not significant. Considering CRM undertaken for other species (e.g., Buzzard, Golden Plover) and their national, regional and local conservation statuses, there is no potential for significant cumulative effects on these species through operational turbine collisions.

Based on the limited scope for the effects from the Proposed Development (see **Sections 8.6.3.1** and **8.6.3.2**), and the limited scope for effects from nearby wind farm projects (as described above, with only one project within 4km of the Proposed Development), there is no potential for significant cumulative disturbance effects during construction, operation and decommissioning, or significant cumulative habitat loss and fragmentation effects during operation and decommissioning.

Other relevant projects were identified 4-10km from the Proposed Development turbines. These included several solar farm developments, the nearest of which is approximately 4.5km west of the Proposed Development turbines. Applications for these developments will need to be accompanied by detailed ecological impact assessment regarding the potential for significant effects on ornithological features. In order to secure planning approval, these projects will have needed to include mitigation to avoid any significant loss, disturbance or fragmentation of important habitats for birds. Considering this, and their distances (i.e., at least 4km) from the Proposed Development, coupled with the bird activity recorded within the Proposed Development site and the scope for effects from the Proposed Development, there is not considered to be potential for significant cumulative effects through habitat loss or disturbance during any stages of the Proposed Development with any other (i.e., non-wind farm) projects. As detailed in **Section 8.5**, the Proposed Development includes embedded mitigation to minimise the potential for effects, and mitigation and enhancement measures (see **Section 8.7**) will further reduce the potential for adverse effects.

Whilst other projects were identified within 350m of the TDR (see **Table 2.2**), considering the limited potential for effects on ornithological features due to activities associated with the TDR, there is no potential for significant cumulative effects from the TDR on ornithological features in combination with other projects.

8.7 Mitigation and Enhancement Measures

This section describes the mitigation measures that will be implemented to avoid the potentially significant effects on Key Ornithological Features identified in **Section 8.6**. These measures will be implemented in addition to the embedded mitigation described in *Section 8.5*, which was taken into consideration during the assessment of effects.

The mitigation measures described below are designed to avoid and minimise the risk of impacts arising from each phase of the Proposed Development. These measures have been specifically aimed at benefitting birds, as well as other key ecological features (i.e., habitats and species).

A Species and Habitats Management Plan has been produced to accompany this application and should be read in conjunction with **Section 8.7**. This provides a framework for the conservation and enhancement of ecological features (notably Hen Harrier and Red Grouse), to avoid potential significant adverse effects and ensure the Proposed Development is managed in the interests of biodiversity.

8.7.1 Construction Phase

The assessment of effects undertaken in **Section 8.6.3.1** identified the following potentially significant effects on ornithological features during the construction of the Proposed Development:

- Direct loss and fragmentation of habitat used by breeding and wintering passerines, Red Grouse, Hen Harrier, Kestrel, other raptor species and Woodcock (including potential cumulative effects with nearby developments); and
- Disturbance and displacement of breeding and wintering passerines, Red Grouse, Hen Harrier, Kestrel, other raptor species and Woodcock.

As stated in **Section 8.5**, the Proposed Development design includes the following measures which will serve to minimise these effects:

- Retainment of areas of more important habitat within the landscape design (e.g., bog, heathland, higher quality grassland/woodland/scrub);
- Minimisation of the extent of habitat loss during construction wherever possible;
- Selection of delivery routes which use existing built infrastructure wherever possible, with laying of cables underground;
- Sensitive timing of construction works with the potential to affect sensitive ornithological features; and
- Presence of an ECoW to oversee any ornithological issues during construction, with appropriate exclusion zones established in relation to any active nests or important winter roosts.

The following supplementary and additional measures are proposed to avoid the potential significant effects on Key Ornithological Features identified in **Section 8.6.3.1**. In addition, these measures will further reduce the potential for adverse effects on populations of other bird species, flora and fauna during construction.

8.7.1.1 *Habitat reinstatement and creation*

Habitats will be created in proportion with the type and extent of habitat loss during construction (see **Table 8.10**: Anticipated habitat loss during the construction of the Proposed Development in the absence of mitigation). The design and management of this habitat will take into consideration the suitability of this habitat for birds; notably for the Key Ornithological Features identified in this report. The locations of habitat reinstatement and enhancement measures will take into consideration the risk of effects from collisions with wind turbines, with creation of features which could bring target species into proximity with wind turbines to be avoided.

Detailed habitat re-instatement and creation focusing on Red Grouse and Hen Harrier is described in the SHMP. The Species and Habitat Management Plan allocates a total of 173.66ha of managed habitats and 14.48km of linear habitats (hedgerows etc.) as compensatory habitats for hen harriers during the lifetime of the Proposed Development. This includes the management/creation of grassland, heath, scrub and forestry which will significantly increase the local availability, quality and connectivity of this habitat, to the benefit of relevant Key Ornithological Features (notably Red Grouse and Hen Harrier).

8.7.2 **Operational Phase**

The assessment of effects undertaken in **Section 8.6.3.2** identified no likely significant effects on ornithological features during the operation of the Proposed Development. As such, targeted mitigation during the operational phase over and above the embedded mitigation described in **Section 8.5** will not be required.

As stated in **Section 8.5**, the Proposed Development design includes measures to minimise adverse effects during operation; notably to retain the most important habitat for birds, and minimise the level of disturbance and habitat loss wherever possible. The SHMP for the Proposed Development includes detailed habitat creation/enhancement measures to provide additional high-quality habitat into which Key Ornithological Features can disperse and which will benefit other local bird populations. Monitoring will also be implemented (see below) by suitably experienced ecologists to identify any fatalities of bird species; the findings of which would be used to inform any additional mitigation requirements.

8.7.2.1 *Monitoring*

As described in **Section 8.8**, detailed monitoring will be undertaken to ensure the mitigation and enhancement measures specified in this EIAR chapter are satisfying their aims, and inform any additional management measures and/or changes in management practices. In particular, monitoring will focus on the success of bird populations within and the Proposed Development site and wider study area (notably in any identified mitigation and enhancement areas), and on monitoring turbine collisions through frequent carcass searches. If monitoring identifies the presence of any adverse effects, and/or any scope for feasible additional mitigation and enhancement measures, these will be implemented into future management to benefit the Key Ornithological Features identified in this report. Full details of monitoring in relation to Key Ornithological Features are provided in the SHMP.

8.7.3 Decommissioning Phase

The assessment of effects undertaken in **Section 8.6.3.3** identified no potentially significant effects on Key Ornithological Features during the decommissioning phase of the Proposed Development. As such, targeted mitigation over and above the embedded mitigation described in **Section 8.5** will not be required.

Any habitat that is temporarily cleared during the decommissioning phase will be reinstated on a like-for-like basis, and areas from which Proposed Development infrastructure is removed will be restored to their pre-construction baseline conditions. Following this habitat reinstatement, the Proposed Development footprint will be subject to frequent monitoring to determine the progress of habitat reinstatement and inform any requirement for management to facilitate this reinstatement (e.g., supplementary planting with native species).

At the end of the first year following the decommissioning of the Proposed Development, a reassessment of the Proposed Development footprint will be undertaken by a suitably experienced ecologist to assess the habitats and species present and inform any further management requirements. This will ensure the Proposed Development footprint is suitable for bird populations and other flora and fauna in the long-term. Further monitoring information is provided in **Section 8.8**.

8.7.4 Enhancement Measures

In accordance with ecological best practice and planning policy (see **Section 8.1.3**), enhancements will be delivered to achieve positive effects on ornithological features and other wildlife. Detailed enhancement measures are specified in the SHMP for the Proposed Development, which present the objectives and targets of enhancements, along with prescriptions for management and monitoring to achieve these objectives. These enhancements will include the improvement and creation of additional heathland, scrub, conifer plantation and grassland.

8.8 Residual Effects

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

- European sites with ornithological interest features, notably River Shannon and River Fergus Estuaries SPA;
- Nationally designated sites with ornithological interest features, specifically Gortacullin Bog NHA;
- Important Bird Areas, specifically Shannon and Fergus Estuaries IBA;
- Hen Harrier;
- Kestrel;
- Other raptor species;
- Red Grouse;
- Woodcock;

- Waders; and
- Passerines.

As described in the assessment of effects presented in **Section 8.6**, taking into consideration embedded mitigation within the Proposed Development design, the following effects were assessed as being potentially significant:

- **Effects during construction:** direct habitat loss and fragmentation, and disturbance and displacement, of passerines, Red Grouse, Hen Harrier, Kestrel, other raptor species and Woodcock (including potential cumulative effects with nearby developments).

As such, additional mitigation and enhancement measures are proposed within **Section 8.7** to avoid these significant effects on Key Ornithological Features and deliver enhancements for birds and other wildlife. These include measures prescribed within the SHMP for the Proposed Development which focuses on delivering mitigation and enhancements for Red Grouse and Hen Harrier and will also benefit other Key Ornithological Features identified in this EIAR chapter.

Considering the scope for effects from the Proposed Development, it is deemed that these mitigation and enhancement measures will be sufficient to avoid significant effects on these bird populations. As such, no residual effects are anticipated.

8.9 Monitoring

As specified in the CEMP (EIAR **Appendix 5.1**) and 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, and inform any additional management measures and/or changes in management practices.

Specific monitoring to be undertaken during the operation of the Proposed Development regarding ornithological features and relevant habitats will be as follows:

- **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 bird populations and other biodiversity features. Monitoring will take place in years 1, 2, 3, 4, 5, 7, 10 and 15 post-construction;
- **Bird Population Monitoring:** frequent bird population monitoring (including annual Hen Harrier monitoring) will take place throughout the construction of the Proposed Development and in years 1, 2, 3, 4, 5, 7, 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 Key Ornithological Feature in question):
 - The number and locations of active nests and breeding areas;
 - The timing and success of breeding attempts, notably the number of chicks successfully fledged; and

- The number and locations of winter roost sites.
- **Avian Mortality Monitoring:** 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 by handlers with specially trained cadaver dogs. This monitoring will involve monthly searches of carcasses within monitoring years (January-December) 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.

8.10 References

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