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Chapter 07 - Ornithology

Ballynisky Wind Farm

Ballynisky Green Energy Ltd.

December 2025

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Appendices

Appendix 7A – Ornithology Baseline Report

Appendix 7B – Ornithology Collision Risk Modelling Report

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7. Ornithology

7.1 Introduction

7.1.1 Purpose of this Report

This chapter of the Environmental Impact Assessment Report (EIAR) for the proposed Ballynisky Wind Farm Project (hereafter referred to as 'the project') assesses potential impacts on ornithological features (sites, habitats and species).

This chapter is supported by the following technical appendices and their accompanying figures:

- Appendix 7A – Ornithology Baseline Report; and
- Appendix 7B – Ornithology Collision Risk Modelling Report.

Appendix 7A – Ornithology Baseline Report identifies the bird populations present within and in close proximity to the site (i.e., the site's 'ornithological baseline'), in reference to relevant statutory designated sites of ornithological interest, based on desk-based review and field surveys undertaken between 2020 and 2023 inclusive.

Appendix 7B – Ornithology Collision Risk Modelling Report presents a study of potential impacts on Key Ornithological Features through collisions with new wind turbines, based on field data presented in the Ornithology Baseline Report.

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

- Assess the current ornithological baseline characteristics of the project site, including determination of the importance of ornithological features;
- Evaluate the potential significance of effects from the project on ornithological features, including from potential impacts during the construction, operational and decommissioning stages, and potential effects in isolation (i.e., from the project alone) and in combination with other relevant development proposals; and
- Identify mitigation and enhancement measures to minimise the potential for effects from the project on ornithological features and deliver ornithological enhancements where possible.

7.1.2 Site Overview

The project site (hereafter referred to as 'the site') is located in the townland of Ballynisky, Co. Limerick, and is approximately 9km north of Newcastle West and 6km west of Rathkeale (hereafter referred to as the 'site'). The site is located in a rural area and predominantly comprises improved agricultural grassland bordered by hedgerows and treelines. Additional habitats present include ditches, mixed broadleaved woodland and fen, as well as nearby watercourses (namely the Ahacronane River and Riddlestown Stream). The site is in a lowland location with elevation ranging from approximately 45-55 metres (m) Above Ordnance Datum (AOD).

7.1.3 The Project

Project details are provided in **Chapter 3, Section 3.2** of the EIAR. The project comprises the following core elements:

- 6. no. wind turbines (blade tip height up to 158 m) and all associated foundations and hardstanding areas ;
- 1 no. permanent meteorological mast (90 m height) and foundation and associated hardstand areas;
- 1 no. on-site substation (38kV) including associated ancillary buildings security fencing and all associated works;
- 2 no. developed site entrances – one permanent access point for use during operational phase, and one temporary access point for use during construction phase only;
- New (3.4km) and upgraded (470m) internal site access tracks; and
- A 9m-long clear span bridge crossing of the Ahacronane River by an internal site access track to the northwest of turbine T1 and an associated 1.5m x 1.0m relief culvert

The project also comprises the following associated components:

- Underground electrical collection and Supervisory Control and Data Acquisition (SCADA) system linking each wind turbine to the on-site project substation;
- Temporary works on sections of the public road network along the turbine delivery route (including relocation of powerlines/poles, lampposts, signage, and local road widening);
- 1 no. temporary construction site compound and additional mobile welfare unit;
- 2 no. material storage areas; and
- Associated surface water management systems;

In addition, the underground 38kV cable for connection to the National Electricity Grid at Carrons Wind Farm is also assessed as part of the project.

The proposed development layout is presented in **Chapter 3, Figure 3-2**.

7.1.4 Legislation, Policy and Guidance

7.1.4.1 Legislative Context

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

- The EC Birds Directive 2009/147/EC;
- 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 (Bonn Convention) 1979;
- The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1979;
- The EIA Directive 2011/92/EU and Directive 2014/52/EU;

- The European Communities (Birds and Natural Habitats) Regulations 2011 (transposes EU Birds directive 2009/147/EC and EU Habitats Directive 2009/147/EC, 92/43/EEC); and
- The Wildlife Act 1976-2018.

Further information on this legislation outlining its relevance to this chapter is provided below:

Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds (Birds Directive) 2009

The Birds Directive 2009 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 of conservation of the 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 Convention on Wetlands of International Importance Especially as Waterfowl Habitat 1971: the Ramsar Convention

The Ramsar Convention is an intergovernmental treaty focused on the conservation and sustainable use of wetland, primarily as habitats for water birds. 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. In addition, the convention promotes international co-operation to promote the wise use of all wetlands and their resources.

The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979

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), 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 Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1979

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 2011/92/EU and Directive 2014/52/EU

The Environmental Impact Assessment Directive aims to ensure that projects that are likely to have significant impacts on the environment are identified and assessed, within an appraisal process, before these projects proceed to development. The directive includes a list of projects that are assessed to have significant impacts 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 proposed project.

The European Communities (Birds and Natural Habitats) Regulations 2011 (transposes EU Birds directive 2009/147/EC and EU Habitats Directive 2009/147/EC, 92/43/EEC)

These regulations provide a new framework for the implementation in Ireland of Council Directive 92/43/EEC on habitats and protection of wild fauna and flora and for the implementation of Directive 2009/147/EC of the European Parliament and of the Council on the protection of wild birds. They provide, among other things, for: the appointment and functions of authorised officers; identification, classification, and other procedures relative to the designation of Community sites; conservation objectives and measures, plans, and other activities for, or affecting, the protection of European sites; appropriate assessment as referred to in Article 6(3) of 92/43/EEC and Natura Impact Statements (NIS); and the protection of wild fauna and flora.

Wildlife Act (1976), as amended

The Wildlife Act 1976 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.

Wildlife (Amendment) Act, 2000, 2010, 2012

The main objectives of the Wildlife (Amendment) Act are to designate and give protection to Natural Heritage Areas (NHAs) and improve the conservation of wildlife and their habitats while ensuring Ireland's compliance with international biodiversity agreements. It broadens the scope of the previous Wildlife Act to include hitherto omitted species. It also legislates for fines and punishments and allows for the imposition of prison sentences in certain circumstances.

7.1.4.2 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;
- Limerick County Development Plan 2022-2028¹;
- Climate Action Plan 2025; and
- National Biodiversity Plan 2017-2021.

Further information on these policies outlining their relevance to this 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 as the population grows, that growth is sustainable, economically, socially, and environmentally. This includes the provision of more renewable energy developments such as this. It ensures that any proposed developments consider biodiversity and the future sustainability of the environment.

¹ See [Limerick Development Plan 2022-2028 | Limerick.ie](#) (accessed: 07/08/2023).

The Biodiversity Sectoral Climate Change Adaptation Plan

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.

Limerick County Development Plan 2022-2028

Adopted in June 2022, the plan sets out planning policies for the county. In Volume 4 (Environmental Reports), the plan details the state of the environment in Limerick County, provides environmental protection objectives and presents expectations on how assessments of impacts of plans and projects will be undertaken.

Climate Action Plan 2025

CAP25 is the third 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 continue to increase the proportion of renewable electricity to 50% by the end of 2025 and 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.

7.1.4.3 Guidance and Resources

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

- Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater Coastal and Marine Version 1.3 – Updated September 2024 (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);
- Recommended bird survey methods to inform impact assessment of onshore wind farms (Scottish Natural Heritage, 2017);

- Recommended bird survey methods to inform impact assessment of onshore wind farms (NatureScot, 2025); and
- The Birds of Conservation Concern in Ireland (BoCCI) Red and Amber Lists (Gilbert et al., 2021).

7.1.5 Statement of Authority

The baseline ornithology surveys described in this report were conducted by experienced ornithologists from MWP Consultants and the Irish Ornithology Survey Group. This EIAR chapter and accompanying appendices have been prepared by suitably qualified RSK ornithologists experienced in ornithological impact assessments. Preparation of the EIAR chapter was led by Nick Henson CEnv MCIEEM, assisted by RSK Biocensus Senior Ornithologist George Wilkinson and Consultant Ecologist Ellis Perry. Nick Henson has more than 20 years' experience of ornithological work, including extensive experience with wind farm projects.

Nick Henson

Nick has more than 20 years' experience of ecological work, including extensive experience with assessing potential ecological effects of wind farm projects in the UK and Ireland. He has a Master's Degree in Environmental Sciences, is a Full Member of the Chartered Institute of Ecology and Environmental Management and a Chartered Environmentalist.

Role: Project Director, client liaison, technical and quality review of reports.

George Wilkinson

George Wilkinson is a Senior Ecologist who has over 7 years' experience in working with protected ornithological species, addressing ecological constraints and overseeing impact assessments for wind farms. He has an MSc in Species Identification and Survey Skills from the University of Reading, and a BSc in Biology from the University of Bristol. He is also an Associate member of CIEEM.

Role: Joint lead author and assessor of ornithological effects.

Ellis Perry

Ellis Perry is a Consultant Ecologist who has over 4 years' experience in surveying protected habitats and species, identifying and writing ecological impact assessments. He has an MSc in Species Identification and Survey Skills from the University of Reading, and a BSc (Hons) in Zoology from the University of Reading. He is also an Associate member of CIEEM.

Role: Project Manager, joint lead author.

7.2 Consultation

A full list of consultees and their responses is provided in Chapter 1 (Appendix 1-B) of the EIAR. Regarding potential impacts on ornithological features, the following bodies were consulted in relation to the project in August 2022:

7.2.1 National Parks and Wildlife Service

The following response was received from the National Parks and Wildlife Service (NPWS) on 28th October 2022:

The Department is not in a position to make specific comment on this particular referral at this time and will await the completed assessment, as it is not in or affecting any designated site. No inference should be drawn from this that the Department is satisfied or otherwise with the proposed activity. The Department may submit observations/recommendations at a later stage in the process.

7.3 Assessment Approach and Methodology

The methods adopted to inform and undertake the assessment presented in this EIAR chapter are described in this section; specifically, the methods for determining the 'ornithological baseline' of the site (i.e., the bird populations present within and in close proximity to the site prior to development), and the methods for identifying and assessing potential impacts from the project (including potential impacts from collisions with new wind turbines). These methods were informed by the best practice guidance described in **Section 7.1.4.3**.

Full details of methods for the desk study and field surveys to inform determination of the ornithological baseline of the site are provided in **Appendix 7-1 – Ornithology Baseline Report**. Full details of methods for ornithology collision risk modelling are provided in **Appendix 7-2 – Ornithology Collision Risk Modelling Report**.

7.3.1 Scope of the Assessment

The scope of this assessment has been established through an ongoing scoping process. This section defines the scope of the assessment and re-iterates the evidence base for scoping in elements following further iterative assessment.

The assessment approach prescribed by the Chartered Institute for Ecology and Environmental Management's (CIEEM) EclA guidelines (CIEEM, 2018) is summarised below, including an explanation of key terminology. In summary, the guidelines advocate the following approach:

- Prediction of the activities associated with a proposed scheme that are likely to generate biophysical changes which may lead to significant effects (either positive or negative) upon ornithological features and resources of importance;
- Identification of the likely Zone of Influence of the proposed scheme;
- Scoping to select the ornithological features and resources (ecological features) that are likely to fall within the potential Zone of Influence of the proposed scheme, to be considered within the assessment;
- Evaluation of ornithological features likely to be affected;
- Assessment of the significance of effects on ornithological features (including assessment of cumulative and residual effects); and
- Refinement of the proposed scheme to incorporate mitigation to avoid significant negative effects on ornithological features, and to incorporate enhancements where possible.

7.3.1.1 Determining the Zone of Influence

The Zone of Influence (ZOI) is defined as 'the area over which features may be affected by biophysical changes as a result of the proposed project and associated activities' (CIEEM, 2018). The ZOI therefore potentially extends beyond the site boundary due to ecological and hydrological links between the site and areas that fall outside its boundaries. Additionally, the ZOI is likely to differ between different ornithological features depending on their characteristics and likely sensitivities. For individual ornithological features the ZOI was assessed following available best practice guidance (SNH 2017; McGuinness et al., 2015; NatureScot 2025). The ZOI of individual ornithological features is further outlined in the sections below.

7.3.2 Determination of the Ornithological Baseline

7.3.2.1 Desk Study

To facilitate a broad review of potential ornithological constraints and the identification of target bird species for subsequent assessment, a desk study was undertaken to identify relevant designated sites with features of ornithological interest and records of specially protected and notable bird species.

A search was made via NPWS website for any statutory designated sites for nature conservation value (e.g., SPAs and 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. Based on the potential ZOI of the project, sites with a statutory designation were initially identified within a 15 km radius of the project site, whilst those with a non-statutory designation were initially identified within a 2 km radius of the project site. Where appropriate (e.g., due to the presence of potential impact pathways), statutory and non-statutory designated sites located outside of these areas were also assessed.

To provide information on the presence of specially protected and notable species in the wider area, records were obtained from the Irish Bird Atlas (Balmer et al., 2013) for hectads R24 and R34 (together covering the project site). Records were obtained for:

- Species afforded protection under wildlife legislation (i.e., the Wildlife Acts); and
- Species considered to be of conservation concern (e.g., Red or Amber listed Bird species of Conservation Concern in Ireland).

In addition, supporting data on specially protected and notable bird species were obtained from NPWS in August 2023 for a 10 km radius around the centre of the site.

Any relevant Irish Wetland Bird Surveys (I-WeBS) data for sites within 10 km of the project site were also reviewed².

7.3.2.2 Field Surveys

Detailed ornithological field surveys of the site were undertaken between 2020 and 2025 inclusive to identify the bird populations using the site and adjacent land, and to gather supporting data to enable detailed impact assessment (e.g., through collision risk modelling).

Field surveys undertaken to inform this EIAR chapter were as follows:

- VP surveys during the breeding season (i.e., April to September inclusive) from 2020 to 2024, and during the non-breeding season (i.e., October to March inclusive) from 2020 to 2025;
- Walked transect surveys undertaken from 2020 to 2025;
- Hinterland bird surveys and wildfowl distribution surveys undertaken during the 2022/23, 2023/24 and 2024/25 non-breeding seasons;
- Breeding Wader surveys undertaken during the 2023 breeding season;
- Detailed surveys for breeding barn owl (*Tyto alba*), breeding peregrine (*Falco peregrinus*) and non-breeding hen harrier (*Circus cyaneus*) in 2022-2025; and
- Bird of prey surveys undertaken during the 2023 and 2024 breeding seasons.

² Available at: [Irish Wetland Bird Survey \(I-WeBS\) - BirdWatch Ireland](#) (accessed 05/07/2023).

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 the CIEEM guidance (SNH, 2017; CIEEM, 2018). Following completion of the surveys, SNH guidance was updated by NatureScot (NatureScot, 2025). Surveys undertaken following previous guidance are detailed in reference to SNH guidance in this assessment but remain in accordance with current best practice guidance from NatureScot.

Certain bird species were identified as 'target species' for consideration in relation to the project. The process for selecting target species is described in Appendix 7A – Ornithology Baseline Report. Survey methods were 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 site;
- Their likely sensitivity to the project (particularly their potential collision risk and/or susceptibility to disturbance from new wind turbines) (Nairn & Partridge, 2013);
- Their level of legislative protection and conservation concern; and
- Their relevance to any nearby designated sites of conservation importance (e.g., SPAs).

In summary, the following species were identified as target species for this assessment, with particular emphasis on specifically protected and notable species including any species relevant to nearby designated sites:

- 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.

Vantage Point Surveys

VP surveys were undertaken in accordance with SNH guidance (SNH, 2017) to record bird activity throughout the site during the breeding and non-breeding seasons, including flight activity by target species. In accordance with the aforementioned best practice guidance, VP surveys were undertaken over multiple years in order to establish a more detailed ornithological baseline for the site, to facilitate thorough assessment of impacts within this EIAR chapter.

To enable detailed coverage of the site, two VP locations (VP1 and VP2) were selected for the VP surveys. VP locations and viewsheds (i.e., the area in which birds could be observed by the ornithologist when surveying from a given VP) are indicated in **Figure 7-3**. VP locations were selected to maximise coverage of the airspace over the site; particularly the airspace over the six proposed turbine locations and to aid observation of any likely flight lines and habitat assessed as being most suitable for target species.

Two surveys from each VP were undertaken monthly during the breeding and non-breeding seasons. Monthly coverage year-round ensured the recording of species using the site at all times of year, including breeding species, wintering species, and spring and autumn passage species. Each VP survey lasted for 3 hours per VP, for the two VP's surveyed twice each month this produced a total survey effort of 12 hours per month. As such, in accordance with SNH best practice guidance (SNH, 2017), VP surveys achieved a minimum survey effort of 36 hours per breeding season³ and 36 hours per non-breeding season for each VP. VP surveys were undertaken from April 2020 to March 2025 inclusive, generating a survey effort of five complete non-breeding seasons and five complete breeding seasons. VP survey effort is summarised in **Table 7-1** below.

³ Except for the 2022 breeding season (discussed in Section 7.3.4).

Table 7-1: Summary of Vantage Point Survey Effort

VP	Hours of Observation									Total
	Breeding Season					Non-breeding Season				
	2020	2021	2022	2023	2024	2020/21	2022/23	2023/24	2024/25	
VP1	36	54	48	36	37	36	72	36	36	426
VP2	37	54	48	36	36	36	78	36	36	433

The VP surveys followed a standard approach in accordance with SNH guidance (SNH, 2017), with surveyors scanning the pre-determined viewsheds from the VP locations for a period of three hours per survey. All flight activity and aggregations of target species were recorded onto standardised recording forms and maps, with the following flight parameters recorded to facilitate collision risk modelling:

- Start time of flight observation;
- Duration of flight observation;
- Species and number of individuals;
- Approximate flight height in metres, recording the time spent in each flight height category (non-flight, 0-20 m, 20-50 m, 50-100 m, 100-180 m and >180 m); and
- The observed or likely purpose of the flight (e.g., foraging, displaying, commuting, etc.).

Transect Surveys

In accordance with best practice guidance (SNH, 2017), VP surveys were accompanied by transect surveys to record supplementary information on bird populations within 500 m of the site. As for VP surveys, transect surveys were undertaken during multiple years and were completed during the breeding season and the non-breeding season.

Initially one transect route (Transect A) was surveyed (as indicated in **Figure 7-4**) between April 2020 to August 2022 inclusive. Transect surveys were extended to four transect routes (Transects A, B, C, D; as indicated in **Figure 7-4**) between May 2022 and March 2025 to increase coverage of the site and habitats within 500 m of the site.

During each transect survey the ornithologist walked the predetermined transect route, recording target species onto standardised maps using recommended British Trust for Ornithology (BTO) species codes and behaviour notation (Marchant, 1983). Counts for non-target species were also recorded. Transect routes were interspersed with stops, during which the ornithologist scanned for birds using optical equipment. Transect surveys were undertaken at different times of day, ensuring different areas of the site were surveyed at a range of times and therefore aiding the recording of species that are active at varying times of day.

Hinterland Bird and Wildfowl Distribution Surveys

To provide supplementary information on target species in the wider area, hinterland transect surveys were conducted twice during the 2022/23 non-breeding season and once during the 2023/24 non-breeding season to a maximum distance of 5 km from the site boundary. A consistent road transect was surveyed, with all target species encountered recorded from suitable viewing points along the route.

To provide supplementary information on wildfowl activity at nearby known sites of importance for wildfowl aggregations, wildfowl distribution surveys were carried out during the 2022/23 non-breeding season at the

Lough Doohyle lake. The survey method adopted was based on Birdwatch Ireland's Irish Wetland Bird Survey (I-WEBS) methodology (Bibby et al., 2000).

All target species encountered were recorded, with habitats surveyed including all suitable foraging and roosting areas for wildfowl within the survey area.

Wading Bird Surveys

To provide supplementary information on wader species in the wider area, wading bird transect surveys were conducted four times during the 2023 breeding season in suitable habitat to a maximum distance of 5 km from the site boundary. A consistent transect was surveyed focusing on suitable wader breeding habitat west of the site boundary.

During each wading bird survey, the ornithologist walked the predetermined transect route, recording waders and other target species within 100 m of the route onto standardised maps using recommended BTO species codes and behaviour notation (Marchant, 1983). The transect was interspersed with stops, during which the ornithologist scanned for waders using optical equipment. Wading bird surveys were undertaken at suitable times of day and in suitable weather conditions, avoiding extreme temperatures, heavy rain or fog.

Barn Owl Surveys

Due to their specific ecology, conservation status and potential sensitivity to the project, targeted surveys were undertaken for barn owl as detailed below.

Based on the suitability of the habitats present within and adjacent to the site, a detailed search of all potentially suitable buildings was undertaken within the site and a minimum 100 m buffer in accordance with best practice survey methods (BirdWatch Ireland, 2021; Lusby et al., 2011). Surveys were undertaken between 2022-2025.

An initial review identified nine buildings within the site and the survey buffer requiring visual inspection by a suitably experienced ecologist for evidence of barn owl use. These included a site known to be used by barn owl at Ballyegny House (Site 7). Two of these buildings (Site 4b and 8) were located within the site boundary. These buildings, and any with potential to support nesting barn owl, were subject to a detailed visual inspection by a suitably experienced ecologist for evidence of barn owl use. Barn owl evidence searched for included moulted feathers, pellets, feeding remains and whitewash. Any barn owl sightings or evidence of any other notable species was recorded.

Based on the findings of the initial review and field inspections, dusk activity surveys were undertaken to record any barn owl activity (e.g., sightings, calls) and identify any occupied breeding sites and active roost sites. Potential or known barn owl breeding and roosting sites were observed from discrete viewing points (approximately 20-50 m from the site being surveyed) between May and August 2022 inclusive and May, August and October 2023, with surveyors taking care to avoid causing any disturbance to barn owls. Dusk activity surveys were conducted in calm, dry conditions with good visibility, commencing 0-30 minutes before sunset and concluding when the status of the site regarding barn owl use had been established. Any incidental barn owl observations during other survey types were also recorded and mapped.

Hen Harrier Surveys

Whilst the VP surveys of the site were suitable for recording hen harrier activity within the site, best practice guidance recommends that data for hen harrier should be collected for roosting sites within 2 km of wind farm sites (SNH, 2017). In addition, hen harriers have a maximum foraging range of 10 km (SNH, 2016). Based on these distances, a precautionary approach was adopted, during which potential winter roost sites at Carrigkerry (approximately 6 km west of the site) were subject to specific surveys in reference to best practice hen harrier winter roost survey guidance (O'Donoghue, 2019). No additional areas requiring detailed breeding hen harrier surveys were identified.

Survey visits of potential and known roost sites were undertaken across four survey seasons, including: three visits during the 2022/23 non-breeding season; three visits during the 2023 breeding season; five visits were undertaken during the 2023/24 non-breeding season; and one visit during the 2024/25 non-breeding season. During these surveys, a suitably experienced ornithologist scanned suitable habitat (including potential roost sites) from a suitable vantage point for a period of at least two hours per visit. Any observations of hen harrier or other relevant target species were recorded and mapped.

Peregrine Surveys

To provide supplementary information on breeding peregrine activity, peregrine surveys were undertaken in suitable habitat during the 2023 and 2024 breeding season. Suitable habitat surveyed included Joseph Hogans Quarry approximately 4 km north of the site. During each visit all observations of peregrines were recorded and mapped (notably any evidence of breeding).

Bird of Prey Surveys

Whilst the VP surveys of the site were suitable for recording breeding raptor activity within the site, to provide supplementary information on breeding raptor activity in the surrounding landscape, raptor surveys were undertaken in suitable habitat within 2 km of the site during the 2023 and 2024 breeding seasons. Three visits were undertaken between May and July 2023 inclusive whilst two visits were undertaken in May and June 2024 inclusive during which any observations of raptors were recorded and mapped, with emphasis on recording evidence of breeding.

7.3.3 Assessment Methodology

7.3.3.1 Potential Effects Associated with Wind Farm Development

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

- Direct habitat loss and alteration: through construction and (generally to a lesser extent) operational maintenance and decommissioning of wind farm infrastructure;
- Disturbance and displacement: the construction, operational and decommissioning stages of the wind farm have the potential to cause disturbance of birds using habitats within/near to the wind farm. This may lead to birds avoiding the wind farm and its surrounding area (displacement). Displacement may also include barrier effects, in which birds are deterred from using normal routes to/from feeding or roosting grounds; and
- Death/injury: through collision or interaction with turbine blades and other infrastructure.

For each of these risks, detailed knowledge of bird distribution and flight activity within and adjacent to the site gained from the field surveys has been used to predict the potential effects of the project 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.

7.3.3.2 Collision Risk Modelling

Detailed collision risk modelling has been undertaken in order to identify the potential effects of the project on target bird species (i.e., Key Ornithological Features) through collisions with new wind turbines. Full details of methods for collision risk modelling are described in Appendix 7B – Ornithology Collision Risk Modelling Report.

Collision risk modelling was undertaken using field data collected during the VP surveys described in **Section 7.3.2.2**, and in accordance with the following best practice guidance:

- Recommended bird survey methods to inform impact assessment of onshore wind farms (SNH, 2017);
- Recommended bird survey methods to inform impact assessment of onshore wind farms (NatureScot, 2025);
- Wind farms and birds: Calculating a theoretical collision risk assuming no avoiding action (SNH, 2000);
- Guidance on using an updated collision risk model to assess bird collision risk at onshore wind farms (NatureScot, 2024);
- Using a collision risk model to assess bird collision risks for onshore wind farms (Band, 2024); and
- Avoidance Rates for the onshore SNH Wind Farm Collision Risk Model (SNH, 2018a)

Based on the process for selection of Key Ornithological Features described in Appendix 7B, the following species were identified for inclusion within collision risk modelling to inform impact assessment within this EIAR chapter:

- Black-headed gull (*Chroicocephalus ridibundus*);
- Buzzard (*Buteo buteo*);
- Common gull (*Larus canus*)
- Kestrel (*Falco tinnunculus*);
- Lesser black-backed gull (*Larus fuscus*);
- Peregrine; and
- Sparrowhawk (*Accipiter nisus*).

Collision risk modelling was undertaken for all KOF's identified using the standard approach described in the good practice guidance and calculation tools specified above in **Section 7.3.3.2**.

Collision risk modelling for each KOF was undertaken following a six-stage process described below:

Stage A: Initial modelling uses field survey data on bird flight activity, in the absence of displacement, avoidance or attraction effects to the wind farm, to estimate the number of birds at risk from the proposed wind farm through the calculation of monthly bird densities within the total vantage point survey viewshed, factoring in species underrepresentation due to nocturnal activity and consideration of the proportion of birds within the density calculations which would be flying at collision risk height. Estimates of aerial density were produced for the vantage point survey results for each vantage point location with an average generated for bird occupancy present within the airspace of each associated viewshed within a survey year;

Stage B: Modelling then follows the principle that the total number of bird transits expected through the wind farm rotors is proportional to the number and cross-sectional area of the rotors, and to the density of birds in the airspace at risk height. Therefore, Stage B estimates the monthly and yearly number of bird transits potentially flying through rotors during the survey period through use of: Aerial density outputs from Stage A, turbine specifications, bird flight speed and nocturnal activity factors.

Stage C: Following on from the estimation of the number of transits, Stage C aims to use the turbine specifications and species biometrics to estimate the risk of collision of a bird flying through a rotating turbine blade. Stage C evaluates the probability of collision if a bird passes at random at any point through the rotor disk on a flight path

perpendicular to the rotor plane with the assumption of no influence from alternative angles of approach, turbulence and slipstream effects. Probability of wind direction and potential bias from upwind and down wind flights are also factored into the model. If no influence from predominant wind direction is anticipated an equal probability of upwind and downwind flights is used. Further consideration of the blade profile is made through measurements of chord width using 5% intervals along the length of the blade from the turbine hub. An average collision risk probability is then generated for the passage of a bird at any point across the rotor.

Stage D: This stage multiplies the outputs of the number of flights through rotors across the wind farm (Stage B) and calculated risk of collision for a single bird transit through a rotor (Stage C). An estimate of total potential collision risk is produced when adjusted to factor in the proportion of time the wind farm turbines are operational.

Stage E: Previous calculations assume no avoiding action is taken in response to turbine operation. Stage E applies a standard avoidance rate percentage (e.g. 98%) or avoidance rates provided in referenced literature to determine the potential collision risk mortality outlined in Stage D, inclusive of avoidance rates. Further consideration should be given for attraction effects from wind farm infrastructure, which may pose additional risk to birds. Where the wind farm is arranged in rows and collision risk is additive, an additional large array correction is also provided where birds may pass through the early rows of the array and therefore also be exposed to later rows.

Stage F: The final stage outlines the potential variability and uncertainty inherent in mathematical modelling. The output of Stage E should convey the uncertainty in a collision risk estimate by indicating the results are a best estimate with a range of confidence around that estimate reflecting variability due to flight activity data, nocturnal data confidence, variability of bird dimensions and flight speed, simplification of turbine profile in the model and any unconfirmed designs.

The standard modelling process described above was used for all KOF's identified. Based on black-headed gull flights directly over the site in the direction to/from River Shannon and River Fergus Estuaries SPA (for which wintering black-headed gull forms a Special Conservation Interest (SCI) feature), the migratory species tab was also used for assessing black-headed gull flight activity in relation to the SPA (i.e. directly northwards and southwards over the site). Further information is provided in Appendix 7B – Ornithology Collision Risk Modelling Report.

7.3.3.3 Assessment of the Importance of Ornithological Features

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

- International importance;
- National importance (i.e., important in an Irish context);
- County/district importance (i.e., important in the context of County Cork);
- 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 7-2** below:

Table 7-2: Evaluation Criteria for Assessing the Importance of Ornithological Features

Level of Importance	Evaluation Criteria
International importance	Special Protection Area (SPA) or proposed Special Protection Area (pSPA). Land that is functionally linked to a Natura 2000 site of ornithological importance to the extent that it is essential to maintaining the coherence of the Natura 2000 Network. Ramsar site supporting populations of birds that form qualifying features of reason for the designation of the site. 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.
National importance	Natural Heritage Area (NHA) or Statutory Nature Reserve designated for its ornithological interests. 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 <i>et al.</i>, 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 <i>et al.</i>, 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 <i>et al.</i>, 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 <i>et al.</i>, 2021) or small and/or infrequent populations of species of conservation concern i.e., Annex I or BoCCI Red or Amber Lists.

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 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 (2009/147/EC) Annex I species; and
- BoCCI Red and Amber listed species.

Species Abundance

The assessment of the importance of bird populations 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 International⁴. Importance at a national level was assessed against available national population estimates such as those published by Crowe et al. (2014). 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 took into consideration the sizes of ornithological species assemblages (i.e., the number of species) recorded during the breeding and non-breeding seasons.

Relevant Designated Sites for Features of Ornithological Interest

The importance of the bird populations 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 SPAs (in reference to SNH (2016) guidance), if the populations of those species recorded within/in close proximity to the project site exceeded 1% of the cited population estimates for those species for the relevant SPA(s), the populations recorded were assessed as being potentially significant in the context of the SPA(s). As such, any adverse effects on those populations recorded within/in close proximity to the project site could potentially result in effects on ornithological features of international importance, and therefore cause adverse effects on the integrity of Natura 2000 sites.

7.3.3.4 Identification of Key Ornithological Features

The methodology for assessment followed a precautionary screening approach with regard to 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 project upon which likely significant effects are anticipated and assessed. In accordance with NRA (2009) guidelines and the guidance provided in Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018), 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 project, either directly or indirectly. It includes those species subject to detailed collision risk modelling, as presented in **Appendix 7B – Ornithology Collision Risk Modelling Report**.

⁴ As detailed by Wetlands International. Available at [Waterbird Population Estimates \(wetlands.org\)](https://www.wetlands.org/) (accessed 21/08/2023).

7.3.3.5 Methodology for Assessing Effects

The assessment of potential effects from the project 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);
- 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 project, in terms of size, amount, intensity and volume. Expressed in absolute terms where possible and considered on a scale of negligible, low, medium or large;
- Frequency and timing: 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.

Terminology regarding the significance of effects described in this EIAR chapter references guidelines published in CIEEM (2018) and EPA (2022). Definitions for the level of significance outlined in EPA (2022) are presented below in **Table 7-3**. **Table 7-4** presents a matrix outlining how those criteria correspond to the equivalent level of significance defined by CIEEM (2018).

Table 7-3: CIEEM and EPA Guidelines for Determining Significance of Ecological Effects

Significance following EPA guidelines	Definition
Profound effect	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 effect	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 effect	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 7-4: Significance Matrix

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”.

7.3.3.6 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’. As part of this project, avoidance, mitigation, offsetting, and enhancement measures have been identified as part of the impact assessment process. These principles underpin any EclA and are adapted from CIEEM (2018) as follows:

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

Wherever possible, strategies of avoidance have been implemented to minimise any impacts to ornithological features. If avoidance is not possible, mitigation and offsetting measures will be required, as described in **Section 7.7** of this chapter.

7.3.4 Constraints and Limitations

Limitations associated with ornithological baseline data are discussed within **Appendix 7A – Ornithology Baseline Report**.

Limitations associated with collision risk modelling are discussed within **Appendix 7B – Ornithology Collision Risk Modelling Report**.

In accordance with SNH guidance for surveying wind farm developments (SNH, 2017), the site was surveyed year-round. To facilitate analysis of site usage by bird species at different times of year, surveys undertaken in October

to March inclusive have been broadly categorised as ‘non-breeding’ surveys, whilst surveys undertaken in April to September inclusive have been broadly categorised as ‘breeding’ surveys. It is recognised that species are likely to differ in their patterns of seasonal use of the site, 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 on site. This has been taken into consideration within this report.

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 (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 baseline ornithological information and provides a prediction of the likely ornithological effects of the project, along with prescriptions for mitigation 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.

7.4 Ornithological Baseline

7.4.1 Designated Sites

The desk study identified two SPAs within 20 km of the site boundary, as detailed in **Appendix 7A – Ornithology Baseline Report**. The locations of these internationally designated sites are indicated in **Figure 7-2**. Further details are provided below.

7.4.1.1 Stack’s to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA

The Stack’s to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (hereafter referred to as ‘Stack’s SPA’) is a very large site bordered by the counties of Cork, Kerry and Limerick. The site contains many mountains and rivers, with varied upland habitats including blanket bog, heath, coniferous forest and rough grassland.

The site is designated for its nationally important breeding population of hen harrier, with the primary conservation objective for the SPA being to restore the favourable conservation condition of the hen harrier population within the SPA. The 2021 national SPA monitoring report identified 34 confirmed pairs (plus two possible pairs) in 2021, with eight pairs successfully fledging 19 young (Hen Harrier Programme, 2021). This made Stack’s SPA the largest population of breeding hen harrier in the Irish SPA network.

Breeding species listed on the SPA citation but not forming qualifying features for its designation include short-eared owl (*Asio flammeus*), merlin (*Falco columbarius*) and red grouse (*Lagopus lagopus*).

7.4.1.2 River Shannon and River Fergus Estuaries SPA

The River Shannon and River Fergus Estuaries SPA forms the largest estuarine complex in Ireland, with vast expanses of intertidal mudflats providing rich food resources for wintering birds. The saltmarsh vegetation

present on the mudflats also provides important high tide roost areas. In addition to the qualifying species listed, the SPA is of conservation importance for holding an assemblage of over 20,000 wintering waterbirds. The site supports internationally important populations of light-bellied brent goose (*Branta bernicla hrota*), dunlin (*Calidris alpina*), black-tailed godwit (*Limosa limosa*) and redshank (*Tringa totanus*), as well as nationally important populations of 17 species including the EU Birds Directive Annex I species whooper swan (*Cygnus cygnus*), golden plover (*Pluvialis apricaria*) and bar-tailed godwit (*Limosa lapponica*).

The conservation objective for the SPA is to maintain the favourable conservation conditions for all the qualifying species and the wetland habitat as a resource for the regularly occurring migratory waterbirds that use it. Other species listed on the SPA citation but not forming qualifying features for SPA designation include mallard (*Anas platyrhynchos*), grey heron (*Ardea cinerea*) and common gull (*Larus canus*).

Table 7-5: Relevant Designated Sites

Designated Site	Distance from the Project Site	Qualifying Interests
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161)	3.7 km west of the project site	Hen harrier (<i>Circus cyaneus</i>) [A082]
River Shannon and River Fergus Estuaries SPA (004077)	6.8 km north of the project site	- Cormorant (<i>Phalacrocorax carbo</i>) [A017] (SS) - Whooper swan (<i>Cygnus cygnus</i>) [A038] (SS) - Light-bellied brent goose (<i>Branta bernicla hrota</i>) [A046] (SS) - Shelduck (<i>Tadorna tadorna</i>) [A048] (SS) - Wigeon (<i>Mareca penelope</i>) [A050] (SS) - Teal (<i>Anas crecca</i>) [A052] (SS) - Pintail (<i>Anas acuta</i>) [A054] (SCI) - Shoveler (<i>Spatula clypeata</i>) [A056] (SCI) - Scaup (<i>Aythya marila</i>) [A062] (SCI) - Ringed plover (<i>Charadrius hiaticula</i>) [A137] (SS) - Golden plover (<i>Pluvialis apricaria</i>) [A140] (SS) - Grey plover (<i>Pluvialis squatarola</i>) [A141] (SS) - Lapwing (<i>Vanellus vanellus</i>) [A142] (SS) - Knot (<i>Calidris canutus</i>) [A143] (SS) - Dunlin (<i>Calidris alpina</i>) [A149] (SS) - Black-tailed godwit (<i>Limosa limosa</i>) [A156] (SS) - Bar-tailed godwit (<i>Limosa lapponica</i>) [A157] (SS) - Curlew (<i>Numenius arquata</i>) [A160] (SS) - Redshank (<i>Tringa totanus</i>) [A162] (SS) - Greenshank (<i>Tringa nebularia</i>) [A164] (SS) - Black-headed gull (<i>Chroicocephalus ridibundus</i>) [A179] (SCI) - Wetland and waterbirds [A999]

7.4.2 Records of Protected and Notable Bird Species

Table 7-6 details specially protected and notable bird species records from the Irish Bird Atlas for hectads R24 and R34, including the site and surrounding land (Balmer et al., 2013).

Table 7-6: Protected and Notable Bird Species Recorded within Hectads R24 and R34 in 2007-2011

Species	Wintering	Breeding	Conservation status
Bar-tailed godwit	Present	Confirmed	BoCCI Red listed / Birds Directive – Annex I / Wildlife Acts / SS
Black-headed gull	Present	Confirmed	BoCCI Amber listed / Wildlife Acts / SCI
Dunlin	Present	Not recorded	BoCCI Red listed / Birds Directive – Annex I / Wildlife Acts / SS
Hen harrier	Present	Confirmed	BoCCI Amber listed / Birds Directive – Annex I / Wildlife Acts / SS
Herring gull	Present	Not recorded	BoCCI Amber listed / Wildlife Acts
Kestrel	Present	Confirmed	BoCCI Red listed / Wildlife Acts
Kingfisher	Absent	Possible	BoCCI Amber listed / Birds Directive – Annex I / Wildlife Acts
Little egret	Present	Not recorded	BoCCI Green listed / Birds Directive – Annex I / Wildlife Acts
Merlin	Present	Not recorded	BoCCI Amber listed / Birds Directive – Annex I / Wildlife Acts
Peregrine	Present	Possible	BoCCI Green listed / Birds Directive – Annex I / Wildlife Acts
Redshank	Present	Possible	BoCCI Red listed / Wildlife Acts / SS
Whooper swan	Present	Not recorded	BoCCI Amber listed / Birds Directive – Annex I / Wildlife Acts / SS
Yellowhammer	Present	Not recorded	BoCCI Red listed / Wildlife Acts

Data obtained from NPWS in 2023 identified relevant records of additional specially protected and notable bird species during the last ten years, notably:

- Hen harrier: two confirmed breeding sites in hectad R24 within Stack's SPA in 2015; and
- Peregrine: one occupied nest site in hectad R24 within 5 km of the project site, and one unoccupied nest site in hectad R23 located 5-10 km from the project site, both recorded in 2017.

A review of I-WeBS data identified two relevant subsites of the River Deel: Reen's Bridge (nr. Coolanoran) (c.3.8 km south-east of the project site), and Doohyle Lough (c.5.8 km east of the project site). Whilst peak counts were not published for specific sub-sites, 13 waterbird species were recorded in the River Deel I-WeBS site in 2012/13 including teal (peak count: 180), lapwing (2,600), curlew (240) and black-headed gull (150).

7.4.2.1 Breeding Bird Populations

Vantage Point and Transect Surveys

Full details of the bird populations recorded from VP and transect surveys during the breeding season are provided in **Appendix 7A – Ornithology Baseline Report**. A total of 67 species were recorded during the breeding season, along with one additional species (barn owl) during the targeted surveys for this species.

Target species recorded during these surveys are summarised in **Table 7-7** below, along with their peak counts from the field surveys.

Table 7-7: Peak Counts for Target Species Recorded During the Breeding Season

Common Name	Scientific Name	Peak Count					Conservation status
		2020	2021	2022	2023	2024	
Black-headed gull	<i>Chroicoce-phalus ridibundus</i>	-	1	-	3	2	BoCCI Amber listed / Wildlife Acts / SCI
Buzzard	<i>Buteo buteo</i>	4	2	3	2	8	BoCCI Green listed / Wildlife Acts
Common gull	<i>Larus canus</i>	-	4	-	-	-	BoCCI Amber listed / Wildlife Acts
Cormorant	<i>Phalacrocorax carbo</i>	-	2	-	1	1	BoCCI Amber listed / Wildlife Acts / SS
Curlew	<i>Numenius arquata</i>	-	1	-	-	-	BoCCI Red listed / Wildlife Acts / SS
Great black-backed gull	<i>Larus marinus</i>	2	4	-	-	-	BoCCI Green listed / Wildlife Acts
Grey heron	<i>Ardea cinerea</i>	1	-	-	1	1	BoCCI Green listed / Wildlife Acts
Herring gull	<i>Larus argentatus</i>	2	4	-	-	-	BoCCI Amber listed / Wildlife Acts
Kestrel	<i>Falco tinnunculus</i>	1	1	1	1	3	BoCCI Red listed / Wildlife Acts
Lesser black-backed gull	<i>Larus fuscus</i>	1	3	5	5	39	BoCCI Amber listed / Wildlife Acts
Little egret	<i>Egretta garzetta</i>	1	1	-	1	1	Annex I EU Birds Directive / BoCCI Green listed / Wildlife Acts
Mallard	<i>Anas platyrhynchos</i>	-	-	-	-	6	BoCCI Amber listed / Wildlife Acts
Mute swan	<i>Cygnus olor</i>	-	-	-	-	1	BoCCI Amber listed / Wildlife Acts

Common Name	Scientific Name	Peak Count					Conservation status
		2020	2021	2022	2023	2024	
Peregrine	<i>Falco peregrinus</i>	-	-	-	-	1	Annex I EU Birds Directive / BoCCI Green listed / Wildlife Acts
Snipe	<i>Gallinago gallinago</i>	1	1	-	4	-	BoCCI Red listed / Wildlife Acts
Sparrowhawk	<i>Accipiter nisus</i>	1	-	-	1	2	BoCCI Amber listed / Wildlife Acts
Whimbrel	<i>Numenius phaeopus</i>	-	-	-	20	8	BoCCI Green listed / Wildlife Acts

Specially protected and notable non-target species recorded during the breeding season are summarised in **Table 7-8** below, along with their peak counts from the field surveys.

Table 7-8: Peak Counts for Non-Target Species Recorded During the Breeding Season

Common Name	Scientific Name	Peak Count					Conservation status
		2020	2021	2022	2023	2024	
Cuckoo	<i>Cuculus canorus</i>	-	-	-	2	2	BoCCI Red listed
Goldcrest	<i>Regulus regulus</i>	2	2	12	2	4	BoCCI Amber listed
Greenfinch	<i>Chloris chloris</i>	4	2	4	7	5	BoCCI Amber listed
Grey wagtail	<i>Motacilla cinerea</i>	-	-	-	1	3	BoCCI Red listed
House martin	<i>Delichon urbicum</i>	8	3	30	2	9	BoCCI Amber listed
House sparrow	<i>Passer domesticus</i>	4	-	8	0	3	BoCCI Amber listed
Linnet	<i>Linaria cannabina</i>	15	-	10	18	8	BoCCI Amber listed
Meadow pipit	<i>Anthus pratensis</i>	6	6	24	20	11	BoCCI Red listed
Sand martin	<i>Riparia riparia</i>	-	-	-	0	1	BoCCI Amber listed
Skylark	<i>Alauda arvensis</i>	1	-	4	0	3	BoCCI Amber listed
Starling	<i>Sturnus vulgaris</i>	16	74	250	171	82	BoCCI Amber listed
Stock dove	<i>Columba oenas</i>	1	-	-	2	3	BoCCI Red listed

Common Name	Scientific Name	Peak Count					Conservation status
		2020	2021	2022	2023	2024	
Swallow	<i>Hirundo rustica</i>	26	20	120	176	11	BoCCI Amber listed
Swift	<i>Apus apus</i>	-	6	-	4	5	BoCCI Red listed
Willow warbler	<i>Phylloscopus trochilus</i>	2	1	12	5	3	BoCCI Amber listed

Barn Owl Surveys

Whilst no barn owl records were identified within the desk study, barn owl feathers were found near VP1 during the 2020/21 non-breeding season, and barn owl pellets were found near VP2 during the 2021 breeding season. This indicates barn owl presence adjacent to (either side of) the site during the survey period.

Detailed surveys of buildings within and adjacent to the site undertaken in 2022 identified a barn owl occupied breeding site at site 7, approximately 400 m west of the project site boundary. The nest was located in a deep vertical wall cavity on the gable end of a derelict two-storey outbuilding. Subsequent nest monitoring surveys at site 7 in 2022 recorded eggs in April, and three chicks fledged from the site in August 2022.

On 9th May 2023, a further detailed assessment of buildings within 1km of the project identified eight buildings for assessment of their potential to support breeding barn owl. Detailed inspections identified eight sites. Of these sites, five were unsuitable (Sites 3, 4a, 5, 6 and 8) and therefore unlikely to support breeding barn owl due to the lack of suitable nesting features. Three were considered to be suitable (Sites 1, 2 and 7) and had suitable features present within the structure that could support breeding barn owl. Site 7, where a previous nest was confirmed, was unable to be accessed during the visit.

Following this, further nocturnal surveys were undertaken to assess the presence of barn owl within sites 1, 2 and 7 in May 2023. A nocturnal survey of site 7 on 30th May 2023 recorded faint 'snoring' vocalisations in the vicinity of the 2022 nest site, and a single barn owl was observed flying over the site at a height of 5 m whilst emitting territorial calls. No activity was observed at sites 1 and 2.

Although breeding seemed unlikely at sites 1, 2 and 7, a second nocturnal visit to the site later in the season was undertaken as a small percentage of sites nest later in the year than the average and can have young fledging as late as September. Therefore, another visit was carried out on 1st August 2023, to determine if any late nesting had taken place, or if any birds were still present, maintaining the territory. No sightings or vocalisations of Barn Owls were seen or heard. The conclusion was that site 7 had not been used in Summer 2023, with no adults present, it was possible that the site had been abandoned. sites 1 and 2 were unoccupied for a second survey.

Preceding the nocturnal surveys, a nearby derelict cottage (Site 4b), overgrown with vegetation which had been incidentally recorded by other surveyors, was briefly visually surveyed during the day on the 1st August 2023. The surveyors recorded between 2-3 barn owls present with vocalisations indicative of the birds being juveniles. A further visit was completed on 2nd August during the day which provided a thorough inspection of the derelict cottage. It had a central chimney, initially thought to be suitable as a Barn Owl nest site, a close inspection with a drone showed that the top of the chimney was a ceramic pot (difficult for young Barn Owls to climb out of) and had cobwebs over the top entrance. The lower section of the chimney was blocked by sticks (placed by nesting Jackdaws), so didn't allow access to the chimney shaft from below. There was only a small amount of 'whitewash' on the gable end wall, and no pellets or downy feathers were found below the chimney or any of the walls of the

cottage. A nearby Ash (*Fraxinus excelsior*) tree and small derelict cottage were inspected with whitewash recorded on the tree, but no suitable features were identified. Due to the proximity between site 7 and 4b (i.e. within 1km) it was considered possible by the surveyor that the breeding pair present in the previous year could have occupied a site nearby to 4b.

Site 4b was further surveyed on 15th October, with a further daytime inspection made and a nocturnal survey undertaken. During the dusk observation, the site was confirmed as 'active', with a presumed male Barn Owl roosting in the central wall of the cottage (Site 4b). The loud territorial calls heard would indicate that the bird has taken 'ownership' of the site and is likely to remain at the site during the winter, and into the following spring. The lack of any other vocalisations (begging calls from young, or recently fledged birds) and lack of further activity at the site once the Barn Owl had left to hunt, indicated that late breeding did not take place at this site.

Overall, detailed surveys of buildings within and adjacent to the site undertaken in 2023 identified the remaining buildings (i.e., Sites 3, 4, 5, 6 and 8) as unsuitable for barn owl nest sites. Sites 1 and 2 were considered suitable as potential nesting sites. Nocturnal surveys carried out at sites 1 and 2 and other survey visits did not record any barn owl activity in either building. Site 7 was occupied in 2022 but not found to be occupied in 2023. Site 4b was assessed only in 2023 and was found to be occupied by juvenile birds but the location of the nest was unable to be confirmed as the features assessed appeared to be unsuitable for nesting barn owl. The locations of all assessed sites and their nesting potential for barn owls are indicated in **Figure 7-8**. Barn owl observations are detailed in Annex C.

Evidence of roosting kestrel was recorded at site 6 in breeding 2022. The pellets found were all several months old, suggesting site 6 was a winter roost for kestrel. Longer grassland and hedgerows within the site comprised suitable foraging habitat for barn owl and kestrel.

Wading Bird Surveys

No waders were recorded during the wading bird surveys undertaken during the 2023 breeding season. However, three snipe including a displaying individual were recorded during the 2023 breeding season VP surveys, suggesting the presence of a territory approximately 150 m west of the site boundary. Wading bird survey observations are indicated in **Figure 7-7**.

Bird of Prey Surveys

Two raptor species were recorded during the bird of prey surveys undertaken during the 2023 and 2024 breeding seasons. In 2023, buzzard was observed six times in June-July 2023, with observations of individual birds perching, flying, circling, hunting and soaring over improved grassland outside of the site boundary. A kestrel was observed hunting over improved grassland on a single occasion in May. No raptor breeding evidence was recorded. Whilst in 2024, buzzard was observed three times in May and June with observations of individual birds flying, hunting, perched or being mobbed by corvids. Kestrel was observed on two occasions in May and June 2024 of individual birds hunting over grassland.

Hen Harrier Surveys

There were two observations of hen harrier during the breeding season at Carrigkerry Bog, located over 5 km west of the site (immediately north of Stack's SPA); specifically, one observation in May 2023 and one in June 2023, comprising one adult female and one adult male. The female and male were observed circling over pines and hunting over grassland. No breeding behaviour was observed during the surveys. Hen harrier observations are indicated in **Figure 7-9**.

Peregrine Surveys

One observation of a peregrine was recorded during the peregrine surveys undertaken in 2023. This was recorded on 8th June approximately 4 km north of the site at Roadstone Joseph Hogans Quarry, and was of an adult female

perching in a tree on the northern extent and circling over the quarry, eventually flying west from the quarry site. No roosting behaviour was confirmed, and no breeding behaviour was observed. No observations were seen during surveys in July 2024. Peregrine observations are indicated in **Figure 7-10**.

7.4.2.2 Non-breeding Bird Populations

Vantage Point and Transect Surveys

Full details of the bird populations recorded from VP and transect surveys during the non-breeding season are provided in **Appendix 7A – Ornithology Baseline Report**. A total of 65 species were recorded during the non-breeding season.

Target species recorded during these surveys are summarised in **Table 7-9** below, along with their peak counts from the field surveys.

Table 7-9: Peak Counts for Target Species Recorded During the Non-breeding Season

Common Name	Scientific Name	Peak Count					Conservation status
		20/21	21/22	22/23	23/24	24/25	
Black-headed gull	<i>Chroicocephalus ridibundus</i>	120	200	60	94	372	BoCCI Amber listed / Wildlife Acts / SCI
Buzzard	<i>Buteo buteo</i>	1	4	1	4	4	BoCCI Green listed / Wildlife Acts
Common gull	<i>Larus canes</i>	200	-	-	44	2	BoCCI Amber listed / Wildlife Acts
Cormorant	<i>Phalacrocorax carbo</i>	-	-	-	1	1	BoCCI Amber listed / Wildlife Acts
Curlew	<i>Numenius arquata</i>	-	-	-	1	-	BoCCI Red listed / Wildlife Acts
Golden plover	<i>Pluvialis apricaria</i>	-	-	12	36	2	Annex I EU Birds Directive / BoCCI Red listed / Wildlife Acts / SS
Great black-backed gull	<i>Larus marinus</i>	-	-	1	-	-	BoCCI Green listed / Wildlife Acts
Great white egret	<i>Ardea alba</i>	-	-	-	1	-	BoCCI Green listed / Wildlife Acts
Grey heron	<i>Ardea cinerea</i>	-	-	-	-	1	BoCCI Green listed / Wildlife Acts

Common Name	Scientific Name	Peak Count					Conservation status
		20/21	21/22	22/23	23/24	24/25	
Hen harrier	<i>Circus cyaneus</i>	-	-	1	-	-	Annex I EU Birds Directive / BoCCI Amber listed / Wildlife Acts / SS
Herring gull	<i>Larus argentatus</i>	30	-	-	-	-	BoCCI Amber listed / Wildlife Acts
Kestrel	<i>Falco tinnunculus</i>	1	1	1	5	3	BoCCI Red listed / Wildlife Acts
Lapwing	<i>Vanellus vanellus</i>	-	-	-	-	12	BoCCI Red listed / Wildlife Acts / SS
Lesser black-backed gull	<i>Larus fuscus</i>	48	62	-	43	37	BoCCI Amber listed / Wildlife Acts
Little egret	<i>Egretta garzetta</i>	3	2	8	4	4	Annex I EU Birds Directive / BoCCI Green listed / Wildlife Acts
Mallard	<i>Anas platyrhynchos</i>	1	-	2	13	3	BoCCI Amber listed / Wildlife Acts
Mute swan	<i>Cygnus olor</i>	-	-	-	3	4	BoCCI Amber listed / Wildlife Acts
Peregrine	<i>Falco peregrinus</i>	-	-	1	-	1	Annex I EU Birds Directive / BoCCI Green listed / Wildlife Acts
Snipe	<i>Gallinago gallinago</i>	9	3	1	3	24	BoCCI Red listed / Wildlife Acts
Sparrowhawk	<i>Accipiter nisus</i>	1	1	1	3	3	BoCCI Amber listed / Wildlife Acts
Whooper swan	<i>Cygnus cygnus</i>	-	1	-	-	-	Annex I EU Birds Directive / BoCCI Amber listed / Wildlife Acts / SS

Specially protected and notable non-target species recorded during the non-breeding season are summarised in **Table 7-10** below, along with their peak counts from the field surveys.

Table 7-10: Peak Counts for Non-target Species Recorded During the Non-breeding Season

Common Name	Scientific Name	Peak Count					Conservation status
		20/21	21/22	22/23	23/24	24/25	
Goldcrest	<i>Regulus regulus</i>	1	8	5	3	3	BoCCI Amber listed
Greenfinch	<i>Chloris chloris</i>	-	-	-	6	2	BoCCI Amber listed
Grey wagtail	<i>Motacilla cinerea</i>	-	-	1	-	2	BoCCI Red listed
House martin	<i>Delichon urbicum</i>	-	-	-	-	6	BoCCI Amber listed
House sparrow	<i>Passer domesticus</i>	-	-	9	2	8	BoCCI Amber listed
Linnet	<i>Linaria cannabina</i>	-	30	6	3	6	BoCCI Amber listed
Meadow pipit	<i>Anthus pratensis</i>	40	25	9	41	22	BoCCI Red listed
Redwing	<i>Turdus iliacus</i>	22	300	125	69	169	BoCCI Red listed
Skylark	<i>Alauda arvensis</i>	-	-	1	1	-	BoCCI Amber listed
Starling	<i>Stumus vulgaris</i>	45	300	149	80	127	BoCCI Amber listed
Stock dove	<i>Columba oenas</i>	-	-	2	1	-	BoCCI Red listed
Stonechat	<i>Saxicola rubicola</i>	-	-	-	-	4	BoCCI Amber listed
Swallow	<i>Hirundo rustica</i>	5	-	-	-	28	BoCCI Amber listed

Hinterland Bird Surveys

Peak counts (i.e., the largest aggregations) for specially protected and notable species recorded during the hinterland bird surveys are summarised in **Table 7-11** below. A total of 16 species were observed during the hinterland bird surveys conducted up to 5 km from the site boundary between December 2022 and January 2024.

Table 7-11: Summary of Specially Protected and Notable Species Counts for 2022/23 and 2023/24 Hinterland Bird Surveys

Common Name	Scientific Name	Peak Count		Conservation status
		2022/23	2023/24	
Black-headed gull	<i>Chroicocephalus ridibundus</i>	120	300	BoCCI Amber listed / Wildlife Acts / SCI
Buzzard	<i>Buteo buteo</i>	-	1	BoCCI Green listed / Wildlife Acts
Goshawk	<i>Accipiter gentilis</i>	1	-	Annex I EU Birds Directive / BoCCI Amber listed / Wildlife Acts
Hen harrier	<i>Accipiter gentilis</i>	-	1	Annex I EU Birds Directive / BoCCI Amber listed / Wildlife Acts / SS
Kestrel	<i>Falco tinnunculus</i>	1	-	BoCCI Red listed / Wildlife Acts
Lesser black-backed gull	<i>Larus fuscus</i>	6	2	BoCCI Amber listed / Wildlife Acts
Little egret	<i>Egretta garzetta</i>	1	-	Annex I EU Birds Directive / Wildlife Acts
Mallard	<i>Anas platyrhynchos</i>	10	-	BoCCI Amber listed / Wildlife Acts
Shoveler	<i>Spatula clypeata</i>	2	-	BoCCI Red listed / Wildlife Acts / SCI
Teal	<i>Anas crecca</i>	35	-	BoCCI Amber listed / Wildlife Acts / SS

Wildfowl Distribution Surveys

Various wildfowl species were recorded during the wildfowl distribution surveys undertaken during the 2022/23 non-breeding season. Of these, nine species were also recorded within (and are therefore relevant to) the site during the non-breeding VP surveys. These were as follows (the largest flock observed is indicated in brackets): black-headed gull (3), curlew (17), little grebe (2), mallard (4), moorhen (2), mute swan (2), snipe (5), teal (45) and wigeon (5).

Hen Harrier Surveys

Seven observations of hen harrier were recorded at Carrigkerry Bog at surveys during non-breeding 2022/23 (February 2022 and March 2023), non-breeding 2023/24 (January and February 2024) and non-breeding 2024/25 (November 2024). Carrigkerry Bog is situated over 5 km west of the site (immediately north of Stack's SPA), observations included: two observations in February 2023, one in March 2023, one in January 2024, two in February 2024 and one in November 2024. The February 2022 and March 2023 birds were observed flying from east to west, away from the project site. The January 2024 observation involved a male bird flying low over the bog before heading north into the forest clearing and out of view. The February 2024 observations consisted of an individual male hunting low over the bog on two occasions before flying north-east from the survey location at sunset. An adult female was observed possibly roosting on 23rd February 2023 with another female also observed flying into roost on 6th November 2024.

7.4.2.3 Flight Activity

Full details of flight activity by target species in 2020-2025 are provided in **Appendix 7A – Ornithology Baseline Report** and **Appendix 7B – Ornithology Collision Risk Modelling Report**. Flight activity was recorded by 18 target species as summarised in **Table 7-12** below. This flight activity data was incorporated into subsequent collision risk modelling for Key Ornithological Features, where it was observed to have taken place at potential collision risk height, as detailed further within **Appendix 7B – Ornithology Collision Risk Modelling Report**.

Table 7-12: Summary of Flight Activity by Target Species in 2020-2025

Species	Breeding Season		Non-breeding Season		Total (2020-2025)	
	No. of Observations	Flight Time (s)	No. of Observations	Flight Time (s)	No. of Observations	Flight Time (s)
Black-headed gull	3	345	54	215,259	57	215,604
Buzzard	63	27,495	16	7,935	109	35,430
Common gull	2	200	3	43,463	12	43,763
Cormorant	4	179	2	56	6	235
Curlew	1	22	1	15	2	37
Golden plover	-	-	2	2,208	2	2,208
Great black-backed gull	7	1,444	2	36	9	1,480
Great white egret	-	-	1	27	1	27
Grey heron	5	185	1	0	6	185
Hen harrier	-	-	1	33	1	33
Herring gull	4	672	2	240	6	912

Species	Breeding Season		Non-breeding Season		Total (2020-2025)	
	No. of Observations	Flight Time (s)	No. of Observations	Flight Time (s)	No. of Observations	Flight Time (s)
Kestrel	79	9,061	42	5,709	121	14,770
Lapwing	-	-	2	246	2	246
Lesser black-backed gull	68	28,685	41	15,368	109	44,053
Little egret	10	1,095	35	2,162	45	3,257
Mallard	6	349	10	552	16	901
Mute swan	1	140	4	152	5	292
Peregrine	2	225	1	40	3	265
Snipe	3	242	11	392	14	634
Sparrowhawk	8	178	21	1,177	29	1,355
Whimbrel	4	700	-	-	4	700
Whooper swan	-	-	1	40	1	40

7.4.3 Future Baseline ('Without Scheme Scenario')

The future baseline describes the ornithological features as they would be in the opening year/year of operation, in the absence of the project. 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 becoming more likely. Combined with changes in land management, increased urbanisation and increased biotic pressures, climate change may lead to an increase in the populations and distributions of some species in Ireland (e.g., certain migratory species), but a decrease in other species (e.g., barn owl). 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 the operation of the project.

There are no committed or forecasted changes in land management proposals within the site that will likely materially alter the baseline conditions in the absence of the project. 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 project would be consistent with that of the existing baseline conditions described above.

7.4.4 Evaluation of Ornithological Features

Determination of population importance within the likely Zone of Influence of the project is provided in the sections below following the criteria described in **Section 7.3.3.3. Section 7.4.4.2** specifies Key Ornithological Features carried forward for detailed assessment of potential effects.

The field surveys undertaken in 2020-2025 recorded five species included on Annex I of the Birds Directive, all of which were target species: specifically, golden plover, hen harrier, little egret, peregrine and whooper swan. Species recorded also included various species of conservation concern in Ireland, as reflected by their inclusion of the BoCCI Red and Amber Lists.

Based on the findings of these field surveys, no species were present within or in close proximity to the site in numbers of international importance or in numbers of national importance.

Considering the results of the field surveys, and in view of the regional statuses of these species, populations of the following species are considered to be of **Local (Higher value) importance**:

- **Barn owl:** field signs were recorded near VP1 and VP2 (west and east of the site boundary), and eight potentially suitable breeding sites were recorded within 1 km of the site including an occupied breeding site approximately 400 m west of the project site boundary in 2022 and an unconfirmed breeding site approximately 200m east of project site boundary in 2023. The site and surrounding land are of value during the breeding and non-breeding seasons, with suitable foraging habitat present within the site along field boundaries and within the area of wet grassland/fen habitat to the west of the proposed location of Turbine 2;
- **Buzzard:** frequently recorded during the breeding and non-breeding seasons, with activity observed towards the north of the site, and far greater levels of buzzard activity immediately north and west of the site. Counts of at least four individuals were recorded during field surveys;
- **Kestrel:** frequently recorded during the breeding and non-breeding seasons, with a possible nesting location identified north of the site boundary. As such, the site overlapped with at least one kestrel breeding territory, and was also of value for foraging during the non-breeding season;
- **Black-headed gull:** whilst not recorded using habitats within the site in significant numbers, black-headed gull was frequently recorded flying over the site in flocks of up to 200 birds, including birds flying within the airspace over the site and birds flying directly over the site in a northward/southward direction (i.e., commuting and/or migrating). Considering this, the airspace over the site is potentially significant in the context of black-headed gull movement patterns in the local area and the wider landscape during the non-breeding season;
- **Lesser black backed gull:** Not observed using habitats within the site in significant numbers, lesser black-backed gull was frequently recorded flying over the site in large flocks, subsequently recording significant flight activity over the site. Considering this, the airspace over the site is potentially significant in the context of lesser black-backed gull movement patterns in the local area during the non-breeding season; and
- **Non-target farmland species:** a range of songbird species were recorded during the breeding and non-breeding seasons, with species of conservation concern present in higher numbers including meadow pipit (breeding and non-breeding seasons), redwing (non-breeding season), rook (breeding and non-breeding seasons), starling (breeding and non-breeding seasons) and swallow (breeding season).

Common gull, golden plover, peregrine and sparrowhawk were recorded using the site infrequently and/or in relatively low numbers. The site and/or airspace over the site is therefore considered to be of no more than Local (Lower value) importance for these species.

Occasional snipe activity was recorded, including a territory in wet grassland approximately 150 m west of the site boundary in 2023. Snipe activity within the site was limited, and habitats within the site were of lower suitability for this species compared with wet grassland adjacent to (e.g., west of) the site. The site is therefore considered to be of no more than **Local (Lower value)** importance for snipe, although the presence of breeding snipe within the wider area should be taken into consideration (e.g., when proposing habitat creation and enhancement measures).

Little egret were recorded using the site and adjacent land, including foraging activity along the Ahacronane River, loafing and flying. The majority of activity was recorded north-west and south-west (outside) the site boundary, with relatively low levels of little egret activity recorded within the site. Considering this, and the conservation status of this species in Ireland, the site is considered to be of no more than **Local (Lower value)** importance for little egret.

Two additional target species, hen harrier and whooper swan, were each recorded on a single occasion (i.e., one observation of one individual in flight) outside of the site boundary during the surveys of the site undertaken between 2020 and 2025 inclusive. Considering this, the site is considered to be of **Negligible** importance for hen harrier and whooper swan.

Other species recorded during the 2020 - 2025 field surveys were present in low numbers and/or infrequently within or adjacent to the site boundary. No other species were potentially present in numbers exceeding **Local (Lower value)** importance.

7.4.4.1 Importance to Nearby Natura 2000 Designated Sites

The desk study identified two relevant designated sites with features of ornithological interest, as discussed below.

Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA

Stack's SPA is located approximately 3.3 km west of the project site. This site is designated for its breeding hen harrier population. Hen harrier was recorded once during the surveys of the site undertaken between 2020 and 2025; specifically one flying approximately 80 m north of the site boundary.

Winter roost surveys between 2022/23, 2023/24 and 2024/25 non-breeding seasons identified hen harrier activity (including confirmed roosting by one adult female) by at least one adult male and two adult females over 5 km west of the site at Carrigkerry Bog. Hen harriers were observed flying from east to west (i.e., away from the project site), with limited evidence of movement towards the project site boundary observed. Nesting surveys at Carrigkerry Bog in 2023 identified hen harrier activity (one male and one female) but no evidence of breeding or movement towards the project site.

Considering the level and location of hen harrier activity recorded within the project site and during the supplementary winter roost surveys in the surrounding area, the site is not considered to be of significant value to hen harrier, either in isolation or in relation to (i.e., with regard to potential functional linkage to) Stack's SPA. No other species forming interest features of Stack's SPA (namely merlin, red grouse and short-eared owl) were recorded during the field surveys of the site and adjacent land undertaken between 2020 and 2025.

River Shannon and River Fergus Estuaries SPA

Eight Selection Species and SCI species for River Shannon and River Fergus Estuaries SPA (located approximately 6.8 km north of the project site) were recorded during the surveys in 2020-2023. Seven of these species (cormorant, whooper swan, teal, shoveler, golden plover, curlew and greenshank) were recorded infrequently and/or in low numbers; the project site is therefore not considered to be of significant value to the populations of these species also using River Shannon and River Fergus Estuaries SPA.

The wintering black-headed gull population forms a Special Conservation Interest feature for River Shannon and River Fergus Estuaries SPA. A baseline wintering population of 2,681 individuals is stated on the Standard Data Form (updated 2005-10⁵), whilst an average wintering population of 1,303 individuals was reported for the SPA in 2006-2011 following a review undertaken by NPWS (2012).

Black-headed gulls were frequently recorded during the non-breeding season, with annual peak counts of 60 to 372 birds recorded in the five seasons surveyed. Activity largely comprised birds in flight, with few recorded using land within the project site (e.g., for foraging and loafing). The project site is not considered to comprise Functionally Linked Land to the SPA in relation to the wintering population of black-headed gull.

However, frequent flights northwards and (particularly) southwards were recorded in the direction towards/from River Shannon and River Fergus Estuaries SPA. Whilst detailed guidance on black-headed gull movement patterns in relation to connectivity with inland SPAs is not available, based on the known general movement patterns of this species when commuting and on migration, and considering the distance between the project site and the SPA (approximately 6.8 km), birds observed flying northwards and southwards potentially belong to the population which forms an SCI feature for River Shannon and River Fergus Estuaries SPA. The peak count for a flock flying within the site towards/from the direction of the SPA was 102 birds (equating to 3.8% of the baseline citation population for the SPA, and 7.8% of the 2006-2011 population estimate for the SPA). Therefore, the black-headed gull flight route recorded over within proximity of the project site is potentially of significance in the context of River Shannon and River Fergus Estuaries SPA.

7.4.4.2 Identification of Key Ornithological Features

Table 7-13 below outlines the importance of each of the ornithological features identified within the Zone of Influence of the project. Features of Local (Lower value) or Negligible importance, and those to which impacts can be categorically ruled out, are scoped out for further assessment, and are therefore not considered to be Key Ornithological Features (KOF). A precautionary approach has been taken in determining which features are assigned as KOFs (and thus which are taken forward for further assessment) as described in **Section 7.3.3.4**, based upon their conservation status, population trends and likely importance to designated sites.

⁵ Available at: <https://natura2000.eea.europa.eu/natura2000/SDF.aspx?site=IE0004077> (accessed 15/08/2023).

Table 7-13: Assessment of Importance and Identification of Key Ornithological Features

Ornithological Feature	Conservation Status	Evaluation Rationale	Importance	KOF Yes/No
Designated Sites				
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA	Designated as a Special Protection Area (SPA) under the EU Habitats Directive.	Stack's SPA is designated for its nationally important breeding hen harrier population. The SPA is approximately 3.6 km west of the project site. Whilst this is within the maximum range during the breeding season of 10 km quoted by Scottish National Heritage (2016) (although outside the quoted core range of 2 km), only one hen harrier observation was recorded in close proximity to the site during the field surveys undertaken between 2020 and 2025. Winter roost surveys identified a confirmed roost over 5 km west of the project site, and no hen harrier flights between this area and the project site were observed. There is therefore no functional linkage regarding breeding hen harrier populations between the project site and Stack's SPA. As such, there is no requirement for further assessment relating to hen harrier associated with the SPA. Additional interest features for the SPA comprise merlin, red grouse and short-eared owl. None of these species were recorded within or adjacent to the project site during the field surveys undertaken in 2020-2025. There is therefore no potential for functional linkage between the project site and Stack's SPA with regard to these species.	International importance (breeding season)	No
River Shannon and River Fergus Estuaries SPA	Designated as a Special Protection Area (SPA) under the EU Habitats Directive.	River Shannon and River Fergus Estuaries SPA is designated 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 and golden plover. The wintering population of black-headed gull forms a Special Conservation Interest feature. The majority of species for which the SPA is designated were either absent from the site during the field surveys undertaken in 2020-2025 or were recorded infrequently/in very low numbers. There is therefore no potential for functional linkage in relation to seven of the eight relevant species recorded.	International importance (all seasons; notably non-breeding season)	Yes: commuting/migrating black-headed gull (non-breeding season) No other Selection Species and Special Conservation Interests

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Ornithological Feature	Conservation Status	Evaluation Rationale	Importance	KOF Yes/No
One species, black-headed gull (forming an additional SCI for the SPA), was recorded frequently and in higher numbers (comprising >1% of the cited SCI population) flying over the project site in the direction towards/from the SPA. Considering this, and the distance between the project site and the SPA (c. 6.8 km), further consideration of impacts on commuting/migrating black-headed gulls in relation to the SPA is required. Based on the low level of usage of habitats within the site recorded, habitats within the site (e.g., grassland) do not comprise Functionally Linked Land to the SPA.				
<u>Bird Species</u>				
Barn owl	BoCCI Red List, Wildlife Act.	Regarded as a species of high conservation concern in Ireland due to its inclusion on the BoCCI Red List. Barn owl evidence was recorded adjacent to the site, which contains suitable foraging habitat. Targeted nesting barn owl surveys identified an occupied breeding site, potential breeding site and three other suitable breeding sites within 1 km of the project site. Therefore, the site could potentially support at least one confirmed pair of breeding barn owl. The site is therefore considered to be of Local (Higher) value importance for barn owl. The site and the potential ZOI comprises suitable habitat for foraging, roosting and nesting barn owls and so further assessment of potential habitat loss and disturbance/displacement is required.	Local (Higher value) importance (all seasons)	Yes
Buzzard	BoCCI Green list & Wildlife Act.	Whilst a common and widespread species in Ireland, reflected by its inclusion on the BoCCI Green List, high levels of flight activity were recorded within the site, including year-round activity. The buzzard population is therefore considered to be of Local (Higher value) importance. Therefore, the potential for effects through habitat loss, disturbance/displacement and collision-related mortality cannot be excluded, and so further assessment of potential effects is required.	Local (Higher value) importance (all seasons)	Yes

Ornithological Feature	Conservation Status	Evaluation Rationale	Importance	KOF Yes/No
Gull species	BoCCI Red and Amber Lists & Wildlife Act.	Whilst not recorded using the habitat within the site in significant numbers, black-headed gulls were frequently recorded flying within airspace over and adjacent to the site, including flocks of up to 200 birds. Similar flight activity was observed by lesser black-backed gull and common gull. All three species of gull are included on the BoCCI Amber List. Based on the level and type of activity recorded, airspace over the site is considered to be of Local (Higher value) importance for movements of black-headed gull (non-breeding season), common gull (non-breeding season) and lesser black-backed gull (all seasons) within the local area. Therefore, the potential for effects through disturbance/displacement and collision-related mortality cannot be excluded and so further assessment of potential effects is required. Other gull species recorded comprised herring gull and great black-backed gull, which include BoCCI Amber listed species. These species were typically recorded in relatively low numbers, with the majority of activity comprising birds flying over the site and adjacent land. The site and adjacent land is considered to be of no more than Local (Lower value) importance for these species.	Local (Higher value) importance (non-breeding season): black-headed gull (flying over), common gull (flying over) Local (Higher value) importance (all seasons) lesser black-backed gull (flying over) Local (Lower value) importance (all seasons): all other gull species	Yes: black-headed gull (flying over), common gull (flying over) and lesser black-backed gull (flying over) No: other gull species
Hen harrier	Annex I EU Birds Directive; BoCCI Amber List, & Wildlife Act.	Hen harrier is an Amber listed bird species of conservation concern in Ireland and is afforded additional legal protection due to its inclusion on Annex I of the Birds Directive. Hen harrier was only recorded once during the VP surveys (outside of the site boundary), whilst the nearest winter roost was identified over 5 km from the site. Based on the low level of hen harrier activity recorded, and the suitability of the habitats on site for hen harrier, the project site is considered to be of Negligible importance to this species. No further assessment is therefore required.	Negligible importance	No
Kestrel	BoCCI Red List, & Wildlife Act.	Regarded as a species of high conservation concern in Ireland due to its inclusion on the BoCCI Red List. High levels of flight activity were recorded within the site, and the kestrel population is considered to be of Local (Higher value) importance . Kestrel activity was recorded throughout the year.	Local (Higher value) importance (all seasons)	Yes

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Ornithological Feature	Conservation Status	Evaluation Rationale	Importance	KOF Yes/No
		Therefore, the potential for effects through habitat loss, disturbance/displacement and collision-related mortality cannot be excluded and so further assessment of potential effects is required.		
Little egret	Annex I EU Birds Directive; BoCCI Green List, & Wildlife Act.	A common and widespread species in Ireland afforded additional legal protection due to its inclusion on Annex I of the Birds Directive. Little egret was frequently recorded during the field surveys, with counts of up to eight recorded, and birds observed foraging, loafing and flying mostly adjacent to the site. Based on the levels of activity recorded in the context of their conservation status in Ireland, the little egret population is considered to be of Local (Lower value) importance . Little egret activity was recorded throughout the year.	Local (Lower value) importance (all seasons)	No
Peregrine	Annex I EU Birds Directive; BoCCI Green list, & Wildlife Act.	A locally common and increasingly abundant species in Ireland, reflected by its inclusion on the BoCCI Green list. Afforded additional protection due to its inclusion on Annex I of the Birds Directive. Peregrine was recorded infrequently during field surveys. Considering the level of activity recorded and the conservation status of this species, the peregrine population is considered to be of Local (Lower value) importance . Whilst not a KOF requiring further detailed assessment, due to the susceptibility of this species to collision impacts, peregrine is taken forward for Collision Risk Modelling on a precautionary basis.	Local (Lower value) importance (all seasons)	No
Sparrowhawk	BoCCI Green list, & Wildlife Act.	Sparrowhawk is regarded as a widespread species and is not considered to be of particular conservation concern in Ireland. This species was recorded flying over the site relatively infrequently, with the site including some suitable habitat for hunting. Taking this into consideration, the species has been assessed as being of Local (lower value) importance .	Local (Lower value) importance (non-breeding season)	No
Waders	Annex I EU Birds Directive; BoCCI Red	Includes species regarded as being of high and medium conservation concern in Ireland, and species included on Annex I of the Birds Directive. Wader species were largely recorded infrequently and in low numbers. Golden plover was recorded	Local (Lower value) importance (all seasons): golden plover and snipe.	No

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Ornithological Feature	Conservation Status	Evaluation Rationale	Importance	KOF Yes/No
	and Amber Lists & Wildlife Act.	infrequently across the survey period on multiple occasions during non-breeding seasons, with a peak count of 36 individuals in the non-breeding season recorded during a vantage point survey in 2023/24. Snipe was recorded in wet grassland during the breeding and non-breeding seasons, and a territory was identified c.150 m west of the site boundary. Based on the level of activity recorded across the entire survey period and the conservation of this species in Ireland, the snipe and golden plover populations are considered to be of Local (Lower value) importance . Populations of other wader species (e.g. curlew, lapwing and whimbrel) recorded were of Negligible importance. Wader species are therefore not taken forward for further assessment.	Negligible importance: all other waders	
Waterfowl	Annex I EU Birds Directive; BoCCI Red and Amber Lists & Wildlife Act.	Waterfowl species were recorded within and adjacent to the site, including Birds Directive Annex I species and BoCCI Red and Amber listed species. These were all either recorded in relatively low numbers and/or outside of the site boundary. The one whooper swan observation was of a single bird flying outside of the site boundary and the site. Considering the levels of activity recorded, waterfowl populations recorded were not significant. Waterfowl species are therefore not taken forward for further assessment.	Negligible importance	No
Non-target farmland birds	BoCCI Red and Amber List, & Wildlife Act.	Various non-target songbird species were recorded including species of conservation concern as specified on the BoCCI Red and Amber Lists. Notable species present during the breeding season included cuckoo, grey wagtail, house martin (foraging), linnet, meadow pipit, rook (foraging), skylark, starling (foraging) and swallow whilst notable species present during the non-breeding season included redwing, linnet, meadow pipit, rook and starling. Considering the levels of activity recorded and the conservation statuses of these species, populations of linnet, meadow pipit, redwing, rook, starling and swallow are considered to be of Local (Higher value) importance . Therefore, the potential for effects through habitat loss and disturbance/displacement cannot be excluded and so further assessment of potential effects is required .	Local (Higher value) importance (all seasons)	Yes

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7.5 Embedded Mitigation

From the early stages of the project design development, an iterative process of a constraints led design was employed, whereby ecological information was utilised to avoid impacting potentially important ornithological features where possible.

Likely impacts on ornithological features were a contributing factor to the determination of the site, with the selected project site generally comprising relatively low suitability habitat for breeding and non-breeding birds, and therefore being unlikely to support particularly notable bird populations. Areas of greater importance to avian features (e.g., woodland, waterbodies and mature trees) will be retained within the design of the project. The project has been designed to minimise the extent of habitat loss required. As such, new hardstanding areas will cover the minimum required area possible, whilst the grid connection and turbine delivery routes would utilise-built infrastructure for the majority of their lengths, with cables being laid underground within the existing road network where possible to minimise effects on roadside hedgerows and other habitats and species.

The project design has followed the basic principles outlined below to eliminate the potential for significant effects on ornithological features.

7.5.1 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) within Appendix 3D, Section Reference EMP 9: Ecological Management Plan for the Protection of Habitats and Fauna and Chapter 6 – Biodiversity) 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. All plant and machinery will comply with specific noise legislation (Construction Plant and Equipment Permissible Noise Levels Regulations, 1998) and will be turned off when not in use. Works will aim to avoid the use of artificial lighting in habitat (i.e., rough grassland, hedgerows and tree lines) used by potentially sensitive species such as barn owl. In particular, removal of trees and dense vegetation (i.e., hedgerows and scrub) will be avoided where possible. The CEMP also includes measures to avoid pollution of waterbodies within and adjacent to the site.

7.5.2 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 habitat (e.g., grassland, hedgerows and scrub) 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, 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 7.5.3** below (i.e., by timing works outside the peak bird breeding season, and undertaking nesting bird checks prior to clearance of any suitable nesting habitat where avoidance is not possible).

Furthermore, the installation of warning lights on turbines can help to increase their visibility, thereby reducing the risk of bird collision. A number of the turbines will be fitted with aviation warning lights in accordance with the requirements of the Irish Aviation Authority in advance of project operation.

7.5.3 Timing of Works

To minimise the potential for impacts on nesting birds, removal or alteration of suitable nesting habitat (e.g., grassland, hedgerow, scrub and trees) 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 to 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 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 would 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 would be suspended until the nest is no longer active (to be confirmed by a suitably experienced ornithologist through ongoing monitoring of the nest). The size of the exclusion zone would 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 5 m to several hundred metres.

7.5.4 Ecological Clerk of Works

An Ecological Clerk of Works (ECoW) will be appointed to address issues relating to birds and other sensitive habitats and species. 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 project 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.

7.6 Assessment of Effects

7.6.1 Scope of Assessment

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

The potential for these effects to adversely impact the Key Ornithological Features described in **Section 7.4** is then assessed in accordance with the process described in **Section 7.3.3.5**. This assessment takes into consideration embedded mitigation within the project design. Where embedded mitigation measures are insufficient to avoid

potentially significant effects on bird populations, further mitigation measures will be required (as described in **Section 7.7**).

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).

7.6.2 Assessment of Effects on Designated Sites

7.6.2.1 Natura Impact Statement

In accordance with best practice guidance, a screening assessment and Natura Impact Statement were prepared to provide the planning authority with the information necessary to complete an Appropriate Assessment for the project in compliance with Article 6(3) of the Habitats Directive.

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'. This section provides a summary of the key assessment findings regarding relevant Natura 2000 sites with features of ornithological interest.

In the absence of any specific European or Irish guidance, the SNH guidance document 'Assessing Connectivity with Special Protection Areas (SPAs)' (2016) was consulted. This document provides guidance in relation to assessment of connectivity between SPAs and suitable habitat for qualifying bird populations within the wider landscape (i.e., potential Functionally Linked Land). The guidance takes into consideration the typical distances specific species may travel beyond SPA boundaries, and outlines information on dispersal and foraging ranges of relevant species.

The desk study and subsequent evaluation of ornithological features identified one designated site as a Key Ornithological Feature and therefore requiring detailed assessment of potential effects, as discussed below.

7.6.2.2 River Shannon and River Fergus Estuaries SPA

This designated site is located approximately 6.8 km north of the project site and is designated for its internationally and nationally important waterbird populations, primarily comprising wintering waterfowl and wader populations. The SPA citation details various Selection Species (SS) for the SPA, as well as several additional SCI features.

Considering the distance between the project site and the boundary of River Shannon and River Fergus SPA, there would be no direct effects (i.e., through habitat loss or disturbance) on the SPA as a result of the construction, operation or decommissioning phases of the project.

In accordance with best practice guidance, it is necessary to examine whether there is any potential functional linkage between the project site and the SPA regarding qualifying bird populations. Of the species forming SSs and additional SCI features for the site, nine were recorded during the field surveys to inform the project. Based on the level of activity recorded, no relevant species were recorded using habitats within the site in significant numbers in the context of the SPA. As such, habitats within or in close proximity to the project site do not comprise Functionally Linked Land to River Shannon and River Fergus Estuaries SPA. There is therefore no potential for

significant effects on designated bird populations through habitat loss, displacement and/or disturbance of birds using habitat within the site.

As discussed in **Section 7.4.4.1**, black-headed gulls were recorded flying in a direction towards/from the SPA, with a peak flock count of 102 birds which would equate to 3.8% of the cited non-breeding population (2,681) and 7.8% of the 2006-2011 population estimate for the SPA. Whilst it is not possible to confirm to what extent these birds were using River Shannon and River Fergus Estuaries SPA, considering the distance between the SPA and the project site (c. 6.8 km) and the known movement patterns of this species, on a precautionary basis all black-headed gulls recorded flying north or south towards/from the direction of the SPA over the VP survey area are considered to potentially form part of this SCI feature for the purpose of this impact assessment.

Based on the habitat types and airspace present either side of the project site, over which black-headed gulls would be able to commute and migrate without any significant deviation in their flight paths, there is not considered to be potential for significant disturbance and/or displacement impacts on flying black-headed gulls to the extent that significant impacts (i.e., through barrier effects) on the SPA population could be anticipated, during the construction, operational or decommissioning stages of the project.

To establish whether there is any potential for significant impacts on the SPA black-headed gull population through collision fatalities due to new turbines, collision risk modelling was undertaken (see Appendix 7B – Ornithology Collision Risk Modelling Report). An additional modelling scenario utilising the migration tab was adopted (see **Appendix 7B – Ornithology Collision Risk Modelling Report, Section 4.2.5**), incorporating all observations at risk height of black-headed gulls flying northwards or southwards through the airspace within the VP viewsheds. Based on the behaviour observed and the distance from the SPA, observations of birds that were not commuting directly over the project site in a direction to or from the SPA were considered unlikely to form part of the SPA population and were omitted from collision risk modelling in relation to the SPA.

Estimated collision risk fatalities (taking into account published avoidance rates within best practice guidance), both annually and over the proposed 35-year project lifespan, are summarised in **Table 7-14** below. Modelled collision fatalities (migration approach) for black-headed gulls potentially belonging to the SCI population for River Shannon and River Fergus Estuaries SPA are estimated as 0.014 birds per year, equating to 0.472 birds over the operational lifespan of the project.

Table 7-14: Black-headed Gull Collision Risk Model Summary

Survey Period*	Avoidance Rate	Estimated Collision Fatalities	
		Per Non-breeding Season	35 Years
October 2020-March 2021	98% (default value)	0.000	0.000
October 2021-March 2022		0.000	0.000
October 2022-March 2023		0.018	0.623
October 2022-March 2023		0.011	0.376

Survey Period*	Avoidance Rate	Estimated Collision Fatalities	
		Per Non-breeding Season	35 Years
October 2024-March 2025		0.039	1.361
Average		0.014	0.472

*Only provided for non-breeding seasons due to the significantly lower black-headed gull numbers recorded during the breeding season, with no flight data recorded in the at collision risk height during the 2021, 2022 and 2023 breeding seasons and limited flight seconds during 2024 breeding season.

A baseline wintering population of 2,681 black-headed gulls is stated on the Standard Data Form (updated 2005-10⁶) for the SPA, whilst an average wintering population of 1,303 individuals was reported for the SPA in 2006-2011 following a review undertaken by NPWS (2012). Whilst it is acknowledged that black-headed gull populations have undergone declines in many areas, potentially including recent significant declines associated with avian influenza, the estimated number of collision fatalities during the lifespan of the project (0.472 birds) is less than 1% of the citation population for the SPA (1% threshold = 26.81) and is less than 1% of the estimated 2012 wintering black-headed gull population for the SPA (1% threshold = 13.03). In addition, the following factors should be taken into consideration:

- Collision Risk Modelling represents a precautionary assessment of likely collisions (see **Appendix 7B – Ornithology Collision Risk Modelling Report, Section 3.6**).
- This modelling assumes that all birds flying in a northwards or southwards direction over the project site belong to the wintering population of the SPA. Given the distance between the project site and the SPA (c. 6.8 km), and the widespread nature of this species (i.e., over-wintering in a range of coastal and inland habitats), it is considered unlikely that all black-headed gulls observed flying northwards or southwards over the project site belong to the SPA population.
- Whilst gull fatalities due to wind farms can be relatively high, black-headed gulls typically display lower susceptibility to turbine collisions than many other gull species. For example, Rothery et al. (2009) did not observe any turbine collisions at a wind farm at Blyth, UK, and reported that only 4% of black-headed gull flights at the site were at collision risk height.

Based on the field data, the findings of collision risk modelling and the factors described above, the project is not considered to have a significant effect on River Shannon and River Fergus Estuaries SPA through black-headed gull collision fatalities during the non-breeding season. Overall, the effect on the River Shannon and River Fergus Estuaries SPA as a result of the project during the construction, operation and decommissioning phases would be **not significant**.

⁶ Available at: <https://natura2000.eea.europa.eu/natura2000/SDF.aspx?site=IE0004077> (accessed 15/08/2023).

7.6.3 Assessment of Effects on Bird Species

7.6.3.1 Construction Effects

The assessment of effects on bird species during the construction of the project is described below and summarised in **Table 7-16**, in accordance with the effect terminology described in **Section 7.3.2.2**. Potential effects identified during the construction phase of the project 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), with the potential to cause displacement of birds into land outside of the project footprint.

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; notably those identified within this report, including barn owl, birds of prey and non-target farmland birds.

Direct habitat loss due to the development of wind farms tends to be relatively small (Drewitt & Langston, 2006). The permanent land take will be largely limited to the area of the turbine bases, new access tracks, electrical substation, and a met mast. Temporary land take during construction and decommissioning will additionally include temporary access tracks for site vehicles and machinery, crane hard standing areas and lay down areas for each turbine, and a site compound with associated car parking. Temporary land take may also occur at 'pinch points' along the Turbine Delivery Route (TDR) where vegetation will need to be pruned to enable the transport of turbine infrastructure. As described in **Section 7.5**, the project design includes embedded mitigation to minimise areas of created hardstanding and the alteration and disturbance of habitats of value to bird populations (notably woodland, mature trees and hedgerows).

As described within **EIAR Chapter 6 – Biodiversity**, habitats on site within which the turbines will be constructed and additional project infrastructure will be established are largely dominated by agricultural land comprising improved agricultural grassland with smaller areas of scrub and other supporting habitats. Habitats anticipated to be lost during the construction of the project total 2.68 ha (96% of which is wet grassland) and 613 m of linear habitats, as detailed in **Table 7-15** below.

The potential of effects of this habitat loss during project construction on Key Ornithological Features is discussed below.

Table 7-15: Anticipated Habitat Losses for the Project (Before Mitigation/Offsetting)

Habitat Type	Extent included within the Site Boundary	Likely extent to be lost within the Site Boundary
Area features	Total area (ha)	
GA1 – Improved agricultural grassland		35.51
GS4 – Wet grassland	4.485	2.572
WS1 – scrub	0.344	0.041

Habitat Type	Extent included within the Site Boundary	Likely extent to be lost within the Site Boundary
WS1 – scrub / GS4 – wet grassland	0.330	0.044
WD1/WS1 Mixed broadleaved woodland / scrub	0.234	0.003
WD1/GS4/WS1 Mixed broadleaved woodland/wet grassland/scrub	0.288	0.018
PF2 – poor fen and flush	0.097	0
WS2 – immature woodland	0.036	0
Linear features	Total length (m)	
WL1 – hedgerow	2835	1065
FW4 – drainage ditch	1662	156
WL2 – treeline	717	34
FW2 – lowland/depositing river	25	6
BL1 – stone walls	82	17

Barn Owl

No barn owl activity was recorded within the project site. However, the site contains suitable foraging habitat for barn owl, and an active nest site was identified approximately 400 m west of the site boundary in 2022 and a potential breeding site approximately 200 m east of the site boundary in 2023. Due to the presence of at least one confirmed pair of barn owl, the project site is therefore considered to potentially be of Local (Higher value) importance for barn owl.

Taking into consideration the embedded mitigation within **Section 7.5** and the predicted habitat losses presented in **Table 7-15**, anticipated direct loss of suitable barn owl habitat during construction comprises approximately 2.6 ha of suitable foraging habitat (wet grassland). Considering the suitability and extent of this habitat in the context of retained habitat immediately adjacent to the site and within the wider landscape, this does not represent a significant decrease in the local availability of barn owl foraging habitat. There would be no impacts on confirmed or suitable roosting or nesting sites. Likely effects from habitat loss and fragmentation are therefore deemed not significant. This limited potential for adverse effects will be further reduced by the mitigation described in **Section 7.7**.

No nests or roosts were recorded within the site boundary, with the nearest confirmed breeding site (approximately 400 m west of the site boundary) while the nearest unconfirmed breeding site was 200 m east of the site boundary. Both would be outside of the likely zone of disturbance impacts quoted within best practice guidance (Shawyer, 2011; Goodship & Furness, 2022). Potential disturbance effects would therefore be limited to foraging and commuting individuals. Barn owls have relatively large home ranges, with adults in the breeding season commonly ranging between 1 km and 1.5 km from their breeding sites to forage (Shawyer, 1990). The

project site is therefore potentially within the core foraging range of the confirmed barn owl pair. Considering the susceptibility of barn owls to disturbance when foraging, and the extent and quality of the foraging habitat to be subject to increased disturbance in the context of retained habitat immediately adjacent to the site and within the wider landscape, likely effects from construction disturbance are deemed not significant. This limited potential for adverse effects will be further reduced by the mitigation described in **Section 7.7**.

Raptor Species

The site is assessed as being of Local (Higher value) importance for buzzard and kestrel during the breeding and non-breeding seasons. The project site predominantly comprises improved agricultural grassland that offers sub-optimal habitat for foraging raptors, with lesser extents of wet grassland, scrub and hedgerows that provide more suitable habitats. Taking into consideration the embedded mitigation within **Section 7.5** and the predicted habitat losses presented in **Table 7-15**, direct loss of suitable foraging habitat for these species will be minimal in the context of retained foraging habitat adjacent to the project site and in the wider landscape. As such, the local availability of prey for these species will not be significantly affected. There will be no loss of suitable nesting habitat for buzzard or kestrel. As such, effects on populations of these raptor species as a result of habitat loss and fragmentation during construction are considered not significant. This limited potential for adverse effects will be further reduced by the mitigation described in **Section 7.7**.

Construction activities have the potential to cause disturbance and displacement of buzzard and kestrel. However, the area of suitable habitat that would be subject to disturbing activities will be small, particularly in the context of retained areas of suitable foraging and commuting habitat within adjacent land and the wider landscape. As described in **Section 7.5.1**, the project includes embedded mitigation to minimise construction disturbance. Considering this, and the low susceptibilities of these species to disturbance, potential disturbance and displacement effects from construction are considered **not significant**. This limited potential for adverse effects will be further reduced by the mitigation described in **Section 7.7**.

Gull Species

Airspace over the site has been assessed as being used by in-flight numbers of black-headed gull, common gull and lesser black-backed gull of Local (Higher value) importance, with birds recorded flying within the airspace in various directions without using habitats within the site (e.g., for foraging, roosting or loafing). Considering the type of activity for which the site is significant (i.e., flight activity only), these gulls would not be significantly affected by the loss of terrestrial habitat within the site. As such, effects on these gulls as a result of habitat loss and fragmentation during construction are considered not significant. This limited potential for adverse effects will be further reduced by the mitigation described in **Section 7.7**.

Similarly, as gulls were recorded primarily using airspace over the site rather than terrestrial habitats within the site, there is negligible potential for significant effects from disturbance or displacement of commuting birds during construction activities. Based on the sensitivity of this species, it is anticipated that gulls will continue to fly over active construction areas, and the availability of suitable flight routes and retained terrestrial habitat adjacent to the site and in the wider landscape mean that the effects of any displacement during construction would be minimal, likely causing only minor deviations in flight routes. As such, effects on black-headed gull as a result of disturbance and displacement during construction are considered **not significant**.

Non-target Farmland Bird Species

The site is assessed as being of Local (Higher value) importance for the assemblage of notable non-target farmland bird species such as linnet, meadow pipit, redwing, rook, starling and swallow. Habitats within the site provide opportunities for these species during the breeding and non-breeding seasons; notably hedgerows, treelines, grassland, scrub, and arable fields. The temporary and permanent loss of these habitats to facilitate construction, as outlined in **Table 7-15**, would result in a reduction in the availability and connectivity of habitats for the bird assemblage. Whilst the embedded mitigation outlined within **Section 7.5** will help to reduce such impacts, in the absence of additional mitigation measures, it is likely that the construction of the project would have a **significant negative effect** on these farmland bird species at a **Local level (slight effect)** through direct habitat loss and fragmentation. This effect would be addressed through additional mitigation/offsetting (see **Section 7.7**).

Whilst the area of suitable habitat subject to disturbing activities for these farmland bird species will be relatively small, particularly in the context of retained areas of suitable habitat present within the wider landscape, there is potential for disturbance and displacement of farmland bird species during the construction of the project. This includes potential disturbance of birds when nesting and may cause birds to vacate territories close to works. Additional impacts may occur during the construction due to required road works along the turbine delivery route, the laying of cabling, the placement of underground cabling, and excavation of materials. Considering the potential extent of disturbance, and the Local (Higher value) importance of the bird populations present, it is possible that the construction of the project could have a **significant negative effect** on these farmland bird species at a Local level (slight effect) through disturbance and displacement, in the absence of additional mitigation.

Summary

Table 7-16: Construction Effect Characterisation for Key Ornithological Features

Key Ornithological Feature	Effect	Magnitude of Effect	Significance of Effect
Barn Owl	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Raptor Species	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Gull Species	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant

Key Ornithological Feature	Effect	Magnitude of Effect	Significance of Effect
Non-target Farmland Species	Direct habitat loss and fragmentation	Low	Long-term, Slight Negative Effect (significant at a Local level)
	Disturbance and displacement	Low	Short-term, Slight Negative Effect (significant at a Local level)

7.6.3.2 Operational Effects

The assessment of effects upon ornithological features during the operation of the project is described in this section and summarised in **Table 7-19**. It is understood that the wind farm has an anticipated lifespan of 35 years. Potential effects identified during the operational phase are as follows:

- Direct habitat loss: permanent and temporary reductions to the extent, quality and connectivity of the habitats present for birds to facilitate the operational maintenance of the project;
- 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
- Bird fatalities and/or injuries through collisions with turbines whilst flying over the site.

Assessment of operational effects for Key Ornithological Features is informed by species-specific collision risk modelling where appropriate. Full details of collision risk modelling are provided in **Appendix 7B – Ornithology Collision Risk Modelling Report**.

Barn Owl

No barn owl activity was recorded within the project site. However, the site contains suitable foraging habitat for barn owl, and an active nest site was identified approximately 400 m west of the site boundary while a potential breeding site was also recorded within a building 200 m east of the site boundary. Evidence of barn owl activity was also recorded west and east of the site boundary. The project site is therefore considered, on a precautionary basis, to potentially be of **Local (Higher value) importance** for barn owl.

Removal of habitat (e.g., vegetation clearance) to facilitate operational maintenance of the project will be limited in extent, likely involving only very small areas of low-quality barn owl foraging habitat, and no removal of suitable nesting or roosting habitat would occur. There would therefore be no significant reduction in the suitability of the site for barn owl due to operational maintenance. Likely effects from habitat loss and fragmentation during the operation of the project are therefore deemed **not significant**.

As no nests or roosts were recorded within the site boundary, operational disturbance effects will be limited to foraging and commuting individuals. As outlined in **Section 7.6.3.1**, barn owls have relatively large home ranges with adults commonly ranging between 1 km and 1.5 km from their breeding sites to forage (Shawyer, 1990). Whilst the project site is therefore potentially within the core foraging range of the confirmed barn owl pair, the extent of the foraging habitat to be subject to increased disturbance will be limited in the context of retained habitat within and adjacent to the site and in the wider landscape. Disturbance levels from the project on this retained habitat will be insufficient to significantly affect foraging barn owls. Guidance provided by the Barn Owl

Trust⁷ (BOT) indicates that barn owl activity is not generally significantly affected by the presence of operational turbines. The BOT cites examples of a pair nesting successfully only 35 m from an operational turbine for three years and nesting within 500 m of an operational turbine on six occasions, and six successful nesting attempts 750 m from a wind farm comprising 16 large operational turbines. Considering the availability of retained suitable foraging habitat, and guidance indicating that operational turbines within the core foraging ranges of breeding barn owl pairs do not cause significant disturbance, likely project effects from operational disturbance are deemed **not significant**. This limited potential for adverse effects will be further reduced by the mitigation described in **Section 7.7**.

No barn owl flight activity was recorded within the potential collision risk zone of the proposed turbines. As such, collision risk modelling for barn owl was not undertaken to inform this assessment. Whilst it is acknowledged that relatively little survey effort was undertaken at dawn/dusk (when barn owl flight activity is most likely to be recorded), the habitats within the immediate vicinity of the proposed turbine locations will, for the most part, continue to provide only sub-optimal foraging opportunities for barn owls during the operational phase, with larger areas of suitable foraging habitat present outside of the site boundary. Collision risk for barn owls with turbines is deemed to be very low, due to their relatively low cursory flight path associated with foraging and commuting, coupled with their high flight manoeuvrability. BOT guidance states that the majority of barn owl flights are within 3 m of ground level (i.e., significantly below the rotor sweep zone), and cites only one confirmed case of a barn owl being killed by a wind turbine in Britain. This leads the BOT to state that, "Overall there is no evidence that wind turbines have a significant impact on Barn Owls in the UK". Considering the similar nature of barn owl behaviour and habitat use in Ireland to the UK, this guidance is also deemed applicable in an Irish context. As such, effects on barn owl associated with collision risk are deemed **not significant**.

Raptor Species

The site is assessed as being of Local (Higher value) importance for buzzard and kestrel during the breeding and non-breeding seasons. The project site predominantly comprises improved agricultural grassland that provides only sub-optimal foraging opportunities for raptors, with lesser extents of wet grassland, scrub and woodland that provide more favourable foraging habitat. Removal of habitat (e.g., vegetation clearance) to facilitate operational maintenance of the project will be limited in extent, likely involving only very small areas of relatively low-quality foraging habitat, and no removal of suitable nesting habitat for raptors is anticipated. Operational habitat removal will be insufficient to significantly affect prey availability, particularly in the context of the wider landscape. Considering this, likely effects from habitat loss and fragmentation during the operation of the project on buzzard and kestrel are deemed **not significant**.

Regarding potential operational disturbance of raptors, the proposed wind turbines have the potential to cause disturbance and displacement of raptor populations using the site. Whilst there is evidence of raptors avoiding the area within 500 m of turbines (Pearce-Higgins et al., 2009), considering the level of raptor activity recorded within and adjacent to the site, the conservation statuses of these species and the relatively low suitability of habitat within the site in comparison with suitable raptor habitat within the wider landscape (which does not appear to contain sufficient raptor numbers such that competition is likely to be a significant issue), this relatively minor disturbance and potential displacement would not have a significant effect on the local conservation statuses of these species. Operational disturbance and displacement effects from construction are therefore considered **not significant**.

⁷ See <https://www.barnowltrust.org.uk/hazards-solutions/barn-owls-wind-turbines/> (accessed 30/08/2023).

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. Collision risk modelling was therefore undertaken for these raptor species based on field survey data collected for the site between 2020 and 2025.

Both raptor species for which the site is of Local (Higher value) importance, buzzard and kestrel, were recorded flying within the potential collision risk zone and were therefore subject to collision risk modelling. The site was of Local (Lower value) importance for peregrine which was also subject to collision risk modelling on a precautionary basis.

Estimated collision risk fatalities for these species (taking into account published avoidance rates within best practice guidance), both annually and over the proposed 35-year project lifespan, are summarised in **Table 7-17**. Further details of collision risk modelling are provided in **Appendix 7B – Ornithology Collision Risk Modelling Report**.

Table 7-17: Summary of Collision Risk Modelling for Raptor Species

Species	Avoidance Rate	Mean Estimated Collision Fatalities	
		Per Year	35 Years
Buzzard	98%	0.093	3.247
Kestrel	95%	0.034	1.187
Peregrine	98%	0.001	0.045

Modelled buzzard and kestrel collision fatalities are estimated as 0.093 and 0.034 birds per year respectively, equating to 3.2 and 1.2 birds respectively over the operational lifespan of the project. Recent population estimates are not available for these species for the local area, but they are considered locally widespread and common and collision fatalities over the operational lifespan of the project would equate to less than 1% of the county populations. The resultant increases in bird mortality would not be significant when compared against the annual background mortality for these species, which for buzzard and kestrel are stated to be 10% and 31% of adult birds respectively and 37% and 68% of juvenile birds respectively⁸.

Based on the methods adopted in collision risk modelling, it should be noted that estimated numbers of fatalities are precautionary and are considered likely to be higher than the actual number of collision fatalities. As such, based on the anticipated number of collision fatalities, collision impacts on buzzard and kestrel during the operation of the project are considered **not significant**.

Modelled peregrine collision fatalities are estimated as 0.001 birds per year, equating to 0.03 birds respectively over the operational lifespan of the project. Considering the conservation statuses of these species within the county and the local area, these numbers would not be significant in the context of these populations. Again, it should be noted that estimated numbers of fatalities are precautionary and are considered likely to be higher than the actual number of collision fatalities that occur. As such, collision impacts on peregrine during the operation of the project are considered **not significant**.

Gull Species

⁸ According to mortality rates published on the BTO Bird Facts website (<https://www.bto.org/understanding-birds/welcome-birdfacts>).

Airspace over the site has been assessed as being used by in-flight numbers of black-headed gull (non-breeding season), common gull (non-breeding season) and lesser black-backed gull (all seasons) of Local (Higher value) importance, with birds recorded flying within the airspace in various directions without using habitats within the site (e.g., for foraging, roosting or loafing). Considering the type of activity for which the site is significant (i.e., flight activity only), gulls would not be significantly affected by the loss of terrestrial habitat within the site to facilitate operational maintenance of the project. Likely effects from habitat loss and fragmentation during the operation of the project on black-headed gull, common gull and lesser black-backed gull are therefore deemed **not significant**.

As all gull species were using airspace over the site rather than terrestrial habitats within the site, there is negligible potential for significant effects from disturbance or displacement of flying gulls during the operation of the project. Whilst some displacement of birds flying through site airspace may be caused by turbine operation, considering the availability of suitable airspace and underlying terrestrial habitat adjacent to the site and in the wider landscape, the effects of any displacement during operation would be minimal. As such, effects on black-headed gull, common gull and lesser black-backed gull due to disturbance and displacement during operation are considered **not significant**. This limited potential for adverse effects will be further reduced by the mitigation described in **Section 7.7**.

To establish whether there is any potential for significant impacts on black-headed gull, common gull and lesser black-backed gull flying within project airspace through collisions with new turbines, a collision risk model was undertaken (Refer to **Appendix 7B**).

Estimated collision risk fatalities for these species, both annually and over the proposed 35-year project lifespan, are summarised in **Table 7-18**. Further details of collision risk modelling are provided in **Appendix 7B – Ornithology Collision Risk Modelling Report**.

Table 7-18: Gull Airspace Collision Risk Model Summary

Species	Avoidance Rate	Mean Estimated Collision Fatalities	
		Per Year	35 Years
Black-headed gull	98% (default value)	0.143	5.007
Common gull		0.163	5.696
Lesser black-backed gull		0.178	6.237

Modelled black-headed gull, common gull and lesser black-backed gull collision fatalities due to flight activity with the project airspace are estimated as 0.1, 0.2 and 0.2 birds per year, equating to 5, 5.7 and 6.2 birds over the operational lifespan of the project. Throughout the survey period activity generally remained consistent between the non-breeding seasons for black-headed gull and common with slightly lower activity in 2020/21. While flight activity was higher in 2024/25 for lesser black-backed gull.

Additional modelling due to the type of activity recorded was provided for black-headed gull utilising migration passages of birds within the survey area to assess potential collision related impacts for individuals potentially associated with the River Shannon and Fergus SPA. The collision fatalities from the separate modelling scenarios should be considered in isolation when assessing the potential total number of black-headed gull collision fatalities from the project and the resultant effects significance regarding local populations of this species.

Black-headed gull, common gull and lesser black-backed gulls are also relatively common and widespread species in Ireland, with national population estimates of 50,181, 18,415 and 10,363 wintering birds in 2006-2011⁹. Whilst lesser black-backed gull was present within the site year-round with national population estimates of 4,239 breeding pairs⁹. Based on the methods adopted in collision risk modelling, it should be noted that estimated numbers of fatalities are precautionary and are considered likely to be higher than the actual number of collision fatalities. As such, based on the anticipated number of collision fatalities across the lifespan of the proposed development, and considering the national and regional population status of this species, collision impacts on black-headed gull, common gull and lesser black-backed gull during the operation of the project are considered **not significant**.

Non-target Farmland Bird Species

The site is assessed as being of Local (Higher value) importance for notable non-target bird species such as linnet, meadow pipit, redwing, rook, starling and swallow. Habitats within the site provide opportunities for these species during the breeding and non-breeding season; notably hedgerows, treelines, grassland, scrub and arable fields.

Vegetation removal to facilitate operational maintenance of the project could cause a reduction in the availability and connectivity of habitats, to the potential detriment of local populations of these species. However, the extent of any such vegetation removal will be small-scale and only likely to have a negligible effect on birds, especially when considered in the context of retained habitat within the site and the wider landscape. In addition, embedded mitigation outlined within **Section 7.5** will help to reduce operational habitat loss. As such, likely effects from habitat loss and fragmentation during the operation of the project are deemed **not significant**.

Regarding effects from operational disturbance due to additional noise, vibration, light, and human activity associated with the project, non-target farmland bird species for which the site is of Local (Higher value) importance are considered to be relatively tolerant to such disturbance and are likely to quickly habituate to the new levels of 'background' disturbance within the site. In addition, any areas subject to higher levels of disturbance will be small-scale in the context of undisturbed suitable habitat immediately adjacent to the site and in the wider landscape. As such, operational disturbance and displacement effects on these non-target farmland bird species are deemed **not significant**.

Due to their size and typical flight patterns, non-target passerine species are generally considered not to be significantly impacted by wind farms, with significant impacts generally limited to scarce species potentially associated with nearby designated sites, with restricted geographical range and/or where turbines are located on significant migration flight routes (SNH, 2025). Furthermore, the NatureScot guidance states that surveys of lowland farmland passerines are generally not required in relation to proposed farms; this reflects the low susceptibility of passerines to collision impacts with turbines. Whilst passerine populations within the site were identified as being of Local (Higher value) importance, these were populations of common and widespread species and no significant migration routes were recorded. As such, these populations are not considered to be susceptible to collisions with new wind turbines, and collision risk modelling was not undertaken for these species. Collision impacts on non-target farmland bird species during the operation of the project are considered **not significant**.

⁹ See https://cdr.eionet.europa.eu/Converters/run_conversion?file=/ie/eu/art12/envuvesya/IE_birds_reports-14328-144944.xml&conv=343&source=remote#A082_B (accessed 30/08/2023).

Summary

Table 7-19: Operational Effect Characterisation for Ornithological Features

Key Ornithological Feature	Effect	Magnitude of Effect	Significance of Effect
Barn Owl	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Raptor Species	Collision risk	Negligible	Not significant
	Direct habitat loss and fragmentation	Negligible	Not significant
Gull Species	Disturbance and displacement	Negligible	Not significant
	Collision risk	Minor	Not significant
Non-target Farmland Species	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant

7.6.3.3 Decommissioning Effects

The assessment of effects on ornithological features during the decommissioning phase of the project is described below and summarised in **Table 7-20**. Potential effects identified through 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.
- The project site predominantly comprises improved agricultural grassland, with relatively low availability of higher quality nesting and foraging habitat for birds. This will likely continue to be the case throughout the operational phase of the project to the time of decommissioning.

Removal of habitat during the decommissioning of the project will be limited in extent, likely involving only small areas of relatively low-quality habitat, similar to those temporary losses reported above for the construction phase, where habitats temporarily removed during construction are to be reinstated. Removal of potentially suitable nesting habitat for raptors and barn owls is unlikely and the extent of the habitat affected during decommissioning will be small in the context of retained immediately adjacent habitat and habitat within the wider landscape. Following decommissioning, habitats would be reinstated to their pre-construction baseline and impacts would be short-term and temporary. As such, likely effects on all KOFs from habitat loss and fragmentation during the decommissioning of the project are deemed **not significant**.

Impacts during decommissioning would be less extensive and of a shorter duration than those experienced during construction and disturbance during decommissioning is unlikely to significantly discourage flight activity, foraging or breeding attempts by birds in the vicinity of the project, especially given the short-term temporary nature of

the proposed works. Significant disturbance impacts on birds are not anticipated, given that extensive areas of suitable foraging and breeding habitat exist and will remain on site and in the wider area during the decommissioning phase of the project. Disturbance effects on all KOFs from decommissioning are therefore considered **not significant**.

Summary

Table 7-20: Decommissioning Effect Characterisation for Ornithological Features

Key Ornithological Feature	Effect	Magnitude of Effect	Significance of Effect
Barn Owl	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Raptor Species	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Gull Species	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Non-target Farmland Species	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant

7.6.3.4 Cumulative Effects

As described in Chapter 2 of the EIAR, 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 project. 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”.

Projects in the wider hinterland to be considered for cumulative effects were identified using various online plans and resources, including:

- Limerick City and County Council Planning Register
- An Coimisiún Pleanála (Strategic infrastructure development (SID) applications, Strategic Housing Development (SHD) applications and major project applications including wind farms) (<https://www.pleanala.ie/en-ie/home>);
- Limerick County Development Plan 2022-2028;
- Shannon International River Basin Plan (Water Framework Directive);
- Food Vision 2030;
- Irish Wind Energy Association (IWEA) (<https://windenergyireland.com/>); and

- Department of Housing, Local Government and Heritage's EIA Portal (<https://www.gov.ie/en/publication/9f9e7-eia-portal/>).

Many consent applications pertain to one-off residential dwellings or farm buildings/structures along the regional roads (see **EIAR Chapter 2: Table 2-1**). The scale of these applications are unlikely to have cumulative effects upon the ornithological features identified within this chapter. Therefore, within this section, only developments of a particular size and nature have been considered further for cumulative assessment. The list of projects and plans was reviewed and the potential for cumulative impacts on Ornithology was considered.

As per SNH guidance on Assessing the Cumulative Impacts of Onshore Wind Energy Developments (2018b), cumulative effects arising from two or more 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).

Other Projects and Plans with Potential to cause Cumulative Effects

Plans and projects in the vicinity of the project site are identified in EIAR Chapter 2 and in the Screening for Appropriate Assessment Report. This identified projects in the surrounding townlands of Ballynisky, , Graigoor, Ballyegny More, Kilbradran, Lisbane, Ballysteen, Dunmoylan, and Carrons, and relevant plans including the Shannon International River Basin Plan (Water Framework Directive) and Food Wise 2025. These are reviewed in detail in EIAR Chapter 6 – Biodiversity with regard to cumulative impacts on biodiversity receptors. Considering the nature, scale and/or locations of these applications and plans, these were not expected to introduce complex or significant issues and were not anticipated to have potential for cumulative impacts with the project on biodiversity receptors. Considering this, and the nature of the Key Ornithological Features identified, no cumulative impacts on ornithological receptors from these plans and projects are anticipated.

Wind Farms with Potential to cause Cumulative Effects

Wind farms and proposed wind farms in the vicinity of the project site were also considered for the potential to give rise to cumulative impacts. The proximity of the wind farms and whether they are operational, permitted or pending (proposed) has been considered within this assessment.

Sixteen operational wind farms were identified within 20 km of the project site, as summarised in **Table 7-21** below (in bold). Relevant planning applications for these wind farms are presented in **EIAR Chapter 2 – Table 2-2**.

Table 7-21: Operational Windfarms considered for Cumulative Impacts

Windfarm	Year connected to grid	Output (MW)	Proximity to the Project
Mauricetown	2019	6	20.5 km south
Gortnacloghy	2018	2	18.5 km south
Vistakon, Castletroy	2017	1	>25km
Ballagh	2016	2	18.1 km south

Windfarm	Year connected to grid	Output (MW)	Proximity to the Project
Garracummer	2015	17	>25 km east
Athea	2014	16	18.3 km south
Dromdeveen	2011	14	21.7 km south
Grouselodge	2011	6	4.5 km southwest
Rathcahill	2011	5	15.3 km southwest
Slievereagh	2011	1	>25 km southeast
Carrons	2010	2	2.5 km west
Kilmeedy	2016	2	14.5 km southeast
Dromada	2009	19	13 km southwest
Knockastanna	2009	4	>25 km northeast
Knockawarriga	2008	8	23 km southwest
Tournafulla	2007	18	16.8 km southwest

Cumulative Impacts on Designated Sites

The potential cumulative and in-combination impacts on internationally designated sites (Natura 2000 sites) arising from the proposed development is discussed in detail in the NIS which accompanies this planning application. This includes consideration of potential impacts on the Stack's SPA and River Shannon and River Fergus Estuaries SPA.

No projects were identified which are considered likely to act cumulatively upon the local terrestrial ecology (habitats and species) of the identified designated sites during the construction, operation and decommissioning phases of the project. Furthermore, the project site was identified as not being functionally linked to any SPAs, as described within **Section 7.4.4.1**.

Two operational wind farms are located within 13 km of the project site; the two-turbine Carrons Wind Farm, located approximately 2.5 km west of the nearest proposed Ballynisky turbine (T1); and the six-turbine Grouse Lodge Wind Farm, located approximately 4.5 km south-west of the nearest proposed Ballynisky turbine (T3).

As indicated in **Figure 18** of the **NIS** for the project, operational wind farms within 20 km of the project site are relatively dispersed in relation to the project site. The two operational wind farms within 13 km of the project site contain six active turbines, and there is no clustering of turbines at Ballynisky or within the surrounding area.

Considering this, and the lack of potential for impacts on Stack's SPA identified in relation to the project alone (see **Section 7.4.4**), there is no potential for significant additive or synergistic cumulative effects on Stack's SPA.

Regarding impacts on River Shannon and River Fergus Estuaries SPA, as discussed in **Section 7.4.4**, only one potential impact pathway was identified from the project; specifically, collision impacts with black-headed gulls

flying over the project site. Whilst black-headed gulls associated with the SCI wintering population of the SPA could potentially fly through additional wind farm airspace in the wider area (notably Carrons Wind Farm and Grouse Lodge Wind Farm), based on the distance from the project site and the SPA, understanding of the likely susceptibility of black-headed gulls to collisions, and the modelled number of collisions from the project in isolation (see **Section 7.6.2.2**), the proposed development will not have a significant cumulative impact on the black-headed gull population of the SPA.

The regional projects and wind farms identified within proximity to the site have all been subject to their own relevant detailed environmental impact assessments and mitigation measures applied appropriately. The proper planning and implementation of environmental controls, monitoring and mitigation of large-scale projects greatly minimises the risk of significant residual impacts upon bird species of conservation importance. Consequently, the risk of cumulative and in-combination effects on qualifying and interest features of any SPAs is unlikely to be significant, especially considering the distance at which the designated site lies from the project site and other proposed developments assessed for cumulative effects.

Cumulative Impacts on Bird Species

Existing or proposed projects in the hinterland of this project have the potential to cumulatively impact on the local ecology, particularly through increased fragmentation of the landscape, increased habitat disturbance, barrier effects, intensification of collision or displacement impacts on sensitive bird species.

Each additional turbine erected in the landscape can potentially increase the cumulative risk of collision for birds foraging and commuting through a landscape. For most species, their ecology and in particular their pattern of movement means that they will not experience an incremental increase in collision risk for each turbine erected (e.g., passerine species). For species with large home ranges, or those commuting long distances, there is a potential for individuals to experience a cumulative collision risk. Information from recovery of ringed and tagged birds indicates that losses associated with collision from road traffic and buildings, along with hunting and predation fatalities, are the most significant source of bird mortality (Wernham et al., 2002). Observations of flightlines of key target species made during the breeding and non-breeding VP surveys indicate that the site is not situated along any regular commuting routes for these species (with the exception of black-headed gull). Therefore, significant cumulative displacement/barrier and collision risk effects are not anticipated.

For the reasons described in relation to River Shannon and River Fergus Estuaries SPA; namely the susceptibility of black-headed gull to collision impacts, the population status of this species and the number and proximity of nearby wind turbines (i.e., six operational turbines within 13 km of the project site), significant cumulative impacts on black-headed gulls through turbine collisions are not anticipated.

Conclusion of Assessment of Cumulative Effects

Following consideration of the impact assessment, it is noted that the project in isolation will not result in any significant effects upon any of the identified KOFs that would be sensitive to impacts from developments in other areas. Non-target farmland bird species are the only identified KOF with the potential for significant effects (as identified in **Section 7.6**) and they are unlikely to be significantly impacted by other wind farm developments and projects. No potentially significant cumulative disturbance and habitat loss effects are expected.

No additive, antagonistic, or synergistic effects have been identified with regard to habitat loss, displacement, and collision mortality.

7.7 Mitigation and Enhancement Measures

7.7.1 Scope

This section describes recommended mitigation measures for the avoidance of the potentially significant effects on Key Ornithological Features described in **Section 7.6**. These measures are recommended in addition to the embedded mitigation described in **Section 7.5**, which was taken into consideration during the assessment of effects.

Effects on features have been addressed in two ways:

- Design of the project in terms of embedded mitigation (see **Section 7.5**), and
- Management and enhancement of development phases (described in this section).

The mitigation measures described below are designed to address and minimise the risk of impacts arising from each phase of the project. These measures have been specifically aimed at benefitting birds, as well as other key ecological features.

An Biodiversity Environmental Management Plan (BEMP) will be produced to provide a framework for the conservation and enhancement of ecological features during the operation stage and beyond, and to ensure the site is managed in the interests of biodiversity and that ongoing management is successful in achieving a biodiversity net gain as described below.

The BEMP should be implemented over a three-year period from when the Project becomes operational, and enhancement measures will be incorporated into the CEMP as necessary. The effectiveness of mitigation and enhancement measures should be monitored for effectiveness over the first five years and, based on the results, alterations and/or further enhancements should be undertaken. The area will be routinely assessed as part of a program of habitat surveys carried out in line with the BEMP, during which the suitability of habitats for birds (notably the KOFs identified in this report) should be taken into consideration.

7.7.2 Mitigation of Likely Effects During Construction

Assessment of effects undertaken in **Section 7.6.3.1** identified the following potentially significant effects on ornithological features during the construction of the project:

- Direct loss and fragmentation of habitat used by non-target farmland bird species such as linnet, meadow pipit, redwing, rook, starling and swallow; and
- Disturbance and displacement of these non-target farmland bird species.

As stated in **Section 7.5**, the 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., waterbodies and woodland);
- Minimisation of the extent of habitat loss during construction as much as is possible within the development design;
- Selection of delivery routes which use existing built infrastructure wherever possible, with laying of cables underground; and
- Presence of an EcoW on site to oversee any ornithological issues during construction.

The following supplementary and/or additional measures are proposed to avoid significant effects on the identified bird populations. In addition to avoiding significant impacts on non-target farmland birds, these measures would further reduce the potential for adverse effects on other KOF during construction.

7.7.2.1 Habitat Reinstatement and Creation

Habitats will be created in proportion with the type and extent of habitat loss during construction. The design and management of this habitat will take into consideration the suitability of this habitat for birds including the KOF 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 is described in **Chapter 6, Appendix 6F Biodiversity Enhancement and Management Plan**, with proposed locations for these measures indicated in **Figure 2-2** of the **BEMP**. This includes the following (see **Section 7.7.5** for additional enhancement measures):

Wet grassland: to compensate for the loss of wet grassland, retained wet grassland south of T6 will be enhanced by fencing to prevent cattle encroachment (identified as a current issue in this area) and sensitive management to increase its suitability for breeding and wintering waders. A significantly large area of wet grassland will be enhanced south and west of T2. Further areas that will be enhanced include south-west of T3 and east of the proposed substation. Suitability for foraging barn owl, raptors, waders (e.g., snipe) and passerines will be taken into consideration within habitat management practices. Retained and enhanced wet grassland will be managed during the operation of the project.

Hedgerows: In total, it is proposed to plant a total of 3.864km of linear habitats in the form of hedgerows. To ensure hedgerow continuity and to improve structure and connectivity along and between linear features, native shrubs and tree species including whitethorn (*Crataegus monogyna*), hazel (*Corylus avellana*) and holly (*Ilex aquifolium*) will be planted at selected locations.

Double rows of trees planted one metre apart will ensure replacement hedgerows are consistent with those to be removed during the project and that they are suitable for nesting, foraging and roosting birds (notable non-target farmland species). Retained and created hedgerows will be left in situ following decommissioning.

Watercourse buffering: a riparian buffer zone will be established to provide a buffer between the project site and the receiving watercourses within the site (e.g., the Riddlestown Stream and the Ahacronane River). This will create an intact and permanent buffer area of natural vegetation alongside the aquatic zone, protecting water quality and aquatic ecosystems from possible overland flow of sediment and nutrient runoff from both the project and non-project land practices on site. In addition to maintaining the suitability of these watercourses for notable bird species (e.g., little egret, grey wagtail), the riparian buffer zone will create structural diversity and important woodland edge and open habitats suitable for a range of bird species at various times of year.

7.7.3 Mitigation of Likely Significant Effects During Operation

The assessment of effects undertaken in **Section 7.6.3.2** identified no significant effects on KOF during the operational phase of the project and, as such, targeted mitigation during this period is not required. The following monitoring measures are proposed as industry best practice rather than in response to any identified impacts associated with the proposed development.

7.7.3.1 Monitoring

Operational monitoring will be undertaken in prescribed monitoring years during the operational lifetime of the proposed Ballynisky Wind Farm. The SNH guidance document 'Monitoring the impact of onshore wind farms on birds' (SNH, 2009) requires that bird monitoring in wind farms should occur in years 1, 2, 3, 5, 10 and 15 after the turbines become operational.

The ornithological surveys that will be undertaken during prescribed monitoring years are listed below and the methodology is outlined in the following sections:

- Vantage point surveys
- Transect surveys

Vantage Point Surveys

Vantage point surveys will be undertaken to monitor flight activity within a 500m radius of the turbine positions. Surveys should be conducted from the same two fixed point vantage points as were used during pre-planning surveys (**Figure 7-3**). Should vantage point locations need to be moved, a viewshed analysis will be conducted to ensure there is still comprehensive coverage of the 500m radius of turbines at the new locations.

Flight activity of target species will be mapped and recorded as per defined flight bands chosen in relation to the dimensions of the turbines as built: below rotor swept height, at the rotor swept height and above rotor swept height. In addition, the presence of any non-target species will be recorded to inform the evaluation of supporting habitat.

Transect Surveys

In accordance with SNH guidance (SNH, 2017) and current best practice guidance (NatureScot, 2025), VP surveys will be accompanied by transect surveys to record supplementary information on bird populations within 500 m of the site. Transect surveys will be undertaken during the breeding and non-breeding seasons.

7.7.3.2 Collision Searches

The objective of collision monitoring and corpse search is to establish whether bird fatalities are occurring as a result of collision with turbine blades.

Carcass search was traditionally completed by human observers whose efficiency is influenced by several factors including carcass type, environmental conditions and observer competence. Numerous studies have been conducted demonstrating that dogs have a superior ability to detect bird and bat carcasses than humans, particularly with small carcasses or in dense vegetation. A trained dog under the control of a handler will be used.

A comprehensive onsite fatality monitoring programme will follow best practice guidance (SNH, 2021) and include:

- Carcass removal trials to establish levels of predator removal of possible fatalities. This should be done following recommended best practice and with due cognisance of published effects such as predator swamping, whereby excessive placement of carcasses increases predator presence and consequently skews results. At the time of publication predation trials set using trail cameras following guidance set out in (Smallwood, 2010) provides the most accurate results.
- Turbine searches for fatalities should be undertaken with the use of conservation dogs following best practice in terms of search area (minimum radius hub height) and at intervals selected to effectively sample fatality rates as determined by carcass removal trials in (a) above. At the time of publication, the typical search area surrounding the turbine bases follow (Edkins, 2014) Impacts Of

Wind Energy Developments On Birds And Bats: Looking Into The Problem, who recommends the "search width should be equal to the maximum rotor tip height".

- Search intervals would follow (SNH, 2021).
- Recorded fatalities should be calibrated against known predator removal rates to provide an estimate of overall fatality rates. The analysis tool Evidence of Absence V2 (Dalthorp, Huse and Dail, 2017) is recommended as a minimum, or other equivalent guidance as dictated by up-to-date standards and practices.

Post-construction fatality monitoring will be carried out in Years 1, 2, 3, 5, 10 and 15 after the turbines become operational. Monitoring reports to be submitted to Limerick County Council following each year of monitoring.

At the end of this period, the results will be reviewed in consultation with Limerick County Council and NPWS and future monitoring needs and gaps will be identified to determine the frequency of monitoring in subsequent years including any decision to reduce the frequency of surveys, will be agreed with the NPWS, allowing an adaptive approach to monitoring at Site.

7.7.4 Mitigation of Likely Significant Effects During Decommissioning

The assessment of effects undertaken in **Section 7.6.3.3** identified no potentially significant effects on KOF during the decommissioning phase of the project and, as such, targeted mitigation during this period, over and above the embedded mitigation outlined in **Section 7.5**, will not be required.

Any habitat temporarily cleared during the decommissioning phase to accommodate the planned works will be reinstated on a like-for-like basis. Where infrastructure is removed, those areas will be restored to their pre-construction baseline conditions and returned for agricultural use.

Following reinstatement, the site will be monitored on a regular basis to determine the progress of re-vegetation and, if necessary, to look at introducing supplementary planting with native species. A reassessment of the site will be carried out at the end of the first-year post-decommissioning to assess the site's progression over the previous year in relation to vegetation status, drainage management and general site appearance, to ensure the site remains favourable to ornithology and wider biodiversity.

7.7.5 Enhancement Measures

In accordance with ecological best practice and the requirement to achieve net gains for biodiversity, enhancements will be delivered to ensure the project has an overall positive effect on ornithological features. These will be detailed within the BEMP for the project, which will present the objectives and targets of the enhancement plan along with prescriptions for management and monitoring to achieve such aims.

The management plan will incorporate enhancement of retained habitat as well as the creation of new habitats of value to biodiversity, including birds.

Detailed biodiversity enhancement measures are described in **Section 6.10.1 of EIAR Chapter 6 – Biodiversity**, with proposed locations for these measures indicated in **Section 6-17**. Enhancements will target KOFs identified in this report, as well as species of conservation concern in Ireland (i.e., BoCCI Red and Amber listed species). Specifically, enhancements will be considered for farmland species such as passerines (e.g., linnet, skylark), barn owl and waders such as curlew and snipe. Guidance on specific habitat creation and enhancement measures for

these species is provided on the RSPB website¹⁰. The provision of the BEMP will ensure that enhancements establish successfully and deliver long-term benefits.

The following measures have been proposed in addition to the habitat reinstatement and creation measures described in **Section 7.7.2.1** and **Chapter 6, Appendix 6F BEMP**. These measures would enhance the site and adjacent land for birds and other biodiversity receptors. Specifications for these measures (e.g., locations, management regimes) is outlined within the BEMP.

- **Ponds:** where conditions allow, silt ponds constructed for water quality protection (in line with drainage design and sensitively placed regarding turbine locations) will be retained to provide a permanent enhancement for various bird species including little egret, waders and non-target farmland species (Davies et al., 2016). The ECoW and site engineer will decide the final pond locations but they will broadly correspond to locations indicated in Appendix 6F, BEMP Figure 2-1.
- **Mixed broadleaved woodland and scrub:** soil deposition areas will be converted to mixed broadleaved woodland and scrub (north of the site) and wet grassland (south of the site), to provide biodiversity enhancement for a range of species. The mixed woodland/scrub mosaic will incorporate native tree species known to be of value to different bird species at various times of year.
- **Dead wood:** any trees requiring removal to facilitate the construction of the project will be stacked in piles to create habitat for invertebrates which will increase prey availability for birds including non-target farmland species. These features will be constructed under ECoW supervision and will be placed in areas where their benefit can be maximised (e.g., near higher quality bird habitat).
- **Livestock control:** cattle drinkers will be installed in strategic locations to minimise poaching of retained watercourses (e.g., the Riddlestown Stream and the Ahacronane River).
- **Field margin development** adjacent to boundary features such as hedgerows and ditches to provide nesting, foraging and sheltering habitat and to improve habitat connectivity. Flower-rich margins typically support a more diverse invertebrate and small mammal assemblage, providing food for a range of breeding and non-breeding bird species, including barn owl and raptors. Use of wild bird seed planting mixtures shall be considered to provide a food source; and
- **Nest box provision:** in addition to the natural nesting habitat (e.g., trees, hedgerows, grassland) described above, nest boxes would be provided to increase the availability of nesting opportunities, with emphasis on notable species including KOFs identified in this report. Considering the scale of the project, the following nest boxes are proposed. These nest boxes would be inspected during monitoring visits and relocated/replaced if necessary to ensure they continue to provide suitable opportunities for the intended species. Nest boxes would comprise at least:
 - 15 nest boxes suitable for a range of non-target farmland species. Based on the species recorded within and adjacent to the site these shall predominantly comprise close-fronted nest boxes with a round entrance, in sizes suitable for a range of species including house sparrow, tit species and flycatcher species. These nest boxes would be installed in woodland and hedgerows and distributed throughout the site;
 - Two kestrel nest boxes: to be installed on suitable trees or buildings near suitable grassland foraging habitat, at least 500 m from any turbines; and
 - One barn owl nest box: to be installed on a suitable tree or building near suitable grassland foraging habitat, at least 500 m from any turbines.

¹⁰ Further information is available at: <https://www.rspb.org.uk/our-work/conservation/conservation-and-sustainability/farming/advice/helping-species/> [accessed 14/08/2023].

Many of the measures outlined above would benefit barn owls and raptors such as kestrel by improving habitat for small mammals, which are their primary food resource, as well as by providing additional nesting/roosting opportunities. Habitat creation and enhancement outlined in **Section 7.7.2**, including wet grassland management, hedgerow planting and watercourse buffering will also benefit these species.

Rough tussocky grassland that is at least 4m wide with a litter layer of dead grass that is at least 7cm deep provides the optimal habitat for small mammals such as voles, and so providing additional areas of such habitat will provide enhancements for barn owls and raptors. Further details of this will be provided in Chapter 6, Appendix 6F BEMP in reference to the Barn Owl Conservation Handbook (Barn Owl Trust, 2012).

7.8 Residual Effects

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

- River Shannon and River Fergus Estuaries SPA;
- Barn owl;
- Raptor species (specifically buzzard and kestrel);
- Gull species (specifically black-headed gull, common gull and lesser black-backed gull); and
- Non-target farmland bird species.

As described in the assessment of effects presented in **Section 7.6**, taking into consideration embedded mitigation within the project design, only construction effects on non-target farmland bird species were assessed as being potentially significant. Effects on all other KOF were assessed as being non-significant.

Additional mitigation measures to avoid significant effects on bird populations are specified in **Section 7.7**. Considering the scope for effects from the project, and the importance and sensitivities of the Key Ornithological Features, it is deemed that these measures will be sufficient to avoid significant effects on these bird populations. No residual effects are anticipated. Additionally, further enhancements detailed in **Section 7.7** of this report and **EIAR Chapter 6 Biodiversity** (and specified within the **BEMP**) will ensure that the project has an overall positive effect on those sensitive ornithological features identified within this assessment as well as biodiversity.

The adoption of appropriate mitigation measures for IOFs has ensured that the residual collision risk effects following successful implementation of the measures are not significant. Furthermore, in accordance with Article 16b of RED III, these effects shall not be considered to be deliberate and therefore prohibited by Article 5 of the Birds Directive where appropriate and necessary mitigation measures have been adopted.

7.9 References

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