8 ORNITHOLOGY

8.1 INTRODUCTION

8.1.1 Purpose of this Report

This chapter of the Environmental Impact Assessment Report (EIAR) was prepared for the Garrane Green Energy Project (hereafter referred to as 'the Project') on behalf of Garrane Green Energy (hereafter referred to as 'the Developer') to assess potential impacts on ornithological features (i.e., sites, habitats and species).

This chapter is supported by the following appendices included in **Volume IV** of the EIAR and their accompanying figures:

- **Appendix 8.1: Ornithology Baseline Report**
- **Appendix 8.2: Ornithology Collision Risk Modelling Report.**

Appendix 8.1 – Ornithology Baseline Report identifies the bird populations present within the Site and survey study areas (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 2024 inclusive.

Appendix 8.2 – 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 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 plans and projects; and
- identify mitigation and enhancement measures to minimise the potential for effects from the Project on ornithological features and deliver ornithological enhancements where possible.

8.2 SITE OVERVIEW

A detailed description of the Site is provided in **Chapter 1: Introduction**. The Site (approximately 158.75ha) is located in County Limerick, approximately 2.5 kilometres (km) north of Charleville town. The Site is rural in nature, with land cover comprising agricultural grassland interspersed with rivers and hedgerows. The N20 road extends along the western border of the Site. The Site is in a lowland location on relatively level ground, with elevation ranging from approximately 58-61 metres (m) Above Ordnance Datum (AOD) in the northern side of the Site, to 63-73m AOD in the southern portion of the Site.

8.3 THE PROJECT

A detailed description of the Project is provided in **Chapter 2: Project Description**. The Project will include the following main components:

- Erection of 9 No. wind turbines with a tip height of 170m. The wind turbines will have a rotor diameter of 150m and a hub height of 95m.
- Upgrade of existing Access Tracks and construction of new permanent Access Tracks, permanent turbine hardstand areas and turbine foundations.
- Construction of two new bridge crossings on-site, one over the River Maigue and one over the Charleville Stream.
- Upgrade of existing site drainage network and installation of new site drainage.
- Wind Farm Internal Cabling connecting the wind turbines to the electrical substation.
- Construction of a permanent on-site AIS 110kV Substation, with a 'loop in' Grid Connection to the existing 110kV overhead line between Charleville and Killonan, including two single-storey control buildings with welfare facilities, all associated electrical plant and equipment, security fencing, gates, signage, all associated underground cabling, private well for water supply, wastewater holding tank, and all ancillary structures and works.
- Construction of a permanent double circuit 110kV underground cable and two steel cable interface masts to connect to the existing overhead line OHL.
- Erection of a permanent 60m Meteorological Mast for monitoring wind speeds.
- Construction of a Temporary Construction Compound for use during construction.
- Upgrade of the existing entrance on the N20 (Site Entrance 1) (to be used for abnormal loads and turbine component delivery) and upgrade of an existing site entrance on the L1537 (Site Entrance 2) (to be used for all construction traffic except for abnormal loads and turbine component delivery).
- 6 No. temporary spoil storage areas and 1 No. permanent spoil storage area.
- Biodiversity enhancement and improvements associated with the Project.
- Landscaping, fencing and all associated ancillary works.

A 10-year planning permission and 35-year operational life from the date of commissioning of the entire wind farm is being sought.

A permanent planning permission is being sought for the Grid Connection and the Substation as these will become an asset of the national grid under the management of ESB & EirGrid and will remain in place upon decommissioning of the wind farm.

8.4 LEGISLATION, POLICY AND GUIDANCE

8.4.1 Legislative Context

This EIAR chapter has been prepared in reference to the following legislation and any amendments made thereto:

- The EC Birds Directive 2009/147/EC.
- The Habitats Directive 92/43/EEC
- 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).
- The Wildlife Act 1976
- Wildlife (Amendment) Act, 2000

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

8.4.1.1 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.

8.4.1.2 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.

8.4.1.3 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.

8.4.1.4 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.

8.4.1.5 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.

8.4.1.6 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 anew 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.

8.4.1.7 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.

8.4.1.8 Wildlife (Amendment) Act, 2000, 2010, 2012, 2022

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.

8.4.2 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 (2019);
- Limerick Development Plan 2022-2028;

- Climate Action Plan 2025 (CAP25); and
- National Biodiversity Action Plan 2023-20301

Further information on these polices outlining their relevance to this chapter is provided below:

8.4.2.1 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.

8.4.2.2 The Biodiversity Sectoral Climate Change Adaptation Plan (2019)

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

8.4.2.3 Limerick Development Plan 2022-2028

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

- Protect and conserve Limerick's natural heritage and biodiversity; in particular, areas designated as part of the Natura 2000 network, such as SPAs and Special Areas of Conservation (SACs), in accordance with relevant EU Directives and national legislation and guidelines.
- Maintain the conservation value of all Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) for the benefit of existing and future generations.

[1] National Biodiversity Action Plan | National Parks & Wildlife Service

- Ensure that projects and plans likely to have significant effects on European sites (either individually or in combination with other plans or projects) are subject to an appropriate assessment and are not permitted under the Limerick Development Plan unless they comply with Article 6 of the Habitats Directive. The council will, through the planning enforcement process where applicable, seek to restore the ecological functions of designated sites where they have been damaged (e.g., through inappropriate development).
- Protect ground and surface water resources and take account of the requirements of the Water Framework Directive when dealing with planning and land use issues.
- Implement the measures prescribed in the Limerick Groundwater Protection Plan when assessing planning applications and their consequences for ground water.

8.4.2.4 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.

8.4.2.5 National Biodiversity Plan 2023-2030

In 1996 the Irish Government ratified the convention on Biological Diversity and launched a series of National Biodiversity Plans; most recently the 4th National Biodiversity Plan 2023-2030. This plan contains the following five objectives:

- Adopt a whole-of-government, Whole-of-Society approach to biodiversity.
- Meet urgent conservation and restoration needs
- Secure nature's contribution to people
- Enhance the evidence base for action on biodiversity
- Strengthen Ireland's contribution to international biodiversity initiatives

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

8.4.2.6 Limerick Biodiversity Action Plan 2025-2030

The Limerick Biodiversity Action plan provides a framework to guide the council, businesses, voluntary groups and people on the county's strategy for conservation of the natural environment in response to the biodiversity and climate crises. This plan re-iterates

the five objectives outlined in the National Biodiversity Plan 2023-2030 and provides measurable actions aligned with these objectives to outline how the council anticipates to conserve, enhance and restore biodiversity within the county.

8.5 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)[2].
- Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022)[3].
- Guidance on the preparation of the EIAR (European Commission, 2017)
- Best Practice Guidelines for the Irish Wind Energy Industry (Irish Wind Energy Association, 2012)[4].
- Wind energy development and Natura 2000 (European Commission, 2011)[5].
- Recommended bird survey methods to inform impact assessment of onshore wind farms (SNH, 2017 and NatureScot, 2025)[6][7].
- Bird Sensitivity Mapping for Wind Energy Developments and Associated Infrastructure in the Republic of Ireland (McGuinness *et al.*, 2015)[8];
- The Birds of Conservation Concern in Ireland (BoCCI) Red and Amber Lists (Gilbert *et al.*, 2021)[9].

8.6 STATEMENT OF AUTHORITY

The baseline ornithology surveys described in this report were conducted by experienced ornithologists from MWP Consultants and Irish Ornithological 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 Consultant

[2] CIEEM. (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.3 – Updated September 2024. [Available at: Guidelines for Ecological Impact Assessment (EcIA) | CIEEM – accessed 16/12/2024].

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

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

[5] European Commission. (2011) Wind energy development and Natura 2000.

[6] SNH. (2017) Recommended bird survey methods to inform impact assessment of onshore wind farms. NatureScot, Perth.

[7] NatureScot. (2025) Recommended bird survey methods to inform impact assessment of onshore wind farms. NatureScot, Perth.

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

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

Ecologist Ellis Perry ACIEEM and Senior Ecologist George Wilkinson ACIEEM. Nick Henson has more than 20 years' experience in ornithological work, including extensive experience with wind farm projects.

8.6.1 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.

8.6.2 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 and assessor of ornithological effects.

8.6.3 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.

8.7 CONSULTATION

A full list of consultees and their responses is provided in **Chapter 1: Introduction, Section 1.10** of the EIAR. Regarding potential impacts on ornithological features, the following bodies were consulted in relation to the project in relation to ornithology: Birdwatch Ireland. No response was received in relation to the Project.

Further to the submission of a formal scoping request by the Developer, a pre-planning meeting was held with An Bord Pleanála (ABP) on 16th May 2024, where the Project proposals of two potential turbine layouts were presented to ABP representatives after request for pre-application consultation as required under Section 37B of the Planning and

Development Act 2000. In response to the proposals, ABP representatives recommended Environmental Impact Assessment would be required to consider effects to the environment from the Project as it qualifies as an Strategic Infrastructure Development by exceeding the 50 MW threshold for this process to be required in relation to proposed wind farm developments. Wider ecological impacts are discussed in **Chapter 6: Biodiversity**. No specific comments were made with regards to ornithology.

A second pre-planning meeting with ABP was held on 6th September 2024, where further changes to the project proposals were discussed with the removal of a Battery Energy Storage System (BESS) due to potential flooding impacts. Further discussion was had in regards to the two turbine layouts being considered. The representatives noted differences in the number of turbines within the layout to address flooding constraints would require further consideration from impacts to ornithology.

A third and final pre-application meeting with ABP was held on 4th October 2024, where further clarification in respect to the design strategy for the proposed turbines was sought and for further consultation on the necessity for design flexibility, or to proceed with a single design proposal during the full application process. No specific comments were made with regards to ornithology.

As the Project is situated within Limerick County Council jurisdiction a pre-application consultation meeting was undertaken on 13th September 2024 to discuss the project proposals, policy, guidance, design principles, project progress and community engagement/benefits. No specific comments were made by Limerick City and County Council with regards to ornithology in response to the presentation provided by the Developer on survey progress.

8.8 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 the Site, study areas extending beyond the Site boundary and presence prior to the Project), 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 8.5**.

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 8.1 – Ornithology Baseline**

Report. Full details of methods for ornithology collision risk modelling are provided in **Appendix 8.2 – Ornithology Collision Risk Modelling Report**.

8.9 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 as an iterative process to define features of relevance to the ornithological impact assessment.

The assessment approach prescribed by the Chartered Institute for Ecology and Environmental Management's (CIEEM) EcIA guidelines (CIEEM, 2018)[10] 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 of 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.

8.9.1 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 Project and associated activities' (CIEEM, 2018)[11]. The ZOI therefore 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

[10] CIEEM. (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.3 – Updated September 2024. [Available at: Guidelines for Ecological Impact Assessment (EcIA) | CIEEM – accessed 16/12/2024].

[11] CIEEM. (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.3 – Updated September 2024. [Available at: Guidelines for Ecological Impact Assessment (EcIA) | CIEEM – accessed 16/12/2024].

and likely sensitivities. For individual ornithological features the ZOI was assessed following available best practice guidance (NatureScot, 2025; McGuinness *et al.*, 2015)[12,13]. A conservative approach has been adopted in accordance with Scottish Natural Heritage (SNH) guidance (SNH, 2016)[14], the ZOI is expected to be up to 20km for the Project for ornithological features assessed. The ZOI of individual ornithological features is further outlined in the sections below.

8.10 DETERMINATION OF THE ORNITHOLOGICAL BASELINE

8.10.1 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 National Parks & Wildlife Service (NPWS) 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 20km radius of the Site, whilst those with a non-statutory designation were initially identified within a 2km radius of the Site.

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 Hectad R52. Records were obtained for:

- Species afforded protection under wildlife legislation (e.g. the Wildlife Act and Article 4(2) of the EU Birds Directive); 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 requested from NPWS in November 2021, October, 2022 and May 2023 by MWP. Another request

[12] NatureScot. (2025) *Recommended bird survey methods to inform impact assessment of onshore wind farms.* NatureScot, Perth.

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

[14] Scottish Natural Heritage. (2016) *Assessing Connectivity with Special Protection Areas (SPAs).* Guidance Version 3 – June 2016. Scottish Natural Heritage, Inverness.

was sent to NPWS in 2024 by RSK Biocensus for a 10km radius around the centre of the Site. No response to the 2024 request was received from NPWS in 2024. Further discussion is given in **Section 8.12**.

A Bird Sensitivity Mapping Tool for wind energy development was developed by BirdWatch Ireland and provides a measured spatial indication of where protected birds are likely to be sensitive to wind energy developments. The tool was accessed in 2019 via the National Biodiversity Data Centre Website[15] and is accompanied by a guidance document (McGuiness *et al.,* 2015)[16]. The criteria for estimating a zone of sensitivity (i.e., 'low', 'medium', 'high' and 'highest') is based on a review of the behavioural, ecological, and distributional data available for each species. A review of this mapping tool determined that the site lies within zones of low and medium bird sensitivity to wind energy development. Relevant Irish Wetland Bird Surveys (I-WeBS) data[17] between 2011 – 2024 were also reviewed where possible for sites of ornithological interest within 20km.

8.10.2 Field Surveys

Detailed ornithological field surveys of the Site were undertaken between 2020 and 2024 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 undertaken during the breeding season (i.e., April to September inclusive) from 2021 to 2024, and during the non-breeding season (i.e., October to March inclusive) from October 2020 to March 2024.
- Walked transect surveys undertaken during the 2023 and 2024 breeding seasons, and during the 2022/23 and 2023/24 non-breeding season.
- Hinterland bird surveys undertaken during the 2022/23 and 2023/24 seasons.
- Breeding raptor surveys undertaken during the 2023 and 2024 seasons.
- Barn owl (*Tyto alba*) surveys undertaken during the 2023 breeding season.
- Wader surveys undertaken during the 2023 breeding season.

[15]Biodiversity Ireland (2025) www.biodiversityireland.ie

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

[17] Bird Watch Ireland (2024) Irish Wetland Bird Survey [Available at: https://c0amf055.caspio.com/dp/f4db30005dbe20614b404564be88 - accessed 14/11/2024]

- Waterbird surveys at Charleville lagoons undertaken during the 2022/23 and 2023/2024 seasons.
- Whooper swan (*Cygnus cygnus*) surveys undertaken during the 2023/24 non-breeding season.

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 SNH and the CIEEM guidance (SNH, 2017; CIEEM, 2018)[18,19].

Certain bird species were identified as 'target species' for particular consideration within field surveys and impact assessment. Identification of target species was informed by:

- their known or likely presence within the Site or within the ZoI the Site;
- their potential sensitivity to the Project (particularly their potential collision risk and/or susceptibility to disturbance from new wind turbines);
- their level of legislative protection and/or conservation concern; and
- their relevance to any nearby designated sites (e.g., SPAs, IBAs).

Based on these characteristics, species identified as target species for this study included all waterfowl, raptor, owl, wader and gull species.

8.10.3 Vantage Point Surveys

VP surveys were undertaken in reference to current best practice guidance (SNH, 2017) at the time of survey and remain in accordance with updated guidance from NatureScot (2025)[20]. Surveys aimed 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.

[18] Scottish Natural Heritage. (2017) *Recommended bird survey methods to inform impact assessment of onshore wind farms.* NatureScot, Perth.

[19] CIEEM. (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.3 – Updated September 2024. [Available at: Guidelines for Ecological Impact Assessment (EcIA) | CIEEM – accessed 16/12/2024].

[20] Scottish Natural Heritage. (2025) *Recommended bird survey methods to inform impact assessment of onshore wind farms.* NatureScot, Perth.

To enable detailed coverage of the Site, a total of eight VPs were selected for the VP surveys. Four VPs (VPs 1-4) were used from October 2020 to March 2023 inclusive. To provide increased coverage of the Site, an additional four VPs (VPs 5-8) were surveyed from October 2022 to September 2024. Additional site coverage provided by the new VPs removed the necessity for VP3 and VP4, which were not surveyed between October 2022 to September 2024. VP locations and viewsheds (i.e., the area in which birds could be observed by the ornithologist from a given VP) are shown in **Appendix 8.1 - Figure 3.**

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 was surveyed for six hours per month. As such, in accordance with NatureScot best practice guidance (NatureScot, 2025)[21], VP surveys achieved a survey effort of 36 hours per breeding season and 36 hours per non-breeding season for each VP. VP survey effort is summarised in **Table 8.1**.

Table 8.1: Summary of Vantage Point survey effort

VP	Hours of observation								
	Breeding season				Non-breeding season				Total
	2021	2022	2023	2024	2020/21	2021/22	2022/23	2023/24	
VP1	36	36	36	36	36	36	36	36	288
VP2	36	36	36	36	36	36	36	36	288
VP3	36	36	-	-	36	36	-	-	144
VP4	36	36	-	-	36	36	-	-	144
VP5	-	-	36	36	-	-	36	36	144
VP6	-	-	36	36	-	-	36	36	144
VP7	-	-	36	36	-	-	36	36	144
VP8	-	-	36	36	-	-	36	36	144

The VP surveys followed a standard approach in accordance with best practice guidance (NatureScot, 2025)[22], with surveyors scanning the pre-determined viewsheds from the VP locations. All flight activity and aggregations of target species were recorded onto

[21] NatureScot. (2025) Recommended bird survey methods to inform impact assessment of onshore wind farms. NatureScot, Perth.

[22] NatureScot. (2025) Recommended bird survey methods to inform impact assessment of onshore wind farms. NatureScot, Perth.

standardised recording forms and maps, with the following flight parameters recorded to facilitate collision risk modelling:

- the start time of the flight observation;
- the duration of the flight observation;
- the lateral flight path taken through the Site and/or nearby land;
- the species and number of individuals;
- the sexes of all individuals (where possible);
- the likely purpose of the flight (e.g., foraging, displaying, commuting); and
- the approximate flight height in metres, including the time spent in each of the following flight height categories: 0-20m, 20-50m, 50-100m, 100-180m, >180m, and non-flight.

8.10.4 Transect Surveys

Transect surveys were completed in accordance with previous best practice guidance from SNH (2017)[22] and subsequently reviewed to be aligned with current best practice guidance from NatureScot (2025)[23]. VP surveys were accompanied by transect surveys to record supplementary information on bird populations within and beyond 500m of the Site. Transect surveys were undertaken between 2022 – 2024 following Countryside Bird Survey (CBS)[24] guidance and were completed during the breeding season and the non-breeding season.

Four transect routes were selected within and adjacent to the Site (**Appendix 8.1 -Figure 4**). All transects walked through suitable habitat for breeding, wintering and passage birds including areas of pasture grassland, wet grassland, hedgerows and watercourses. These transect routes were designed to maximise coverage of the Site where access permitted, whilst enabling detailed observation of habitats assessed as likely to be of value to bird populations, particularly for target species.

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

[23] NatureScot. (2025) Recommended bird survey methods to inform impact assessment of onshore wind farms. NatureScot, Perth.

[24] Birdwatch Ireland & National Parks and Wildlife Service (2012) CBS Manual: Guidelines for Countryside Bird Survey participants. CBS Counter Manual - Birdwatch Ireland.

a range of times and therefore aiding the recording of species that are active at varying times of day.

8.10.5 Hinterland 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 three times during the 2023/24 non-breeding season to a maximum distance of 5km from the Site. A consistent road transect (**Appendix 8.1 – Figure 5a**) was surveyed, with all target species encountered recorded from suitable viewing points along the route.

8.10.6 Raptor 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 (e.g. buzzard (*Buteo buteo*), kestrel (*Falco tinnunculus*) and peregrine (*Falco peregrinus*) in the surrounding landscape, raptor surveys following best practice guidance[25] were undertaken in suitable habitat within 5km of the Site (**Appendix 8.1** – **Figure 5b**) during the 2023 and 2024 breeding seasons. Surveys were undertaken between April to July inclusive, during which any observations of raptors were recorded, with emphasis on recording evidence of breeding. Full survey details of breeding raptor surveys are provided in **Appendix 8.1**.

8.10.7 Barn Owl Surveys

Based on the suitability of the habitats present within and adjacent to the Site, a detailed search of all potentially suitable buildings for evidence of use by barn owl was undertaken within the Site and 1km buffer, in accordance with best practice survey methods[26].

Of the 12 buildings assessed during the surveys, an initial review identified seven buildings (**Appendix 8.1 - Figure 5c**) suitable for use by barn owl within the Site and the 1km survey buffer which were surveyed in April 2023. All structures were subject to an initial detailed visual inspection of features from the ground and with the use of a drone by a suitably experienced ecologist for evidence of barn owl use. Barn owl evidence searched for included moulted feathers, pellets, feeding remains and whitewash (faeces). Any barn owl sightings or evidence of any other notable species was recorded. Suitable structures for nesting barn owl were also subject to a second visit to confirm activity in May 2023. An

[25] Hardey, J., Crick, H.Q.P., Wernham, C.V., Riley, H., Etheridge, B. & Thompson (2013) Raptors. A field Guide for Surveys and Monitoring. The Stationary Office, Edinburgh.

[26] BirdWatch Ireland. (2021) Survey and Mitigation Standards for Barn Owls to inform the Planning, Construction and Operation of National Road Projects. Transport Infrastructure Ireland, Dublin.

additional visit was undertaken in September 2023 due to a barn owl sighting near Site 4 (**Appendix 8.1** - **Figure 5c**).

Based on the findings of the initial review and field inspections, dusk activity surveys at suitable sites 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 20-50m from the site being surveyed) between 21:50 and 01:25 on the night of the 25th/26th May 2023 with surveyors taking care to avoid causing any disturbance to barn owls. Dusk activity surveys were conducted if barn owl activity was suspected during 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.

8.10.8 Breeding Wader Surveys

To provide supplementary information on breeding wader activity in the wider area, wading bird surveys were conducted on three occasions between April and June 2023. Survey areas and transects (**Appendix 8.1** – **Figure 5d**) were undertaken following best practice[27], in suitable habitat to a maximum distance of 500m from the Site. A survey area within suitable wet grassland habitat was walked in April and June 2023. Additionally, as part of the assessment two transects within wet grassland with and adjacent to the site were also surveyed in May 2023.

During each wading bird survey, the ornithologist walked the predetermined transect route, recording waders and other target species within 100m of the route onto standardised maps using recommended BTO species codes and behaviour notation (Marchant, 1983)[28]. Emphasis was placed on recording any evidence of breeding (e.g., displaying, pairs in suitable breeding habitat). The transect was interspersed with stops, during which the ornithologist scanned for waders using optical equipment.

8.10.9 Waterbird Surveys

To provide supplementary information on target species in the wider area, waterbird surveys were conducted on ten occasions at Charleville Lagoons, located 0.1km south of the Site (**Appendix 8.1 - Figure 5e**), between the 2022/23 and 2023/24 non-breeding seasons. The survey method adopted was based on the I-WeBS methodology (Bibby *et al.*, 2000)[29]. All

[27] Gilbert, G., Gibbons, D.W. & Evans J. (1998*) Bird monitoring methods. A manual of techniques for key UK species*. RSPB, Sandy, Bedfordshire.

[28] Marchant, J.H. (1983) BTO Common Birds Census instructions. BTO, Tring.

[29] Bibby. C., Burgess. N., Hill. D., & Mustoe. S. (2000). (2nd Eds). Bird Census Techniques. Academic Press.

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

8.10.10 Whooper Swan Surveys

In addition to the surveys of the Site undertaken annually during the non-breeding season between 2020/21 and 2023/24, detailed surveys for whooper swan were conducted during the 2023/24 non-breeding season. The aims of these surveys were to locate any whooper swan feeding and roosting sites within the study area (if present, recording the number of whooper swans using these sites), and to determine whether any whooper swan flightlines extended through the study area.

The study area for these surveys included the Site and a 5km buffer, within which whooper swan surveys were undertaken on six occasions between October 2023 and March 2024. Surveys comprised dawn and dusk watches, during which all whooper swan observations were recorded (i.e., the number of birds and their behaviour), along with observations of other target species.

In addition, two known whooper swan wintering sites (**Appendix 8.1 – Figure 5f**) were surveyed to provide context on whooper swan use of the wider landscape and to identify any potential connectivity: Churchtown (located c.13.5km south-west of the Site) and Kilcolman Wildfowl Reserve (located c.15.0km south of the Site). These locations were surveyed on 11 occasions between October 2023 and March 2024 inclusive.

8.11 ASSESSMENT METHODOLOGY

8.11.1 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)[30,31]:

- direct habitat alteration and loss: changes to the natural environment 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

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

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

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.

8.11.2 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 8.2.**

Collision risk modelling was undertaken using field data collected during the VP surveys described in **Appendix 8.2**, and in accordance with the following best practice guidance:

- Recommended bird survey methods to inform impact assessment of onshore wind farms (SNH 2017 and NatureScot, 2025) [32][33]
- Wind farms and birds: Calculating a theoretical collision risk assuming no avoiding action (SNH, 2000)[34]
- Developing field and analytical methods to assess avian collision risk at wind farms (Band et al., 2007)[35]
- Avoidance Rates for the onshore SNH Wind Farm Collision Risk Model (SNH, 2018)[36]
- Calculation of collision risk for birds passing through rotor area (Band, 2011)[37].

[32] Scottish Natural Heritage. (2017) *Recommended bird survey methods to inform impact assessment of onshore wind farms.* NatureScot, Perth.

[33] NatureScot. (2025) *Recommended bird survey methods to inform impact assessment of onshore wind farms.* NatureScot, Perth.

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

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

[36] Scottish Natural Heritage. (2018) *Assessing the cumulative impacts of onshore wind farms on birds.* Scottish Natural Heritage, Inverness.

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

Based on the process for selection of Key Ornithological Features described in **Appendix 8.2**, the following species were identified for inclusion within collision risk modelling to inform impact assessment within this EIAR chapter: black-headed gull (*Choroicocephalus ridibundus*), buzzard, cormorant (*Phalacrocorax carbo*), golden plover (*Pluvialis apricaria*), kestrel, lapwing (*Vanellus vanellus*), lesser black-backed gull (*Larus fuscus*), mallard (*Anas platyrhynchos*), peregrine, snipe (*Gallinago gallinago*) and wigeon (*Mareca penelope*).

SNH has published two models for calculating collision risk. These models are appropriate for different scenarios, depending on how Key Ornithological Receptors are using the Wind Farm Area (WFA):

- The 'Airspace' Model applies where birds are typically recorded within the airspace of the WFA; for example, birds with breeding territories or observed foraging within the WFA.
- The 'Fly Through' Model applies where birds are typically recorded using regular commuting routes across the WFA.

Based on the flight activity recorded during the VP surveys, Airspace Models were selected for all modelled species. In addition, based on black-headed gull flights directly over the Site in a consistent direction, a separate Fly Through model was adopted for black-headed gull flight commuting/migration activity. Further information is provided in **Appendix 8.2**.

8.11.3 Assessment of 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)[38]. These guidelines and the CIEEM (2018) guidelines[39] set out the context for the determination of value on a geographic basis. They provide a basis for determination of whether a 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 Limerick and/or County Cork).

[38] National Road Authority. 2009. Guidelines for Assessment of Ecological Impacts of National Road Schemes. NRA.

[39] CIEEM. (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.1 – Updated September 2019. [Available at: Guidelines for Ecological Impact Assessment (EcIA) | CIEEM – accessed 16/12/2024].

- Local importance (Higher or Lower) (i.e., locally important populations/assemblages of bird species and/or protected and/or priority species/habitats).

The evaluation criteria for these scales of importance are provided in **Table 8.2**:

Table 8.2: 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 Act and/or species included on the BoCCI Red List (Gilbert *et al*., 2021)[40].
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 Act and/or species included on the Red or Amber Lists (Gilbert *et al*., 2021).

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

Level of importance	Evaluation criteria
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 Act and/or species included on the BoCCI Red or Amber Lists (Gilbert *et al*., 2021), or populations of species that are assessed as uncommon in the local area.
Local importance (Lower value)	Populations of species that are common in the local area including those included on the BoCCI Green List (Gilbert *et al*., 2021).

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

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

8.11.3.1 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.

8.11.3.2 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 International[41]. Importance at a national level was assessed against available national population estimates

[41] As detailed by Wetlands International. Available at Waterbird Population Estimates (wetlands.org) (accessed 16/12/2024).

such as those published by Crowe *et al*. (2014)[42]. Assessment of county or local importance was based on professional judgement and using county population estimates where available (e.g. relevant I-WeBS data).

8.11.3.3 Species diversity

The assessment of the importance of the populations took into consideration the diversities of ornithological species assemblages (i.e., the number of species) recorded during the breeding and non-breeding seasons.

8.11.3.4 Relevant designated sites with 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[43]), if the populations of those species recorded within/beyond the 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 Site could potentially result in effects on ornithological features of international importance, and therefore cause adverse effects on the integrity of Natura 2000 sites.

8.11.4 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[44] and the guidance provided in Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018)[45], 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

[42] Crowe, O., Musgrove, A. J., & O'Halloran, J. (2014) *Generating population estimates for common and widespread breeding birds in Ireland.* Bird Study, 61(1), 82-90.

[43] Scottish Natural Heritage. (2016) *Assessing Connectivity with Special Protection Areas (SPAs).* Guidance Version 3 – June 2016. Scottish Natural Heritage, Inverness.

[44] National Road Authority. 2009. Guidelines for Assessment of Ecological Impacts of National Road Schemes. NRA.

[45] CIEEM. (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.3 – Updated September 2024. [Available at: Guidelines for Ecological Impact Assessment (EcIA) | CIEEM – accessed 16/12/2024].

directly or indirectly. It includes those species subject to detailed collision risk modelling, as presented in **Appendix 8.2**.

8.11.5 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: 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: 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: the number of times an activity may occur to influence the resulting effect.
- Extent: the spatial or geographical area over which the impact/effect may occur under a suitably representative range of conditions.
- 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[45], 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)[46] and EPA (2022)47. Definitions for the level of significance outlined in EPA (2022) are presented below in **Table 8.3**.
Table 8.4 presents a matrix outlining how those criteria correspond to the equivalent level of significance defined by CIEEM (2018).

Table 8.3: CIEEM and EPA guidelines for determining significance of ecological effects

Effect significance	Definition
Profound	An effect which obliterates sensitive characteristics. Total/near total loss of a bird population due to mortality or displacement. Total/near total loss of productivity in a bird population due to disturbance. Guide: >80% of population lost through additive mortality.
Very significant	An effect which, by its character, magnitude, duration, or intensity significantly alters most of a sensitive aspect of the environment. Major reduction in the status or productivity of a bird population due to mortality, displacement, or disturbance. Guide: 21-80% of population lost through additive mortality.

[46] CIEEM. (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.3 – Updated September 2024. [Available at: Guidelines for Ecological Impact Assessment (EcIA) | CIEEM – accessed 16/12/2024].

[47] Environmental Protection Agency (2022) *Guidelines on the information to be contained in Environmental Impact Assessment Reports*.

Effect significance	Definition
Moderate	An effect that alters the character of the environment that is consistent with existing and emerging trends. Partial reduction in the status or productivity of a bird population due to mortality, displacement, or disturbance. Guide: 6-20% of population lost through additive mortality.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. Small but discernible reduction in the status or productivity of a bird population due to mortality, displacement, or disturbance. Guide: 1-5% of population lost through additive mortality.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences. Very slight reduction in the status or productivity of a bird population due to mortality, displacement, or disturbance. Reduction barely discernible, approximating to the "no change" situation. Guide: <1% population lost through additive mortality.

Table 8.4: Effect significance matrix

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

As outlined above, a significant effect at the international level under the CIEEM guidelines would equate to a profound effect using the EPA guidelines. As a deviation from the

standard EIA methodology, minor effects identified within this chapter have been classified as negligible to ensure that (as per the CIEEM guidelines) a clear statement is made as to whether the effect is "significant" or "not significant".

8.11.6 Mitigation Hierarchy

In accordance with CIEEM's guidelines (2018)[46], 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 EcIA 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.
- **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 8.7** of this chapter.

8.12 LIMITATIONS AND ASSUMPTIONS

Limitations associated with ornithological baseline data are discussed within **Appendix 8.1 – Ornithology Baseline Report**. Limitations associated with collision risk modelling are discussed within **Appendix 8.2 – Ornithology Collision Risk Modelling Report**. In summary, survey limitations detailed in these reports predominantly consisted of non-significant limitations due to adverse weather conditions, survey timings, nocturnal species underrepresentation, flight band recording, turbine specifications, CRM assessment methodology assumptions and VP viewshed coverage. Limitations discussed below and within the appendices listed above have not affected the assessment of effects in relation to the Project to the ornithological receptors identified in this chapter.

In accordance with current best practice guidance for wind farm developments (NatureScot, 2025)[6], 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 the 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 search area.

A desk study for protected species was not able to be received from NPWS in 2024. Considering three protected species searches had been provided by NPWS to MWP between 2021-2023 and the composition of the site hasn't significantly changed since these have been undertaken, this is not considered to be a significant limitation to the assessment.

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)[48], after which it may be necessary for further field surveys to be undertaken. For wind farm developments best practice guidance from NatureScot (2025)[6] recommends survey data to inform any proposal should have been collected within five years of the planned submission and within three years where species populations are rapidly changing. All survey data was collected within a maximum of 5 years of this report with additional update surveys following initial assessments and therefore is robust for inclusion within the ornithological impact assessment.

The information provided in this EIAR chapter accurately and comprehensively describes the baseline ornithological information and provides a prediction of the likely ornithological

[48] CIEEM. (2019) Advice Note on the lifespan of ecological surveys and reports. [Available at: Advice-Note.pdf (cieem.net) – accessed 14th November 2024].

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.

8.13 ORNITHOLOGICAL BASELINE

8.13.1 Designated Sites

The desk study identified three designated sites with features of ornithological interest within 20km of the Site boundary. The locations of these internationally designated sites are indicated in Appendix 8.1 - **Figure 2**.

8.13.1.1 Blackwater River (Cork/Waterford) SAC

Blackwater River (Cork/Waterford) SAC[49], is located approximately 7.1km south of the Site at its nearest point. This extensive site overlaps with the Blackwater Callows and Blackwater Estuary SPAs which are designated for internationally important waterbird populations. However, these SPAs are in excess of the 20km search area adopted in this assessment. The wider areas of river and marginal habitats within the SAC (including those within 20km of the Site) are recognised on the SAC citation as being of value to several species including cormorant, dipper (*Cinclus cinclus*), grey heron (*Ardea cinerea*) and long-eared owl (*Asio otus*), although these species are not identified as being present within the site in internationally important numbers and are not considered to be qualifying features of this site. Blackwater River SAC also includes one pNHA site: Awbeg Valley. No details of ornithological interests are available for this site.

8.13.1.2 Ballyhoura Mountains SAC and IBA

Ballyhoura Mountains SAC[50] is located approximately 9.7km south-east of the Site bordering Limerick and Cork. The site is primarily afforested with conifer plantations and designated as an SAC due to an extensive mosaic of dry and wet heathland [4010 and 4030] and blanket bog [7130]. At the time of the most recent assessment in 2013, the habitats present also supported notable populations of two Annex 1 bird species: hen harrier (*Circus cyaneus*) (seven pairs), and peregrine (one pair). The site was designated as an

[49] NPWS. (2016) *Site Synopsis: Blackwater River (Cork/Waterford) SAC (Site Code 002170).* National Parks and Wildlife Service. [Available at: Blackwater River (Cork/Waterford) SAC | National Parks & Wildlife Service (npws.ie) – accessed 14th November 2024].

[50] NPWS. (2013) *Site Synopsis: Ballyhoura Mountains SAC (Site Code 002036).* National Parks and Wildlife Service. [Available at: Ballyhoura Mountains SAC | National Parks & Wildlife Service (npws.ie) – accessed 14th November 2024].

IBA[51] on account of Ballyhoura Mountains SAC supporting a nationally significant population of hen harrier (c.17-19 pairs) equivalent to 12% of the national population in 2006. Ballyhoura Mountains SAC/IBA also includes six pNHA sites: Ballyhoura mountains; Mountrussel Wood; Carrigeenamronety Hill; Castleoliver Woods; Ballynacourty Wood; and Ballyroe Hill and Mortlestown Hill. No details of ornithological interests are available for these sites.

8.13.1.3 Kilcolman Bog SPA

Kilcolman Bog SPA[52] is situated 15km south of the Site in the southern foothills of the Ballyhoura Mountains in Co. Cork, occupying a glacially eroded hollow in Carboniferous limestone. The site comprises a quaking fen fed by calcareous groundwater, with areas of reed swamp, freshwater marsh and wet grassland. The site is designated for its internationally important populations of the following wintering bird species (SPA citation populations are in brackets): Shoveler (*Spatula clypeata*) (150); teal (*Anas crecca)* (690); and whooper swan (95). Conservation objectives for the SPA aim to maintain or restore the favourable conservation condition of those bird species listed above as Special Conservation Interests and for regularly occurring migratory wetland and waterbirds within the SPA. Other wintering species listed on the SPA's citation but not comprising qualifying features for SPA designation include golden plover, lapwing and wigeon.

Breeding species listed on the SPA's citation but not comprising qualifying features for SPA designation include little grebe (*Tachybaptus ruficollis*) and mute swan (*Cygnus olor*).

Kilcolman Bog SPA also includes one pNHA site: Kilcolman Bog. No further details of ornithological interest is provided for this site.

8.13.2 Records of Protected and Notable Bird Species

Table 8.5 details specially protected and notable bird species records from the Irish Bird Atlas for hectads R52, including the Site and surrounding land (Balmer *et al.*, 2013).

[51] BirdLife International. (2024a) *Important Bird Area factsheet: Ballyhoura Mountains (Ireland).* [Available at: https://datazone.birdlife.org/site/factsheet/ballyhoura-mountains-iba-ireland – accessed 14th November 2024].

[52] NPWS. (2014) *Site Synopsis: Kilcolman Bog SPA (Site Code 004095).* National Parks and Wildlife Service. [Available at: Kilcolman Bog SPA | National Parks & Wildlife Service (npws.ie) – accessed 14th November 2024].

Table 8.5: Protected and notable bird species recorded within R52 in the Irish Bird Atlas.

Common name	Species name	Wintering	Breeding	Conservation status
Barn owl	*Tyto alba*	-	Present	BoCCI Red Listed / Wildlife Act
Curlew	*Numenius Arquata*	-	Present	BoCCI Red Listed / Wildlife Act
Kingfisher	*Alcedo atthis*	-	Present	BoCCI Amber Listed / Annex I EU Birds Directive / Wildlife Act
Lapwing	*Vanellus vanellus*	Present	Present	BoCCI Red Listed / Wildlife Act
Little egret	*Egretta garzetta*	Present	Present	Annex 1 EU Bird Directive / BoCCI Green Listed / Wildlife Act.
Peregrine	*Falco peregrinus*	-	Possible	Annex 1 EU Bird Directive / BoCCI Green Listed / Wildlife Act
Redshank	*Tringa totanus*	Present	Present	BoCCI Red Listed / Wildlife Act

Records were requested by MWP in November 2021, October 2022 and May 2023 for species of conservation concern due to their decline over recent years, species afforded additional protection under national and/or international legislation, and species relevant to the designated sites described in **Section 8.13.1**. In 2021 and 2022, the records from NPWS returned 12 sightings and between one to three breeding sites within 10km of the Project for hen harrier between 2005-2020. No protected or threatened bird species were recorded for R52 in the NPWS rare and protected species dataset in 2023. An update to the desk study data was requested but not able to be obtained from NPWS from a request for rare and protected species records when submitted in December 2024.

A review of I-WeBS data[53] identified four wetland sites of potential ornithological value within 20km of the Site, these included: Charleville Lagoons (<100m south of the Site), Ballyhea Gravel Pit (8.3km south of the Site), Kilcolman Marsh (15km south of the Site) and Lough Gur (19.8km north-east).

Charleville Lagoons is located at land adjacent to the Site and was most recently assessed in 2018/19 with further data between 2011 – 2014. A total of 25 species were recorded across this survey effort including average peak counts for mute swan (20), whooper swan (1), wigeon (167), gadwall (*Mareca strepera*) (7), teal (159), mallard (75), shoveler (40), cormorant (3), grey heron (1), moorhen (*Gallinula chloropus*) (3), lapwing (51), snipe (2), black-tailed godwit (*Limosa limosa*) (10), curlew (*Numenius arquata*) (5), redshank (*Tringa totanus*) (1), green sandpiper (*Tringa ochropus*) (2), black-headed gull (34) and lesser black-backed gull (30).

Ballyhea Gravel Pits is a flooded quarry located 500m west of the town of Ballyhea, Co. Cork and was assessed between 2011 – 2014 with a total of ten species recorded, including average peak counts for mute swan (16), wigeon (76), teal (21), mallard (6), cormorant (2), lapwing (85), snipe (4) and curlew (45).

Kilcolman Marsh is included within the Kilcolman Bog SPA/IBA and was assessed between 2011 – 2019 with a total of 24 species recorded across this survey effort. This included average peak counts of mute swan (2), whooper swan (42), greylag goose (*Anser anser*) (14), wigeon (159), teal (410), mallard (53), shoveler (70), grey heron (2), moorhen (4), lapwing (3), snipe (2), curlew (1), green sandpiper (1), black-headed gull (20), and lesser black-backed gull (9).

Lough Gur is a large lake located 500m north-east of Holycross, Co. Limerick and was assessed between 2011 – 2013, 2014 – 2015 and 2017 – 2021 with a total of 30 species recorded across this survey effort. This included average peak counts of mute swan (23), whooper swan (2), greylag goose (29), wigeon (210), gadwall (18), teal (137), mallard (51), shoveler (31), cormorant (15), little egret (*Egretta garzetta*) (1), grey heron (3), moorhen (5), golden plover (1), lapwing (73), snipe (2), curlew (25), black-headed gull (20), common gull (*Larus canus*) (4) and lesser black-backed gull (1).

[53] Available at: https://c0amf055.caspio.com/dp/f4db30005dbe20614b404564be88 (Accessed 16th November 2024)

8.13.3 Bird Populations Recorded during the Breeding Season

8.13.3.1 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 8.1**. A total of 74 species were recorded during the breeding season.

Peak counts for target species recorded during the breeding season VP and transect surveys undertaken in 2021, 2022, 2023 and 2024 are listed below in **Table 8.6**.

Table 8.6: Peak counts for target species recorded during VP and transect surveys during the breeding seasons.

Common name	Scientific name	2021	2022	2023	2024	Conservation status
Barn owl	*Tyto alba*	0	0	0	1	BoCCI Red Listed / Wildlife Act
Black-headed gull	*Choroicocephalus ridibundus*	5	15	3	4	BoCCI Amber Listed / Wildlife Act / SCI
Black-tailed godwit	*Limosa limosa*	0	0	37	0	BoCCI Red Listed / Wildlife Act
Buzzard	*Buteo buteo*	3	5	2	3	BoCCI Green Listed / Wildlife Act
Common gull	*Larus canus*	0	7	0	0	BoCCI Amber Listed / Wildlife Act
Cormorant	*Phalacrocorax carbo*	3	10	6	19	BoCCI Green Listed / Wildlife Act
Curlew	*Numenius arquata*	0	0	1	0	BoCCI Red Listed / Wildlife Act

Common name	Scientific name	2021	2022	2023	2024	Conservation status
Gadwall	*Mareca strepera*	0	0	2	0	BoCCI Amber Listed / Wildlife Act
Golden plover	*Pluvialis apricaria*	0	2	6	0	Annex 1 EU Birds Directive / BoCCI Red Listed / Wildlife Act
Great black-backed gull	*Larus marinus*	0	0	1	0	BoCCI Green Listed / Wildlife Act
Grey heron	*Ardea cinerea*	2	1	1	2	BoCCI Green Listed / Wildlife Act
Greylag goose	*Anser anser*	0	0	7	0	BoCCI Amber Listed / Wildlife Act
Kestrel	*Falco tinnunculus*	1	2	3	3	BoCCI Red Listed / Wildlife Act
Lapwing	*Vanellus vanellus*	0	0	4	0	BoCCI Red Listed / Wildlife Act
Lesser black-backed gull	*Larus fuscus*	30	48	34	12	BoCCI Amber Listed / Wildlife Act
Little egret	*Egretta garzetta*	1	5	2	6	Annex 1 EU Birds Directive / BoCCI Green Listed / Wildlife Act
Mallard	*Anas playtrhynchos*	4	18	10	7	BoCCI Amber Listed / Wildlife Act

Common name	Scientific name	2021	2022	2023	2024	Conservation status
Moorhen	*Gallinula chloropus*	0	0	1	1	BoCCI Green Listed / Wildlife Act
Mute swan	*Cygnus olor*	0	0	2	1	BoCCI Amber Listed / Wildlife Act
Peregrine	*Falco peregrinus*	2	0	1	1	Annex 1 EU Birds Directive / BoCCI Green Listed / Wildlife Act
Snipe	*Gallinago gallinago*	10	29	29	1	BoCCI Red Listed / Wildlife Act
Sparrowhawk	*Accipiter nisus*	1	1	1	3	BoCCI Green Listed / Wildlife Act
Whimbrel	*Numenius phaeopus*	0	0	0	13	BoCCI Green Listed / Wildlife Act
Yellow-legged gull	*Larus michahellis*	0	0	1	0	BoCCI Green Listed / Wildlife Act

Peak counts for specially protected and notable non-target species recorded during the non-breeding VP and transect surveys undertaken in 2020/21, 2021/22, 2022/23 and 2023/24 are listed below in **Table 8.7**.

Table 8.7: Peak counts for specially protected and notable non-target species recorded during VP and transect surveys during the breeding seasons.

Common name	Scientific name	2021	2022	2023	2024	Conservation status
Goldcrest	*Regulus regulus*	10	12	2	8	BoCCI Amber Listed / Wildlife Act

Common name	Scientific name	2021	2022	2023	2024	Conservation status
Greenfinch	*Chloris chloris*	0	0	2	1	BoCCI Amber Listed / Wildlife Act
Grey wagtail	*Motacilla cinerea*	2	1	1	1	BoCCI Red Listed / Wildlife Act
House martin	*Delichon urbicum*	20	22	6	12	BoCCI Amber Listed / Wildlife Act
House sparrow	*Passer domesticus*	32	18	4	18	BoCCI Amber Listed / Wildlife Act
Kingfisher	*Alcedo atthis*	0	0	1	0	BoCCI Amber Listed / Wildlife Act
Linnet	*Linaria cannabina*	35	8	30	40	BoCCI Amber Listed / Wildlife Act
Meadow pipit	*Anthus pratensis*	22	28	25	17	BoCCI Red Listed / Wildlife Act
Sand martin	*Riparia riparia*	5	3	30	13	BoCCI Amber Listed / Wildlife Act
Skylark	*Alauda arvensis*	8	12	7	5	BoCCI Amber Listed / Wildlife Act
Spotted flycatcher	*Muscicapa striata*	0	0	1	0	BoCCI Amber Listed / Wildlife Act
Starling	*Sturnus vulgaris*	120	300	75	150	BoCCI Amber Listed / Wildlife Act
Stock dove	*Columbus oenas*	0	0	2	0	BoCCI Red Listed / Wildlife Act
Swallow	*Hirundo rustica*	100	70	60	90	BoCCI Amber Listed / Wildlife Act
Swift	*Apus apus*	12	2	12	12	BoCCI Red Listed / Wildlife Act
Wheatear	*Oenanthe oenanthe*	2	1	0	0	BoCCI Amber Listed / Wildlife Act
Willow warbler	*Phylloscopus trochilus*	7	4	4	6	BoCCI Amber Listed / Wildlife Act

8.13.3.2 Raptor Surveys

Observations recorded for specially protected and notable species during the raptor surveys are summarised in **Table 8.8** below. A total of three species were observed at suitable habitat locations during the three breeding raptor bird surveys conducted up to 2km from the Site between May 2023 to July 2023 and May 2024.

Table 8.8: Summary of specially protected and notable species counts for breeding raptor bird surveys within 2km of the Site.

Common name	Scientific name	Observations	Conservation status	Activity
Buzzard	*Buteo buteo*	15	BoCCI Green listed / Wildlife Act	Birds observed flying, hunting, soaring over the Site. No breeding activity recorded.
Kestrel	*Falco tinnunculus*	15	BoCCI Red listed / Wildlife Act	Birds observed flying over the Site. No breeding activity recorded.
Sparrowhawk	*Accipiter nisus*	1	BoCCI Green listed / Wildlife Act	Individual bird observed flying over the survey area in June 2023. No breeding activity records.

8.13.3.3 Barn Owl Surveys

Site descriptions for buildings recorded with potential to support nesting barn owls within 1km of the Site during the barn owl surveys are summarised in **Table 8.9**. Of the seven sites identified with potential, three were considered suitable for nesting barn owl across two survey visits between April (Visit 1) and September 2023 (Visit 2) with an additional visit to update the condition of the sites in April 2025 (Visit 3).

Table 8.9: Summary of barn owl site suitability and activity within 5km of the Site.

Site	Site Description	Visit 1	Visit 2	Visit 3
1	Derelict cottage with cavities under the metal roof.	Considered suitable for nesting barn owl. Cavities under the metal roof provided a suitable nesting site.	No barn owl activity or vocalisations were detected throughout the survey visit and dusk survey.	Remained suitable for nesting barn owl. Cavities under the metal roof provided a suitable nesting site. No evidence of barn owl
3	Derelict cottage with cavities within the original thatch roof covered by sheet-metal roofing.	Considered suitable for nesting barn owl. Cavities under the original thatch and metal roof provided potential nesting sites.	No barn owl activity or vocalisations were detected throughout the survey visit and dusk survey.	Remained suitable for nesting barn owl. Cavities under the original thatch, metal roof and chimney provided potential nesting sites. No evidence of barn owl observed
4	Derelict cottage with accessible chimney covered by ivy and access points through gable walls.	Considered suitable for nesting barn owl. Cavities present which could provide potential nesting sites. Iin use by roosting jackdaw.	No barn owl activity or vocalisations were detected throughout the survey visit and dusk survey.	Considered suitable for nesting barn owl. Cavities present which could provide potential nesting sites. White wash observed but likely from use by jackdaws. Dusk visit to confirm

8.13.3.4 Wader Surveys

A total of two species were observed during the breeding wader bird surveys conducted within the Site between April and May 2023. No breeding activity was recorded within the Site. Peak counts (i.e., the largest aggregations) recorded during the breeding wader surveys for specially protected and notable species are summarised in **Table 8.10**.

Table 8.10: Summary of specially protected and notable species counts for breeding wader surveys within the Site.

Common name	Scientific name	Peak count	Conservation status
Snipe	*Gallinago gallinago*	8	BoCCI Red listed / Wildlife Act / SCI
Golden plover	*Pluvialis apricaria*	24	BoCCI Green listed / Wildlife Act

8.13.3.5 Waterbird Surveys

8.13.3.5.1 2023

A total of 22 species were observed during the waterbird bird surveys conducted within the Charleville Lagoons (approximately 100m south-west of the Site) between April 2023 and September 2023. Peak counts (i.e., the largest aggregations) recorded during the waterbird surveys for specially protected and notable species are summarised in **Table 8.11**. No breeding activity was recorded within the Site.

Table 8.11: Summary of specially protected and notable species counts for waterbird surveys within Charleville Lagoons during the 2023 breeding season.

Common name	Scientific name	Peak count	Conservation status
Black-headed gull	*Choroicocephalus ridibundus*	54	BoCCI Amber Listed / Wildlife Act / SCI
Common sandpiper	*Actitis hypoleucos*	1	BoCCI Amber Listed / Wildlife Act
Coot	*Fulica atra*	16	BoCCI Amber Listed / Wildlife Act
Cormorant	*Phalacrocorax carbo*	11	BoCCI Amber Listed / Wildlife Act / SS

Common name	Scientific name	Peak count	Conservation status
Gadwall	*Mareca strepera*	2	BoCCI Amber Listed / Wildlife Act / SCI
Green sandpiper	*Tringa ochropus*	3	BoCCI Green Listed / Wildlife Act
Grey heron	*Ardea cinerea*	2	BoCCI Green Listed / Wildlife Act
Kestrel	*Falco tinnunculus*	1	BoCCI Red Listed / Wildlife Act
Kingfisher	*Alcedo atthis*	1	BoCCI Amber Listed / Annex I EU Birds Directive / Wildlife Act
Little egret	*Egretta garzetta*	2	BoCCI Green Listed / Annex I EU Birds Directive / Wildlife Act
Little grebe	*Tachybaptus ruficollis*	100	BoCCI Green Listed / Wildlife Act
Mallard	*Anas platyrhynchos*	194	BoCCI Amber Listed / Wildlife Act
Moorhen	*Gallinula chloropus*	21	BoCCI Green Listed / Wildlife Act
Mute swan	*Cygnus olor*	5	BoCCI Amber Listed / Wildlife Act
Peregrine	*Falco peregrinus*	1	BoCCI Green Listed / Annex I EU Birds Directive / Wildlife Act
Pochard	*Aythya farina*	1	BoCCI Red Listed / Wildlife Act
Ringed plover	*Charadrius hiaticula*	2	BoCCI Amber Listed / Wildlife Act
Ruff	*Calidris pugnax*	2	BoCCI Amber Listed / Annex I EU Birds Directive / Wildlife Act
Shoveler	*Spatula clypeata*	45	BoCCI Red Listed / Wildlife Act
Spotted redshank	*Tringa erythropus*	1	BoCCI Amber Listed / Wildlife Act

Common name	Scientific name	Peak count	Conservation status
Teal	*Anas crecca*	127	BoCCI Amber Listed / Wildlife Act / SS
Tufted duck	*Aythya fuligula*	32	BoCCI Amber Listed / Wildlife Act

8.13.4 Bird Populations Recorded during the Non-Breeding Season

8.13.4.1 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 8.1**. A total of 78 species were recorded during the non-breeding season.

Peak counts for target species recorded during the non-breeding season VP and transect surveys undertaken in 2020/21, 2021/22, 2022/23 and 2023/24 are listed below in **Table 8.12**.

Table 8.12: Peak counts for target species recorded during VP and transect surveys during the non-breeding seasons.

Common name	Scientific name	2020/21	2021/22	2022/23	2023/24	Conservation status
Barn owl	*Tyto alba*	0	0	0	1	BoCCI Red Listed / Wildlife Act
Black-headed gull	*Choroicocephalus ridibundus*	180	42	107	146	BoCCI Amber Listed / Wildlife Act / SCI
Buzzard	*Buteo buteo*	2	1	1	4	BoCCI Green Listed / Wildlife Act
Cattle egret	*Bubulcus ibis*	0	0	0	1	Wildlife Act
Common gull	*Larus canus*	0	3	7	30	BoCCI Amber list / Wildlife Act.
Cormorant	*Phalacrocorax carbo*	4	6	12	10	BoCCI Green Listed / Wildlife Act

Common name	Scientific name	2020/ 21	2021/ 22	2022/ 23	2023/ 24	Conservation status
Curlew	*Numenius arquata*	5	0	0	1	BoCCI Red Listed / Wildlife Act
Golden plover	*Pluvialis apricaria*	42	0	47	14	Annex 1 EU Birds Directive / BoCCI Red Listed / Wildlife Act
Great black-backed gull	*Larus marinus*	0	1	0	0	BoCCI Green Listed / Wildlife Act
Green sandpiper	*Tringa ochropus*	0	0	1	0	BoCCI Green Listed / Wildlife Act
Grey heron	*Ardea cinerea*	2	1	2	2	BoCCI Green Listed / Wildlife Act
Greylag goose	*Anser anser*	1	0	11	11	BoCCI Amber Listed / Wildlife Act
Hen harrier	*Circus cyaneus*	0	0	1	1	Annex 1 EU Birds Directive / BoCCI Amber Listed / Wildlife Act
Herring gull	*Larus argentatus*	0	57	1	1	BoCCI Amber Listed / Wildlife Act
Kestrel	*Falco tinnunculus*	1	3	1	4	BoCCI Red Listed / Wildlife Act
Lapwing	*Vanellus vanellus*	1	0	24	26	BoCCI Red Listed / Wildlife Act
Lesser black-backed gull	*Larus fuscus*	31	80	14	57	BoCCI Amber Listed / Wildlife Act
Little egret	*Egretta garzetta*	3	1	4	7	Annex 1 EU Birds Directive / BoCCI Green Listed / Wildlife Act

Common name	Scientific name	2020/ 21	2021/ 22	2022/ 23	2023/ 24	Conservation status
Mallard	*Anas playtrhynchos*	17	13	9	43	BoCCI Amber Listed / Wildlife Act
Mediterranean gull	*Icthyaetus melanocephalus*	0	0	1	0	BoCCI Amber Listed / Wildlife Act
Merlin	*Falco columbarius*	1	0	1	0	Annex 1 EU Birds Directive / BoCCI Amber Listed / Wildlife Act
Mute swan	*Cygnus olor*	2	0	4	12	BoCCI Amber Listed / Wildlife Act
Peregrine	*Falco peregrinus*	2	0	1	2	Annex 1 EU Birds Directive / BoCCI Green Listed / Wildlife Act
Redshank	*Tringa totanus*	1	0	0	0	BoCCI Red Listed / Wildlife Act
Short-eared owl	*Asio flammeus*	0	0	0	1	Annex 1 EU Birds Directive / BoCCI Amber Listed / Wildlife Act
Shoveler	*Spatula clypeata*	0	0	6	5	BoCCI Red Listed / Wildlife Act
Snipe	*Gallinago gallinago*	7	1	11	28	BoCCI Red Listed / Wildlife Act
Sparrowhawk	*Accipiter nisus*	1	0	1	1	BoCCI Green Listed / Wildlife Act
White-tailed eagle	*Haliaeetus albicilla*	0	0	0	1	Annex 1 EU Birds Directive / BoCCI Red Listed / Wildlife Act
Teal	*Anas crecca*	0	0	4	4	BoCCI Amber Listed / Wildlife Act
Whooper swan	*Cygnus cygnus*	0	0	2	0	Annex 1 EU Birds Directive / BoCCI

Common name	Scientific name	2020/ 21	2021/ 22	2022/ 23	2023/ 24	Conservation status
						Amber Listed / Wildlife Act
Wigeon	*Mareca penelope*	0	0	18	327	BoCCI Amber Listed / Wildlife Act

Peak counts for specially protected and notable non-target species recorded during the non-breeding VP and transect surveys undertaken in 2020/21, 2021/22, 2022/23 and 2023/24 are listed below in **Table 8.13.**

Table 8.13: Peak counts for specially protected and notable non-target species recorded during VP and transect surveys during the non-breeding seasons.

Common name	Scientific name	2020/ 21	2021/ 22	2022/ 23	2023/ 24	Conservation status
Goldcrest	*Regulus regulus*	10	1	3	4	BoCCI Amber Listed / Wildlife Act
Grey wagtail	*Motacilla cinerea*	1	1	2	2	BoCCI Red Listed / Wildlife Act
House martin	*Delichon urbicum*	21	0	0	0	BoCCI Amber Listed / Wildlife Act
House sparrow	*Passer domesticus*	25	8	8	3	BoCCI Amber Listed / Wildlife Act
Linnet	*Linaria cannabina*	12	0	15	2	BoCCI Amber Listed / Wildlife Act
Meadow pipit	*Anthus pratensis*	26	16	35	40	BoCCI Red Listed / Wildlife Act
Redwing	*Turdus iliacus*	450	100	120	68	BoCCI Red Listed / Wildlife Act
Sand martin	*Riparia riparia*	0	0	24	13	BoCCI Amber Listed / Wildlife Act
Skylark	*Alauda arvensis*	16	2	30	14	BoCCI Amber Listed / Wildlife Act
Starling	*Sturnus vulgaris*	410	300	292	190	BoCCI Amber Listed / Wildlife Act

Common name	Scientific name	2020/ 21	2021/ 22	2022/ 23	2023/ 24	Conservation status
Stock dove	*Columbus oenas*	5	4	2	1	BoCCI Red Listed / Wildlife Act
Swallow	*Hirundo rustica*	0	1	1	0	BoCCI Amber Listed / Wildlife Act

8.13.4.2 Hinterland

Peak counts (i.e., the largest aggregations) recorded for specially protected and notable species during the hinterland surveys are summarised in **Table 8.14** below. A total of 16 species were observed during the three hinterland bird surveys conducted up to 5km from the Site between October 2022 and April 2024.

Table 8.14: Summary of specially protected and notable species counts for hinterland bird surveys within 5km of the Site.

Common name	Scientific name	Peak count	Conservation status
Black-headed gull	*Chroicocephalus ridibundus*	1	BoCCI Amber listed / Wildlife Act / SCI
Buzzard	*Buteo buteo*	6	BoCCI Green listed / Wildlife Act
Cormorant	*Phalacrocorax carbo*	1	BoCCI Amber listed / Wildlife Act / SS
Dipper	*Cinclus cinclus*	1	BoCCI Green listed / Wildlife Act
Grey heron	*Ardea cinerea*	2	BoCCI Green listed / Wildlife Act
Grey wagtail	*Motacilla cinerea*	1	BoCCI Red listed / Wildlife Act
Kestrel	*Falco tinnunculus*	2	BoCCI Red listed / Wildlife Act
Lesser black-backed gull	*Larus fuscus*	19	BoCCI Amber listed / Wildlife Act
Little egret	*Egretta garzetta*	2	BoCCI Green listed / Annex I EU Birds Directive / Wildlife Act

Common name	Scientific name	Peak count	Conservation status
Mallard	*Anas platyrhynchos*	2	BoCCI Amber listed / Wildlife Act / SCI
Mute swan	*Cygnus olor*	3	BoCCI Amber listed / Wildlife Act
Sparrowhawk	*Accipiter nisus*	1	BoCCI Green listed / Wildlife Act

8.13.4.3 Waterbird Surveys

8.13.4.3.1 2022/23

A total of 15 species were observed during the waterbird bird surveys conducted within the Charleville Lagoons (approximately 100m south-west of the Site) in March 2023. Peak counts (i.e., the largest aggregations) recorded during the waterbird surveys for specially protected and notable species are summarised in **Table 8.15**. No breeding activity was recorded within the Site.

Table 8.15: Summary of specially protected and notable species counts for waterbird surveys within Charleville Lagoons in 2022/23 non-breeding season.

Common name	Scientific name	Peak count	Conservation status
Black-headed gull	*Choroicocephalus ridibundus*	18	BoCCI Amber Listed / Wildlife Act / SCI
Coot	*Fulica atra*	51	BoCCI Amber Listed / Wildlife Act
Cormorant	*Phalacrocorax carbo*	10	BoCCI Amber Listed / Wildlife Act / SS
Lesser black-backed gull	*Larus fuscus*	6	BoCCI Amber Listed / Wildlife Act
Little egret	*Egretta garzetta*	1	BoCCI Green Listed / Annex I EU Birds Directive / Wildlife Act
Little grebe	*Tachybaptus ruficollis*	6	BoCCI Green Listed / Wildlife Act
Mallard	*Anas platyrhynchos*	67	BoCCI Amber Listed / Wildlife Act

Common name	Scientific name	Peak count	Conservation status
Moorhen	*Gallinula chloropus*	6	BoCCI Green Listed / Wildlife Act
Mute swan	*Cygnus olor*	7	BoCCI Amber Listed / Wildlife Act
Shoveler	*Spatula clypeata*	38	BoCCI Amber Listed / Wildlife Act
Snipe	*Gallinago gallinago*	5	BoCCI Red listed / Wildlife Act
Teal	*Anas crecca*	307	BoCCI Amber Listed / Wildlife Act / SS
Tufted duck	*Aythya fuligula*	24	BoCCI Amber Listed / Wildlife Act
Water rail	*Rallus aquaticus*	1	BoCCI Amber Listed / Wildlife Act
Wigeon	*Mareca penelope*	402	BoCCI Amber Listed / Wildlife Act / SS

8.13.4.3.2 2023/24

A total of 21 species were observed during the waterbird bird surveys conducted within the Charleville Lagoons between December 2023 and March 2024. Peak counts (i.e., the largest aggregations) recorded during the waterbird surveys for specially protected and notable species are summarised in **Table 8.16.** No breeding activity was recorded within the Site.

Table 8.16: Summary of specially protected and notable species counts for waterbird surveys within Charleville Lagoons in 2023/24 non-breeding season.

Common name	Scientific name	Peak count	Conservation status
Black-headed gull	*Choroicocephalus ridibundus*	59	BoCCI Amber Listed / Wildlife Act / SCI
Common sandpiper	*Actitis hypoleucos*	1	BoCCI Amber Listed / Wildlife Act
Coot	*Fulica atra*	4	BoCCI Amber Listed / Wildlife Act

Common name	Scientific name	Peak count	Conservation status
Cormorant	*Phalacrocorax carbo*	5	BoCCI Amber Listed / Wildlife Act / SS
Dunlin	*Calidris alpina*	4	BoCCI Red Listed / Wildlife Act / SCI
Gadwall	*Mareca strepera*	17	BoCCI Amber Listed / Wildlife Act / SCI
Great crested grebe	*Podiceps cristatus*	1	BoCCI Amber Listed / Wildlife Act
Green sandpiper	*Tringa ochropus*	1	BoCCI Green Listed / Wildlife Act
Grey heron	*Ardea cinerea*	2	BoCCI Green Listed / Wildlife Act
Lesser black-backed gull	*Larus fuscus*	4	BoCCI Amber Listed / Wildlife Act
Little egret	*Egretta garzetta*	6	BoCCI Green Listed / Annex I EU Birds Directive / Wildlife Act
Little grebe	*Tachybaptus ruficollis*	8	BoCCI Green Listed / Wildlife Act
Mallard	*Anas platyrhynchos*	129	BoCCI Amber Listed / Wildlife Act
Moorhen	*Gallinula chloropus*	17	BoCCI Green Listed / Wildlife Act
Mute swan	*Cygnus olor*	5	BoCCI Amber Listed / Wildlife Act
Shoveler	*Spatula clypeata*	63	BoCCI Amber Listed / Wildlife Act
Snipe	*Gallinago gallinago*	18	BoCCI Red listed / Wildlife Act
Teal	*Anas crecca*	543	BoCCI Amber Listed / Wildlife Act / SS
Tufted duck	*Aythya fuligula*	19	BoCCI Amber Listed / Wildlife Act

Common name	Scientific name	Peak count	Conservation status
Water rail	*Rallus aquaticus*	3	BoCCI Amber Listed / Wildlife Act
Wigeon	*Mareca penelope*	456	BoCCI Amber Listed / Wildlife Act / SS

8.13.4.4 Whooper Swan

Whooper swan observations recorded during the detailed surveys undertaken between October 2023 and March 2024 inclusive are as detailed in **Table 8.17**. In summary, two whooper swan observations were recorded within 5km of the Site, the nearest of which was approximately 1.1km north-east of the Site. No evidence of connectivity with the Site was observed regarding whooper swan movement patterns.

Table 8.17: 2023/24 whooper swan survey results for the study area

Visit (date)	Location	Number of whooper swans recorded	Description of whooper swan activity
1 (27/10/23)	Near Bruree (c.1.1km north-east of the Site)	10	One group of ten flying in a north-eastern direction at 09:02.
	All other locations	0	None recorded.
2 (29-30/11/23)	Charleville Lagoon (c.0.1km south of the Site)	1	One recorded with a group of mute swans, before flying eastwards towards Bruff at 11:00.
	All other locations	0	None recorded.
3 (19/12/23)	All locations	0	None recorded.
4 (15/01/24)	All locations	0	None recorded.
5 (13/02/24)	All locations	0	None recorded.
6 (13/03/24)	All locations	0	None recorded.

Whooper swan observations recorded during the detailed surveys undertaken between October 2023 and March 2024 at Churchtown (located 13.5km south-west of the Site) and Kilcolman Wildlife Reserve (located c.15.0km south of the Site) are detailed in **Table 8.18**. Whooper swans were recorded roosting and foraging at these locations throughout winter 2023/24, with peak counts of 119 at Churchtown and 104 at Kilcolman Wildfowl Reserve recorded. No evidence of connectivity between these locations and the Site was recorded.

Table 8.18. 2023/24 whooper swan survey results for Churchtown and Kilcolman Wildlife Reserve

Site	Whooper swan count										
	27/10/23	16/11/23	29/11/23	15/12/23	19/12/23	15/01/24	31/01/24	13/02/24	27/02/24	04/03/24	13/03/24
Churchtown	94	84	39	97	43	115	119	103	104	110	112
Kilcolman Wildfowl Reserve	0	0	42	28	104	3	16	24	23	19	19
Total	**94**	**84**	**81**	**125**	**147**	**118**	**135**	**127**	**127**	**129**	**131**

8.13.5 Flight Activity

Full details of flight activity by target species in 2020-2024 are provided in the Ornithology Baseline Report (**Appendix 8.1**) and the Ornithology Collision Risk Modelling Report (**Appendix 8.2**). In summary, flight activity was recorded by 16 target species as summarised in **Table 8.19** below. This flight activity data was incorporated into subsequent collision risk modelling for KOFs.

Table 8.19: Summary of flight activity by target species in 2020-2024

Species	Breeding season		Non-breeding season		Total	
	No. of observations	Flight time (s)	No. of observations	Flight time (s)	No. of observations	Flight time (s)
Barn owl	1	8	1	6	2	14
Black-headed Gull	16	2,173	67	185,107	83	187,280
Black-tailed godwit	2	4,070	0	0	2	4,070
Buzzard	123	25,849	101	10,786	224	36,635

Species	Breeding season		Non-breeding season		Total	
	No. of observations	Flight time (s)	No. of observations	Flight time (s)	No. of observations	Flight time (s)
Cattle egret	0	0	2	120	2	120
Common gull	3	35	8	23,148	11	23,183
Cormorant	154	10,639	163	14,575	317	25,214
Curlew	2	177	2	262	4	439
Gadwall	1	24	0	0	1	24
Golden plover	4	225	17	46,300	21	46,525
Great Black-backed Gull	1	40	2	120	3	160
Green sandpiper	0	0	1	0	1	0
Grey Heron	73	473	24	739	97	1,212
Greylag goose	4	2,784	5	1,730	9	4,514
Hen Harrier	0	0	8	214	8	214
Herring Gull	0	0	7	30,692	7	30,692
Kestrel	155	22,361	146	27,032	301	49,393
Lapwing	1	480	9	7,075	10	7,555
Lesser black-backed gull	68	46,818	86	158,588	154	205,406
Little Egret	35	1,219	36	3,009	71	4,228
Mallard	118	3,991	69	6,157	187	10,148
Mediterranean Gull	0	0	1	60	1	60
Merlin	0	0	3	250	3	250
Moorhen	2	9	0	0	2	9
Mute swan	7	325	14	1,160	21	1,485
Peregrine	5	570	20	1,344	25	1,914
Short-eared owl	0	0	1	40	1	40
Shoveler	0	0	5	3,414	5	3,414
Snipe	13	21,455	41	4,736	54	26,191
Sparrowhawk	25	1,537	25	837	50	2,374

Species	Breeding season		Non-breeding season		Total	
	No. of observations	Flight time (s)	No. of observations	Flight time (s)	No. of observations	Flight time (s)
Teal	0	0	1	60	1	60
Whimbrel	2	610	0	0	2	610
White-tailed eagle	0	0	1	469	1	469
Wigeon	0	0	7	91,177	7	91,177
Yellow legged gull	1	30	0	0	1	30

8.13.6 The 'Do-nothing' impact

The 'do-nothing impact' describes the impacts to ornithological features across the 35-year lifespan of the Project should it not proceed within the Site. Ornithological features 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., peregrine, snipe and short-eared owl)[54].

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 in the presence of the 'do-nothing impact' will, in general, be relatively similar to the current baseline, and the populations of the ornithological features that are relevant to the Project would be largely consistent with that of the existing baseline conditions described above.

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

8.13.7 Evaluation of Ornithological Features

Determination of population importance within the likely Zone of Influence is provided in the sections below following the criteria described in **Section 8.11.4. Section 8.13.9** specifies KOFs carried forward for detailed assessment of potential effects.

The field surveys undertaken in 2020-2024 recorded ten species included on Annex 1 of the Birds Directive, specifically: golden plover, hen harrier, kingfisher, little egret, Mediterranean gull, merlin, peregrine, short-eared owl, white-tailed eagle and whooper swan. Those surveys also recorded 14 BoCCI Red Listed and 29 Amber Listed species.

Based on the findings of these field surveys, no species were present in numbers of international importance, national importance or county importance.

Regarding the 37 target species recorded during the surveys, of the species identified eight identified of greater than Local (Higher value) importance in reference to criteria outlined in **Section 8.11.3**, including:

Kestrel was frequently recorded between 2020-2024 during the breeding and non-breeding seasons, with at least one kestrel territory overlapping with the Site due to breeding activity recorded c. 250m south-west of the boundary. Peregrine was recorded on six occasions, comprising individual birds and occasionally potential pairs including adults and juveniles but no evidence of breeding was recorded within the Site. Golden plover was recorded foraging on grassland in flocks (peak count of 24) and also flying over the Site on 21 occasions, comprising a range of individual birds, small flocks (3 – 16 birds) and larger flocks (24 – 42 birds). Similar aggregations of flocks were also recorded for snipe which frequently flew over, foraged and roosted within the Site. While lapwing was similarly recorded in small flocks and individuals occasionally foraged within the Site. Gulls frequently flew over the Site in a range of individual birds, small flocks and large flocks; these species included peak counts of black-headed gull (140) and lesser black-backed gull (34). Cormorant activity consisted of frequent flight activity of individuals and flocks (2 – 14 birds) frequently flying over the Site with a potential commuting route outside of the Site between the River Maigue and River Loobagh towards Charleville Lagoons located south of the Site. These species populations within the Zone of Influence are considered to be of **Local (Higher value) importance**.

Regarding non-target species, based on the level and type of activity recorded breeding populations of non-target species including meadow pipit, starling and swallow are

considered to be of **Local (Higher value) importance**. Non-breeding populations of non-target birds including meadow pipit, redwing, skylark and starling are also considered to be of **Local (Higher value) importance**.

Other species recorded during the 2020-2024 field surveys were present in low numbers and/or infrequently within or adjacent to the Site. No other species were potentially present in numbers exceeding Local (Lower value) importance.

8.13.8 Importance to nearby Designated Sites

The desk study identified three internationally designated sites within 20km of the Site boundary for features of ornithological interest relevant to the Project: Blackwater River (Cork/Waterford) SAC; Ballyhoura Mountains SAC and IBA; and Kilcolman Bog SPA.

Three qualifying interest species were recorded for Kilcolman Bog SPA, including: Shoveler, teal and whooper swan. Shoveler and teal were recorded infrequently flying within the Site or over Charleville Lagoons and/or in low numbers in the context of the citation populations. Similarly, whooper swan was recorded in small numbers within the hinterland with only one observation of an individual foraging on grassland within the Site. Therefore, due to the very limited activity throughout the survey period within the Site, it can be concluded that the Site is not functionally linked to the SPA and likely significant effects on it can be ruled out.

Non-qualifying species listed on the citation for Kilcolman Bog SPA of potential interest to the Project include black-headed gull (citation population of 133 wintering birds), golden plover (162), lapwing (740), lesser black-backed gull (131), mallard (188) and wigeon (590). Of these species, black-headed gull, golden plover, lapwing and lesser black-backed gull were recorded in notable numbers. However, considering the distance between Kilcolman Bog SPA and the Site (approximately 15km), it can be concluded that the Site is not of significant value to these wintering (non-qualifying) bird populations of the SPA.

The two SAC's identified with non-qualifying species of ornithological interest included Blackwater River (Cork/Waterford) SAC and Ballyhoura Mountains SAC and IBA.

Non-qualifying species listed on the citation for Blackwater River SAC of potential interest to the Project included cormorant (no citation population estimate) and grey heron (approximately 54 pairs). Considering the distance between the Project and the SAC (approximately 7.2km from the Site) and lack of grey heron observations during the course

of the bird surveys within the Site, the Site is not considered to be of significant value to the SAC's grey heron and cormorant populations.

Non-qualifying species listed on the citation for Ballyhoura Mountains SAC and IBA of potential interest to the Project included peregrine and breeding hen harrier. Peregrine and hen harrier were observed on 25 and eight occasions respectively, with the majority of the observations for both species during the non-breeding season with infrequent observations (peregrine) or absence (hen harrier) during the breeding season. Significant effects on this designated site are therefore highly unlikely as a result of the Project, especially considering the Site is located 9.7km from the designated site and therefore beyond the core sustenance zone of breeding hen harrier and peregrine that could be associated with the designated site, which is 2km, and only within the upper maximum range of 10km and 18km respectively for these species during the breeding season.

8.13.9 Identification of KOFs

Table 8.20 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 of 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 KOFs. It should be noted that a precautionary approach has been taken in determining which features are described as KOFs (and thus which are taken forward for further assessment) as described in **Section 8.11.4**, based upon their conservation status, population trends and likely importance to designated sites.

Table 8.20: Assessment of importance and identification of Key Ornithological Features

Ornithological feature	Conservation status	Evaluation rationale	Importance	KOF Yes/No
Designated sites				
Kilcolman Bog SPA	Designated as a Special Protection Area (SPA) under the EU Birds Directive.	Kilcolman Bog SPA is designated for its internationally important populations of shoveler, teal and whooper swan. Shoveler, teal and whooper swan were recorded infrequently and in low numbers during the 2020-24 field surveys of the Site and considering the distance from the designated site, functional linkage between the Site and this SPA is not considered likely. Therefore, Kilcolman Bog SPA will not be considered further in this assessment.	International importance	No
Ballyhoura Mountains SAC and IBA	Designated as a Special Area for Conservation (SAC) under the EU Habitats Directive. Designated as an Important Bird Area (IBA).	The Ballyhoura Mountains SAC and IBA is designated for dry/wet heathland and blanket bog habitat. As part of this designation, non-qualifying species for the SAC include peregrine and hen harrier which are also listed under the IBA designation. No hen harriers were recorded using the Site or its immediate surroundings during the breeding season surveys undertaken at the Site. Observations of peregrine were infrequent during the breeding season with a total of five observations. The Project site is located beyond the core sustenance zone of breeding hen harrier and peregrine that could be associated with the non-qualifying SAC populations. Therefore, with the distance and designation criteria of the SAC considered, likely significant effects on the SAC in view of its conservation objectives will not arise through habitat loss, bird mortality,	International importance	No

Ornithological feature	Conservation status	Evaluation rationale	Importance	KOF Yes/No
		displacement and/or disturbance and this designated site will, as such, not be considered further in this assessment.		
Blackwater River (Cork/Waterford) SAC	Designated as a SAC under the EU Habitats Directive.	Whilst the Blackwater River SAC falls within the Zone of Influence of the Project site, the part of the Site that does fall within this area is not designated for its bird interests, with none of the non-qualifying bird species referenced on the citation being recorded within the Site in notable numbers. Therefore, with the distance and designation criteria of the SAC considered, likely significant effects on the SAC in view of its conservation objectives will not arise through habitat loss, bird mortality, displacement and/or disturbance and this designated site will, as such, not be considered further in this assessment.	International importance	No
Bird Species				
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 and afforded additional legal protection due to its inclusion on Annex 1 of the Birds Directive. Barn owls were only recorded twice during the VP and transect surveys. Targeted nesting barn owl surveys did not identify any breeding activity within 2km of the Site. Despite the species being BoCCI Red Listed, due to the low numbers recorded during the surveys, locally increasing conservation	Local (Lower value) importance (all seasons)	No

Ornithological feature	Conservation status	Evaluation rationale	Importance	KOF Yes/No
		status of the species in the county (McCarthy *et al.*, 2023)[55] and low susceptibility to collision related impacts from wind farms in lowland habitat comparable to Ireland's natural environment[56] the population of barn owl is considered to be of **Local (Lower value) importance**. No further assessment is therefore required, although general recommendations regarding mitigation and enhancement for birds that would be adopted would also potentially benefit barn owl (**Section 8.16**).		
Black-tailed godwit	BoCCI Red List & Wildlife Act.	Regarded as a species of high conservation concern in Ireland due to its inclusion on the BoCCI Red List. There were only two observations of a flock of 37 birds recorded during a vantage point survey in August 2023. Considering the activity within the Site, the population is therefore considered to be of **Local (lower value) importance** to the Project and is therefore not considered to be a KOF. No further assessment is therefore required, although general recommendations regarding mitigation and enhancement for birds that would be adopted would also potentially benefit black-tailed godwit (**Section 8.16**).	Local (Lower value) importance (all seasons)	No

[55] McCarthy, A., Ó Teangana, D., Nagle, T., Bayley, S., Heardman, C., Rees, D., Deasy, C., Riordan, N., McDonnell, B. & Lusby, J. (2023*). Barn Owl population status and trends in County Cork in 2023*. BirdWatch Ireland.

[56] See https://www.barnowltrust.org.uk/hazards-solutions/barn-owls-wind-turbines/ (accessed 12/06/2025).

Ornithological feature	Conservation status	Evaluation rationale	Importance	KOF Yes/No
Buzzard	BoCCI Green list & Wildlife Act.	Whilst high levels of flight activity were recorded within the Site, including year-round activity, buzzard is a common and widespread species in Ireland, reflected by its inclusion on the BoCCI Green list. Despite the activity, in reflection of buzzard's conservation status the population is considered to be of **Local (Lower value) importance.** No further assessment is therefore required, although general recommendations regarding mitigation and enhancement for birds that would be adopted would also potentially benefit buzzard **(Section 8.16**).	Local (Lower value) importance (all seasons)	No
Cattle egret	Wildlife Act.	Not assessed as a species of concern on the Birds of Conservation Concern list in Ireland, cattle egret is an infrequent migrant species to Ireland during the non-breeding season. Two observations were recorded during the vantage point surveys in the 2023/24 non-breeding season. Considering the low level of activity and conservation status, the population is considered to be of Negligible importance and is therefore not considered to be a KOF. Cattle egret will therefore not be taken forward for further assessment.	Negligible importance (all seasons)	No
Cormorant	BoCCI Green list & Wildlife Act.	Whilst high levels of flight activity were recorded within the Site, including year-round activity, cormorant is a common and widespread species in Ireland, reflected by its inclusion on the BoCCI Green list. However, in the context of the activity recorded and the Site's proximity to Charleville	Local (Higher value) importance (all seasons)	**Yes**

Ornithological feature	Conservation status	Evaluation rationale	Importance	KOF Yes/No
		Lagoons, the population is considered to be of **Local (Higher value) importance.** Therefore, the potential for significant effects through habitat loss, disturbance/displacement and collision-related mortality cannot be excluded and so further assessment of potential effects is required.		
Golden plover	Annex 1 EU Birds Directive; BoCCI Red List & Wildlife Act.	Regarded as a species of high conservation concern in Ireland due to its inclusion on the BoCCI Red List, and its inclusion on Annex 1 of the Birds Directive. Based on the level of activity recorded, the golden plover population is considered to be of **Local (Higher value) importance**. Therefore, the potential for significant 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 (non-breeding season)	**Yes**
Gulls (black headed gull, common gull, great black-backed gull, herring gull, lesser black-backed gull, Mediterranean	Wildlife Act (all species); BoCCI Amber list (black headed gull, herring gull, lesser black-backed gull & Mediterranean	A total of seven gull species were identified as target species during the ornithology surveys on Site. Four of these species (black-headed gull, common gull, herring gull and lesser black-backed gull) are of conservation concern, being listed on the BoCCI Amber List. These species were recorded as individuals, small flocks and large flocks with black-headed gull and lesser black-backed gull frequently observed flying over the Site and infrequently roosting on the fields as individuals or small flocks. Greater activity for black-headed gull was recorded during the non-breeding seasons with high activity recorded in both the breeding	Lesser black-backed gull: Local (Higher value) importance (all seasons). Black-headed gull: Local (Higher value) importance	**Lesser black-backed gull: Yes** **Black-headed gull: Yes** Other gulls: No

Ornithological feature	Conservation status	Evaluation rationale	Importance	KOF Yes/No
gull and yellow-legged gull)	gull), and BoCCI Green list (great black-backed gull)	and non-breeding seasons for lesser black-backed gull. Limited activity for common gull and herring gull was recorded within the Site. Therefore, considering the conservation status and activity within the Site, the population of black-headed gull (non-breeding) and lesser black-backed gull (all seasons) flying over the Site during the non-breeding season has been determined as **Local (Higher value) importance**. Therefore, the potential for significant effects through disturbance/displacement and collision-related mortality cannot be excluded for these species and so further assessment of potential effects is required. The remaining five gull species (common gull, great black-backed gull, herring gull, Mediterranean gull and yellow-legged gull) were recorded less frequently during the field surveys. Considering the conservation status and low level of activity recorded within the Site (typically 1-3 birds), these species populations are considered to be of Negligible importance. No further assessment is therefore required, although general recommendations regarding mitigation and enhancement for birds that would be adopted would also potentially benefit these gull species (**Section 8.16**).	(non-breeding season) Other gulls (common gull, great black-backed gull, herring gull, Mediterranean gull, yellow-legged gull): Negligible importance (all seasons)	
Grey heron	BoCCI Green list; Wildlife Act.	Grey heron is a common and widespread species in Ireland, reflected by its inclusion on the BoCCI Green list. The species was recorded frequently; however, considering the conservation status and limited flight	Local (Lower value) importance (all seasons)	No

Ornithological feature	Conservation status	Evaluation rationale	Importance	KOF Yes/No
		seconds from individual birds recorded within the Site, the grey heron population is considered to be of **Local (Lower value) importance**. No further assessment is therefore required, although general recommendations regarding mitigation and enhancement for birds that would be adopted would also potentially benefit grey heron (**Section 8.16**).		
Hen harrier	Annex 1 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 1 of the Birds Directive. Hen harrier was recorded on eight occasions during the non-breeding VP surveys, comprising individual male and female adult birds flying over pasture and wet grassland within the Site typically between 0-20m above ground level. This activity would mostly be outside of the collision risk height of the turbines. Additionally, the habitat within the Site is distant from known populations within designated sites and provides limited nesting suitability during the breeding season and would therefore be unlikely to be of importance to breeding hen harrier Considering the quantity hen harrier activity recorded within the four year survey period, flight patterns, habitat suitability, distance from known breeding populations and wider habitat availability the Site is considered to be of no more than **Local (Lower value) importance** to this species. No further assessment is therefore	Local (Lower value) importance (non-breeding season)	No

Ornithological feature	Conservation status	Evaluation rationale	Importance	KOF Yes/No
		required, although general recommendations regarding mitigation and enhancement for birds that would be adopted would also potentially benefit hen harrier (**Section 8.16).**		
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. Therefore, the potential for significant 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**
Lapwing	BoCCI Red List, & Wildlife Act.	Regarded as a species of high conservation concern in Ireland due to its inclusion on the BoCCI Red List. Lapwing was recorded ten times within the survey period during the non-breeding season. Considering the activity and conservation status, the lapwing population is considered to be of **Local (Higher value) importance**. Therefore, the potential for significant 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 (non-breeding season)	**Yes**

Ornithological feature	Conservation status	Evaluation rationale	Importance	KOF Yes/No
Little egret	Annex 1 EU Bird Directive; BoCCI Green List, & Wildlife Act.	Little egret is a common and increasingly abundant species in Ireland, reflected by its inclusion on the BoCCI Green List. Due to historical scarcity the species is afforded additional legal protection due to its inclusion on Annex 1 of the Birds Directive. Little egret was recorded a total of 71 times and typically observations were of individual birds flying low (between 0-20m above ground level) over grassland across the VP survey period. However, considering 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**. No further assessment is therefore required, although general recommendations regarding mitigation and enhancement for birds that would be adopted would also potentially benefit little egret (**Section 8.16**).	Local (Lower value) importance (all seasons)	No
Mallard	BoCCI Green list; Wildlife Act.	Mallard is a common and widespread species in Ireland, reflected by its inclusion on the BoCCI Green list. The species was recorded frequently flying over the Site towards Charleville Lagoons. Despite the conservation status, the proximity to Charleville Lagoons and flight activity observed indicates mallard is considered to be of **Local (Lower value) importance**. No further assessment is therefore required, although general recommendations regarding mitigation and enhancement for birds that would be adopted would also potentially benefit mallard (Section 8.7).	Local (Lower value) importance (all seasons)	No

Ornithological feature	Conservation status	Evaluation rationale	Importance	KOF Yes/No
Merlin	Annex 1 EU Birds Directive; BoCCI Amber list, & Wildlife Act.	Merlin is an Amber Listed species of conservation concern in Ireland and is afforded additional legal protection due to its inclusion on Annex 1 of the Birds Directive. Merlin was recorded a total of three times across the survey period. Considering the low level of activity the population is therefore considered to be of **Local (Lower value) importance** to the Project and is therefore not considered to be a KOF. No further assessment is therefore required, although general recommendations regarding mitigation and enhancement for birds that would be adopted would also potentially benefit merlin (**Section 8.16**).	Negligible importance (all seasons)	No
Peregrine	Annex 1 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 1 of the Birds Directive. Peregrine was recorded on multiple occasions with greater activity during the non-breeding season. Activity included observations of male, female and juvenile birds. Considering the level of flight activity within and near the Site, the peregrine population is considered to be of **Local (Higher value) importance**. Therefore, the potential for significant 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 (non-breeding season)	**Yes**

Ornithological feature	Conservation status	Evaluation rationale	Importance	KOF Yes/No
Short-eared owl	BoCCI Amber list, & Wildlife Act.	Short-eared owl is an Amber Listed species of conservation concern in Ireland and is afforded additional legal protection due to its inclusion on Annex 1 of the Birds Directive. Short-eared owl was recorded once across the survey period, comprising an individual bird hunting over grassland west of the Site in January 2024. Considering the low level of activity recorded, the population is considered to be of Negligible importance in the context of the Project and is therefore not considered to be a KOF. No further assessment is therefore required, although general recommendations regarding mitigation and enhancement for birds that would be adopted would also potentially benefit short-eared owl (**Section 8.16**).	Negligible importance (all seasons)	No
Snipe	BoCCI Red List, & Wildlife Act.	Regarded as a species of high conservation concern in Ireland due to its inclusion on the BoCCI Red List. Snipe was recorded 54 times within the survey period during the non-breeding and breeding seasons. Despite no evidence of breeding, the cryptic nature of snipe and presence of suitable habitat indicates potential for breeding snipe. Considering the activity and conservation status, the snipe population is considered to be of **Local (Higher value) importance**. Therefore, the potential for significant 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
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, reflected by its inclusion on the BoCCI Green List. 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**. Sparrowhawks would not be significantly affected by the Project and so are not identified as a KOF. They will therefore not be taken forward for further assessment.	Local (Lower value) importance (non-breeding season)	No
White-tailed eagle	Annex 1 EU Birds Directive, BoCCI Red List, & Wildlife Act.	White-tailed eagle is a Red Listed species of conservation concern in Ireland and is afforded additional legal protection due to its inclusion on Annex 1 of the Birds Directive. White-tailed eagle was recorded once across the survey period, comprising an individual bird flying between 100-180m over grassland east of the Site in March 2024. Considering the low level of activity the population is considered to be of Negligible importance in the context of the Project and is therefore not considered to be a KOF. No further assessment is therefore required, although general recommendations regarding mitigation and enhancement for birds that would be adopted would also potentially benefit white-tailed eagle (**Section 8.16**).	Negligible importance (all seasons)	No

Ornithological feature	Conservation status	Evaluation rationale	Importance	KOF Yes/No
Whooper swan	Annex 1 EU Birds Directive, BoCCI Amber List, & Wildlife Act.	An Amber Listed species of conservation concern in Ireland, afforded additional legal protection due to its inclusion on Annex 1 of the Birds Directive. Whooper swan is a qualifying species for Kilcolman Bog SPA, with the site citation specifying a wintering population of 95 birds, NPWS, 2014[57]. Only one individual was recorded foraging within the Site on a single occasion throughout the course of the surveys. In consideration with the distance from the SPA and unlikely functional linkage, limited activity within the Site and habitat availability within the wider area the whooper swan population in the context of the Project is considered to be of Negligible importance. No further assessment is therefore required, although general recommendations regarding mitigation and enhancement for birds that would be adopted would also potentially benefit whooper swan (**Section 8.16**).	Negligible importance (all seasons)	No
Wigeon	BoCCI Amber list; Wildlife Act.	Wigeon is a common and widespread species that is in decline in Ireland, reflected by its inclusion on the BoCCI Amber list. The species was recorded seven times with a notable observation of 300 individuals flying within the Site on one occasion. Considering the conservation status and levels of flight activity and flight seconds from birds recorded within the Site, the wigeon population is considered to be of **Local (Lower value)**	Local (Lower value) importance (non-breeding season)	No

[57] NPWS. 2014. Site Synopsis: Kilcolman Bog SPA (Site Code 004095). National Parks and Wildlife Service. [Available at: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004095.pdf – accessed 26/09/2022].

Ornithological feature	Conservation status	Evaluation rationale	Importance	KOF Yes/No
		importance. No further assessment is therefore required, although general recommendations regarding mitigation and enhancement for birds that would be adopted would also potentially benefit wigeon (Section 8.7).		
Other waders (curlew, green sandpiper, redshank and whimbrel)	BoCCI Red (curlew and redshank) Green (green sandpiper and whimbrel) lists, Wildlife Act.	Four other wader species were recorded during the survey period. Of which two were of conservation concern and listed on the BoCCI Red List. These species were recorded in low numbers and/or infrequently. As such, the Site is considered to be of low value to these species. Whilst some flight activity was recorded, the majority of observations recorded were either not within the potential collision risk zone of the Project or infrequent within the Site. A collision risk assessment is therefore not necessary for these species. The populations of these species has therefore been assessed as being of Negligible importance in the context of the Project and are not taken forward for further assessment.	Negligible importance (all seasons)	No
Other waterbirds (gadwall, greylag goose, moorhen, mute swan, shoveler, teal) species	BoCCI Red (shoveler) and Amber (gadwall, graylag goose, mute swan, teal and	Six other waterbird species of conservation concern were recorded during the ornithological surveys, with one being BoCCI Red Listed and five being BoCCI Amber Listed species. These species were recorded in low numbers and/or infrequently. As such, the Site is considered to be of low value to these species. Whilst some flight activity was recorded, the majority of observations recorded were either not within the potential collision risk zone of the Project or infrequent within the Site. A collision	Negligible importance (all seasons)	No

Ornithological feature	Conservation status	Evaluation rationale	Importance	KOF Yes/No
	wigeon) lists, Wildlife Act.	risk assessment is therefore not necessary for these species. The population of these species has therefore been assessed as being of Negligible importance in the context of the Project and are not taken forward for further assessment.		
Notable non-target species (Red and Amber Listed species)	BoCCI Red and Amber List, & Wildlife Act.	The ornithological surveys recorded various non-target farmland bird species including species of conservation concern as specified on the BoCCI Red and Amber Lists. Considering the numbers of these species recorded, breeding populations of meadow pipit, starling and swallow are considered to be of **Local (Higher value)** importance. Non-breeding populations of, meadow pipit, redwing, skylark and starling are also considered to be of **Local (Higher value)** importance. Therefore, the potential for significant 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**

8.14 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 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., waterbodies, mature trees and hedgerows) will be retained where possible within the design of the Project. The Project has been designed to minimise the extent of habitat loss required.

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

8.14.1 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) (**Appendix 2.1**) and include measures to minimise working areas to avoid alteration of hydrology, unnecessary habitat removal/alteration and disturbance, and measures to avoid/minimise the generation of additional noise, dust, light spill and vibration. Whilst significant effects on barn owls are not anticipated, works will aim to avoid the use of artificial lighting of suitable habitat (i.e., rough grassland, hedgerows and tree lines). The CEMP has also included details of measures to avoid pollution of waterbodies within and adjacent to the site. All plant and machinery will comply with specific noise legislation (for example, Construction Plant and Equipment Permissible Noise Levels Regulations, 1998) and will be turned off when not in use (**Chapter 11: Noise**).

8.14.2 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 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.

8.14.3 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 March to August 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 hydrological changes and 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 (e.g. snipe and lapwing).

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 will 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 5m to several hundred metres.

8.14.4 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.

8.15 ASSESSMENT OF EFFECTS

8.15.1 Scope of Assessment

Potential effects on breeding and non-breeding bird populations from the Project during its construction, operation, and decommissioning phases are described in this section. The potential for these effects to adversely impact the KOFs described in **Section 8.13.9** is then assessed in accordance with the process described in **Section 8.11.5**. 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 8.16**).

This assessment of effects is structured as follows:

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

8.15.2 Assessment of Effects on Designated Sites

Three designated sites were identified during the desk study as described in **Section 8.13.1**. All sites were a considerable distance from the Project and no notable populations of qualifying species were present that would require assessment of the Site as functionally linked land to these designated sites. Therefore, as no designated sites were identified as being KOF within this assessment, potential impacts to designated sites from the Project will not be considered further.

8.15.3 Assessment of Effects on Bird Species

8.15.3.1 Construction Effects

The assessment of effects on bird species during the construction of the Project is described below and summarised in **Table 8.22**, in accordance with the effect terminology described in **Section 8.11**. 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 tracks, 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.

Direct habitat loss due to the development of wind farms tends to be relatively small (Drewitt & Langston, 2006)[58]. The permanent land take will be largely limited to the area of the turbine bases, new access tracks, electrical substation, bridge crossings, meteorological mast and road upgrades. 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, two site compounds with associated car parking, and borrow pits. Temporary land take will also occur at 'pinch points' along the turbine delivery routes (TDR) where vegetation will need to be removed to enable the transport of turbine infrastructure as well as along parts of the cable route from the N20 and L1537 roads. It should be noted however that for the purpose of this ornithological assessment, the likely effects on birds from either of the TDR options and grid connection options assessed would not differ significantly.

As described within **Chapter 6: Biodiversity**, habitats on site are largely dominated by agricultural land, within which the turbines will be constructed. The proposed site substation, met mast, and construction compounds will additionally sit within agricultural land. These

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

habitats are highly modified and are of low ecological value, thus limiting impacts on ornithological features. The Project could influence these habitats resulting in direct habitat loss from infrastructure and habitat degradation due to hydrological changes, pollution, increased human presence and/or vibration. It was determined in **Chapter 6** that the impacts to permanent and temporary habitat loss in area habitats is not significant as only a minor loss of habitat is to occur. In overview, not including temporary vegetative loss along the TDR and grid connection routes, the wind farm development would result in the loss of 1,649m of linear habitats as a result of permanent infrastructure. It is anticipated that limited extents of improved, neutral and wet grassland area habitats will be lost permanently from the Project. Habitat loss calculations for the Project are provided in **Chapter 6,** a summary of area and linear feature habitat loss in the absence of additional mitigation is provided in **Table 8.21** below.

Table 8.21: Area and linear feature habitat losses for the Project (before mitigation/ offsetting)

Habitat type	Total area (ha)
Permanent works	
GA1 – improved grassland	1.93
GS1/GS4 – Neutral and wet grassland	8.05
Linear features	**Total length (m)**
WL1/WL2 – hedgerows and treelines	1,649

8.15.3.1.1 Cormorant

The Site was assessed as being of Local (Higher value) importance for cormorant with activity consisting of individuals and small groups frequently flying over the Site. A potential commuting route outside of the Site between the River Maigue and River Loobagh towards Charleville Lagoons located south of the Site. The Site itself is primarily dominated by arable, pasture and wet grassland surrounded by hedgerows with patches of scrub, with limited waterbodies present aside from the Rivers that are located in the north-east of the Site.

Taking into consideration the embedded mitigation within **Section 8.14** and the predicted habitat losses presented in **Table 8.21**, direct loss of suitable cormorant habitat during construction would be minimal and restricted to the north-east of the Site at the proposed river crossing and there would be no permanent removal of suitable waterbodies for cormorant. As such, the effects on cormorant as a result of habitat loss during construction are considered negligible and **not significant**.

Potential disturbance effects could occur from minor habitat loss associated with the construction of the bridge that would provide an access route for construction traffic across the River Maigue. As a result, there would be a minor disturbance to a small area of suitable cormorant habitat in the north-eastern corner of the Site only. Disturbance would be temporary in nature during the construction of the bridge, which would be mitigated by the embedded mitigation outlined in **Section 8.14**.

As cormorants also showed evidence frequenting the airspace within the Site, there is potential for disturbance or displacement of commuting birds during construction activities. Based on the sensitivity and flight behaviour of this species, it is anticipated that cormorant will continue to fly over active construction areas, and the availability of suitable flight routes elsewhere throughout the Site over 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 cormorant as a result of disturbance and displacement during construction would be minor and **not significant**.

8.15.3.1.2 Raptors

The Site is assessed as being of Local (Higher value) importance for raptors including kestrel and peregrine. The Site is dominated by pasture and wet grassland, with limited availability of higher quality foraging habitat for these raptor species. Taking into consideration the embedded mitigation within **Section 8.14** and the predicted habitat losses presented in **Table 8.21**, direct loss of suitable foraging habitat for these species will be minimal in the context of the wider environment and highly unlikely to significantly affect prey availability for any of the raptor species identified within the ZoI of the Project. Furthermore, breeding activity was limited with only one confirmed kestrel breeding observation within c. 250m of the Site and juvenile peregrine and kestrel recorded within the Site during the breeding season. Although areas of suitable nesting habitat for kestrel including trees will be lost as a result of the construction phase of the Project, habitat availability remains abundant in the surrounding area of the Site and the loss is considered to be negligible in the landscape context. Furthermore, no suitable nesting sites were identified within the Site for peregrine or indeed would be lost as a result of the Project. As such, effects on populations of these raptor species as a result of habitat loss and fragmentation during construction are considered **not significant** for all raptor species identified.

Construction activities do have the potential to cause disturbance and displacement of the raptor species described above. Such activities include but are not limited to mechanical piling, increased human activity, plant machinery, presence of infrastructure and vegetation clearance. Of the species recorded during field surveys, kestrel flight activity was frequent within the Site, while only occasional flight activity was observed for peregrine (peak count of two). Therefore, within the Site the kestrel population would be more susceptible to potential construction effects, with disturbance and displacement impacts less likely for peregrine.

Considering the limited areas of potentially suitable habitat within the Site which would be subject to disturbance during construction, it is unlikely that the effect on raptors would be significant. In the context of the wider landscape, habitats within the Site are considered locally abundant and any loss or displacement resulting from disturbance during construction would be sufficiently mitigated with the embedded mitigation proposed. Considering this, and the levels of activity recorded for raptor species within the Site, potential disturbance and displacement effects from construction would be **not significant**.

8.15.3.1.3 Gulls

The Site is assessed as being of Local (Higher value) importance for black-backed gull (non-breeding season) and lesser black-backed gull (all seasons). The Site is dominated by pasture and wet grassland which is abundant in the wider landscape with limited availability of higher quality foraging habitat for these gull species. Taking into consideration the embedded mitigation within **Section 8.14** and the predicted habitat losses presented in **Table 8.21**, direct loss of suitable foraging habitat for these species will be minimal in the context of the wider environment and highly unlikely to significantly affect foraging habitat availability for any of the gull species identified within the ZoI of the Project. No breeding activity was recorded during the survey period within the Site. As such, effects on populations of these gull species as a result of habitat loss and fragmentation during construction are considered **not significant** for all raptor species identified.

Construction activities do have the potential to cause disturbance and displacement of the gull species described above. Flight activity for both species was frequent within the Site during their respective activity periods with occasional roosting on fields in small numbers. Therefore, the gull species present within the Site the would be susceptible to potential construction effects.

Considering the limited areas of potentially suitable habitat within the Site which would be subject to disturbance during construction, it is unlikely that the effect on gulls would be significant. In the context of the wider landscape, habitats within the Site for gulls are considered locally abundant and any loss or displacement resulting from disturbance during construction would be sufficiently mitigated with the embedded mitigation proposed. Considering this, and the levels of activity recorded for gull species within the Site, potential disturbance and displacement effects from construction would be **not significant**.

8.15.3.1.4 Waders

The Site is assessed of being of Local (Higher value) importance for golden plover (non-breeding), lapwing (non-breeding) and snipe (all seasons). Whilst habitats on Site are suitable for these wader species, this habitat is relatively limited in extent in the context of the wider landscape, and the majority of observations were typically of individuals in flight with only infrequent foraging activity for lapwing and golden plover observed on pasture and wet grassland within the Site. Snipe were frequently flushed in low numbers during the breeding (typically during autumn passage) and non-breeding seasons from wet grassland and occasionally observed roosting within the Site. No evidence of breeding by any wader species was recorded during the breeding wader surveys and transects undertaken within the Site. Despite this, suitable breeding habitat for snipe is present within wet grassland and so it is possible breeding activity may have been underrepresented during the surveys due to difficulty of recording breeding activity for this species. Taking into consideration the embedded mitigation within **Section 8.14** and the predicted habitat losses presented in **Table 8.21**, direct loss of suitable habitat for these species will be minimal, particularly in the context of retained habitat within the wider landscape. Habitat loss and fragmentation effects from construction are therefore considered minor and **not significant**.

Given the limited activity of roosting waders recorded within the Site, the absence of breeding by any wader species and use of the Site primarily limited to occasional foraging, there is limited potential for disturbance of golden plover and lapwing during construction of the Project. Greater activity was observed by snipe within the Site whereby populations within upland wind farms have recorded declines of up to 53% due to disturbance and displacement during the construction phase[59]. Despite this, the Site population and area of suitable habitat that would be subject to potentially disturbing activities for these species would be small, particularly in the context of retained areas of suitable habitat within the wider lowland farmland landscape.

[59] Pearce-Higgins, J.W., Stephen, L., Douse, A. & Langston, R.H.W. (2012). Greater impacts of windfarms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. *Journal of Applied Ecology,* **49**, 386–394.

Greater activity was observed by birds in flight within the Site and construction activities in winter months particularly could cause minor disturbance, resulting in birds deviating in their flight lines to avoid construction areas. However, considering the low levels of wader activity on Site and the abundance of suitable retained habitat, disturbance and displacement effects from construction would be minor and **not significant**.

8.15.3.1.5 Non-target species

The Site is assessed as being of Local (Higher value) importance for the assemblage of notable non-target bird species such as meadow pipit, redwing, skylark and starling. Habitats within the Site provide opportunities for these species during the breeding and non-breeding seasons, most notably the hedgerows, treelines, grassland, scrub, and arable fields. The temporary and permanent loss of these habitats to facilitate construction, as outlined in **Table 8.21**, would result in a reduction in the availability and connectivity of habitats for the bird assemblage. Whilst the embedded mitigation outlined within **Section 8.14** 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 adverse effect on these farmland bird species due to the loss of hedgerow and treeline habitat at a **Local level (slight effect)** through direct habitat loss and fragmentation. This effect would be reversible through the additional mitigation/offsetting that is outlined in **Section 8.16** below.

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, excavation of materials and active construction of the Project infrastructure (i.e. Substation, access roads). Considering the potential extent of disturbance, and the importance of the bird populations present, it is possible that the construction of the Project could have a significant adverse effect on these farmland bird species at a **Local level (slight effect)** through disturbance and displacement, in the absence of additional mitigation. This effect would be reversible through the additional mitigation/offsetting that is outlined in **Section 8.16** below.

8.15.3.1.6 Summary

Table 8.22: Construction effect characterisation for Key Ornithological Features

Key Ornithological Feature	Effect	Magnitude of effect	Significance of effect
Cormorant	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Raptors	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Gulls	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Waders	Direct habitat loss and fragmentation	Low	Not significant
	Disturbance and displacement	Low	Not significant
Non-target farmland species	Direct habitat loss and fragmentation	Medium	Long-term, Slight Negative Effect (significant at a Local level)
	Disturbance and displacement	Medium	Short-term, Slight Negative Effect (significant at a Local level)

8.15.3.2 Operational Effects

The assessment of effects upon ornithological features during the operation of the Project is described in this section and summarised in **Table 8.27**. 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 KOFs is informed by species-specific collision risk modelling where appropriate. Full details of collision risk modelling are provided in **Appendix 8.2.**

8.15.3.2.1 Cormorant

As discussed, throughout the assessment cormorant were observed primarily using the airspace rather than terrestrial habitats within the Site. Therefore, there is negligible potential for significant effects to cormorant from disturbance or displacement and potential impacts from habitat loss during operation of the Project. As such, effects on cormorant due to habitat loss and fragmentation are considered to be **not significant**.

Whilst some displacement of birds flying through the 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 cormorant due to disturbance and displacement during operation are considered **not significant**.

Despite the Site not being of importance to cormorant, within the airspace cormorant had significant flight activity throughout the survey period and due to the susceptibility of this it was taken forward for collision risk modelling to provide further information on potential impacts from collision fatalities. Estimated collision risk fatalities for this species, both annually and over the proposed 35-year project lifespan, are summarised in **Table 8.23**. Further details of collision risk modelling are provided in **Appendix 8.2.**

Table 8.23: Summary of collision risk modelling for waterbird species

Species	Avoidance rate	Mean estimated collision fatalities	
		Per year	35 years
Cormorant	98%	0.244	8.566

Local population estimates are not available for these species, but national population estimates[60] consider cormorant (8,720 birds) to be locally common and widespread throughout Ireland. The estimated mortalities due to collision across the operational lifespan of the Project for cormorant would likely equate to considerably less than 1% of the county populations present. 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 that occur. As such, collision impacts on cormorant during the operation of the Project are considered to be **not significant**.

8.15.3.2.2 Raptors

The Site is assessed as being of Local (Higher value) importance for raptors including kestrel and peregrine. As previously discussed, the Site is dominated by pasture, arable land and hedgerows with occasional wet grassland and scrub with relatively low availability of higher quality foraging habitat for raptors. Removal of habitat (e.g. vegetation clearance) to facilitate operational maintenance of the Project is anticipated to be limited in extent, involving only very small areas of low-quality foraging habitat, and no significant removal of suitable nesting habitat for raptors will occur. This is therefore highly unlikely to significantly affect prey availability, particularly in the context of habitat availability in the wider landscape. Considering this, likely effects from habitat loss and fragmentation during the operation of the Project on raptors are deemed negligible and **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 500m of turbines[61], considering the level of raptor activity recorded within and adjacent to the Site, lack of evidence of breeding activity within the Site, the conservation statuses of these species and the low suitability of habitat within the Site in comparison with more suitable habitat within the wider landscape, 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 to be negligible and **not significant**.

[60] See https://cdr.eionet.europa.eu/Converters/run_conversion?file=/ie/eu/art12/envuvesya/IE_birds_reports-14328-144944.xml&conv=343&source=remote#A683_W (Accessed 11 December 2024)

[61] Pearce-Higgins, J.W., Stephen, L., Langston, R.H.W., Bainbridge, I.P. & Bullman, R. (2009) *The distribution of breeding birds around upland wind farms*. Journal of Applied Ecology, 46, 1323-1331.

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 kestrel and peregrine based on field survey data collected for the Site between 2020 and 2024.

To establish whether there is any potential for significant effects on kestrel and peregrine flying within the wind farm airspace through collisions with new turbines, collision risk modelling was undertaken (**Appendix 8.2**). An 'Airspace' model was adopted, incorporating all observations at risk height of raptors flying within the Wind Farm Area.

Estimated collision risk fatalities for these species, both annually and over the proposed 35-year project lifespan of the Project, are summarised in **Table 8.24**. Further details of collision risk modelling are provided in **Appendix 8.2.**

Table 8.24: Summary of collision risk modelling for raptor species

Species	Avoidance rate	Mean estimated collision fatalities	
		Per year	35 years
Kestrel	95%	0.260	9.075
Peregrine	98%	0.001	0.219

Recent local population estimates are not available for these species, but kestrel is considered locally widespread and common while peregrine is a scarce increasing in population species in Ireland, reflected by its inclusion on the BoCCI Green List. National population estimates[62] for kestrel (21,220) and peregrine (515) indicate collision fatalities over the operational lifespan of the Project would likely 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 kestrel and peregrine are stated to be 31% and 19% respectively. As such, based on the anticipated number of collision fatalities, collision impacts on kestrel and peregrine during the operation of the Project are considered **not significant**.

8.15.3.2.3 Gulls

Airspace over the Site has been assessed as Local (Higher value) importance for use by in-flight numbers of black-headed gull (non-breeding) and lesser black-backed gull (all

[62] See https://cdr.eionet.europa.eu/Converters/run_conversion?file=/ie/eu/art12/envuvesya/IE_birds_reports-14328-144944.xml&conv=343&source=remote#A683_W (Accessed 11 December 2024)

seasons), with birds recorded flying within the airspace in various directions without using habitats within the Site (e.g., for foraging, roosting or loafing) in notable numbers. Considering the type of activity for which the Site is used (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 gulls are therefore deemed negligible and **not significant**.

As gulls were observed using the 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 the 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 gulls 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 8.16**.

To establish whether there is any potential for significant effects on black-headed gulls and lesser black-backed gulls flying within the airspace of the Project through collisions with new turbines, collision risk modelling was undertaken (**Appendix 8.2**). An Airspace model was adopted, incorporating all observations at risk height of gulls flying within the airspace of the Site (i.e., excluding observations of birds evidently commuting directly through the Site).

Estimated collision risk fatalities for these species, both annually and over the proposed 35-year project lifespan, are summarised in **Table 8.25**. Further details of collision risk modelling are provided in **Appendix 8.2.**

Table 8.25: Summary of collision risk modelling for gull species

Species	Avoidance rate	Mean estimated collision fatalities	
		Per year	35 years
Black-headed gull	98%	0.216	7.574
Lesser black-backed gull	98%	0.843	29.503

Black-headed gull required additional modelling using a 'Fly Through' model due to the type of flight activity recorded. The combined collision fatalities from the Fly Through and Airspace models should be considered when assessing the potential total number of black-headed gull collision fatalities from the Project and the resultant significance of effects with regard to local populations of this species. Based on the combined outputs of both models, black-headed gull collision fatalities due to the Project are estimated as 0.211 birds per non-breeding season, equating to 7.379 birds over the operational lifespan of the Project.

Throughout the survey period, activity remained consistent for both species across multiple years. Black-headed gull activity was limited to the non-breeding season while greater activity for lesser black-backed gull was observed across both seasons. Both species are considered common and widespread species in Ireland, with national population estimates[63] of black-headed gull (50,181 birds) and lesser black-backed gull (10,363 birds) in 2006-2011.

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, and taking into account the national and regional population status of these species, collision impacts on black-headed gull and lesser black-backed gull during the operation of the Project would be low and are considered **not significant**.

8.15.3.2.4 Waders

The Site is assessed as being of Local (Higher value) importance to: golden plover, lapwing and snipe. Whilst habitats on Site are suitable for these species, this habitat is relatively limited in extent in the context of the wider landscape, and the majority of observations were of individuals in flight rather than of birds using habitats on Site for foraging or roosting. No evidence of breeding by any wader species was recorded during the targeted surveys. Although, as previously discussed, snipe were frequently flushed from suitable wet grassland during the breeding and non-breeding seasons.

Removal of habitat (e.g., vegetation clearance) to facilitate operational maintenance of the Project would be limited in extent, likely involving only very small areas of suitable wader habitat. There would therefore be no significant reduction in the suitability of the Site for

[63] See https://cdr.eionet.europa.eu/Converters/run_conversion?file=/ie/eu/art12/envuvesya/IE_birds_reports-14328-144944.xml&conv=343&source=remote#A683_W (Accessed 11 December 2024)

wader species due to operational maintenance. Considering this, and the limited level of wader activity recorded on the Site, likely effects from habitat loss and fragmentation during the operation of the Project are deemed negligible and **not significant**.

Research on post-construction monitoring during the operational phase indicates that golden plovers may reduce their use of habitat within 200m of turbine bases[64], whilst a further review of 29 other studies suggests golden plovers will approach wind turbines to an average distance of 175m during the non-breeding season, (Hotker *et al.,* 2006)[65]. However, post-construction monitoring at 15 upland wind farms has shown no significant decline in populations, (Pearce-Higgins *et al.,* 2012)[66], especially when there are extensive areas of suitable retained habitat in the wider area. In contrast, lapwing are understood to be significantly disturbed by larger turbines in the non-breeding season with avoidance distances greatly increasing[65]. However, as discussed previously this contrasts with literature for snipe which suggests a persistent decline of populations throughout the construction phase into the operational phase within upland wind farms[66].

Snipe were frequently observed flying low or roosting within wet grassland in the breeding (passage only) and non-breeding seasons but unlikely to be in sufficient numbers for the Project to provide a significant effect from disturbance and displacement during the operational phase. While golden plover and lapwing were infrequently observed foraging in low numbers and had no evidence of roosting activity within the Site, with observations typically consisting of flocks of birds in flight. Therefore, displacement of birds flying through Site airspace is more likely to be as a result of turbine operation. However, 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 waders due to disturbance and displacement during operation are considered **not significant**.

All three species were recorded flying within the potential collision risk zone throughout the survey period between 2020 to 2024. Golden plover were only observed in the non-breeding season while lapwing and snipe were observed in the breeding and non-breeding seasons.

[64] Pearce-Higgins, J.W., Stephen, L., Langston, R.H.W., Bainbridge, I.P. & Bullman, R. (2009). The distribution of breeding birds around upland wind farms. *Journal of Applied Ecology*, 46, 1323-1331.

[65] Hotker, H., Thomsen, K.M. & Jeromin, H. (2006). Impacts on biodiversity of exploitation of renewable energy sources: the example of birds and bats – facts, gaps in knowledge, demands for further research, and ornithological guidelines for the development of renewable energy exploitation. Michael-Otto-Institut im NABU, Bergenhusen.

[66] Pearce-Higgins, J.W., Stephen, L., Douse, A. & Langston, R.H.W. (2012). Greater impacts of windfarms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. *Journal of Applied Ecology,* **49**, 386–394.

There is therefore potential for impacts from collisions with the proposed turbines, potentially resulting in injury and/or fatalities. Collision risk modelling was therefore undertaken for these species to inform this assessment.

Estimated collision risk fatalities for these species, both annually and over the proposed 35-year project lifespan, are summarised in **Table 8.25**. Further details of collision risk modelling are provided in **Appendix 8.2.**

Table 8.26: Summary of collision risk modelling for wader species

Species	Avoidance rate	Mean estimated collision fatalities	
		Per year	35 years
Golden plover	98%	0.398	13.922
Lapwing	98%	0.082	2.876
Snipe	98%	0.202	7.057

Based on 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 that occur. Considering these estimated collision fatalities in the context of the national and regional status of these species, collision impacts on golden plover, lapwing and snipe during the operational phase of the Project would affect considerably less than 1% of the county populations in the respective activity seasons and are therefore considered **not significant**. This is further justified when considered in the context of the annual background rates of mortality for these species, which for adult birds is 27%, 30% and 51% respectively (based on the mortality rates taken from the BTO Bird Facts website).

8.15.3.2.5 Non-target species

The Site is assessed as being of Local (Higher value) importance for non-target notable bird species such as meadow pipit (all seasons), skylark (non-breeding), starling (all seasons), swallow (breeding) and redwing (non-breeding). Habitats within the Site provide opportunities for these species during the breeding and non-breeding seasons. As such, the removal of vegetation 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 would 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. As

such, likely effects from habitat loss and fragmentation during the operation of the Project would be **not significant**.

Regarding effects from operational disturbance due to additional noise, vibration, light, and human activity associated with the Project, 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 would be small-scale in the context of undisturbed suitable habitat within the Site and the wider landscape. As such, operational disturbance and displacement effects on these farmland bird species would be **not significant**.

Due to their size and typical flight patterns, non-target farmland bird species such as those identified as being of Local (Higher value) importance are not considered to be susceptible to collisions with new wind turbines. As such, 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**.

8.15.3.2.6 Summary

Table 8.27: Operational effect characterisation for Key Ornithological Features

Key Ornithological Feature	Effect	Magnitude of effect	Significance of effect
Cormorant	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
	Collision risk	Negligible	Not significant
Raptors	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
	Collision risk	Negligible	Not significant
Gulls	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
	Collision risk	Low	Not significant

Key Ornithological Feature	Effect	Magnitude of effect	Significance of effect
Waders	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
	Collision risk	Negligible	Not significant
Non-target species	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
	Collision risk	Negligible	Not significant

8.15.3.3 Decommissioning Effects

The assessment of effects on ornithological features during the decommissioning phase of the Project is described below and summarised in **Table 8.28**. 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 Site predominantly comprises improved agricultural grassland (e.g. arable and pasture), 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 would 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 waders is unlikely and the extent of the habitat affected during decommissioning would 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 through natural revegetation 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 would be **not significant**.

Decommissioning works would likely result in short-term disturbance as a result of increased noise and human presence, which could lead to energetic stress and a reduction in breeding success of certain bird species. However, such impacts would be experienced on a temporary basis only and would not be expected to affect the population status of any bird populations within the Zone of Influence. 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 that exist and would 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**.

8.15.3.3.1 Summary

Table 8.28: Decommissioning effect characterisation for Key Ornithological Features

Key Ornithological Feature	Effect	Magnitude of effect	Significance of effect
Cormorant	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Raptors	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Gulls	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant
Waders	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant

Key Ornithological Feature	Effect	Magnitude of effect	Significance of effect
Non-target species	Direct habitat loss and fragmentation	Negligible	Not significant
	Disturbance and displacement	Negligible	Not significant

8.15.4 Cumulative Effects

As described in **Chapter 2: Project Description,** a planning search was carried out to identify permitted and constructed projects in the wider receiving environment. Cumulative effects are defined by CIEEM (2018)[67] as: "*Additional changes caused by a proposed development in conjunction with other developments or the combined effect of a set of developments taken together*".

As per SNH guidance[68] on Assessing the Cumulative Impacts of Onshore Wind Energy Developments, 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).

8.15.4.1 Projects with potential to cause cumulative effects

8.15.4.1.1 N/M20 Upgrade Works

The proposed N/M20 Cork to Limerick Improvement scheme (case reference: NA04.310286) will improve connectivity between Cork and Limerick and provide safer and more efficient journey times. The route extends 80km from Blarney, Co. Cork to Patrickswell, Co. Limerick.

While it could be several years before a consent application is made, it is possible that within the 10-year lifetime of consent requested for the Project, this proposed development has a

[67] CIEEM. (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.3 – Updated September 2024. [Available at: Guidelines for Ecological Impact Assessment (EcIA) | CIEEM – accessed November 2024].

[68] Scottish Natural Heritage (2018) *Assessing the cumulative impacts of onshore wind farms on birds.* Scottish Natural Heritage, Inverness.

reasonable prospect of either being submitted for planning consent or commencing construction by this time. Also, two of the TDR routes examined in this chapter will cross the proposed N/M20 corridor in certain areas.

An Environmental Impact Assessment has been conducted with associated baseline ecological surveys. Surveys recorded the presence of a relatively low number of bird species with the outcome of the EIAR showing that the proposed development will have no significant effects upon ornithological features after mitigation. With appropriate mitigation in place, cumulative effects on the KOFs considered within this assessment would be unlikely.

8.15.4.1.2 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 effects. The proximity of the wind farms and whether they are operational, permitted, or pending (proposed) has been considered within this assessment. Wind farm projects with the potential to give rise to cumulative effects are presented in **Table 8.29** below.

Table 8.29: Wind Farms within 20km of the proposed wind farm site

Development	Status	Distance/Direction	Number of Turbines	Tip Height
Rathnacally Wind Farm	Operational	c. 5.9km, south	2	
Boolard Wind Farm	Operational	c. 9.0km, south-west	2	
Kilmeedy Wind Farm	Operational	c. 16km, north-west	2	
Slivereragh Wind Farm	Operational	c. 19.3km, east	2	
Knocknatallig Wind Farm (formerly Buttevant Wind Farm	Operational	c. 11.3km, south	6	
Catlepook Wind Farm	Operational	c. 14km, south-east	14	
Kilberehert Wind Farm	Operational	c. 18.8km, south-west	3	

8.15.4.1.3 Other projects

Other projects identified in **Chapter 2** were considered within 10km for their potential to cause likely significant cumulative effects on the KOFs considered within this assessment, including: two solar farms located 3.8km north and 8.7km south-west respectively and a 56-unit residential development located 3.9km to the south. Other developments in the area either lie beyond the core ranges of the KOFs associated with the Project site and/or are not of a sufficient scale whereby significant cumulative effects with the Project would be likely. Such developments are therefore not considered further within this assessment.

8.15.4.2 Cumulative Effects 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 with road traffic and buildings, along with hunting and predation fatalities, are the most significant source of bird mortality (Wernham *et al.,* 2002)[69]. Observations of flightlines of key target species made during the breeding and wintering VP surveys indicate that the Site is not situated along any particularly important commuting routes for these species. The closest wind farm (Rathnacally Wind Farm) consists of two turbines situated 5.9km south of the Site with the remaining six wind farms located >9km from the Site. Considering the distance of the wind farms from the Site, density of turbines in proximity of the Site and population status of this species, significant cumulative displacement/barrier and collision risk effects are not anticipated.

[69] Wernham, C.V., Toms, M.P., Marchant, J.H., Clark, J.A., Siriwardena, G.M. & Baillie, S.R. (eds) 2002. The Migration Atlas: movements of the birds of Britain and Ireland. T. & A.D Poyser, London

8.15.4.3 Summary of assessment of cumulative effects

Following consideration of the impact assessment, it is noted that the Project on its own, would not result in any significant effects upon any of the identified KOFs that would be sensitive to impacts from developments in other areas. No additive, antagonistic, or synergistic effects have been identified with regard to habitat loss, displacement, and collision mortality and no potentially significant cumulative effects are likely.

8.16 MITIGATION AND ENHANCEMENT MEASURES

8.16.1 Scope

This section describes recommended mitigation measures for the avoidance of the potentially significant effects on KOFs described in **Section 8.13.7**. These measures will be implemented in addition to the embedded mitigation described in **Section 8.14**, 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 (**Section 8.5**), 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. A Biodiversity and Enhancement Plan has been produced for the Project (**Appendix 6.2**) to ensure that the Site is managed in the interests of biodiversity and that ongoing management is successful in achieving a net gain for biodiversity as described below within **Section 8.8**. These measures have been specifically aimed at benefitting birds, as well as other key ecological features.

8.16.2 Mitigation of Likely Significant Effects during Construction

Assessment of effects undertaken in **Section 8.15.3** 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 meadow pipit, skylark, starling, swallow and redwing; and
- Disturbance and displacement of these non-target farmland bird species.

As stated in **Section 8.14**, the Project design includes the following measures which will serve to minimise these effects:

- Retainment of areas of more important habitat as much as possible within the development design (e.g., waterbodies and hedgerows);

- Minimisation of the extent of habitat loss during construction as much as possible within the development design;
- Selection of delivery routes which use existing built infrastructure wherever possible, with laying of cables underground on the public roadway; and
- Presence of an ECoW on site to oversee any ornithological issues during construction.

8.16.3 Mitigation of Likely Significant Effects during Operation

The assessment of effects undertaken in **Section 8.15** identified no potentially significant effects on KOF during the operational phase of the Project and, as such, targeted mitigation during this period is not required.

8.16.3.1 Monitoring

During the operational phase, an avian fatality monitoring programme will be implemented within the operational wind farm. This will aim to confirm the accuracy of the collision risk modelling predictions that were made within this assessment. Carcasses of birds likely to be associated with collision with turbines will be searched for using specially trained cadaver dogs and their handlers. Monitoring will involve monthly (January-December) searches of carcasses within the first three years of operation and subsequently in years 5,7,10,15,20, 25, and 30, to ensure non-breeding and breeding species of birds are accounted for. All feather spots and bird carcasses will be photographed and logged in an annual fatality search report, which will be submitted to relevant stakeholders and the planning authority for consultation.

The results obtained from monitoring will be analysed to determine whether EIAR predictions were accurate and whether any additional mitigation measures may be required.

8.16.4 Mitigation of Likely Significant Effects during Decommissioning

The assessment of effects undertaken in **Section 8.15** did not identify potential 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 8.14,** will not be required.

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

Following reinstatement, the Site would 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 would 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.

8.16.5 Enhancement Measures

In accordance with ecological best practice, enhancements will be delivered to ensure the Project has an overall positive effect on ornithological features. Habitat enhancements are detailed within the BEMP (**Volume III, Appendix 6.2**), which presents the objectives and targets of the BEMP along with prescriptions for management and monitoring to achieve such aims.

Following the proposed loss of 1,649m of hedgerow and tree lines associated with the Project, the BEMP commits to replacement planting of 1,359m of new hedgerow and enhancement of 4,074m of existing unmanaged hedgerows.

Consideration has been given to the location of new and enhancement habitats with regard to potential collision impacts; for example, features targeting species susceptible to collisions with turbines will be located away from turbines and in areas that would not encourage commuting routes through the wind farm area.

Proposed enhancements would aim to target the KOFs identified in this assessment, as well as species of conservation concern in Ireland (i.e., BoCCI Red and Amber Listed species). Specifically, proposed enhancements would be considered for farmland species such as passerines (e.g., skylark), barn owl and waders such as snipe. The provision of the management plan will ensure that enhancements establish successfully and deliver long-term benefits. The following measures have been proposed to enhance the Site and/or adjacent land for ornithological features:

- **Hedgerows:** New planting, enhancement and revitalisation to provide additional nesting, foraging, and commuting habitats for a range of species, primarily scrub dwelling passerine species. Planting will use native plant species of local provenance and of known value to wildlife, whilst rotational management regimes will be adopted to newly planted and existing hedgerows to create varying age structures which would be favoured by different species and at different times of the year.

- **Native woodland:** Establishment of an area of 0.67 ha of native woodland

In addition to the natural nesting habitat (e.g., trees and hedgerows) described above, nest boxes will 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 will 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. These nest boxes will be installed in hedgerows and distributed throughout the southern aspects of the site;
- Two kestrel nest boxes: to be installed on suitable trees or buildings near suitable grassland foraging habitat, at least 500m 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 500m from any turbines.

The habitat creation and enhancement measures outlined in the BEMP will benefit owls (e.g barn owl) and raptors (e.g. kestrel) by extending and improving foraging habitat for small mammals, which are their primary food resource, as well as by providing additional nesting/roosting opportunities.

8.17 RESIDUAL EFFECTS

The following features were identified as KOFs and were therefore subject to detailed assessment of effects:

- Cormorant
- Raptor species (specifically kestrel and peregrine);
- Gull species (specifically black-headed gull and lesser black-backed gull);
- Wader species (specifically golden plover, lapwing and snipe); and
- Non-target farmland bird species (e.g., meadow pipit, redwing, skylark and starling).

As described in the assessment of effects presented in **Section 8.15**, taking into consideration embedded mitigation within the Project design, only effects on non-target farmland bird species were assessed as being potentially significant. Effects on all other KOFs were assessed as being not significant.

Additional mitigation and enhancement measures to avoid significant effects on bird populations are specified in **Section 8.16**. Considering the scope for effects from the Project, and the importance and sensitivities of the KOFs, it is deemed that these measures will provide sufficient compensation of nesting habitat, foraging opportunities and retain connectivity within the site once implemented and will provided overall benefit for non-target species within the Site and therefore will be sufficient to mitigate significant habitat loss, disturbance and displacements effects on non-target farmland bird populations. Therefore, no significant residual effects are anticipated. Additionally, further enhancements laid out within the BEMP (**Appendix 6.2**) would ensure that the Project has an overall positive effect on those sensitive ornithological features identified within this assessment as well as biodiversity as a whole.