MWP

Chapter 7 Ornithology

Ballinla Wind Farm

Ballinla Wind Farm Limited

August 2025

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7. Ornithology

7.1 Introduction

This chapter considers the potential effects the Proposed Development (described in Chapter 2) may have on avifauna within the study area. This chapter considers the potential effects with regard to each phase of the development: construction phase, operational phase and the decommissioning phase. A full description of the Proposed Development, development lands and all associated project elements is provided in **Chapter 2** of this **EIAR**. The nature and probability of effects on avifauna arising from the overall project has been assessed and appropriate mitigation measures are described to avoid or reduce potential significant negative effect(s).

Assessment of collision risk was undertaken based on the Vestas V162 which has been selected as the turbine model to be installed at the proposed development. Based on this turbine model and project-specific dimensions, the turbine dimensions assessed are as follows:

- Hub height: 104m
- Blade diameter: 162m
- Blade radius: 81m
- Maximum swept height: 185m
- Minimum swept height: 23m

The ornithological assessment comprises:

- A review of the existing receiving environment.
- Prediction and characterisation of likely impacts.
- Evaluation of effects significance.
- Consideration of mitigation measures, where appropriate.

Ornithological surveys adhered to Scottish Natural Heritage guidance (SNH, 2017) and included:

- Vantage Point (VP) surveys.
- Hinterland surveys.
- Breeding Bird Transect surveys.
- Winter Bird Transect surveys.
- Breeding Wader surveys.
- Hen Harrier Roost Surveys.
- Nocturnal Migration Audio Surveys.

7.1.1 Competency of Assessor

The lead author of this chapter is Ben O'Dwyer (BSc. Wildlife Biology (Hons)). This chapter was reviewed by Steven Tooher and Rita Mansfield.

Background information and biographies of report authors and ornithological surveyors are presented in Table 7-1.

Table 7-1: Biographies of Authors and Ornithological Surveyors

Name	Role	Biography
Ben O'Dwyer	EIAR Ornithological assessment lead author Audio surveys and assessment (nocturnal whooper swan activity survey)	Ben is a Senior Project Ecologist with Fehily Timoney with 9 years' experience in ecological assessment and holds a BSc (Hons) in Wildlife Biology from Institute of Technology Tralee (now MTU). Ben has prepared EcIAs, EIAR Biodiversity chapters, AA Screening reports and Natura Impact Statements for numerous large scale infrastructure projects in the renewable energy, commercial, waste management and transport sectors. He is an experienced and versatile field surveyor and his experience across a broad range of habitats and projects in Ireland has given him an extensive knowledge of protected sites and species across the country.
Steven Tooher	EIAR Ornithological assessment reviewer	Steven Tooher ACIEEM is a Principal Ecologist with Fehily Timoney and Company and has over 10 years' ecological consultancy experience. He has led and contributed to surveys and EIA/AA reports for a range of large-scale developments across several industries in the Republic of Ireland and the UK. He holds a BSc (Hons) in Zoology from University College Cork and a MSc in Environmental Resource Management from UCD.
Rita Mansfield	EIAR Ornithological assessment reviewer	Rita holds a BSc.(Hons) in Applied Ecology and a H. Dip Environmental Protection and Pollution Control. Rita is a Principal Ecologist and Associate Director with 20 years' experience as a technical ecology lead within the environmental and planning services sector. She specialises in statutory consent and environmental assessment for large scale public infrastructure projects in the energy, water (including flood relief schemes) and transport sectors. She is a qualified ecologist with responsibility for environmental impact assessment, planning applications (conventional and strategic infrastructure development), Appropriate Assessment, foreshore licensing, and stakeholder engagement for large scale plans and projects in Ireland, including for wind energy developments.
Orla Commins	EIAR Ornithological assessment co-author	Orla Commins is a Graduate Ecologist with Fehily Timoney and Company. She holds a first-class BSc in Ecology and Environmental Biology from University College Cork and has previous experience in ornithological field work, collision risk modelling and analysis. Since joining Fehily Timoney, she has prepared AA screening reports and NIS's for numerous projects and has completed ornithological reports, field work and data management.
Jon Kearney	Collision Risk Model (CRM)	The CRM was carried out by Jon Kearney (FT Technical Director of Ecology, BSc. Applied Ecology, MSc. Ecological Management and Biological Conservation). Jon has 20 years of ecological consultancy experience working in both the UK and Ireland.
Jason Cahill	Audio surveys (nocturnal whooper swan activity survey)	Jason holds a degree in B.Sc. (Hons) in Field Biology with Wildlife Tourism, Institute of Technology Tralee. He has four years postgraduate experience and is a Project Ecologist with Fehily Timoney. Jason has experience in various field surveys including bird, bat, mammal, habitat, invasive species, and freshwater surveys. He also has experience undertaking Appropriate Assessments and Environmental Impact Assessments for developments including wind farms, solar farms, and various urban developments. Jason has worked as an Ecological Clerk of Works on a large-scale infrastructure development and several smaller projects.
Lorraine Benson	Ornithological surveys	Lorraine is an Ecologist with a Masters in Environmental Science from UCD. She has published in Irish Birds and Bird Habitats in Ireland and has led a campaign to recover and restore large scale habitats in Kildare for birds and nature. Lorraine is an experienced ornithologist, with experience carrying out bird surveys for both ecological consultancies and voluntary organisations.
John Fox	Ornithological surveys	John Fox holds a diploma in Field Ecology and has been actively involved in surveying birds since 2005. He is an active member of BirdWatch Ireland and the Irish Wildlife Trust and was a leader of bird outings with the Irish Wildlife Trust for 8 years. He has been a field surveyor for the Bird Atlas 2007-2011 and has also been involved with other national surveys for BirdWatch Ireland, such as IWeBS surveys at North Bull Island and waterbird surveys at Dublin Bay and other locations. Furthermore, he performed breeding hen harrier

Name	Role	Biography
		surveys for the Irish Raptor Group. He has extensive experience in bird survey techniques and has performed winter birds surveys, breeding bird surveys, vantage point and hinterland surveys as well as waterbird surveys. He has also performed birds surveys at an active wind farm site. John Fox is very active in the Irish birding community and has also won several wildlife photography competitions.
Mark Shorten	Ornithological surveys	Mark Shorten has been birding actively since 1975 and has been involved in many conservation projects and surveys since then. He has contributed to the Winter Atlas, Breeding Atlas (1988-91 and 2007-11), Chough Survey 1993, Cork Seabird survey 1985, Cork Harbour Counts 1978-2005, Country Bird Survey and Dragonfly Atlas. He was editor of the Cork Bird Report 1990-95 and is the designated Cork bird recorder 1990-2021 and is joint author of 'The Birds of County Cork'. He also wrote the original proposal to create a Harper's Island bird reserve and is involved in its management. Since 2018 he has worked on the BRIDE Project as a bird surveyor and has been involved in scoring Results Based Payments. Since 2019 he has worked as a bird surveyor on various windfarm projects in Kerry, Cork, Offaly, Laois and Carlow for Ecology Ireland, Tobin, INIS, and Fehily Timoney. Waterfowl monitoring has been carried out for INIS and Atkins. He has a particular interest in bird sound recording and has developed an expertise in nocturnal migration (NocMig) and bird call identification. He has sound recorded over 130 species in Ireland.
Brian McCloskey	Ornithological surveys	Brian McCloskey is an experienced Ornithologist with a BSc in Planning and Environmental management from the Technological University of Dublin (TUD) and 12 years of bird survey experience, including three years of professional Ornithology work. Brian is a longstanding and active member of Bird Watch Ireland and is also the author of several articles in UK birding publication Birdwatch Magazine. He is highly experienced in all survey methodologies and with surveying all species groups of Irish birds and migrants, having provided a range of ornithology survey work for ecological consultancies, e.g., vantage points surveys of gulls, terns, raptors, waders and wildfowl. hinterland surveys of the above as well as riverine species.. breeding waders and country birds.
Adrian Allen	Ornithological surveys	Adrian holds a BSc in Environmental management, is a Qualifying Member of CIEEM, a member of the British Trust for Ornithology and the Botanical Society of Britain and Ireland. Adrian is a skilled and highly experienced ornithologist, with over 20 years' experience carrying out bird surveys for various organisations including ecological consultancies. These surveys include general breeding/wintering bird, hinterland, vantage point, breeding waders/raptors and specialised surveys for hen harrier, merlin, barn owl and woodcock. Adrian has experience in using a range of bird survey methodologies in an ecological consultancy capacity across various proposed wind energy projects. His surveys adhere to the required standards (SNH, 2017) and the survey methodologies he employs are the most up to date, ensuring his survey work is robust and adheres to best practice and relevant guidelines.
Cian Cardiff	Hen harrier roost surveys	Ornithologist with many years' experience, field surveyor and consultant since 2019 (undertook training in with Veale Ecology). Also studied bird biodiversity and survey techniques, working on a broad range of bird studies, including reporting covering of field studies findings carried out by CC Ornithology, bird tour guide, public speaker, writer (has written many articles on birds and bird identification) and photographer. Owner of CC Ornithology and the life of an Irish Birder (bird tour guiding).
Thomas Cardiff	Hen harrier roost surveys	Lifelong ornithologist, working as a professional field surveyor since 2021 with CC Ornithology. Completed training in field surveying for ecological consultancy with CC Ornithology. Experienced in a broad range of field survey methods including vantage point watches, breeding bird and breeding water transects, woodcock surveys, I-WeBs counts and hen harrier roost watches.
Patrikios Antonakis	Hen harrier roost surveys	Patrikios Antonakis holds a BSc in Zoology as well as an MSc in Biotechnology. He has experience as a bird surveyor since 2017 and has worked most extensively with wetland- and seabirds in Scotland and Ireland. He has been involved with monitoring breeding colonies of sea birds and managing habitats to control vegetation encroachment on breeding habitat. He has also performed surveys for breeding and wintering farmland birds, breeding waders and raptors. He has spent 3 years as a Reserve Officer at Forvie NNR for NatureScot. Patrikios as most recently worked on VP surveys and hen harrier roost surveys for wind farm projects in Ireland.

7.1.2 Legislation

7.1.2.1 European Legislation

The EU Habitats Directive (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna) (as amended) (the 'Habitats Directive') together with the Birds Directive (Council Directive 2009/147/EC on the Conservation of Wild Birds) (as amended) (the 'Birds Directive') are the main legislative instrument for the protection and conservation of biodiversity within the European Union (EU).

The Habitats Directive lists habitats and species that must be protected within Special Areas of Conservation (SAC) within Annexes I and II, respectively. The Habitats Directive also identifies plant and animal species within Annex IV which are subject to strict protection anywhere they occur.

The Birds Directive provides for the identification of a network of sites in all member states to protect birds at their breeding, feeding, or roosting areas. The Birds Directive identifies in Annex I species that are rare, in danger of extinction, or vulnerable to changes in habitat and which require special protection and areas for their conservation: Special Protection Areas (SPA).

The Habitats Directive and Birds Directive have been transposed into Irish law, by Part XAB of the Planning and Development Act 2000 (as amended) and by the European Communities (Birds and Natural Habitats) Regulations 2011, as amended.

7.1.2.2 National Legislation

The primary domestic statute providing for wildlife protection in Ireland is the Wildlife Act of 1976 as amended (the 'Wildlife Act'). All bird species are protected under the Wildlife Acts from offences including intentional killing or injury and disturbance during the breeding season (to include eggs, young, and nests which are also protected). A range of mammal species, two amphibian species, one butterfly species, and one reptile species are all similarly protected from intentional killing or injury, whilst the breeding or resting Sites of these species are also protected. The amendment to the Act in 2000 broadens its scope to include fish and aquatic invertebrate species. The Act also provides a mechanism to give statutory protection to Natural Heritage Areas (NHAs).

The Wildlife (Amendment) Act 2023 introduced a new public sector duty on biodiversity. The legislation provides that every public body, as listed in the Act, is obliged to have regard to the objectives and targets in the National Biodiversity Action Plan (2023-2027).

7.2 Methodology

7.2.1 Desktop Study

The methodology used for this study included desk-based research of published information and site visits to assemble information on the local receiving environment.

A desk study was carried out to collate and review available information, datasets and documentation sources pertaining to the natural environment in which the Proposed Development is situated.

Records available on the NPWS and the National Biodiversity Data Centre (NBDC) websites were reviewed (search updated 3rd July 2025), in addition to records of rare/sensitive species within the hectads (10km grid squares) N52 and N53 overlapping the Site obtained by request from NPWS (received 25th March 2024).

NBDC data for the 1km grid squares overlapping the Proposed Grid Connection and Proposed TDR works (N4121, N5630, N5631, N5730, N5830, N5831, N5929, N5930, N6026, N6027, N6028 and N6029) (search updated 5th August 2025) provided desktop information for these locations.

The desk study collated and analysed ornithological data from the following sources:

- National Parks and Wildlife Service (NPWS) website (mapviewer).
- National Biodiversity Data Centre (NBDC) website and data.
- Irish Wetland Bird Survey I-WeBS datasets.
- Bird Atlases, including Ireland's Wetlands and their Waterbirds: Status and Distribution (Crowe 2005), the Atlas of Wintering Birds in Britain and Ireland (Lack, 1986), the Atlas of Breeding Birds in Britain and Ireland (Sharrock, 1976) and the Breeding and Winter Birds of Britain and Ireland Bird Atlas 2007-11 (Balmer et al., 2013).
- I-WeBS site counts
- Wetlands Ireland GIS resource/register of wetland sites
- OSI Aerial photography and 1:50000 mapping.
- Google Maps/Street View
- EPA Maps

7.2.1.1 Designated Nature Conservation Sites

SACs and SPAs for Birds are designated under the EU Habitats Directive and EU Birds Directive, respectively and are collectively known as 'European Sites'.

In relation to European Sites, a Natura Impact Statement has been prepared to provide the Competent Authority with the information necessary to complete an Appropriate Assessment of the Proposed Development in compliance with Article 6(3) of the Habitats Directive. The potential for likely significant effects on European Sites and potential to adversely affect the integrity of European Sites is fully assessed within the Natura Impact Statement (NIS), that accompanies this application.

NHAs are designated under Section 18 the Wildlife (Amendment) Act 2000 and their management and protection is provided for by this legislation and planning policy. Proposed Natural Heritage Areas (pNHAs) were designated on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. Nationally designated Sites that are also designated as European Sites have been assessed as those designations within the NIS, with the relevant conclusions recorded and referenced in this chapter.

The following methodology was used to establish which protected sites designated for nature conservation are within the Likely Zone of Influence (ZoI) of the Proposed Development and have the potential to be effected by the Proposed Development:

Initially the most up to date GIS spatial datasets for European and Nationally designated sites were downloaded from the NPWS website (www.npws.ie) on 8th April 2025. The datasets were utilised to identify Designated Sites which could feasibly be affected by the Proposed Development. All Designated Sites that could potentially be affected were identified using a source-pathway-receptor model.

Waterbody catchment mapping was used to establish or discount potential hydrological connectivity between the Proposed Development and any designated sites. The hydrological catchments are also shown in Chapter 8 Hydrology and Water Quality.

7.2.2 Guidelines and Best Practice

The methodology for this assessment has been devised in accordance with the following relevant guidance published by the Environmental Protection Agency (EPA) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (EPA, 2022) and 'Guidelines for Planning Authorities and An Bord

Pleanála on carrying out Environmental Impact Assessment' (DoHPLG, 2018) and the Chartered Institute of Ecology and Environmental Management (CIEEM) 'Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (Version 1.1)' (CIEEM, 2018 and revisions).

Additional guidance available from the EU such as 'Guidance document on wind energy developments and EU nature legislation' (2020) and 'Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment' (2013) has also been applied. The Heritage Council publication 'Best Practice Guidance for Habitat Survey and Mapping' (Smith et al., 2011) is also referenced.

Relevant guidance published by the National Roads Authority (NRA) such as 'Guidelines for Assessment of Ecological Impacts of National Road Schemes' (2009a) has been applied.

Relevant guidance from Scottish Natural Heritage (SNH) in relation to birds such as SNH Recommended bird survey methods to inform impact assessment of onshore windfarms (2017), 'Survey Methods for use in assessing the impacts of onshore wind farms on bird communities (2005 & 2010)' and 'Assessing the cumulative impact of onshore wind energy developments (2012)' have also been applied. Guidance used to inform Collision Risk Modelling (CRM) included Band (2024) 'Using a collision risk model to assess bird collision risks for onshore wind farms' and NatureScot (2025) 'Wind farm impacts on birds-Use of Avoidance Rates in the NatureScot Wind Farm Collision Risk Model'.

Documentation available from Offaly County Council (OCC) such as the 'Adopted Offaly County Development Plan: 2021-2027' have been reviewed and utilised where relevant.

7.2.3 Determining the Zone of Influence (ZoI)

As per CIEEM guidelines (2018), the study area for the Proposed Development has been defined having regard to the spatial and temporal scale of potential biophysical changes in the environment which might occur as a result of the development and throughout its lifetime. Consideration is given to the following:

- The characteristics, size and location of the Proposed Development.
- Whether there could be landscape or ecological connectivity to any ornithological receptor or their supporting habitat.

As such the study area extends beyond the footprint of the works and associated red line boundary and considers potential for direct and indirect links to ornithological receptors and associated ecological structure and function needs. From this, the Key Ecological Receptors (KER) are identified and are considered further in terms of their ZoI (i.e. the pathway for an effect on the KER (as determined through source-pathway-receptor/target model) and the sensitivity of the KER to the effect as informed by best available guidance/data.

7.2.4 Consultation

The following statutory and non-statutory bodies were issued with consultation requests in relation to potential effects on ecological receptors arising from the Proposed Development:

- An Taisce
- Department of Housing, Local Government & Heritage
- Inland Fisheries Ireland (IFI)
- Heritage Council
- Waterways Ireland

- Birdwatch Ireland
- Friends of the Earth
- Friends of the Irish Environment
- Irish Peatland Conservation Council
- Irish Wildlife Trust

A full list of consultees is available in Volume II Appendix 1-2 of the EIAR.

No responses relevant to ornithology other than acknowledgement of consultation requests were received.

7.2.5 Study Area

The study area for flight activity surveys is comprised of the vantage point viewsheds which encompass a 500m buffer (per SNH, 2017) around proposed turbine locations. Breeding and wintering bird transect surveys sampled the habitats at the Proposed Development. Breeding wader surveys encompassed sampling of the proposed development infrastructure footprint and also extended to cover potentially suitable wader habitats in areas adjacent and surrounding the Site. Hinterland surveys encompassed the areas surrounding the Proposed Development (extending to 6km from Proposed Wind Farm boundary, as per SNH (2017)).

The Proposed Wind Farm is located approx. 4km west of Edenderry, Co. Offaly. Orthophotography indicates the proposed site is dominated by agricultural land and woodland with areas of peatland to the east and west of the southern section of the Proposed Wind Farm. The Proposed TDR will include development in the townlands of Leitrim, Ballyfore Big, Ballyleakin, and Ballina (Geashill By) Co. Offaly. The Proposed Grid Connection is approximately 8km and is located along road networks within the townlands of Lumville, Clarkville, Ballyfore Little, Griffinstown and Ballycullane.

The Grand Canal is to the north of the Proposed Development, approximately 500m from the nearest turbine, however there is no identified direct hydrological connection between the Proposed Development and the Grand Canal. A review of EPA (EPA, 2025) online mapping shows that the Proposed Development is located within the Barrow WFD Catchment (I.D.: 14) with a small section of the northern portion of the site within the Boyne WFD Catchment (I.D.: 07). The majority of the Proposed Grid Connection is also mapped with the Barrow WFD catchment with the exception of a small section of the northern portion of the site within the Boyne WFD Catchment (I.D.: 07).

Areas of flooded cutover bog are present in the surrounding hinterland, and two small artificial lakes and a flooded quarry are present c. 2km southeast of the Proposed Development (noted during site visits and examination of recent orthophotography).

7.2.6 Field Surveys

7.2.6.1 Overview of Surveys

Initial walkovers of the proposed development site and desktop assessments were carried out to identify suitable survey locations at the outset of surveys in April 2021.

Field surveys were undertaken to gather detailed information on bird distribution and flight activity in order to predict the potential impacts of the Proposed Development on birds.

Avian surveys encompassed the following survey types:

- Vantage Point (VP) Surveys:
    - Breeding Season: 2021, 2022 (refer to **Appendices 7-1 and 7-2).**
    - Winter Season: 2021/2022, 2022/2023, 2023/2024, 2024/2025 (refer to **Appendices 7-1, 7-2, 77-6 and 7-8).**
    - Migration Periods: Spring and Autumn 2022, April 2024 (refer to **Appendices 7-2 and 7-7)**.
- Hinterland Surveys:
    - Summer: 2021, 2022 (refer to **Appendices 7-1 and 7-2).**
    - Winter: 2021/2022, 2022/2023, 2023/2024, 2024/2025 (refer to **Appendices 7-1, 7-2 and 7-7).**
- Breeding Bird Transect Surveys:
    - 2021 and 2022 (refer to **Appendices 7-1 and 7-2).**
- Winter Bird Transect Surveys:
    - 2021/2022, 2022/2023, 2023/2024, 2024/2025 (refer to **Appendices 7-1, 7-2 and 7-5).**
- Breeding Wader Surveys:
    - Years: 2021, 2022 (refer to **Appendices 7-1 and 7-2).**
- Hen Harrier Roost Surveys (Winter 2023/2024) (refer to **Appendix 7-6).**
- Nocturnal Migration Audio Surveys (Spring and Autumn: 2024) (refer to **Appendix 7-7**).
- Whooper Swan Migration Surveys Winter 2023/2024, Autumn 2024 (refer to **Appendix 7-7**).

Bird surveys of the study area following SNH (2017) guidance were carried out during the winters of 2021/2022 and 2022/2023, as well as the summers of 2021/2022 and 2022/2023. Vantage point (VP) and hinterland surveys were undertaken across all survey seasons. Wader surveys and breeding bird transects were undertaken both summers, and winter bird transects completed each winter.

Additional surveys for Hen Harrier in the form of winter roost watches were completed in winter 2023/2024. Additional surveys targeting whooper swan migration were also undertaken, encompassing VP and hinterland surveys in winter 2023/2024 and autumn 2024, and nocturnal migration (NocMig) audio surveys in spring and Autumn 2024.

All survey methodologies are detailed below in Sections 7.2.6.3 to 7.2.6.9.

7.2.6.2 Target Species

The following criteria have been utilised to select target species for the current study. Scottish Natural Heritage (SNH) guidance (SNH, 2017) on the assessment of the effects of wind farms on ornithological interests suggests that there are four important species lists from which target species can be drawn, as follows:

- Species listed on Annex 1 of the Birds Directive (EC, 2009).
- Red-listed birds of Conservation Concern.
- Schedule 1 of the Wildlife and Countryside Act 1981 (not applicable in Ireland).
- Regularly occurring migratory species.

In the Irish context, it has been suggested that target species should be taken from species of conservation concern in Ireland (BOCCI) (Gilbert et al., 2021), those likely to occur within the vicinity of the Proposed

Development, and those most at risk from particular impacts such as disturbance and displacement (Nairn and Partridge, 2013).

'Birds of Conservation Concern in Ireland' (BoCCI) are classified into three separate lists: red, amber, and green. Red-listed species are of high conservation concern, Amber-listed species are of medium conservation concern and Green-listed species are considered to be of no conservation concern (Gilbert et al., 2021). To date, four BoCCI lists have been published with the current list by Gilbert et al., (2021) superseding the three former lists by Colhoun and Cummins (2013), Lynas et al., (2007), and Newton et al., (1999). The conservation status of bird species found in this study was assessed using the most recent (2021) BoCCI List (Gilbert et al., 2021).

The primary target species for these surveys were: all raptors and owls, all wild goose, swan and duck species, all waders, and all gull species.

Additionally, a review of the bird species listed on Annex I of the EU Birds Directive (2009/147/EC) was undertaken in assessing the conservation status of birds. Annex I species are afforded additional protection through the designation of SPAs throughout EU countries in addition to existing National legislation.

In addition to the above, consideration was given to species identified locally as being of conservation concern, regionally or those particularly susceptible to impact from the Proposed Development. Note that not all species on the above lists would be categorised as target species, e.g. most passerine species and general lowland farmland birds are not considered to be particularly susceptible to impacts from wind farms (SNH, 2017).

7.2.6.3 Vantage Point Surveys

VP surveys were carried out at the Proposed Wind Farm during the breeding (April to September 2021 & 2022 inclusive) and non-breeding (October 2021 – March 2022 & October 2022 – March 2023) seasons, in accordance with SNH methodology for onshore Wind Farms (SNH, 2017). Additional migration VP watches were also completed in Spring and Autumn of 2023.

A total of four VP locations overlooking the Ballinla study area were used during the VP survey (see Figure 7-1). These were chosen to cover specific viewsheds of the Proposed Development and to encompass the view of the developable area and a 500m buffer zone around the developable area (maximum possible turbine layout of the Proposed Wind Farm). SNH (2017) guidance states that viewsheds should cover a 500m circular buffer drawn around each proposed turbine location and this criterion is fulfilled (prior to turbine layout design) by ensuring the viewsheds cover the 500m buffer around the developable area. This buffer is referred to as the 'SNH Buffer' and constitutes the flight activity study area. Following the finalised turbine layout design freeze, the entirety of the 500m buffer around all proposed turbine locations was confirmed to be covered by the viewsheds used for VP surveys.

The locations of VPs 3 and 4 changed between summer 2021 and winter 2021-22. Relocation of VP3 (from VP3a to VP3b to VP3) was required due to access restrictions at the original VP location (VP3a). Relocation of VP4 (from VP4a to VP4) was required due to rewetting of the cutover bog the VP was originally located on, making it unsafe for continued access. Details of VP relocations are given in Table 7-2, and all VP/Viewshed combinations utilised are shown in Figure 7-1 to Figure 7-3. Combined viewshed coverage of the SNH buffer for the finalised turbine layout remained at 100% across all VP/Viewshed combinations and as such the relocation of VPs did not affect the efficacy of VP surveys.

The objective of VP survey watches is to collect data on target species that will enable estimates to be made of:

- The time spent flying over the defined survey area.
- The relative use of different parts of the defined survey area.

- The proportion of flying time spent within the upper and lower height limits as determined by the rotor diameter and rotor hub height.

VP locations were based on observations from walkover/reconnaissance surveys, viewshed analysis (using GIS) and collated information on known feeding and roosting sites from both desktop review and consultation. The number and location of vantage points was selected in order to achieve visibility of the entire study area and important features for birds in close proximity to the site (e.g., lakes, wetlands).

In line with recommended best practice (SNH, 2017, Band et al. 2007 and Band, 2024), viewshed analysis was undertaken using ARCMAP 10.4.1, to calculate a theoretical zone of visibility from each vantage point. Visibility is calculated from each vantage point along an invisible layer suspended at the predicted lowermost height passed through by the rotor blade tips, using an observer height of 1.5m. The following from SNH guidance in respect of priority areas for viewshed analysis is noted (emphasis added):

> *"Where the key purpose is to estimate the risk of collision with turbines, it is the visibility of the airspace to be occupied by the turbine rotors (the collision risk volume) that is of prime importance. Therefore, it is recommended that visibility be calculated using the least visible part of this airspace, i.e. an imaginary layer suspended at the lowermost height passed through by the rotor blade tips (typically about 20-30m above ground level). Predicting visibility at this level is a simple task using GIS, however it should be noted that the baseline should take account of any forestry or other features that will potentially obstruct the view. For example, forestry may be 10-30m high and if viewshed height is taken as 20-30m ground level the visible area could be overestimated if there is forestry within the viewshed. Being able to view all or most of the site to ground level can be helpful in gauging overall bird activity and usage of the site but is not as important as being able to view the collision risk volume"*

Following SNH guidance (2017), watches were conducted to sample diurnal and crepuscular activity of target species and exceeding the required effort from SNH.

Data recorded included flight activity of target species (flight height, duration, directionality) in addition to metrics such as flock size (per recorded transit) and time of observation. Detailed notes of each observation of a target bird species were recorded including behaviour, gender (where possible), numbers, flight height, associated habitat and the period of time spent within the study area. Successful foraging events were also noted if they arose. Other bird species seen or heard during the VP surveys were also recorded and were considered separately in the analysis as additional species. Flight activity was annotated onto field maps. Total numbers of birds present both on arrival at the VP and on departure was noted. Details of each flightpath observation are provided Volume 3 of this EIAR, in Appendices 7-1, 7-2 and 7-4. Binoculars and telescopes were used to scan for target species. Dictaphones were utilised to dictate bird heights whilst tracking flight events.

Flight heights were estimated visually as allowed for in SNH (2017) guidance. Flight height estimation using a clinometer or rangefinder is accepted as an alternative means of determining flight height however this is often not practicable (equipment may be clumsy and birds may be lost from view whilst trying to focus additional equipment on a target species rapidly moving out of sight). It should be noted that in practice many flocks of swans do not fly close enough to a surveyor for a rangefinder to be used, resulting in most flights heights being estimated in any case. As is often the case an experienced observer will be able to record accurate observations at a higher frequency.

VP surveys involved carrying out 2 x 3-hour VPs at each VP every month. As per SNH guidance (2017), 36 hours of VP effort was carried out at each vantage point during each surveyed breeding period, and 36 hours during each surveyed wintering period. Additional VP survey rounds (6 hours per VP) were conducted in April and

September/October 2022 to cover the spring and autumn migration periods, exceeding SNH (2017) requirements. The proportion of survey time that activity was recorded inside and outside the Proposed Wind Farm was used as part of the overall analysis and assessment of target species usage of the study area. Details of VP locations can be found in Table 7-2. All surveys were conducted during suitable weather conditions.

Flight durations were recorded in the following height bands: 0-15m, 15-30m, 30-100m, 100-200m and >200m. These height bands encompass the height band occupied by the proposed turbine blade sweep (23m – 185m). It is noted that the collision risk model (CRM) (Appendix 7.8) accounts for the percentage of each height band overlapped by the upper and lower blade sweep where the VP survey height bands are not fully overlapped by the blade-swept area. Other additional non-target species were also recorded where observed.

Table 7-2: VP Locations (Coordinates in ITM)

Site	VP ID	Eastings (ITM)	Northings (ITM)	Season
Ballinla	VP 1	658330.038	731741.432	All
	VP 2	654774.031	732654.246	All
	VP 3(a)	657774.9	729900.0	May-July 2021
	VP 3(b)	657366.0	730678.0	August-September 2021
	VP 3	656737.120	732654.246	Winter 2021/2022
	VP 4(a)	655300.0	729778.0	Summer 2021
	VP 4	655554.116	730804.789	Winter 2021/2022

7.2.6.3.1 Vantage Point Surveys – Additional Whooper Swan Survey Effort

Additional VP survey effort was completed during winter 2023/24 and autumn/winter 2024 (see Volume 3 of the EIAR, Appendices 7-1 and 7-2 for survey schedule). The methodology used for these surveys was the same as detailed in Section 7.2.6.3, except that watches were timed to take in the dawn and dusk periods to ensure periods with potentially higher levels of whooper swan activity were covered. The surveys were undertaken from the same VPs, detailed in Figure 7-1. All surveys were conducted during suitable weather conditions.

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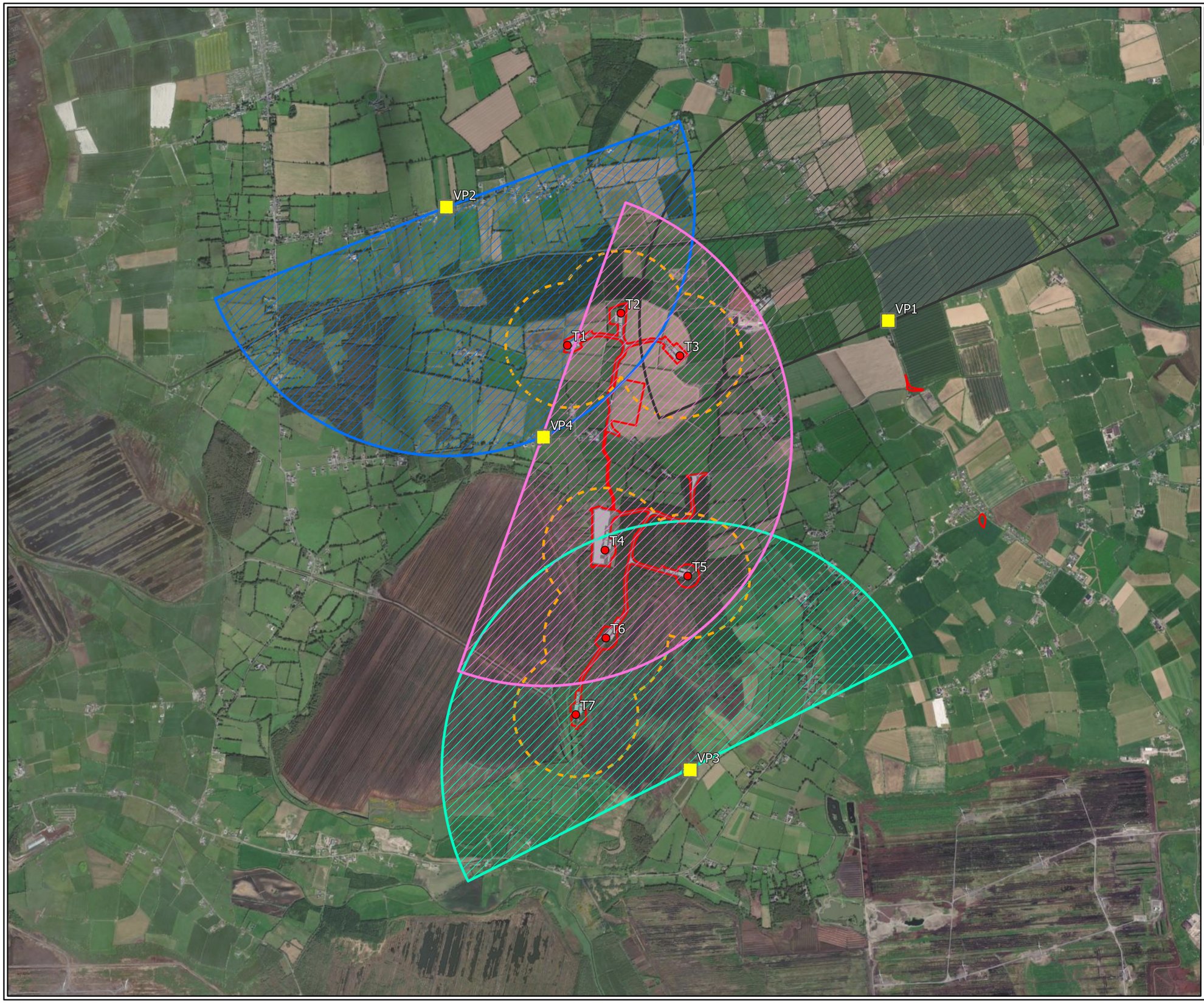

Legend

- Site Boundary
- SNH Buffer
- Site Layout
- Turbine Locations

Viewsheds

- VP1 Viewshed
- VP2 Viewshed
- VP3 Viewshed
- VP4 Viewshed
- Vantage Point (VP)

N W E S

Kilometers
0 0.25 0.5 1

TITLE:	VP Locations and Viewshed Analysis		
PROJECT:	Ballinla Wind Farm, Co. Offaly		
FIGURE NO:	7.1		
CLIENT:	Statkraft		
SCALE:	1:30,000	**REVISION:**	0
DATE:	11/08/2025	**PAGE SIZE:**	A3

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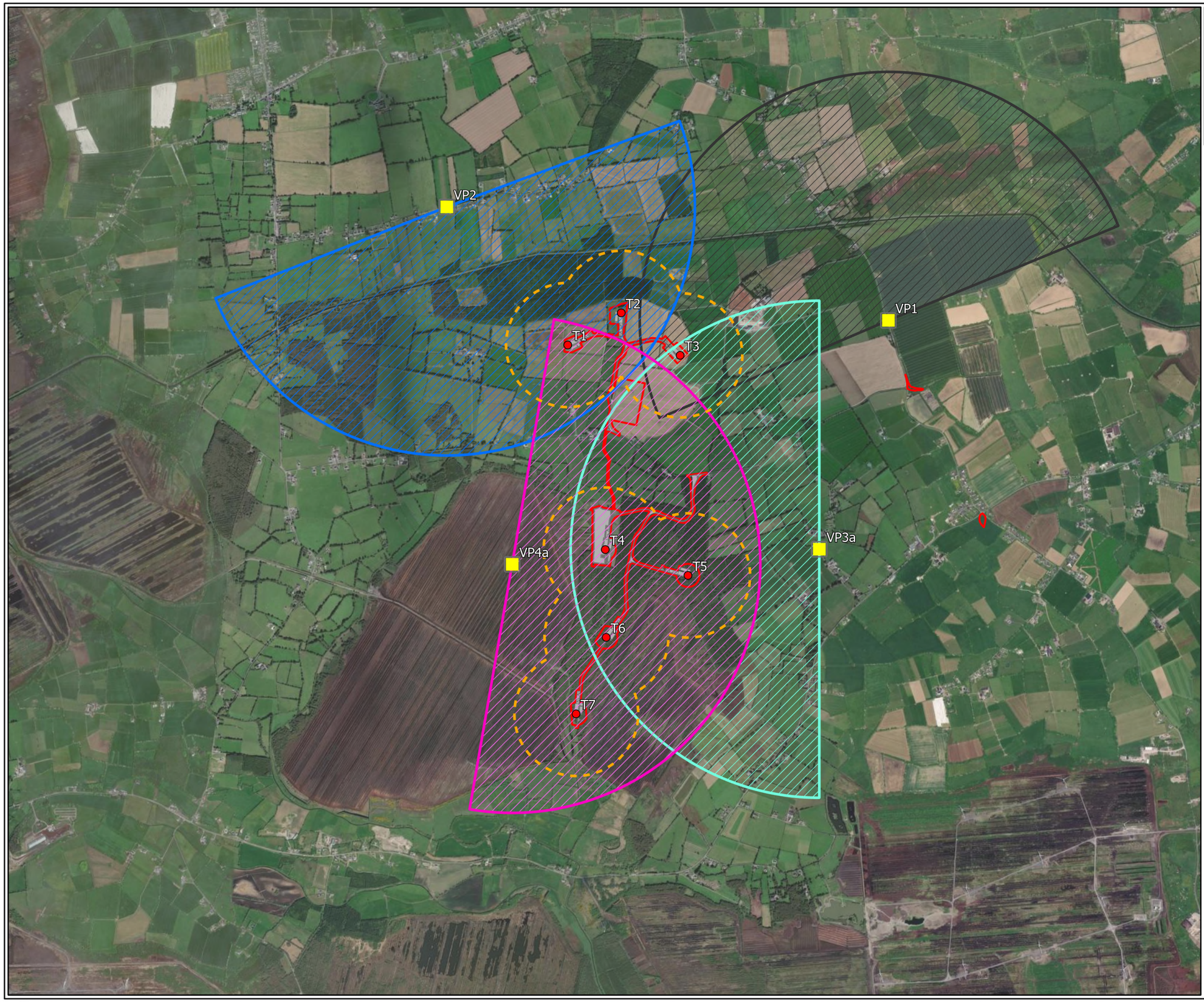

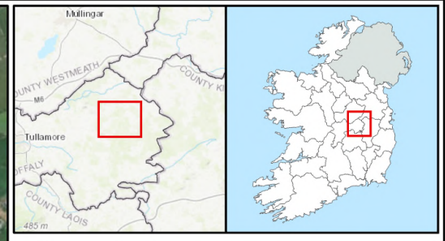

Legend

- Site Boundary
- SNH Buffer
- Site Layout
- Turbine Locations

Viewsheds

- VP1 Viewshed
- VP2 Viewshed
- VP3a Viewshed
- VP4a Viewshed
- Vantage Points (VP)

TITLE:	VP Locations and Viewshed Analysis (May – July 2021)		
PROJECT:	Ballinla Wind Farm, Co. Offaly		
FIGURE NO:	7.2		
CLIENT:	Statkraft		
SCALE:	1:30,000	**REVISION:**	0
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N W E S

0 0.25 0.5 1 Kilometers

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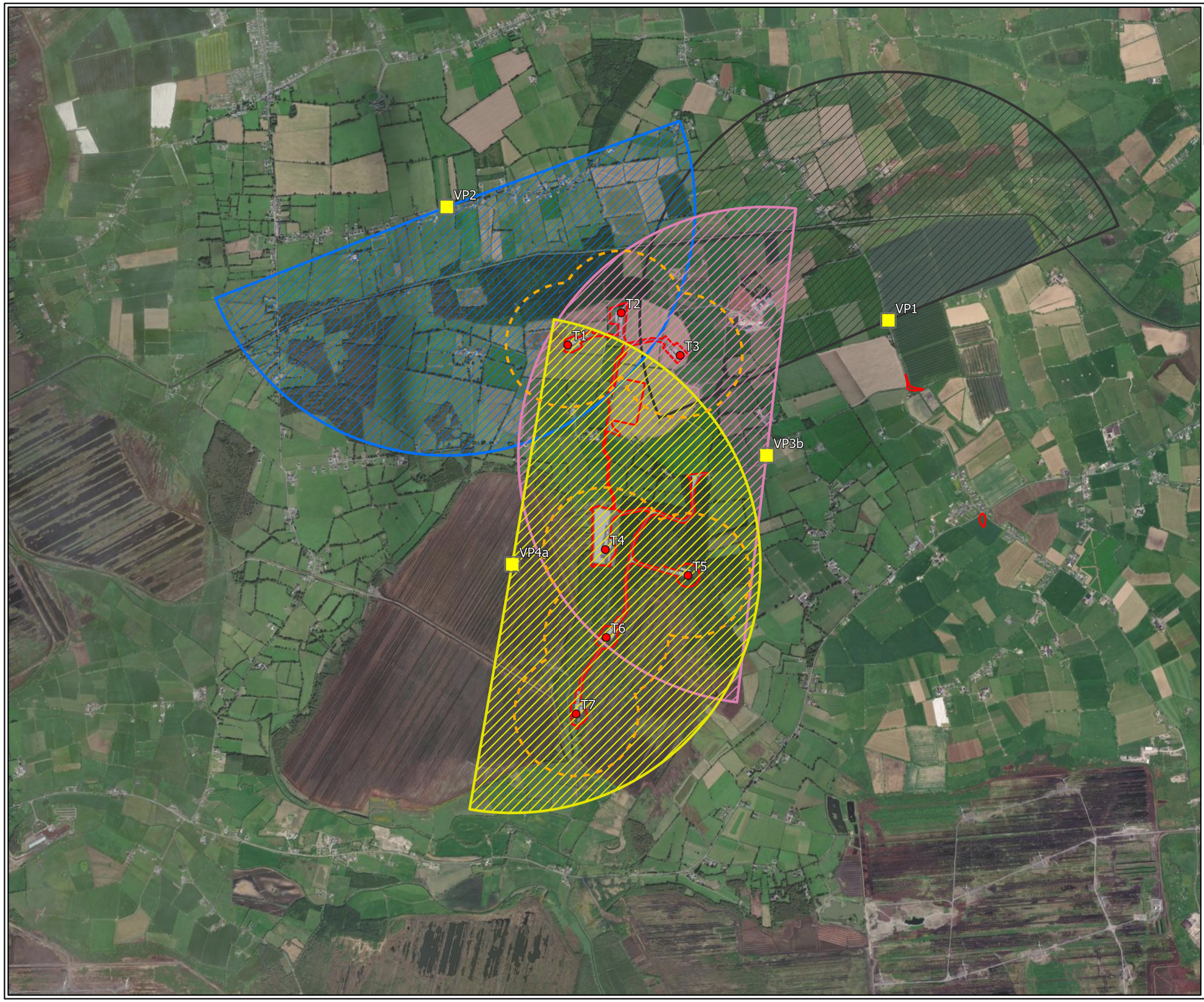

Legend

- Site Boundary
- SNH Buffer
- Site Layout
- Turbine Locations

Name

- VP1 Viewshed
- VP2 Viewshed
- VP3b Viewshed
- VP4a Viewshed
- Vantage Point (VP)

N W E S

0 0.25 0.5 1 Kilometers

TITLE:	VP Locations and Viewshed Analysis (August - September 2021)		
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FIGURE NO:	7.3		
CLIENT:	Statkraft		
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7.2.6.4 Hen Harrier Roost Surveys

The methodology used to survey for hen harrier roosting activity adhered to the Irish Hen Harrier Winter Survey (IHHWS) (O'Donoghue, 2019) and Hardey et al. (2013).

Potentially suitable areas of hen harrier roosting habitat were identified based on a desktop study and field observations gathered during the previous two years of surveys. These 'target areas' comprised of scrub and scrub/open woodland mosaic are shown in Figure 7-4.

Four experienced observers were stationed at four separate VPs overlooking the two target areas suitable for hen harrier roosting at Ballinla.

For each target area, two surveyors simultaneously conducted VP surveys starting three hours prior to dusk and continuing until observations were no longer feasible in the dark per IHHWS guidelines (O'Donoghue, 2019). IHHWS guidelines state that surveyors must be present at least 40 minutes before dusk, and as such the survey effort exceeds that required by IHHWS guidelines. Surveyors recorded all hen harrier flight lines and searched for potential roosting behaviour.

Flight durations were recorded in the following height bands: 0-15m, 15-30m, 30-100m, 100-200m and >200m. These height bands encompass the height band occupied by the proposed turbine blade sweep (23m – 185m). Other additional non-target species were also recorded where observed. The same surveyors covered the same locations for the entire survey period to prevent inter-observer variability. The locations of the hen harrier VPs and viewsheds are shown in Figure 7-4.

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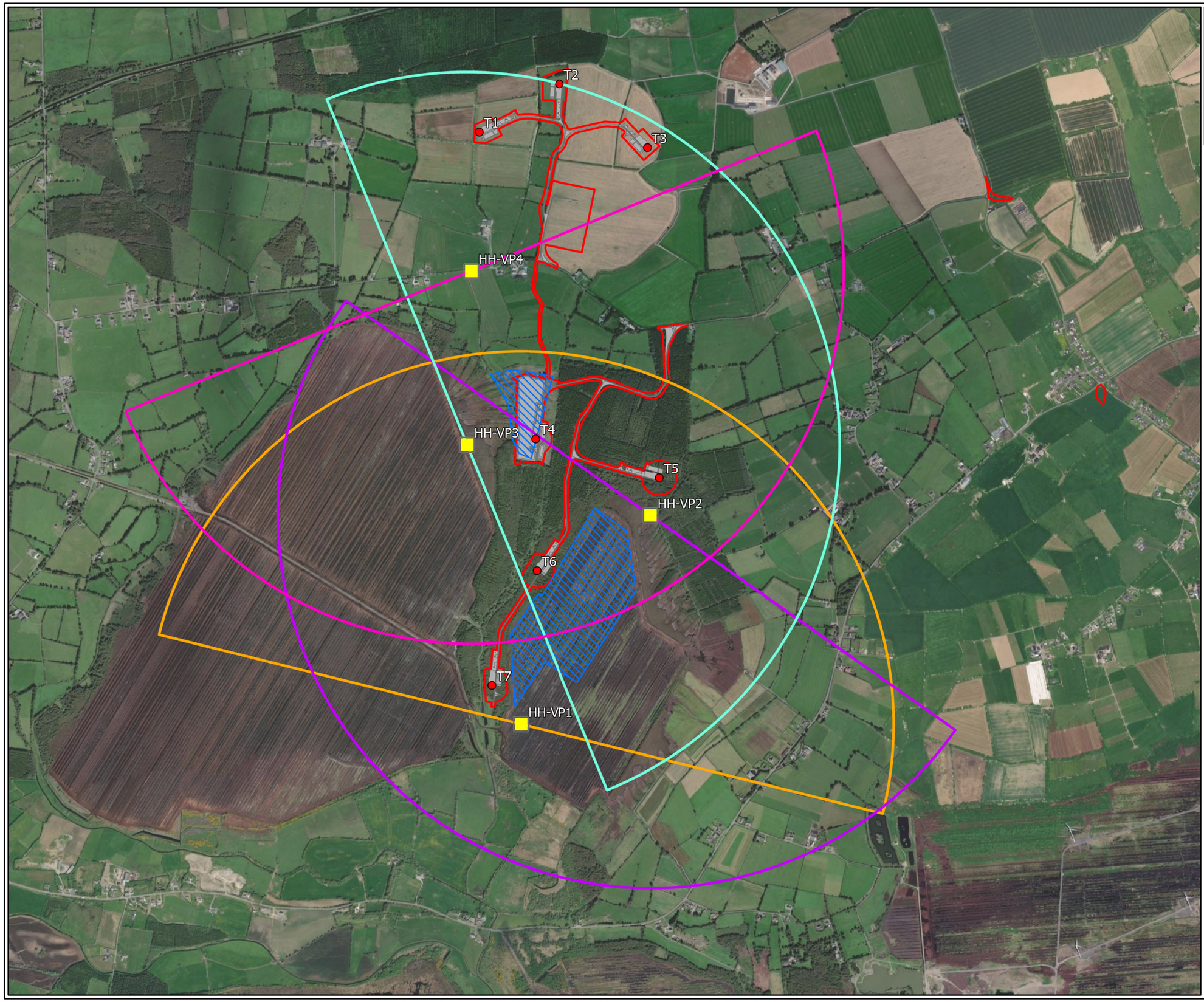

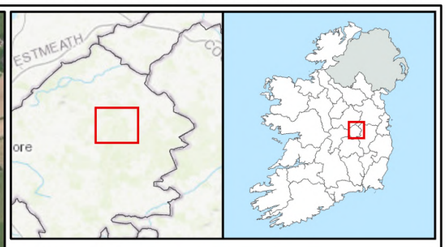

Legend

- Site Boundary
- Site Layout
- HH Roost Target Areas
- HH Viewshed 1
- HH Viewshed 2
- HH Viewshed 3
- HH Viewshed 4
- HH Vps
- Turbine Locations

N W E S

0 0.25 0.5 1 Kilometers

TITLE: Hen Harrier Roost Watch VP Locations and Viewshed Analysis (Winter 2023-24)			
PROJECT: Ballinla Wind Farm, Co. Offaly			
FIGURE NO:	7.4		
CLIENT:	Statkraft		
SCALE:	1:20,000	**REVISION:**	0
DATE:	18/08/2025	**PAGE SIZE:**	A3

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7.2.6.5 Hinterland Surveys

The methodology used for wetland sites during the winter hinterland surveys followed I-WeBS (Irish Wetland Bird Survey) methodology (Lewis et al., 2019), whereby each location was surveyed for the duration necessary to identify and obtain a count for all target species present. The same approach was adapted for non-wetland sites. A hinterland survey for raptors was conducted in accordance with Raptors: a field guide to survey and monitoring (Hardey et al. 2013) to assess hen harrier and other raptor activity over the winter and breeding periods in the greater surroundings. The hinterland survey also encompassed searches for hen harrier breeding and roosting sites within 2km of the Proposed Development, fulfilling the requirement set out in SNH Guidance (2017).

The surveys were carried out in suitable habitats for birds (woodland, wetland, peatland, etc) in the area surrounding the Proposed Wind Farm.

A total of 12 hinterland VPs (HVPs) and 12 hinterland transects within 6km of the Proposed Development across summer 2021 and winter 2021/22 were surveyed (per SNH, 2017). Eight sites were surveyed across both seasons. There were ten hinterland sites surveyed in the summer season and six in winter. Surveys carried out between April 2022 and March 2023 focused on eight hinterland sites within c. 5km of the Proposed Development.

See Appendices 7-1, 7-2 and 7-7 for a full list of hinterland sites and a detailed schedule of surveys and Figure 7-5 and Figure 7-6 for the location of HVPs and hinterland transects. These sites were chosen as they had suitable habitat for target species such as raptors, geese, swans, waterbirds and waders.

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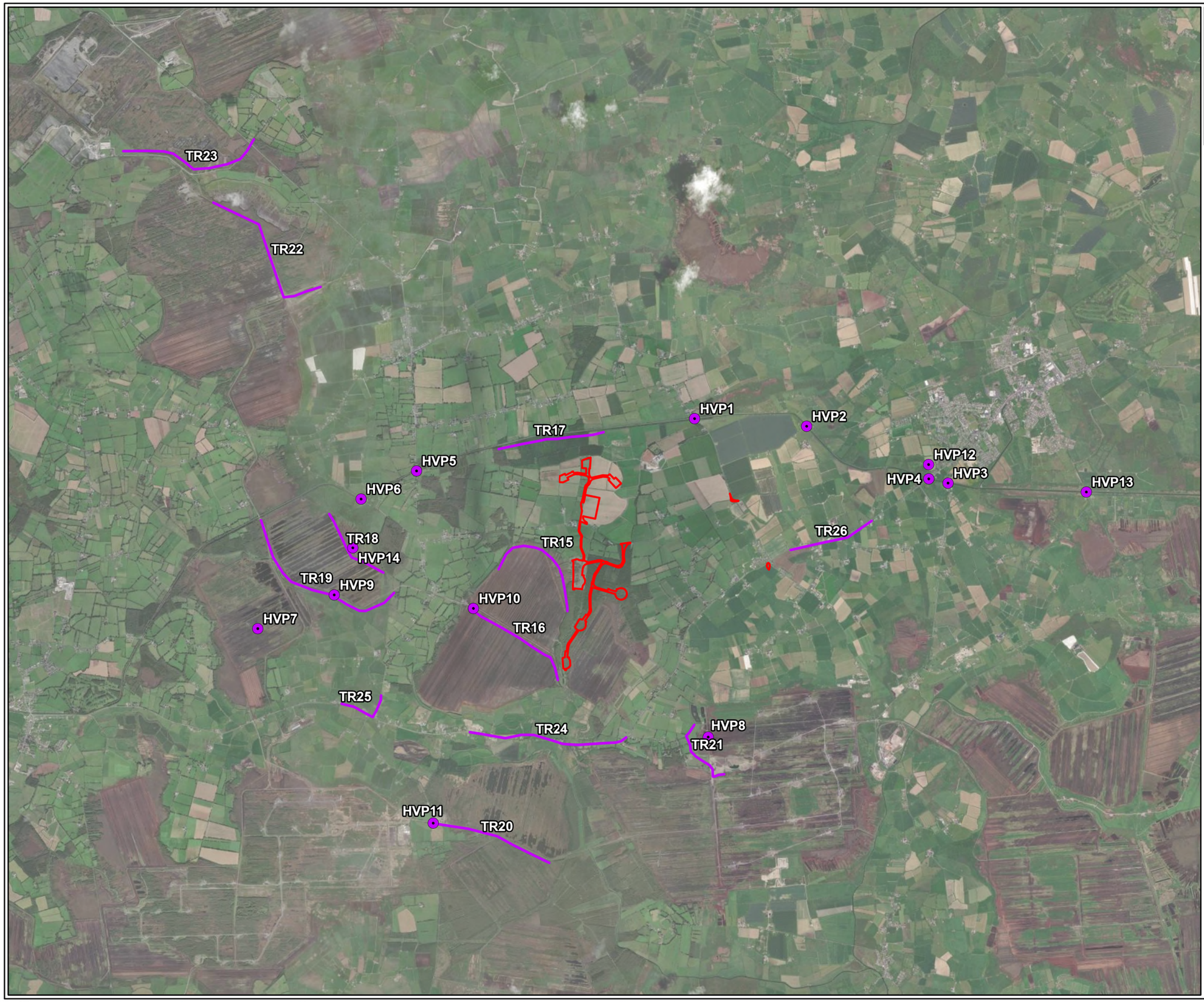

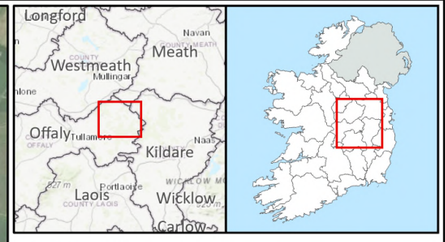

Legend

- Site Boundary
- Hinterland Transects
- Hinterland Sites

Kilometers
0 1 2 4

TITLE:	Hinterland Site and Transect Locations (2021-2022)		
PROJECT:	Ballinla Wind Farm, Co. Offaly		
FIGURE NO:	7.5		
CLIENT:	Statkraft		
SCALE:	1:60,000	**REVISION:**	0
DATE:	09/07/2025	**PAGE SIZE:**	A3

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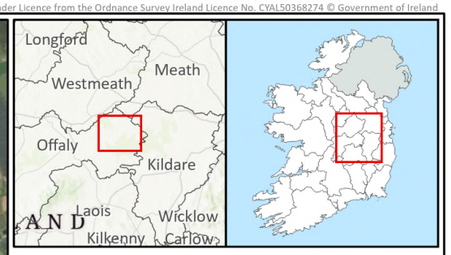

Legend

- Site Boundary
- Hinterland Sites 2022-2024

N W E S

0 1 2 4 Kilometers

TITLE:	Hinterland Site and Transect Locations (2022-2024)		
PROJECT:	Ballinla Wind Farm, Co. Offaly		
FIGURE NO:	7.6		
CLIENT:	Statkraft		
SCALE:	1:60,000	**REVISION:**	0
DATE:	11/07/2025	**PAGE SIZE:**	A3

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7.2.6.6 Breeding Bird Surveys

For general breeding birds the method utilised was based on the existing British Trust for Ornithology (BTO) Breeding Bird Survey (BBS or CBS. Bibby et al. 2000). The study area for this survey comprised four [c. 1km] transects which were selected and centred on different habitats present within the Proposed Development study area (see Figure 7-7). Birds were counted over two visits, each timed to coincide with the early part of the breeding season (April to mid-May 2022) and later part of the season (mid-May to June 2022).

Surveyors recorded all birds seen or heard as they walked methodically along the transect routes. Birds were noted in three distance categories, measured at right angles to the transect line (within 25m, between 25m to 100m and over 100m from the transect line) and those seen in flight only. Recording birds in distance bands gives a measure of bird detectability and allows relative population densities to be estimated if required (BTO, 2018).

The summer breeding bird transect schedule is detailed in Table 7-3, with survey details including weather and start/finish times indicated:

Table 7-3: Breeding Bird Transect Survey Details

Date	Cloud (Oktas)	Precipitation	Visibility	Wind Speed (Beaufort)	Wind Direction	Transect	Start	End
18/05/2021	1	Dry	Good	1	Not Recorded	1	06:42	07:04
18/05/2021	2	Dry	Good	1	Not Recorded	2	07:52	08:25
18/05/2021	2	Dry	Good	1	Not Recorded	3	08:30	09:00
05/06/2021	1	Dry	Good	1	Not Recorded	1	06:30	07:15
05/06/2021	1	Dry	Good	1	Not Recorded	2	08:11	08:37
05/06/2021	1	Dry	Good	1	Not Recorded	3	07:30	08:05
24/04/2022	4	Dry	Good	2	NE	1	07:00	08:40
24/04/2022	3	Dry	Good	3	NE	3	09:00	10:00
24/04/2022	3	Dry	Good	3	NE	2	10:30	11:20
26/04/2022	1	Dry	Good	1	E	4	07:45	09:15
17/06/2022	8	Dry	Good	1	SW	4	07:30	08:30
17/06/2022	8	Dry	Good	1	SW	2	09:45	10:30
20/06/2022	0	Dry	Good	2	NW	1	09:00	10:15
23/06/2022	8	Dry	Good	1	SW	3	09:00	10:15

7.2.6.7 Winter Bird Surveys

Over the winter season, general bird transect surveys were carried out along the same transects as the breeding bird surveys over three rounds, with one visit to each transect per round.

Surveyors recorded all birds seen or heard as they walked methodically along the transect routes. Birds were noted in three distance categories, measured at right angles to the transect line (within 25m, between 25m to 100m and over 100m from the transect line) and those seen in flight only. Recording birds in distance bands gives a measure of bird detectability and allows relative population densities to be estimated if required (BTO, 2018). The winter transect survey details are available in Table 7-4 The results are presented Appendices 7-1, 7-2 and 7-5.

An additional transect, TR5, was surveyed during winter 2024-25 due to the inclusion of a new site access route within the Proposed Wind Farm (see Table 7-4 and Figure 7-7).

Table 7-4: Winter Bird Transect Survey Details

Date	Transect	Cloud (Oktas)	Visibility	Precipitation	Wind Speed (Beaufort)	Wind Direction	Start	End
02/12/2021	1	7	Good	Dry	0	Not Recorded	09:15	11:00
02/12/2021	2	8	Good	Dry	0	Not Recorded	12:00	13:30
04/12/2021	3	3	Good	Dry	2-3	W	08:45	09:30
04/12/2021	4	7	Good	Dry	0	Not Recorded	13:45	15:15
05/12/2021	1	7	Good	Dry	0	Not Recorded	09:15	10:45
05/12/2021	2	7	Good	Dry	0	Not Recorded	14:15	15:15
08/12/2021	3	4	Good	Dry	2-3	W	10:00	11:30
18/01/2022	4	8	Good	Dry	1-2	S	09:30	11:00
14/02/2022	1	0-6	Good	Dry	3-4	NW	11:30	13:00
17/02/2022	2	7	Good	Dry	1	SW	10:00	11:30
06/02/2022	3	2	Good	Dry	3	NW	10:00	11:00
14/02/2022	4	3-4	Good	Dry	3-4	NW	09:30	11:00
03/12/2022	3	8	Good	Dry	0	No Wind	09:00	10:15
03/12/2022	2	8	Good	Dry	0	No Wind	10:30	11:30
18/12/2022	1	8	Good	Dry	0	No Wind	09:00	11:00
20/12/2022	4	2	Good	Dry	2	SW	09:30	11:45
05/01/2023	4	8	Good	Dry	3	SSW	09:15	11:00
19/01/2023	1	0	Good	Dry	0	No Wind	11:30	13:00
24/01/2023	3	7	Good	Dry	0	No Wind	11:00	12:00
24/01/2023	2	8	Good	Dry	0	No Wind	12:30	13:15
09/02/2023	1	1	Good	Dry	2	SW	10:30	12:00
10/02/2023	3	8	Good	Dry	2	WSW	09:00	10:00
10/02/2023	2	8	Good	Dry	3	WSW	10:15	11:00
20/02/2023	4	8	Good	Dry	3	WSW	09:25	11:00
21/12/2024	5	-	Good	Good	0	N/A	11:00	13:00
17/01/2025	5	3	Good	Dry	2	S	11:45	13:00
19/02/2025	5	8	Good	Dry	3-4	SE	15:15	16:15

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Legend

- Site Boundary
- Site Layout
- Transects
- Turbine Locations

TITLE:	Breeding and Wintering Bird Transects		
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FIGURE NO:	7.7		
CLIENT:	Statkraft		
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N W E S

0 0.5 1 2 Kilometers

7.2.6.8 Breeding Wader Surveys

Survey transects to assess the presence of breeding wader populations were completed during the months of May, June and July 2021 and April-June 2022. A number of methods were combined from published literature including Bibby et al, (2000), Gilbert et al, (1998), O'Brien & Wilson (2011) and SNH (2017) to estimate numbers of target species breeding within this envelope.

Methods utilised were grouped into two categories. those for breeding lapwing *Vanellus vanellus* and those for other species such as curlew *Numenius arquata*, common snipe *Gallinago gallinago*, redshank *Tringa totanus*, woodcock *Scolopax rusticola*, common sandpiper *Actitis hypoleucos* and ringed plover *Charadrius hiaticula*. For each species, a pre-defined matrix of suitable habitats was created and used to select target habitats for survey as shown in Table 7-5.

Table 7-5: Target Species and Associated Suitable Breeding Habitat

Target Species	Suitable Breeding Habitat
Lapwing	Lowland wet grassland, arable farmland, cutover bog with pools and wet grassland
Snipe	Wet pastures, marsh, bogs (intact and cutover) and fens
Redshank	Bog
Curlew	Bog
Common Sandpiper	Streams/rivers in bog
Woodcock	Woodland, bog woodland
Ringed Plover	Cutover bog, milled peat with exposed gravel

Survey methods for lapwing followed those in Bibby et al. (2000) where the primary count unit for breeding birds is defined as an incubating female. In addition, displaying birds, birds standing guard near nests or distraction displays were also recorded as indications of occupied territories. Extensive areas of open ground were covered including roads, farm tracks or roadsides (where possible), larger areas of open ground not visible from accessible vantage points were walked using transects.

Surveys were carried out during the time periods recommended in Bibby et al. (2000) although territorial behaviour noted outside these periods was also utilised in the assessment. For all additional species of wader, the employed method was the same and utilised transects walked through suitable habitat within three hours of dawn or dusk. Breeding wader summary sheets were compiled at the end of the breeding season, indicating in each case the minimum number of breeding pairs/occupied territories known to occur. Count units (see Table 7-6) were predefined for each target species and included in the method statement provided to surveyors.

Table 7-6: Count Units for each Wading Species

Species	Unit
Lapwing	Incubating Bird
Common Snipe	Drumming or Chipping Bird
Redshank	Alarming Bird
Woodcock	Displaying Male
Ringed Plover	Presence or Absence/Fledged Young late in season
Common Sandpiper	Presence or Absence/Fledged young late in season
Curlew	Territorial Activity

All species encountered (seen or heard) were recorded and their abundance, behaviour, sex/age and breeding status noted. Any species occurring more than 100m from the observer, or flying over the site and not using it, were recorded as 'additional' species to further inform the baseline survey. Table 7-7 and Table 7-8 detail survey dates and weather conditions.

Audio detectors (Olympus ls-p1 and Audiomoth) were used to augment wader surveys in summer 2021. These were deployed overnight at site 8 (May 17th and June 5th), site 5 (July 25th), site 9 (July 25th) and site 6 (July 25th 21:20-22:30).

Table 7-7: 2021 Breeding Wader Survey Details

Date	Site	Start	End	Dawn	Dusk	All or part of survey within 3 hours of dawn or dusk
17/05/2021	Wader Transect	20:45	21:45	N/A	21:37	Yes
17/05/2021	8	19:45	20:45	N/A	21:37	Yes
17/05/2021	6	21:45	22:45	N/A	21:37	Yes
17/05/2021	1	19:45	20:45	N/A	21:37	Yes
17/05/2021	4	19:45	20:45	N/A	21:37	Yes
18/05/2021	7	06:42	07:40	05:27	N/A	Yes
05/06/2021	8	20:30	20:45	N/A	22:04	Yes
05/06/2021	6	21:45	22:45	N/A	22:04	Yes
05/06/2021	2	19:45	20:30	N/A	22:04	Yes
05/06/2021	3	19:45	20:30	N/A	22:04	Yes
05/06/2021	5	21:00	05:00	05:06	22:04	Yes
25/07/2021	9	21:00	05:00	05:37	21:49	Yes
25/07/2021	6	21:20	22:30	05:37	21:49	Yes

Table 7-8: 2022 Breeding Wader Survey Details

Date	ID	Cloud (Oktas)	Precipitation	Visibility	Wind Speed (Beaufort)	Wind Direction	Start	End
24/04/2022	W2	3	Dry	Good	3	NE	15:00	16:00
26/04/2022	W3	1	Dry	Good	1	E	07:45	08:30
08/05/2022	W1	0	Dry	Good	2	NNE	07:00	10:00
09/06/2022	W2	4	Dry	Good	2	SW	21:15	22:50
17/06/2022	W3	8	Dry	Good	1	WSW	08:30	09:30
20/06/2022	W1	0	Dry	Good	1	NW	10:30	11:45

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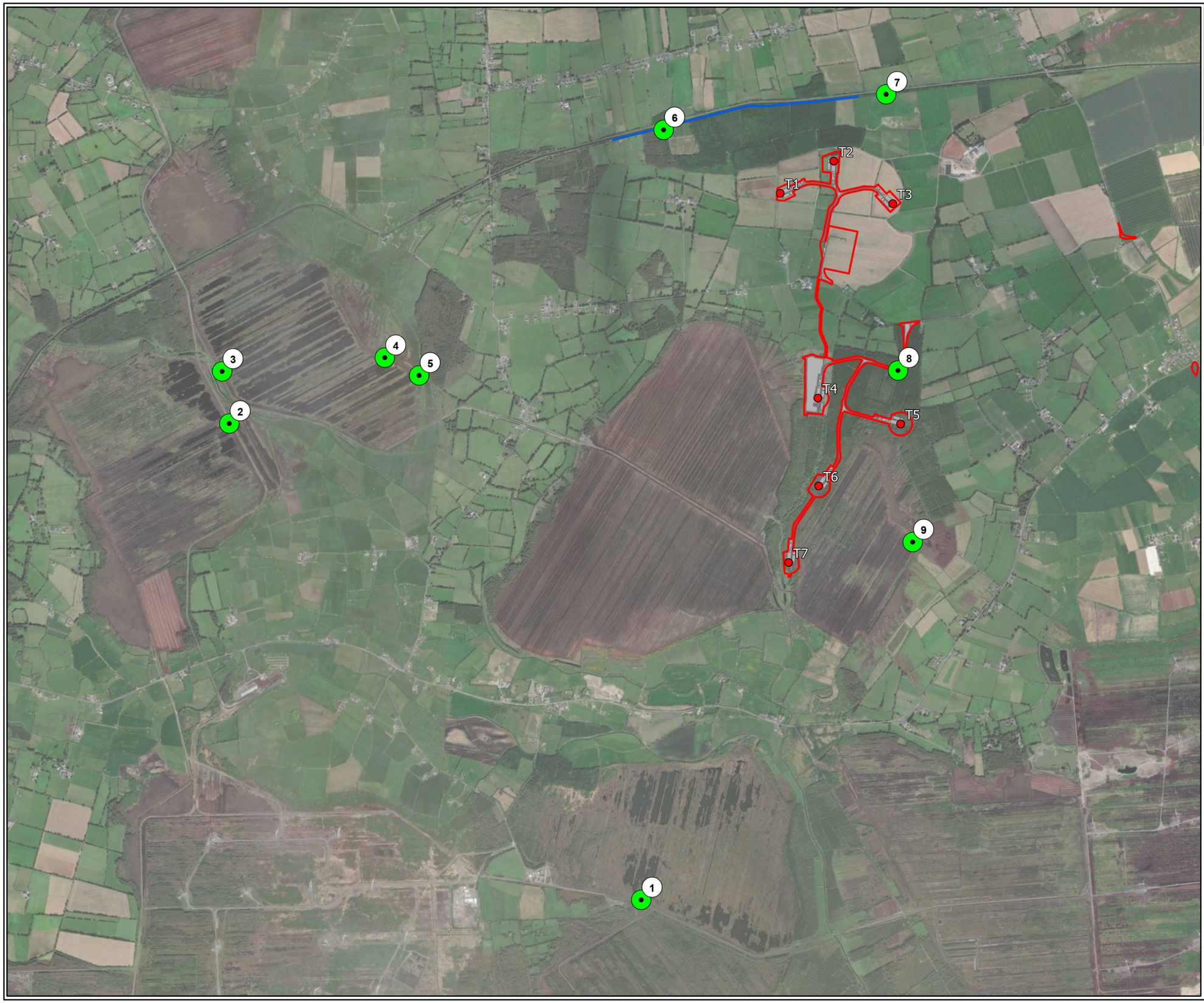

Legend

- Site Boundary
- Site Layout
- Breeding Wader Transect 2021
- Survey Locations
- Turbine Locations

N W E S

0 0.5 1 2 Kilometers

TITLE:	Breeding Wader Transect 2021		
PROJECT:	Ballinla Wind Farm, Co. Offaly		
FIGURE NO:	7.8		
CLIENT:	Statkraft		
SCALE:	1:30,000	**REVISION:**	0
DATE:	11/08/2025	**PAGE SIZE:**	A3

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Legend

- Site Boundary
- Site Layout
- Breeding Wader Transect 2022
- Turbine Locations

TITLE: Breeding Wader Transect 2022			
PROJECT: Ballinla Wind Farm, Co. Offaly			
FIGURE NO:	7.9		
CLIENT:	Statkraft		
SCALE:	1:20,000	**REVISION:**	0
DATE:	11/08/2025	**PAGE SIZE:**	A3

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N W E S

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7.2.6.9 Nocturnal Migration Audio Surveys

In parallel with visual surveys, acoustic monitoring via autonomous recording units (ARUs) and was carried out to monitor nocturnal whooper swan activity, including nocturnal migration. When used in conjunction with visual surveys, ARUs are useful in pinpointing the time of arrival or departure of migratory birds, which can contribute to more robust definition of key periods for migratory activity.

The recording devices used to complete NocMig surveys were Audiomoth passive recording devices. These devices were programmed to record continuously, starting half an hour before sunset and finishing half an hour after dawn.

The deployment periods covered/number of nights recorded are detailed in Table 7-9 and Table 7-10. Audio recorder locations are shown in Figure 7-10. Since the length of device operation is dictated by battery life and other factors, and regular download of data from devices is necessary, regular visits to change batteries, copy data and confirm continued functioning of devices were undertaken. Audio monitoring was not constant, with short intervals of downtime due to low battery levels and required card changes, in addition to scheduling constraints associated with normal working days. However, survey effort was high, covering the majority of key migration periods across multiple locations at the Proposed Wind Farm and therefore comprises a robust sampling effort and baseline data.

Table 7-9: Audio Device Deployment Schedule Spring 2024

Location	B-1	B-2	B-3	B-4	B-5	B-6	B-7
Monitoring Period 1 (nights recorded)	05/03/2024 - 17/03/2024	05/03/2024 - 17/03/2024	05/03/2024 - 17/03/2024	05/03/2024 - 16/03/2024	05/03/2024 - 17/03/2024	05/03/2024 - 17/03/2024	05/03/2024 - 15/03/2024
Monitoring Period 2	19/03/2024 – 31/03/2024	19/03/2024 - 31/03/2024	19/03/2024 - 31/03/2024	19/03/2024 – 01/04/2024	19/03/2024 - 31/03/2024	19/03/2024 - 31/03/2024	19/03/2024 - 28/03/2024
Monitoring Period 3	01/04/2024 - 18/04/2024	02/04/2024 - 18/04/2024	02/04/2024 - 19/04/2024	No recordings (SD card malfunction)	02/04/2024 - 18/04/2024	02/04/2024 - 19/04/2024	02/04/2024 - 17/04/2024
Total No. Dates Monitored	46	43	44	26	43	44	37

Table 7-10: Audio Device Deployment Schedule Autumn 2024

Location	B-1	B-2	B-3	B-4	B-5	B-6	B-7
Monitoring Period 4	07/10/2024 - 14/10/2024	Not Surveyed	07/10/2024 - 21/10/2024	07/10/2024 - 21/10/2024	No recordings (SD card damaged)	No recordings (SD card damaged)	Not Surveyed
Monitoring Period 5	18/10/2024 - 01/12/2024	Not Surveyed	22/10/2024 - 04/12/2024	22/10/2024 - 01/12/2024	22/10/2024 - 10/11/2024	22/10/2024 - 04/12/2024	Not Surveyed
Monitoring Period 6	05/12/2024 - 20/12/2024	Not Surveyed	05/12/2024 - 20/12/2024	05/12/2024 - 19/12/2024	22/11/2024 - 21/12/2024	05/12/2024 - 20/12/2024	Not Surveyed
Total No. Nights Monitored	69	0	75	71	50	60	0

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Legend

- Site Boundary
- Site Layout
- Audiomoth Locations
- Turbine Locations

TITLE:	Audio Device Deployment Locations		
PROJECT:	Ballinla Wind Farm, Co. Offaly		
FIGURE NO:	7.10		
CLIENT:	Statkraft		
SCALE:	1:20,000	**REVISION:**	0
DATE:	11/08/2025	**PAGE SIZE:**	A3

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7.2.7 Avian Resource Evaluation

The value of the ecological resources/receptors was evaluated using the ecological evaluation guidance given in the NRA guidance on assessment of ecological impacts of National Road Schemes (NRA, 2009a).

This guidance provides ratings for resources based primarily on geographic context and allows for resources at International, National, County and Local (higher and lower value) levels. Key ecological receptors (for assessment) are those deemed to be above the 'Local Importance (lower value) evaluation.

Ecological features are assessed on a scale ranging from international-national-county-local. The local scale is approximately equivalent to one 10km square but can be operationally defined to reflect the character of the area of interest.

Avian species were evaluated following the NRA (2009a) criteria on the basis of the following lists:

- Birds of Conservation Concern in Ireland (Gilbert et al., 2021).
- Annex I bird species are those that are listed under the EU Birds Directive.
- Species protected under the Wildlife Acts 1976-2022 and associated orders.

Avifauna resources were initially evaluated as to whether they constitute key receptors for the assessment following NRA guidance. For the purposes of impact assessment, a receptor 'importance value' or sensitivity, following published guidance as in Percival (2007), SNH (2017) and literature review of published information on birds and wind farms (Pearce-Higgins J. L., 2009. Pearce-Higgins J. S., 2012. Drewitt A. L., 2006. Drewitt and Langston, 2008 and Masden, 2009) is to be calculated. Where provided receptor values from Percival (2007) are below those recommended in guidance within the Irish context (NRA, 2009a), then the evaluation has been increased in line with the recommended Irish evaluation as a precautionary principle. Table 7-14 details the combined receptor evaluation criteria used to assign sensitivity levels to key receptors.

7.2.7.1 Assessment Criteria

Determination of the significance of an effect will be made in accordance with the terminology outlined in the EPA Guidelines on Information to be contained in Environmental Impact Assessment Reports (2022) as set out in Table 7-11.

Table 7-11 Impact Assessment Criteria

Descriptor	Term	Description
Quality of Effects		
	Positive	A change which improves the quality of the environment
	Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
	Negative /adverse	A change which reduces the quality of the environment
Significance of Effects		
	Imperceptible	An effect capable of measurement but without significant consequence
	Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities

Descriptor	Term	Description
	Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
	Significant	An effect which, by its character, magnitude duration or intensity alters a sensitive aspect of the environment
	Very Significant	An effect which, by its character, magnitude duration or intensity alters most of a sensitive aspect of the environment
	Profound	An impact which obliterates sensitive characteristics
Duration of Effect		
	Momentary	Effects lasting from seconds to minutes
	Brief	Effects lasting less than a day
	Temporary	Effects lasting less than a year
	Short-term	Effects lasting one to seven years
	Medium-term	Effects lasting seven to fifteen years
	Long-term	Effects lasting fifteen to sixty years
	Permanent	Effects lasting over sixty years
	Reversible	Effects than can be undone e.g. through remediation or restoration
	Frequency	How often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
Types of Effects		
	Indirect	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative	The addition of many minor or significant effects, including effects of other projects, to create a larger, more significant effect.
	'Do Nothing'	The environment as it would be in the future should the subject project not be carried out.
	'Worst case'	The effects arising from a project in the case where mitigation measures substantially fail.
	Indeterminable	When the full consequences of a change in the environment cannot be described.
	Irreversible	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
	Residual	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SOx and NOx to produce smog).

7.2.7.2 Avifauna-Specific Assessment

The criteria applicable to avifauna outlined in Table 7-12 has been developed by Percival (2003) to determine the magnitude of potential effects on a species. Methodology for assessing sites outside of European Sites (i.e. SPAs) state 'the test of significance of an impact will be whether the wind farm impact is causing a significant change to the population its range or distribution' (Percival, 2003). It is important to consider availability of alternative habitat elsewhere during this assessment. Once completed, the Percival (2003) avifauna-specific assessment feeds into and informs the EPA (2022) assessment which is the primary basis of assessment within the EIAR.

Table 7-12: Determination of Magnitude Effects (Percival, 2003)

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

The significance of potential effects is assessed by cross tabulating the magnitude of effects and bird sensitivity to predict significance of each potential effect. Population status, distribution and trends of potentially affected species such as migratory winter birds should be taken into consideration when undertaking the assessment. Significance ratings are interpreted as follows, very low and low should not normally be of concern however normal design care should be undertaken to minimise effects, medium represents a potentially significant effect that requires careful individual assessment, while very high and high represents a highly significant effect on bird populations. A significance matrix table, combining magnitude and sensitivity to assess overall significance is presented in Table 7-13.

Table 7-13: Significance Matrix: Combining Magnitude and Sensitivity To Assess Significance (Percival, 2003)

Significance Magnitude	Sensitivity				
	Very High	High	Medium	Low	Very High
Very High	Very High	Very High	Very High	High	Medium
High	High	Very High	Very High	Medium	Low
Medium	Medium	Very High	High	Low	Very Low
Low	Low	Medium	Low	Low	Very Low
Negligible	Negligible	Low	Very Low	Very Low	Very Low

Table 7-14 outlines the criteria used to determine the sensitivity of key avian receptors potentially affected by the Proposed Wind Farm development. This classification draws on guidance from Percival (2007), the National Roads Authority (NRA) Resource Evaluation and Criteria, and combines these to provide a robust, tiered framework for assessing ornithological sensitivity. The combined criteria reflect the conservation status, population importance, and legal protection of bird species, ensuring that the ecological value of each receptor is appropriately considered in the impact assessment process.

Table 7-14: Avian Receptor Evaluation

Sensitivity of Key Receptor	Percival 2007 criteria	NRA Resource Evaluation	NRA Criteria	Combined Criteria
Very High	Species is cited interest of SPA. Species present in Internationally important numbers.	International Importance	Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive	Species is cited Special Conservation Interest of SPA. Species present in Internationally important numbers. Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive
High	Other non-cited species which contribute to integrity of SPA. Ecologically sensitive species (<300 breeding pairs in UK) and less common birds of prey. Species listed on Annex 1 of the EU Birds Directive. Regularly occurring relevant migratory species which are rare or vulnerable	National Importance	Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts and/or Species listed on the relevant Red Data list	Other non-cited/not a Special Conservation Interest species which contribute to integrity of SPA. Ecologically sensitive species (<300 breeding pairs nationally) and less common birds of prey. Species listed on Annex 1 of the EU Birds Directive. Regularly occurring relevant migratory species which are rare or vulnerable. Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts and/or Species listed on the relevant Red Data list (in this case BOCCI Red list).
Medium	Species present in regionally important numbers (>1% of regional population). Species occurring within SPA's but not crucial to the integrity of the site. Species listed as priority species in the UK BAP subject to special conservation measures	County Importance	Resident or regularly occurring populations (assessed to be important at the County level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive. County important populations of species. Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.	Species present in regionally important numbers (>1% of regional population). Species occurring within SPA's but not crucial to the integrity of the site. Resident or regularly occurring populations (assessed to be important at the County level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive. County important populations of species. Species that are rare or are undergoing a decline in quality or extent at a national level.
Low	Species covered above which are present very infrequently or in very low numbers. Any other species of conservation interest not covered above, e.g. species listed on the red or amber lists of the BoCCI.	Local Importance (High Value)	Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared. Resident or regularly occurring populations (assessed to be important at the Local level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive. Species protected under the Wildlife Acts and/or Species listed on the relevant Red Data list.	Locally important populations of priority species identified in the Local BAP, if this has been prepared. Resident or regularly occurring populations (assessed to be important at the Local level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive. Species protected under the Wildlife Acts and/or Species listed on the relevant Red Data list. Amber listed species.

Sensitivity of Key Receptor	Percival 2007 criteria	NRA Resource Evaluation	NRA Criteria	Combined Criteria
Negligible	Species that remain common and widespread	Local Importance (Low Value)	N/A	Species that remain common and widespread.

7.2.8 Statement on Limitations and Difficulties Encountered

The requirement to move vantage points 3 and 4 during the initial phase of surveys as described in Section 7.2.6.3 posed a challenge in terms of identifying and establishing suitable alternative VPs, and the relocation of VPs during the course of surveys is typically avoided, with every effort made to determine fixed VP locations prior to, or at least very early on during surveys. However, due to the flat topography of the Proposed Development in combination with the design of the finalised turbine layout, it was possible to maintain 100% viewshed coverage of the SNH turbine buffer during all survey periods and as such the movement of VPs 3 and 4 did not reduce the efficacy of VP surveys and results from all survey periods provide robust data for use in the collision risk model (CRM).

Therefore, despite the challenges posed in identifying alternative VPs while surveys were underway, due to the continuity and completeness of coverage provided from all utilised VP locations, this did not represent a limitation on the assessment of flight activity at the Proposed Development in accordance with SNH (2017) guidance.

7.3 Baseline Environment

7.3.1 Desktop Study

7.3.1.1 Designated Sites within the ZoI of the Proposed Development

SPAs are addressed in this chapter. SACs (relating to habitats, plants, mammals and all other non-avian taxa of note) are considered in Chapter 6-Biodiversity. The same logic applies to sites of national importance, and other designated sites.

7.3.1.1.1 Sites of International Importance

SPAs within the potential zone of influence (ZoI) of the Proposed Development were considered, with the nearest being River Boyne and River Blackwater SPA to the northeast of the site, which is designated for Kingfisher. Lough Ennell SPA located to the northwest of the site is designated for Tufted Duck and Pochard. The Slieve Bloom Mountains SPA which is designated for Hen Harrier is located to the southwest.

The presence of a wintering whooper swan population associated with the River Boyne and River Blackwater SAC (17 km north) is also noted. Whooper swan are not a Qualifying Interest of this SAC, but are noted as being present in the site synopsis (NPWS, 2014).

SPAs within the potential ZoI of the Proposed Development are detailed in Table 7-15.

Table 7-15 : Summary of SPAs within potential ZoI of the Proposed Development

Site Code	Site Name	Distance from Proposed Wind Farm	Qualifying Feature
004232	River Boyne and River Blackwater SPA	17 km	Kingfisher (Alcedo atthis) [A229]
004044	Lough Ennell SPA	19.8 km	Tufted Duck (Aythya fuligula) [A061], Coot (Fulica atra) [A125], Pochard (Aythya ferina) [A059], Wetland and Waterbirds [A999]
004160	Slieve Bloom Mountains SPA	25.3 km	Hen Harrier (Circus cyaneus) [A082]

7.3.1.1.2 Sites of National Importance

Sites of National Importance in Ireland are termed NHAs and pNHAs. While the Wildlife (Amendment) Act 2000 has been passed into law, pNHAs will not have legal protection until the consultative process with landowners has been completed. For the purposes of this assessment, pNHAs have be treated as fully designated sites.

NHAs and pNHAs with potential for ornithological interest within the ZoI of the Proposed Development are detailed in Table 7-16. The ZoI is assessed based on occurrence of NHAs and pNHAs in proximity to the proposed development which have either defined ornithological interests and/or habitats which could be of value to birds.

Table 7-16: Summary of NHAs and pNHAs within potential ZoI of the Proposed Development

Site Code	Site Name	Distance from closest proposed turbine	Qualifying Features
002104	Grand Canal pNHA	0.5km N	hedgerow, calcareous grassland, reed fringe, open water, scrub and woodland
00570	Black Castle Bog NHA	3.3km NE	Peatlands [4]
000925	The Long Derries, Edenderry pNHA	8.6km E	Bird species include sand martin, whinchat, whitethroat and cuckoo have been recorded here during summer seasons. Red listed partridge and breeding Annex I nightjar
002033	Daingean Bog NHA	9.9km SW	Peatlands [4]
000582	Raheenmore Bog pNHA	11km W	Active raised bogs; Degraded raised bogs still capable of natural regeneration; Depressions on peat substrates of the Rhynchosporion; Within breeding territory of Annex I merlin. Other species include red grouse and snipe.
001388	Carbury Bog NHA	12.6km NE	Peatlands [4]
002323	Milltownpass Bog NHA	13.6km NW	Peatlands [4]
000917	Raheen Lough pNHA	13.5km SW	Wet pasture and marshland vegetation supports variety of wildfowl and waders. This site is of local importance to a number of species including whooper swan, goldeneye, pochard, mallard, shoveler, pintail, greenshank, jack snipe, purple sandpiper, grey heron, kingfisher and grebes.
000918	Rahugh Ridge pNHA (Kiltober Esker)	15.3 km W	Woodland providing potential habitat for raptor species.
000390	Ballina Bog pNHA	16.3 km NE	Raised bog
000677	Cloncrow Bog (New Forest) NHA	16 km NW	Peatlands [4]

7.3.1.1.3 Other Designated Sites

Nature Reserves

The closest nature reserve to the Proposed Development site is Raheenmore Bog, located 11km west, which is also a pNHA containing active raised bog and having ontological interest associated with breeding merlin as noted above. Other nature reserves in the region are Pollardstown Fen (23.3 km south-east), Clara Bog (27.9 km west), Slieve Bloom Mountains (29 km south-west) and Scragh Bog (29.9 km north).

Ramsar Sites

The closest Ramsar Site is Raheenmore Bog, which overlaps the NPWS nature reserves/pNHA described above.

Wetlands Ireland Sites

The register of Irish wetland sites curated by Wetlands Ireland was also consulted. Sites listed in this register in the immediate surroundings of the Proposed Development include Ballybrittan Farm Pond (mapped as occurring c. 575m north of T2; however, this pond is no longer present). Clonlack Bog Woodland (c. 1.1km southwest of T1) and Esker Bog (c. 28m west of proposed peat deposition area). A fourth site in this register, Esker Bog Rathlumber, is partially overlapped by the proposed T6 hard standing and a section of access road. The area overlapped by this proposed infrastructure is composed of mixed broadleaved/conifer woodland (WD2). It is noted that none of these sites are designated, nor are they proposed for designation. Both Esker Bog and Esker Bog Rathlumber are former industrial peat harvesting areas. Harvesting on Esker Bog Rathlumber has been ceased for longer, with parts of this bog now developing scrub and woodland. Harvesting on Esker Bog ceased more recently, with rehabilitation (re-wetting) works carried out in 2021.

I-WeBS Sites

A total of nine I-WeBS (Irish Wetland Bird Survey) sites are present in County Offaly. The closest is Raheen Lough, located 13.6km southwest of T7 and is also a pNHA as detailed above. This I-WeBS site contained mute swan, whooper swan, wigeon, teal, mallard, shoveler, tufted duck, great northern diver, little grebe, great created grebe, little egret, grey heron, moorhen, coot, lapwing and snipe at the most recent survey (winter 2013-14). The other eight I-WeBS sites in County Offaly are all located west of Tullamore. Distances from the Proposed Wind Farm are: Boora Lakes-Back Lakes Finnamores (35.5km east/southeast). Turraun Nature Reserve (38.8km east/southeast). Cloghanhill (47.8km east/southeast). Shannon Callows (53.6km east/southeast). Blackwater Railway Lake (53.5km east). Little Brosna Callows (57.4km southeast). Little Brosna Callows (Aerial) (61.8km southeast) and Shannon Callows (Aerial) (56.8km east).

7.3.1.2 Avifauna

A desktop study on the avifauna covering the lands overlapping the Proposed Development was conducted. A summary of the desktop study findings is included below.

The Proposed Development is situated within 10km grid squares N53 and N52. Examination of the NBDC Biodiversity Maps website indicates the following:

Excepting historical records for four species (common coot, 1984. corncrake, 1972. grey partridge, 1991. grey wagtail, 1991 and spotted crake, 1993), a total of 44 bird species are present in historical datasets across both hectads as detailed in Table 7-17.

Information received on 25/03/2024 arising from the NPWS rare/protected species data request noted the following peregrine falcon records from 2002 hectad N53: one unoccupied nest site and hectad N62: one occupied nest site. The NPWS also noted the following records for nesting curlew. hectad N62: one record in 2016 and hectad N63: two records in 2015. Hectads N62 and N63 are located east of the Proposed Development.

Birdwatch Ireland's Bird Sensitivity to Wind Energy Mapping Tool which was accessed via the NBDC Biodiversity Maps website, was assessed as a means to predict the sensitivity of birds to wind farm developments within the 10km grid squares N53 and N52 which overlap the site, as per McGuiness et al. (2015). However, no data was available for the wider area in which the Proposed Development is located.

Table 7-17 : Birds of Conservation Interest [1]

Grid Square	Species Name	Date of Last Record	Record Count	Title of Dataset	BoCCI Status	Annex I
N52, N53	Barn Owl (*Tyto alba*)	12/07/2017	2	Birds of Ireland	Red	No
N52, N53	Barn Swallow (*Hirundo rustica*)	19/05/2018	23	Bird Atlas 2007-2011	Amber	No
N52, N53	Black-headed Gull (*Larus ridibundus*)	09/05/2020	5	Birds of Ireland	Amber	No
N52	Common Goldeneye (*Bucephala clangula*)	25/10/2020	2	Birds of Ireland	Red	No
N52, N53	Common Kestrel (*Falco tinnunculus*)	25/10/2020	15	Birds of Ireland	Red	No
N52, N53	Common Kingfisher (*Alcedo atthis*)	31/12/2011	4	Bird Atlas 2007-2011	Amber	Yes
N52, N53	Common Linnet (*Carduelis cannabina*)	13/11/2020	16	Birds of Ireland	Amber	No
N52	Common Redshank (*Tringa totanus*)	25/03/2023	3	Birds of Ireland	Red	No
N52, N53	Common Snipe (*Gallinago gallinago*)	14/04/2023	19	Birds of Ireland	Red	No
N52, N53	Common Starling (*Sturnus vulgaris*)	31/12/2011	22	Bird Atlas 2007-2011	Amber	No
N52, N53	Common Swift (*Apus apus*)	31/12/2011	9	Bird Atlas 2007-2011	Red	No
N52, N53	Corn Crake (*Crex crex*)	31/07/1972	1	The First Atlas of Breeding Birds in Britain and Ireland: 1968-1972.	Red	Yes
N52, N53	Eurasian Curlew *(Numenius arquata*)	21/08/2015	5	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991	Red	No
N52	Eurasian Marsh Harrier (*Circus aeruginosus*)	01/05/2010	1	Birds of Ireland	Amber	Yes
N52, N53	Eurasian Teal (*Anas crecca*)	31/12/2011	3	Bird Atlas 2007-2011	Amber	No
N52, N53	Eurasian Wigeon (Anas penelope)	30/10/2017	1	Birds of Ireland	Amber	No

[1] Red/amber-listed and Annex I avian species recorded historically within 10km Grid squares N52 and N53, in which the Proposed Development is located, from desktop review

Grid Square	Species Name	Date of Last Record	Record Count	Title of Dataset	BoCCI Status	Annex I
N52, N53	Eurasian Woodcock (*Scolopax rusticola*)	16/03/2018	5	Birds of Ireland	Red	No
N52, N53	European Golden Plover (*Pluvialis apricaria*)	31/12/2011	3	Bird Atlas 2007-2011	Red	Yes
N52, N53	Great Cormorant (*Phalacrocorax carbo*)	12/03/2022	1	Birds of Ireland	Amber	No
N52, N53	Grey Partridge (*Perdix perdix)*	29/02/1984	2	The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84.	Red	No
N52, N53	Grey Wagtail (*Motacilla cinerea*)	31/07/1991	1	The First Atlas of Breeding Birds in Britain and Ireland: 1968-1972.	Red	No
N52, N53	Hen Harrier (*Circus cyaneus*)	31/12/2011	3	Bird Atlas 2007-2011	Amber	Yes
N52, N53	House Martin (*Delichon urbicum*)	31/12/2011	10	Bird Atlas 2007-2011	Amber	No
N52, N53	House Sparrow (*Passer domesticus*)	31/12/2011	19	Bird Atlas 2007-2011	Amber	No
N52	Little Egret (*Egretta garzetta*)	25/03/2023	1	Birds of Ireland	Green	Yes
N52, N53	Mallard (*Anas platyrhynchos*)	25/03/2023	15	Birds of Ireland	Amber	No
N52, N53	Merlin (*Falco columbarius*)	31/12/2011	1	The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84.	Amber	Yes
N52, N53	Mute Swan (*Cygnus olor*)	25/03/2023	7	Birds of Ireland	Amber	No
N52, N53	Northern Lapwing (*Vanellus vanellus*)	25/03/2023	18	Birds of Ireland	Red	No
N52, N53	Northern Wheatear (*Oenanthe oenanthe*)	21/04/2021	3	Birds of Ireland	Amber	No
N52, N53	Peregrine Falcon (*Falco peregrinus*)	13/11/2020	5	Birds of Ireland	Green	Yes
N52	Ringed Plover (*Charadrius hiaticula*)	25/03/2023	3	Birds of Ireland	Amber	No
N52, N53	Sand Martin (*Riparia riparia*)	18/10/2015	2	Bird Atlas 2007-2011	Amber	No
N52, N53	Sky Lark (*Alauda arvensis*)	21/05/2019	23	Birds of Ireland	Amber	No
N52, N53	Spotted Flycatcher (*Muscicapa striata*)	31/12/2011	3	Bird Atlas 2007-2011	Amber	No
N52, N53	Tufted Duck (*Aythya fuligula*)	31/12/2011	2	Bird Atlas 2007-2011	Amber	No
N52	Whinchat (*Saxicola rubetra*)	30/05/2021	2	Birds of Ireland	Red	No
N52, N53	Whooper Swan (*Cygnus cygnus*)	25/03/2023	16	Birds of Ireland	Amber	Yes

Grid Square	Species Name	Date of Last Record	Record Count	Title of Dataset	BoCCI Status	Annex I
N52, N53	Yellowhammer (*Emberiza citrinella*)	04/06/2021	12	Bird Atlas 2007-2011	Red	No
N53	Common Coot (*Fulica atra*)	29/02/1984	1	The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84.	Amber	No
N53	Common Quail (*Coturnix coturnix*)	31/12/2011	1	Bird Atlas 2007-2011	Red	No
N53	Common Sandpiper (*Actitis hypoleucos*)	31/12/2011	4	Bird Atlas 2007-2011	Amber	No
N53	Lesser Black-backed Gull (*Larus fuscus*)	16/10/2010	1	Birds of Ireland	Amber	No
N53	Spotted Crake (*Porzana porzana*)	02/07/1993	1	Rare birds of Ireland	Amber	Yes

7.3.1.2.1 Grid Connection & TDR

In addition to the 10km grid square searches detailed above, the 1km grid squares overlapping the proposed grid connection were also searched. The grid connection overlaps the following 1km grid squares: N5630, N5631, N5730, N5830, N5831, N5929, N5930, N6026, N6027, N6028 and N6029. The locations where turbine delivery route (TDR) accommodation works are required overlap the following 1km grid squares: N4121, N5831 and N5930.

The avian species listed in Table 7-18 represent all desktop records of birds overlapping the proposed grid connection and TDR works locations available from the NBDC.

Table 7-18: Avian Desktop Records Overlapping Grid Connection/TDR

Grid Square	Species Name	Date of Last Record	Record Count	Title of Dataset	Bocci Status	Annex I
N4121	Barn Owl (Tyto alba)	12/07/2017	1	Birds of Ireland	Red	No
N4121	Buzzard (*Buteo buteo*)	28/05/2018	2	Birds of Ireland	Green	No
N5930	Sparrowhawk (*Accipiter nisus*)	27/08/2012	1	Birds of Ireland	Green	No

Recent imagery (June 2025) available on google street view for the R420/R402 junction TDR works footprint indicates an existing hard standing is in place along the route proposed for turbine component transport at this corner. The hard standing is bordered by gassy verge vegetation, with trees forming a hedgerow to the west of the hard standing.

Recent imagery (September 2024) from google street view of the R402/L5006 junction shows a tightly cut low hedge, one mature ash tree with signs of ash dieback, and improved agricultural grassland within the proposed TDR works footprint at this location. The presence of these habitats was confirmed at this location during the audio survey site visit on 7th October 2024. Similarly, google street view imagery from July 2024 covering the L5006/un-named local road junction showing tightly cut low hedge and improved agricultural grassland within the proposed TDR works footprint at this location was confirmed during the audio survey site visit on 7th October 2024.

On exiting the Proposed Development site, the proposed grid connection follows existing roads. Examination of aerial imagery, confirmed by observations en route to the Proposed Development, shows the route runs along roads trough which traverse agricultural land (predominantly pasture) verged by low, tightly cut hedges with occasional larger trees dotted along hedgerows. Houses, gardens, planted woodlands and cutover bog are also present along/near the grid route. There are no wetland habitats of ornithological value along the route.

7.3.1.3 Site Description

The Proposed Wind Farm is located in agricultural land and commercial forestry bordered by areas of formerly harvested peatland c. 5km west of Edenderry, Co. Offaly. The dominant habitats at the Proposed Wind Farm are Improved agricultural grassland (GA1), Conifer plantation (WD4), Mixed broadleaved/conifer woodland (WD2) and recently felled woodland – scrub (WS5-WS1), Scrub (WS1), Hedgerow (WL1), and drainage ditches (FW4) throughout the site.

The Grand Canal runs to the north of the of the Proposed Development, however there is no identified direct hydrological connection between the Proposed Development and the Grand Canal. Rogerstown 07 water course is mapped to the north of the Proposed Wind Farm and Leitrim Stream (Leitrim 14) and Lumville Stream are mapped within the central and southern portions of the Proposed Wind Farm are indicated to drain the area. A section of the River Boyne drains the northeast most section of the Proposed Grid Connection and is referred to by the EPA as the Kinnafad Stream. The Leitrim Stream begins within the Proposed Wind Farm and flows in a southerly direction for 4.95km before discharging into the River Figile. Areas of flooded cutover bog are present in the surrounding hinterland, and two small artificial lakes and a flooded quarry are present c. 2km the southeast of the Proposed Wind Farm

7.3.2 Field Surveys

Species of conservation concern that are known to be potentially vulnerable to wind farm developments are discussed in more detail in this section. Species have been selected for detailed discussion on the basis of conservation status, vulnerability to wind farm developments and if species sightings have been confirmed on or near the Proposed Wind Farm, which will indicate potential links between species recorded at the Proposed Development and the surrounding environment.

7.3.2.1 Target Species Recorded During VP, Transects and Other Species-Specific Surveys

The following target species were recorded during VP surveys, transects and other species-specific surveys. The records of these species during hinterland surveys have also been included to provide context in relation to connectivity to important habitats in the surrounding area outside of the Proposed Wind Farm. The study area for VP surveys is called the 'flight activity survey area' and is unique to this survey type. Any target species passing within this 500m buffer from proposed turbine locations (flight activity survey area) is considered within the Proposed Wind Farm site under the SNH (2017) guidance. Many of the observations of target species were outside of the flight activity survey area. However, the details of these observations were noted during surveys. The 'rotor sweep zone' is the height at which the proposed turbine blades would be rotating. It extends for the minimum tip of the blade from the ground to the maximum tip height of the blade in rotation. With a proposed hub height of 104m and a blade radius of 81m, the lower tip height is 23m and the upper tip height is 185m. Theoretically birds flying within this height range (23m to 185m) would be at risk of collision without the consideration of avoidance.

7.3.2.1.1 Buzzard

Vantage Point Surveys: Summer/Breeding Season (Summer 2021, 2022 and April 2024)

Buzzards were recorded on 185 occasions across all surveyed breeding seasons. The majority of these recorded Buzzard flights travelling either wholly within or partially within the 500m buffer zone as well as within the rotor-swept height band (23-185m). There were records of hunting in the flight activity study area; however, there were no records of confirmed breeding behaviour.

There were a total of 117 observations of this green-listed species during the summer 2021 VP surveys. These occurred at every VP across all months of the breeding season. Flight activity was recorded in each of the height bands, with most flight time spent in the 100-200m band. A high proportion of activity also occurred >200m. Flight activity was widely distributed across the entire study area.

Buzzards were recorded 55 times during the 2022 breeding season across every VP and all months (April-September). Six of these observations occurred during spring migration watches from VPs 1-3. Most flight activity was concentrated in/adjacent to the northeast section of the study area. Flight activity was also observed in the northwest and south of the study area. Behaviour observed was typical of buzzards as they were seen soaring, circling and hovering. Hooded crows were seen mobbing buzzards on five occasions from VPs 1 and 3 in April, May and June 2022. One observation from VP 2 on 20th June 2022 recorded a buzzard being mobbed by a peregrine while soaring. Displaying behaviour was observed from VP 1 on 18th April 2022.

During the 2024 migration surveys in April, buzzards were observed 12 times from VPs 2, 3 and 4. Six of these obervations occurred within the 500m buffer zone, with typical buzzard behaviour observed as they were seen circling, soaring, hunting and being mobbed by hooded crows on two occasions.

VP Surveys: Winter Season (Winter 2021/22, 2022/23, 2023/24 & 2024/25)

Buzzards were recorded 197 times throughout the non-breeding seasons. Buzzards were observed during each season, with typical behaviour such as circling, soaring and hunting noted.

During the 2021/22 winter season, there were a total of 43 records of this green-listed raptor species. This included five unmapped static calling records and 38 recorded mapped observations. Observations were noted from all VPs and across every winter month. Flight activity was recorded in every height band with the majority occurring at low heights in the 0-15m band. The behavioural patterns recorded were typical for this species with soaring (seven observations), low flying (four observations) and incidences of mobbing by hooded crows (six observations) observed. Flight activity was primarily concentrated to the northeast and in the mid-west of the study area.

During the 2022/23 winter season, a total of 57 observations of this green-listed species were recorded during winter VP surveys. Of these, seven were recorded during autumn migration watches, all seen from at VP 1. Flight activity was predominantly recorded in the 0-15m and 30-100m height bands. The remainder of winter records were observed from VPs 1, 2 and 3 during every month between October 2022 and March 2023. Flight activity occurred in every height band but most frequently between 0-15m. Flight activity was concentrated in/adjacent to the northeast section of the study area. Several records were made in/to the northwest and southern parts of the study area. Activity recorded was typical of buzzards with observations of circling, soaring, hunting, gliding and soaring. Buzzards were mobbed on four occasions by corvids.

During the 2023/2024 winter season, there were a total of 78 observations from all VPs and HHVPs (hen harrier watch VPs). Flight activity was recorded in every height band with majority occurring at low heights in the 30-100m band. There was some activity >200m and also across the remaining bands. Flight activity was concentrated in the southern parts of the study area and the northeastern section of the study area. Activity recorded was typical of buzzards with observations of circling, soaring, hunting, gliding, soaring and being mobbed by corvids.

During the 2024/25 winter season there was a total of 10 observations from VPs 1 & 3, only one of which traversed the 500m turbine buffer. The majority of flight time was recorded within the 0-15m height band, followed by 30-100m. Flight activity was concentrated in the northeast section of the study area.

Winter Transects (Winter 2021/22, 2022/23, 2024/25)

During the 2021/22 Winter Transect Surveys, green-listed buzzard was recorded four times. These were distributed along transect 1 (0-25m and 25-100m distance bands) and along transect 4 (0-25m and flying over/>100m).

During the 2022/23 Winter Transect Surveys, buzzard was recorded seven times. These were distributed along transect 1 (0-25m and 25-100m distance bands) and along transect 4 (0-25m, 25-100m and flying over/>100m distance bands).

Two buzzards were seen flying and then perching in trees in the 0-25m distance band along TR5 on 02/12/2024.

Hinterland Surveys (2021, 2022, 2023 and 2024)

Buzzards were observed on 29 occasions during the summer of 2021 across every month at hinterland VPs (HVPs) 1, 2, 3 4, 9, 10, 11, 12 and 13. These were primarily observations of single birds.

There were 12 records during winter 2021/22 hinterland surveys in every month, excluding November, at HVPs 4, 7, 8 and 12 and along TRs 24 and 25. Display flight activity was noted in a group of five individuals at HVP 7 on February 2nd, 2022. There was also an incidental record noted on February 4th, 2022.

In the summer of 2022, buzzard was observed seven times during summer hinterland surveys in April, June, July, August and September. These records were noted at HVPs 7 (4.63km west of study area) and 8 (2.17km southeast of study area) and observed single birds. A juvenile was recorded on one occasion at HVP 8 on September 16th, 2022.

During the winter of 2022/23, a total of six records of this species were made during winter hinterland surveys. These occurred at HVPs 7 and 8 during October/November 2022 and in January, February and March 2023. Four of these observations recorded single birds, while two buzzards were seen together on two occasions (at HVP 7 on November 9th and February 3rd).

During the Winter of 2023/24, a total of three buzzard observations were recorded during the hinterland surveys. These occurred at HVPs 7 and 8 during November 2023 and March 2024. Two observations recorded two individuals together (11th November 2023 and 4th of March 2024) while the other observation recorded a single bird.

A single record of buzzard was made during winter 2024/25 hinterland surveys, with a pair recorded at HVP7 on 11th October 2024.

7.3.2.1.2 Black-Headed Gull

VP Surveys: Summer/Breeding Season (Summer 2021, 2022 and April 2024)

There were no Black-headed gulls observed in the summer season of 2021/22.

There were only two Black-Headed Gull observations in breeding season surveys which occurred in 2022. These both occurred from VP 3 on 12th July 2022. The first record noted one gull flying in the 100-200m height band. Three individuals were recorded on the second occasion flying within the following height bands: 0-15m, 15-30m and 30-100m. The flight paths observed traversed the south of the study area over woodland and bog habitat.

There were no Black-headed gulls observed in the April 2024.

VP Surveys: Winter Season (Winter 2021/22, 2022/23, 2023/24 and 2024/25)

There were no Black-headed gulls observed in the winter season of 2021/22.

The non-breeding season of 2022/23 was the only survey period where Black-Headed Gulls were recorded. A total of four observations of this amber-listed species were recorded, all from VP 1 on 20th December 2022. Flight activity was recorded predominantly in the 0-15m height band, with a high proportion of time of time also spent between 30-100m. The remaining flight time was distributed across the other height bands (30-100m and 100-200m). These records were concentrated to the northeast of the study area over farmland. These observations recorded birds circling/searching and then dropping down to land in fields, indicating foraging.

There were no Black-headed gulls observed in the winter seasons of 2023/24 or 2024/25.

No black-headed gulls were observed during any other surveys.

7.3.2.1.3 Common Gull

VP Surveys: Winter Season (Winter 2021/22, 2022/23, 2023/24 and 2024/25)

Common Gull was not observed during the 2021/22, 2023/24 or 2024/25 Winter VP Surveys.

There were two observations of the Common Gull in the 2022/23 non-breeding season surveys. Both were noted from VP 1 on December 20th. The first record noted four gulls which flew in from the east in the 0-15m and 15-30m height bands. The second observation recorded six individuals flying in a westerly direction in the 0-15m height band. These flights occurred to the northeast of the study area over agricultural land. There was no flight activity within the 500m buffer.

No common gulls were observed during any other surveys.

7.3.2.1.4 Cormorant

VP Surveys: Winter Season (Winter 2021/22, 2022/23, 2023/24 and 2024/25)

Cormorant was not observed in the winter VP Surveys of 2022/23, 2023/24 or 2024/25.

This amber-listed species was recorded on one occasion across the winter 2021/22 season. This observation occurred on the 2nd of November from VP 1 and involved one cormorant in direct flight along the Grand Canal bordering the northern part of the proposed site. Flight activity was recorded in the 0-15m height band (20 seconds) and in the 30-100m band (90 seconds). All flight activity was outside the 500m turbine buffer.

No cormorants were observed during any other surveys.

7.3.2.1.5 Great Black-backed Gull

Vantage Point Surveys: Summer/Breeding Season (Summer 2021, 2022 and April 2024)

During summer 2021 VP surveys and early in the breeding season, this green-listed species was recorded a total of five times (during 27th April and 30th April). A total of three observations were recorded from VP 1 and two were recorded from VP 2. Flight activity was predominantly recorded in the 30-100m height band, with less activity noted in the 0-15m and 15-30m height bands. This species was recorded in low numbers with single gulls noted on four the occasions and two individuals sighted together on one occasion (from VP 2).

There were no observations of Great Black-backed Gull in the 2022 Summer season or Migration Survey in April 2024.

No great black-backed gulls were observed during any other surveys.

7.3.2.1.6 Golden Plover

Golden Plover were predominantly observed during the winter season, in addition to a small number of records potentially associated with migratory and post-breeding dispersal. Observations indicate the presence of a wintering population in the locality and wider region which utilises agricultural land and bogs.

Vantage Point Surveys: Summer/Breeding Season (Summer 2021, 2022 and April 2024)

During the 2021 Summer Surveys, there were no observations of Golden Plover.

During the 2022 Summer Surveys, a total of five observations of this Annex I/red-listed species were recorded. Of these, four were recorded during spring migration VP surveys from VP 1 (5th April 2022). Flight activity of 12-15 birds (three observations) was recorded primarily within the 0-15m height band (137 seconds). Time spent in the remaining height bands was distributed as follows: 15-30m (32s) and 30-100m (86s). These observations involved golden plovers in direct and circular flight predominantly concentrated in/adjacent to the northeast section of the study area. One unmapped static record noted 12 golden plovers in breeding plumage foraging in a field to the south of VP 1 on 5th April 2022. The fifth and final summer season observation of this species occurred on 19th August 2022, from VP 2, where a flock of 46 birds were seen in direct flight moving northwest and skirting the northwestern edge of the study area for 40 seconds in the 30-100m height band. Golden plover activity in August is likely to be indicative of post-breeding dispersal associated with the resident population which breeds in the northwest of the country.

During the 2024 April Migration Surveys, one observation was recorded on 9th April 2024. Flight activity of 12 birds was recorded within the 30-100m height band (5 seconds), moving westward to the north of T4.

Vantage Point Surveys: Winter Season (Winter 2021/22, 2022/23, 2023/24 and 2024/25)

During the 2021/22 Winter VP Surveys there were a total of 38 observations. This included 33 visual sightings and five static call records. These records were made from every VP across every winter month. This includes one observation made during an autumn migration survey from VP3. Flight activity was recorded across every height band with the majority occurring in the 30-100m band. Flight time was also recorded across the remaining height bands (0-15m, 15-30m, 100-200m and >200m). Most of the observations were recorded in the north/northeast of the study area. Flock size ranged from eight to 750 individuals. Activity observed included high levels of circling search flight, direct and multidirectional flight. There was also evidence of foraging activity in the flight activity study area.

During the 2022/23 Winter VP Surveys, a total of 20 records of this Annex I/red-listed species were made from VPs 1 and 3. Flight paths were primarily recorded in and adjacent to the northeast of the study area. Flight activity was distributed across all height bands with most time spent in the 100-200m, 30-100m and >200m height bands. One of these observations was noted during an autumn migration survey from VP3 (01/10/2022) and recorded 12 individuals flying in the 0-15m and 30-100m height bands. The smallest number of birds observed together during this season was three, while large flocks of up to 1000 birds were also recorded. The latter large flock of 1000 individuals was seen on three occasions from VP 1 on 15th November 2022. This flock was observed in searching/wheeling flight. Similarly, from VP 1 on 4th November 2022, a group of 500 birds was observed on three occasions. It was first seen rising in a field with lapwing and was later disturbed by a buzzard flying over. The flock returned to the field once the buzzard had departed. A static record of a flock of 55 foraging birds was made on December 20th, 2022 (not mapped). This flock was outside the study area to the east of VP1.

During the 2023/24 Winter VP Surveys, there were a total of 16 observations. Flight activity was recorded in every height band with majority occurring at low heights in the 0-15m band. There was some activity in the >200m band. Flight activity was concentrated around Esker Bog Rathlumber and VP1.

During the 2024/25 Winter VP Surveys, there were a total of 14 golden plover observations, four of which intersected the 500m turbine buffer. Flight activity was recorded in every height band and was distributed as follows. Numbers of individuals observed during this period ranged from 3-600. Flight activity was concentrated mainly in the northeast and southeast of the study area.

Winter Transects (Winter 2021/22 and 2022/23)

Golden plover were not observed in the 2022/23 Winter Transect Surveys; however, were recorded twice in the Winter Transect Surveys of 2021/22. There was an observation of 10 individuals flying over on 5th of January 2022, and an observation of 1000+ individuals >100m form the transect on 2nd of December 2021.

Hinterland Surveys (2021, 2022, 2023 and 2024)

Red-listed/Annex I golden plover were recorded three times throughout winter 2021/22 hinterland surveys. The earliest record was made at TR 26 (5th December 2021). Further records occurred at HVP 4 (5th January 2022) and HVP 8 (10th March 2022). Flock size ranged from 40 -1500 individuals.

This Annex I/red-listed species was observed on one occasion across all 2022/23 hinterland surveys. This occurred on 14th October 2022, at HVP 8 (southeast of study area) where a flock of 20 individuals was observed on peat hidden among heather.

A flock of 80 golden plover were recorded at HVP17 on 1st January 2025.

There were no records of golden plover during summer 2021 and 2022 hinterland surveys.

7.3.2.1.7 Grey Heron

Vantage Point Surveys: Summer/Breeding Season (Summer 2021, 2022 and April 2024)

During the 2021 Summer Surveys, this species was observed five times. Three of these occurred from VP 1 (April 27th April and 10th August) and two were recorded from VP 4a (18th May and 12th September). Grey herons were predominantly recorded individually, and two birds were seen together from VP 4a on one occasion. Flight activity was noted in every height band, except for >200m.

During the 2022 Summer Surveys, grey heron was recorded just once. This observation was recorded from VP 2 on 6th June 2022, when an individual was seen flying straight from the northwest corner of the study area moving in a northerly direction in the 30-100m height band.

Vantage Point Surveys: Winter Season (Winter 2021/22)

During the 2021/22 Winter VP Surveys, grey heron individuals were recorded on four occasions (October 2021). This included one migration survey sighting. A total of three observations were noted from VP 2 and one from VP 1.

During the 2022/23, 2023/24 and 2024/25 Winter VP Surveys, grey heron was not observed.

Winter Transects (Winter 2021/22 and 2022/23)

Grey Heron was not observed in the 2021/22 Winter Transect Surveys.

Grey Heron was observed once in the 0-25m distance band in the Winter Transect Surveys 2022/23.

Hinterland Surveys (2021, 2022, 2023 and 2024)

There were 24 observations of green-listed grey heron during the summer 2021 at HVPs 1, 2, 3, 4, 9, 11, 12, 13 and 19. This species was predominantly found singly or in groups of 2-5 individuals. Grey heron was recorded on five occasions during winter 2021/22 all of which occurred on 5th October 2021. These observations were made

at HVPs 4, 9 ,12 and 13 and were primarily of single birds, along with one record of two individuals together at HVP 9.

Grey Heron was not observed in the 2022/23 Hinterland Surveys.

7.3.2.1.8 Greylag Goose

Vantage Point Surveys: Winter Season (Winter 2023/24)

During the winter 2023/24 hen harrier roost watch VPs, greylag goose was observed once. A single goose was seen commuting in a south-westerly direction in the 100-200m height band, moving through the 500m buffer near T6.

There were no records of greylag goose during any other surveys.

7.3.2.1.9 Hen Harrier

Foraging hen harrier were observed during the winter seasons, and casual/opportunistic roosting of individual birds was observed on three occasions. However, surveys established the absence of any communal/habitual roosts in the locality of the Proposed Development. The region in which the Proposed Development is located provides a landscape-scale habitat mosaic which is suitable for wintering hen harrier.

Vantage Point Surveys: Summer/Breeding Season (Summer 2021, 2022 and April 2024)

During the 2021, 2022 Summer Surveys and April 2024 Migration Surveys, there were no sightings of Hen Harrier.

Vantage Point Surveys: Winter Season (Winter 2021/22, 2022/23, 2023/24 & 2024/25)

During the 2021/22 Winter VP Surveys, Hen Harrier was recorded on 12 occasions throughout the winter 2021/22 season. All of these observations were recorded from VP 3 (January, February and March 2022). Hen harriers were always seen alone, and flight activity was consistently recorded at low heights, with the majority occurring in the 0- 15m band (3010 seconds). An additional 90 second observation was recorded at 15-30m. The distribution of flight activity was concentrated around the southeast of the study area. Birds were predominantly recorded hunting within the study area, which frequently occurred over bog and farmland. Eight of the observations identified a hunting female, five of which were considered to be the same individual on 12th March. Two observations of females flying into the southern part of the study area during February 2022 are considered to be indicative of roosting due to the timing of the observations (17:05 and 16:25 respectively). These observations both recorded a female hen harrier flying low with the flight path terminating out of sight in trees in recolonising cutover bog south/east of the Proposed Development.

During the 2022/23 Winter VP Surveys, there were three observations of hen harrier, all of which were seen from VP 3 on 14th October, 22nd and 29th December 2022. Flight activity occurred in the 0-15m (490s) and 15-30m (425s) height bands. This activity was concentrated to the south of the study area over recolonising cutover bog and remnant drained raised bog. All observations were of single birds, two of which were males. The first record (14th October 2022) noted a male active in this area for almost one hour. During this period, this bird was observed quartering/hunting and preening. A hen harrier was briefly observed (10s) hunting among birch trees within the 15-30m height band in the same area on 29th December 2022. The hen harrier observed on 22nd October 2022 flew southwest before quartering back to fly northeast along bog/woodland edge, occupying the 15-30m height band. This flight pattern is indicative of hunting behaviour.

During the 2023/24 Winter VP Surveys, there were eight observations of hen harrier, with one observation from VP1 (January), one from HHVP 2 (November), four from VP3 (December, March), one from HHVP3 (December) and one from VP4 (March). Flight activity occurred in the 0-15m (410s) height band and was concentrated to the south of the study area.

Six of the observations identified a female of which three were considered to be the same individual on 4th March. One of these observations was an unconfirmed/potential hen harrier recorded flying into the woodland north of T4 at dusk on 11th December 2023. Identification of this bird was inconclusive due to low light; however, this is assessed as a record of roosting hen harrier on a precautionary basis.

Hen harriers were not observed during the 2024/25 winter VP surveys.

There were no observations of hen harrier during any other surveys.

7.3.2.1.10 Kestrel

Vantage Point Surveys: Summer/Breeding Season (Summer 2021, 2022 and April 2024)

During the 2021 Summer Surveys, there were a total of 14 kestrel observations. These occurred at every VP throughout all summer months except June. Flight activity was recorded across every height band up to 200m. Time was primarily spent between 30-100m. Observations were predominantly recorded along the edge of the study area with some circling flight patterns in the southeast. All of the observations recorded single birds with one confirmed male sighting (11th May 2021 VP3a). There was also a record of a moulting juvenile on August 10th (VP1).

During the 2022 Summer Surveys, kestrels were again observed on 14 occasions. Of these, two occurred during spring migration watches (both on 9th April 2022). Flight activity occurred in the 15-30m and 30-100m height bands during these records. The remaining records were noted during every month between April-September 2022. Flight activity was again predominantly recorded in the 30-100m height band, followed by 100-200m. Flight paths were scattered across the study area with activity concentrated in pockets in/adjacent to the northeast, south and northwest corners of the study area. Kestrels were seen alone during all summer observations. Three were identified as males. Kestrels were seen hunting/hovering during twelve observations across the whole summer season.

During the 2024 April Migration Surveys, there were five kestrel observations, all of which occurred at VP3 in April (9th & 10th). Flight paths were observed in the south of the study area with four observed within the 500m buffer with circling flight patterns. Three were identified as males and two females and were observed hovering and hunting.

Vantage Point Surveys: Winter Season (Winter 2021/22, 2022/23, 2023/24 and 2024/25)

During the 2021/22 Winter VP Surveys, there was a total of 19 observations of this red-listed species. These were recorded from every VP and across every month of the winter season. Flight activity was highest at low levels with a total of 4210 seconds recorded in the 0-15m band, followed by 759 seconds in the 30-100m height band. The majority of observations were recorded to the southeast of the study area on the outskirts of the SNH buffer, but records were also distributed across the study area. The flight activity observed followed typical patterns for this species with high levels of hovering and hunting in the study area. There were two observations of kestrels hunting finches. The majority of the records noted single birds with four confirmed male individuals.

During the 2022/23 Winter VP Surveys, there was a total of 29 observations of kestrel. Of these, two were noted during autumn migration watches from VP 3 and VP 4 (September 30th and October 1st, 2022). Activity was primarily recorded in the 100-200m height band. Observations of flight paths were primarily concentrated in pockets in/adjacent to the northeast, northwest and south of the study area. The remaining records between October 2022 and March 2023 were made at every VP. Flight activity for these records occurred predominantly in the 15-30m height band. All kestrels observed were alone and eleven were identified as male. Kestrels observed were mainly engaged in hunting, during both seasons.

During the 2023/24 Winter VP Surveys, there was a total of 65 observations recorded from every VP across every month of the winter season. Flight activity was highest in the 15-30m height band followed by 30-100m. The majority of observations were recorded to the southeast or northeast of the study area on the outskirts of the southeast 500m buffer or within the 500m buffer in the northeast. Hunting and hovering were frequently observed. Kestrels were observed alone, and majority were identified as male.

During the 2024/25 Winter VP Surveys kestrel was observed six times. No flight activity occurred within the 500m buffer. Flight activity was observed in each of these height bands: 0-15m, 15-30m and 30-100m.

Winter Transects (Winter 2021/22 and 2022/23)

There was one observation of red-listed kestrel within the 25-100m distance band at transect 4 (round 1) in the 2021/22 Winter Transect Survey.

There were no observations of kestrel in the 2022/23 Winter Transect Survey.

Hinterland Surveys (2021, 2022, 2023 and 2024)

A total of five observations of this red-listed species were recorded in summer 2021. These occurred in June 2021 (9th and 30th June) from HVPs 9, 10 and 12. These observations were all of single birds. During winter 2021/22, this species was observed twice at TR 24, where hunting activity was recorded on one occasion (January 1st 2022).

Red-listed kestrel was observed on one occasion during summer 2022 hinterland surveys. This occurred at HVP 7 on 12th July 2022. There was one observation of an individual kestrel during winter 2022/23 hinterland surveys, recorded from HVP 7 on 18th December 2022.

Kestrel was observed three times during winter 2023/24 hinterland surveys. These occurred at HVP 8 on 11th November 2023, HVP7 and HVP9 on 4th March 2024.

7.3.2.1.11 Kingfisher

Hinterland Surveys (winter 2021/2022)

There was one incidental record of this amber-listed/Annex I species across hinterland surveys which occurred on 5th December 2021 to the north of TR18 (c. 4.2km west of the Proposed Development).

There were no observations of kingfisher during any other surveys.

7.3.2.1.12 Lapwing

Vantage Point Surveys: Summer/Breeding Season (Summer 2021, 2022 and April 2024)

During the 2021 Summer Surveys, lapwing was recorded twice. These both occurred early in the breeding season (30th April) from VP 2 and recorded single birds. Flight activity only occurred within the 30-100m height band for 308 seconds and noted individuals flying over conifer plantation in the northwest of the study area and then continuing over improved agricultural grassland and woodland in a westerly direction.

This red-listed species was recorded a total of 30 times during summer 2022 VP surveys. Of these, seven were noted during spring migration watches, all of which were seen from VP 3 (1st April and 5th April 2022). During this period flight activity was observed in the 15-20m and 0-15m height bands. Display behaviour was seen during these spring migration surveys on three occasions on both dates, one of which involved a flock of 12 individuals (1st April 2022). The remaining summer observations were seen from VPs 3 and 4. Flight activity was primarily in the by 15-30m height band, followed by 0-15m. Lapwing were commonly observed alone or in pairs. However, groups of 3-22 were also recorded. The largest flock of 22 birds, made up of juveniles only, was seen from VP3 on 20th June. This species was seen foraging, displaying and commuting on/over peatland, and also occasionally agricultural land. These records were primarily concentrated in the south of the study area.

Display flights were recorded over peatland in the south of the study area on 5th April and 8th May 2022. Display flights over fields were recorded on 1st and 5th April.

During the April 2024 Migration Surveys, lapwing was recorded thirteen times. Of these, 12 were seen from VP3 and one from VP4. All observations were in April (9th to 11th). Flight activity was mainly observed in the 15-30m height band. Display flight was observed overlapping the southeast of the 500m buffer on 10th April and potential nesting and foraging behaviour was also observed, including a pair in a stubble field near VP3 (outside the Proposed Development c. 900m outside the 500m buffer. Although breeding behaviour was observed, surveyors noted any potential breeding attempts would be unlikely be successful for this ground-nesting species due to high predator pressure in the locality (resident foxes, hooded crows and magpies were frequently observed, and pine marten and mink are also likely to be present). No evidence of successful breeding on Esker Bog Rathlumber was recorded.

Vantage Point Surveys: Winter Season (Winter 2021/22, 2022/23, 2023/24 and 2024/25)

A total of 15 observations of this red-listed species were recorded during winter 2021/22 VP surveys. These occurred at VPs 1, 3 and 4. Flight activity was recorded across all height bands with the majority of total flight time spent at 100-200m. Number of individuals per record ranged from single birds to flocks of up to 78 individuals. The flock of 78, observed on 8th November 2021 was recorded circling within the 500m buffer over plantation woodland near T4. This was the only incidence of flight activity in this area during winter 2021/22. the majority of flight activity was focused in the area of Esker Bog Rathlumber to the east of T6. The majority of observations recorded lapwing circling over Esker Bog Rathlumber (recolonising cutover bog to the south/east of the Proposed Development). Flocks in direct flight were also observed in the north of the study area. On two occasions, lapwings were flushed, once by a buzzard and once by a peregrine. Additionally, there were three records where lapwing was heard but not seen.

A total of 26 records of this red-listed species were made during 2022/23 winter VP surveys. These were noted from every VP in October, November, December 2022, and January and March 2023. There was flight activity in every height band but primarily within the 30-100m and 15-30m bands. Flight paths were concentrated in two main pockets, one in/adjacent to the south and one in/adjacent to the northeast of the study area. A static record of a flock of four lapwing foraging with a flock of golden plover was made on December 20th, 2022 (not mapped). This flock was outside the study area to the east of VP1. Lapwing were seen alone or in pairs but more commonly in groups ranging between 3-120 individuals. The largest flocks of 90 and 120 birds were observed from VP 1 (November 15th and December 6th, 2022). Another large flock of 58 individuals was recorded from VP 3 (October 22nd, 2022). The size of other groups ranged from 3-50 birds. There were observations of foraging behaviour, searching, and circling flight patterns across the season. In March 2023 at VPs 3 and 4, display flights and calling birds were recorded (four records from March 17th to 21st).

During the 2023/24 Winter VP Surveys a total of 27 lapwing observations were made. These were noted from every VP in every month. Flight activity was primarily in the 0-15m height band. Flight paths were concentrated in two main pockets, one in the south and one in the northeast of the study area. Lapwing were observed in numbers ranging from 1-200 individuals. The largest flock of 200 individuals was seen from HHVP4 on 20th November.

During the 2024/25 Winter VP Survey, lapwing were observed seven times from VPs 1 and 3, with groups of between four to 65 birds recorded. Flight activity occurred in the northeast and south of the study area, with two flights intersecting the southern part of the 500m buffer.

Breeding Wader Surveys (Summer 2021 and 2022/23)

A total of four lapwing observations were recorded in summer 2021, including two sets of pairs at wader site 2 (4.7km west of Proposed Development) and site 4 (3.1km west of Proposed Development), indicative of possible breeding at these locations in the surrounding hinterland. There was also a record of possible breeding noted at site 7 (630m northwest of Proposed Development). Audio recorders detected this species at site 5 (3.1km west of Proposed Development). See **Figure 7-8** for breeding wader (2021) survey locations.

Lapwing was recorded on three occasions during summer 2022 breeding wader surveys. The earliest was at wader transect W3 in April 2022 and noted adults in display flight over cutover bog for ten minutes. This was recorded as an occupied territory. The second observation noted two adult birds flying to roost at W2 on 9th June 2022. During the third and final observation at TR3, two adult birds flushed and flew up after being disturbed. This observation was recorded as an occupied territory.

Breeding Transects (Summer 2021 and 2022)

Lapwing was observed within 25m of transect 1 during the early part of the 2021 breeding season.

There were two observations of this red-listed species during 2022 breeding transect surveys, one in April and one in June. These both occurred within 25-100m of Transect 4. Lapwing was recorded in low numbers (one to two individuals).

Hinterland Surveys (2021, 2022, 2023 and 2024)

A total of seven observations of this red-listed species was recorded during summer 2021 hinterland surveys. These occurred at HVPs 12 and 9 and TRs 18, 19 and 23 in groups of 2- 4 individuals. This includes observations of two sets of pairs inhabiting flooded cutover bog viewed from TR 18 (May 18th) and TR 19 (June 6th). This species was recorded twice during the winter season at HVP 7 (March 10th and 20th).

A total of three observations of this red-listed species were recorded during summer 2022 hinterland surveys. These all occurred at HVP 7 on 8th May 2022, 22nd June 2022 and 1st August 2022. On the first occasion, two pairs were observed defending their nests. The second observation recorded one bird, and five individuals were seen during the final observation. There was one record of this lapwing during winter hinterland surveys. A total of 39 individuals were observed from HVP 7 on 2nd March 2023.

There was one observation of Lapwing during the winter 2023/2024 Hinterland survey on 4th March at HVP7 with 29 individuals observed.

There was one observation of Lapwing during the winter 2024/2025 Hinterland survey on 1st January at HVP17 with 200 birds observed.

7.3.2.1.13 Lesser Black-backed Gull

Vantage Point Surveys: Summer/Breeding Season (Summer 2021, 2022 and April 2024)

A total of 30 observations of this amber-listed species were recorded during summer 2021 VP surveys. Sightings were recorded at every VP across all summer months. Flight activity was observed in each height band, with the majority recorded between 100-200m. Gulls were commonly observed alone (eleven observations) but flocks of up to 48 individuals were also recorded. Flight activity was widely distributed across the study area with the main flight pattern observed being directional flight.

This amber-listed species was recorded on 19 occasions during summer 2022 VP surveys from VPs 1, 2 and 3 in April, May, July, August and September 2022. One static record (not mapped) was made from VP 1 on 25th May 2022. In this instance, three adults and two sub-adults were seen roosting in a field 30m north of VP 1 (inside the study area). For the remainder of records, flight activity occurred predominantly in the 30-100m height band.

This species was recorded primarily to the northeast of the study area. Gulls were sometimes recorded foraging and mostly travelling over agricultural land in this area. There was also some activity to the northwest of the study area and one observation of flight across the south of the study area. This species was observed alone and in pairs but more commonly in groups of 3-17 gulls, primarily moving in direct flight. Two observations on 25th May recorded groups of nine and seven gulls flying in to join gulls roosting north of VP 1.

During the April 2024 Migration Surveys there was one observation from VP 4 on 11th April where 22 individuals were observed, mainly in the 30-100m height band as well as the 15-30m height band, flying south, briefly intersecting the 500m buffer.

Vantage Point Surveys: Winter Season (Winter 2021/22, 2022/23, 2023/24 and 2024/25)

There was one observation of this amber-listed species throughout the winter 2021/22 VP survey season. This occurred from VP 1 on 2nd December 2021. Two gulls were observed flying in the 15-30m and 0-15m height bands.

Lesser black-backed gull was observed on three occasions during winter VP surveys. The earliest observation occurred from VP 1 on 4th November 2022 and recorded two gulls in direct flight in the 30-100m height band. This species wasn't seen again from VP1 until March 22nd 2023. A gull was seen from VP 4 on 18th November 2022, flying in the 15-20m height band. Two of the records were observed in the northeast corner of the study area, while one noted a gull flying through the middle of the study area in a southeasterly direction.

During the 2023/24 Winter VP Surveys there were 11 observations from each of the VPs in October, December and March. Group size ranged from 1-65, with the 65 individuals observed from VP1 on 27th October flying south. Flight activity was observed mainly in the 30-100m flight height band.

Lesser black-backed gull was observed once in the 2024/25 winter VP surveys in the northwest of the study area where a flock of 37 was noted loafing on a ploughed field for one hour. No flight activity was recorded.

Hinterland Surveys (2021, 2022, 2023 and 2024)

There are no records of this species being observed during the 2021, 2023 and 2024 Hinterland surveys.

This amber-listed species was recorded once across all hinterland surveys on 1st August 2022 from HVP 7 (4.63km west of study area) where two individuals were observed.

There were no records of lesser black backed gull during any other surveys.

7.3.2.1.14 Little Egret

Vantage Point Surveys: Winter Season (Winter 2021/22, 2022/23, 2023/24 and 2024/25)

During the 2021/22 Winter VP Surveys Little Egret was not recorded.

During the 2022/23 Winter VP Surveys there were two observations of Annex I species little egret. The first occurred on October 22nd, 2022, from VP 3 and recorded a single bird flying in the 15-30m height band. The second observation similarly recorded one bird from VP 3 flying between 15-30m on 20th December 2022. This flight activity occurred in the south of the study area.

During the 2023/24 Winter VP Surveys little egret was observed from HHVP 3 on 11th December 2023 foraging around pools.

During the 2024/25 Winter VP Surveys, little egret was not recorded.

Hinterland Surveys (2021, 2022, 2023 and 2024)

There are no records of this species being observed during the 2021, 2023, 2024 Hinterland surveys.

This Annex I species was recorded twice during summer 2022 hinterland surveys. These both occurred at HVP 7 (4.63km west of study area), on 1st August and 10th September 2022. On both occasions one bird was observed.

There were no records of little egret during any other surveys.

7.3.2.1.15 Little Grebe

Vantage Point Surveys: Summer/Breeding Season (Summer 2021, 2022 and April 2024)

During the 2021 Summer Surveys, there were no little grebes recorded.

There was one observation of this green-listed species during summer 2022 VP surveys. One bird was observed from VP 2 in the northwest of the study area, on 18th August 2022. This individual spent 15 seconds flying in the 30-100m height band in a north-westerly direction; no flight activity was recorded within the 500m turbine buffer.

During the April 2024 Migration Surveys, there were no little grebe observations.

Hinterland Surveys (2021, 2022, 2023 and 2024)

There are no records of this species being observed during the 2021, 2022 and 2024 Hinterland surveys.

There was one observation of little grebe on 11th November 2023, recorded from HVP8 where two individuals were observed in the Winter Hinterland Survey.

7.3.2.1.16 There were no records of little grebe during any other surveys. Mallard

Vantage Point Surveys: Summer/Breeding Season (Summer 2021, 2022 and April 2024)

This amber-listed species was recorded a total of six times during summer 2021 VP surveys. These were noted from VPs 2, 3a and 4 (16th September, 5th and 18th May 2021). Flight activity was predominantly recorded in the 100-200m height band. Small groups of one to three individuals were recorded on four occasions. Additionally, there were two tight flocks recorded, comprising 28 and 66 individuals.

A total of 12 records of this amber-listed species were made during summer 2022 VP surveys. Of these, five were observed during spring migration watches (1st and 5th April 2022). During this time, observations were recorded from VPs 3 and 4. Flight activity was primarily in the 0-15m height band. Flight paths were mainly concentrated in the south and middle/west of the study area. The remaining records were made in April, May, July, August and September from VPs 1, 3 and 4. Flight activity was predominantly in the 15-30m height band. On one occasion from VP 1 (May 25th), three mallards were seen in chasing flight. This species was most commonly seen in small numbers between 1-5 birds, however, a larger flock of 22 individuals was recorded from VP 3 on 6th September 2022.

During the April 2024 Migration Surveys, there were 6 observations, five from VP3 and one from VP2. All observations were recorded in April with groups ranging from 1-3 birds. Flight activity was mainly concentrated in the south and middle/west of the study area.

Vantage Point Surveys: Winter Season (Winter 2021/22, 2022/23, 2023/24 and 2024/25)

A total of 13 records were noted of this amber-listed species during winter 2021/22 VP surveys. This included 12 mapped flightlines and one static calling record. These all occurred at VP 3 across every winter month except December. Flight activity was recorded at every height band except >200m. Number of individuals per record ranged from single individuals to groups of up to 68. Two pairs were recorded in February 2022.

There were 15 observations of amber-listed mallard during winter 2022/23 VP surveys. Of these, three observations (including a flock of 23 individuals) were recorded during autumn migration watches from VP 3 over 30th September and 1st October 2022.

Flight activity was recorded in the 15-30m and 30-100m height bands. Activity was predominantly recorded in the south and middle/west of the study area. The largest flock (23 birds) recorded during this season was seen at VP 3 on 30th September 2022, during an autumn migration watch. The remaining observations were recorded in October 2022, February and March 2023 from all VPs. Flight activity was predominantly in the 30-100m and 15-30m height bands. During this period, mallards were observed in small numbers (between 1-5 individuals) and seen in either direct or chasing flight.

During the 2023/24 Winter VP Surveys, there were eight mallard observations from all HHVPs in February and March. Mallards were observed alone or in pairs and flight activity was recorded. There were two individuals in two observations from VP3 on 11th March recorded flying in the 30-100m height band before landing in a drain in the south area of the study area. Flight paths were mainly concentrated in the south and middle/west of the study area.

During the 2024/25 Winter VP Surveys, there was one observation of mallard from VP3 outside the 500m buffer in the southeast part of the study area. Flight activity was observed within the 15-30m height band.

Winter Transects (Winter 2021/22 and 2022/23)

There were no observations of Mallard in the 2021/22 Winter Transect Survey.

Mallards were observed once during the 2022/23 winter transect surveys within the height band of >100m/flying over where a total of eight individuals were observed from Transect 4 on 20th December 2022.

Hinterland Surveys (2021, 2022, 2023 and 2024)

There were 22 observations of this amber-listed species during summer 2021 hinterland surveys. These were records of single birds or groups of up to 10 individuals across HVPs 1, 3, 4, 9, 11, 12, and groups of 10 and at both TR18 and TR19. During the winter season, there were eight mallard records across HVP 1, 7, 8, 9, 11 and 12. These predominantly noted groups between 2-13 individuals.

A total of four observations of this amber-listed species were recorded during hinterland surveys. These were recorded from HVP 7 (4.63km west of study area) and HPV 8 (2.17km southeast of study area) on 27th April, 8th May, 11th July and 1st August 2022. These observations recorded mallard groups in numbers between 2-12 birds. The latter largest group was recorded at HVP 7 on August 1st, 2022. Mallard was recorded three times during winter hinterland surveys. These occurred at HVP 8 and HVP 7 on December 18th, 2022, February 10th and March 2nd, 2023. The largest flock recorded was 26 birds at HVP 8 on December 19th, 2022.

There are no records of this species being observed during the 2023 and 2024 Hinterland surveys.

7.3.2.1.17 Merlin

Vantage Point Surveys: Winter Season (Winter 2021/22, 2022/23, 2023/24 and 2024/25)

During the 2021/22 Winter VP Surveys There was a total of two observations of amber-listed/Annex I species merlin. These were recorded at VPs 2 and 3 (3rd November and 5th January respectively). One bird was seen perched on a tree to the northwest of the study area (outside 500m buffer) before dropping out of sight behind houses. The other bird was recorded flying low over the bog in the south of the study area. A total of 13 seconds was spent in the 0-15m height band.

During the 2023/24 Winter VP Surveys, there were two merlin observations from VP 1 and 2 in November and January. Both were observed outside of the 500m buffer within the 0-15m (53s), 15-30m(2s) height bands.

There were no records of merlin during any other surveys.

7.3.2.1.18 Mute Swan

Vantage Point Surveys: Summer/Breeding Season (Summer 2021, 2022 and April 2024)

This amber-listed species was recorded on two occasions throughout the 2021 breeding season from VPs 2 and 4a (30th April and 6th June respectively). Flight activity was recorded exclusively in the 30-100m height band. One record was of an individual. the other was of a pair. Flight patterns displayed directional flight across the north and centre of the study area.

During the 2022 Summer Surveys, Mute Swan was not observed.

During the April 2024 Migration Surveys, Mute Swan was not observed.

Vantage Point Surveys: Winter Season (Winter 2021/22, 2022/23, 2023/24 and 2024/25)

During the 2021/22 Winter VP Surveys, Mute Swan was not observed.

During the 2022/23 Winter VP Surveys, there were four observations of this amber-listed species, all of which were recorded from VPs 1 and 2. One of these observations was made during autumn migration VP watches (27th September 2022) and noted two individuals flying directly from the northeast of the study area to the northwest in the 15-30m height band. The remaining observations noted between 2-4 birds flying together on 16th December 2022, 18th January 2023 and 2nd March 2023. Flight activity was observed in the northwest and northeast corners of the study area.

During the 2023/24 and 2024/25 Winter VP Surveys, Mute Swan was not observed.

Winter Transects (Winter 2021/22 and 2022/23)

Mute Swan were observed twice during the 2021/22 winter transect surveys within the 0-25m distance band where one individual was noted from transect 1 during round 3 (14th February 2022).

Mute Swan were observed twice from transect 1 during the 2022/23 winter transect surveys within the 0-25m distance band. A group of three was seen during round 2 and a pair was seen during round 3.

Hinterland Surveys (2021, 2022, 2023 and 2024)

This amber-listed species was recorded five times during summer 2021 at HVP 12 and TRs 18, 19 and 20. The latter transects run through cutover bog. Breeding activity was recorded along TR 20 where there is extensive wet cutover and areas of open water, on 18th May 2021. A group of ten individuals was recorded along TR 19 on June 5th. During winter season hinterland surveys, there were eleven observations of mute swans at HVPs 1, 7, 8 and 12. These consisted of single birds and groups of 2-4 individuals.

Amber-listed mute swan was observed six times during summer hinterland surveys. These were recorded from HVPs 7 (4.63km west of study area) and 8 (2.17km southeast of study area) in April, May, June, July and September 2022. Most of the observations recorded two individuals together. This included a pair nesting at HVP 8 on May 8th, 2022. A group of five individuals consisting of two adults and three cygnets was observed at HVP 8 on 16th September 2022. A total of 12 observations of this amber-listed species were recorded during winter hinterland surveys. These occurred at HVPs 7 and 8 in every month of the winter 2022/23 season. These observations recorded mute swan in numbers of 1-7 individuals. On 14th October 2022, two adults and five cygnets were recorded at HVP 8. At this same location on November 9th, 2022, two adults and four juveniles were observed. On 17th March 2023, there were two pairs observed at HVP 8.

Mute swan was observed four times during the 2023/24 winter hinterland survey, with records from HVP4 in October 2023, HVP7 in November 2023, HVP8 in January and March 2024.

Mute swan was observed four times during the 2024/25 winter hinterland survey, with records from HVP8 in October and November 2024, January 2025 and HVP17 in January 2025.

The observation at HVP 17 which occurred on 1st January 2025, noted a herd of 80 mute swans at Derryarkin near the Yellow River wind farm to the northwest.

7.3.2.1.19 Redshank

Vantage Point Survey: Autumn migration (Winter 2021/22)

There was a single record of redshank, with this species noted calling for 20 seconds near VP3 on 1st October 2022. There was no visual record of this species.

Redshank was not recorded during any other surveys.

7.3.2.1.20 Peregrine

Vantage Point Surveys: Summer/Breeding Season (Summer 2021, 2022 and April 2024)

There were two observations of this green-listed/Annex I species throughout summer 2021 VP surveys. These were recorded from VP 4a (18th May and 25th July). Flight activity recorded consisted of one record of a pair and another record of an individual, flying in the 30-100m height band. These records occurred over cutover bog within the study area, in the central/western sector of the study area.

A total of eight observations of this Annex I species were made during summer 2022 VP surveys, all of which occurred at VP 2. Of these, one was recorded during spring migration watches on 5th April 2022. The remaining observations were noted on 6th and 20th June and 7th July 2022. Flight activity occurred predominantly in the 15- 30m and 100-200m height bands. Flight patterns most frequently consisted of soaring and circling. On June 20th, one peregrine was observed diving at a buzzard three times before heading south. Flight activity was concentrated in the northwest corner of the study area. Peregrines were primarily seen alone. However, on 7th July two birds, a juvenile and an adult were seen together and later on the same date two juveniles and one adult were recorded.

During the April 2024 Migration Surveys, there was one Peregrine observation on 2nd April from VP 2 in direct flight in a southeasterly direction within the 30-100m and 15-30m height bands.

Vantage Point Surveys: Winter Season (Winter 2021/22, 2022/23, 2023/24 and 2024/25)

This green-listed/Annex I species was recorded on one occasion during winter 2021/22 VP surveys. This occurred at VP 3 on 8th November and involved one bird flying for 180 seconds between 100-200m altitude. This individual was observed hunting lapwing within the southeast sector of the study area. It is noted this event occurred in an area with a high concentration of lapwing activity.

Peregrines were recorded on three occasions during the winter 2022/23 VP surveys, all of which were observed from VP 3. Most flight activity occurred in the 15-30m height band. Two observations were recorded on 22nd October 2022, and the final record was noted on 9th February 2023. These birds were observed flying over the south of the study area. Peregrine were observed alone for all winter records. The same female individual was recorded twice on 22nd October 2022 and was seen hunting low and landing on peat during the second observation.

During the 2023/24 Winter VP Surveys, there were seven observations of peregrine In January, November and December from all VPs but predominantly VP2. The majority of flight activity occurred in the 15-30m and 30-100m height bands. These birds were observed flying mainly in the southeast and northwest of the study area with just 2 observations overlapping the 500m buffer.

During the 2024/25 Winter VP Surveys, Peregrine was observed once hunting over bird flocks. This flight activity was observed outside of the 500m buffer near VP1, within the 30-100m height band.

Winter Transects (Winter 2021/22 and 2022/23)

There were no observations of Peregrines in the 2021/22 Winter Transect Survey.

Annex I peregrine was observed on one occasion during 2022/23 winter transect surveys. This occurred on 19th January 2023, when one bird was observed within 25-100m of Transect 1.

Hinterland Surveys (2021, 2022, 2023 and 2024)

Annex I /green-listed peregrine falcon was observed on one occasion during winter 2022/21 hinterland surveys. This occurred on 6th June 2021 and recorded single bird at HVP 13.

There were no peregrine falcons observed in the remaining 2022, 2023 and 2024 hinterland surveys.

7.3.2.1.21 Ringed Plover

Breeding Wader Surveys (Summer 2021)

This species was recorded as potentially breeding in the surrounding hinterland during summer 2021 breeding wader surveys.

Indications of ringed plover breeding were recorded at Site 2 (4.7km west of Proposed Development) as there were a minimum of six ringed plover pairs observed there. Audio recorders also detected this species at site 1 (2.8km southwest of Proposed Development).

There were no ringed plover observations during any other surveys.

7.3.2.1.22 Short-eared Owl

Vantage Point Surveys: Winter Season (Winter 2023/24)

This Annex I/Amber-listed species which occurs as a scarce but widespread winter visitor was recorded on four occasions across two rounds of hen harrier roost watch VPs. A short-eared owl was seen hunting from HHVP1 in the 15-30m height band outside the 500m buffer on 30th October 2023 at 17:00. A short-eared owl was then seen hunting in the 0-15m height band at 17:22 near HHVP2 by the second surveyor. This second observation recorded flight activity both inside and outside the 500m buffer. This activity occurred over woodland, cutover bog, high bog and farmland. Based on observed flight patterns and timing of observations, both of these records are likely to have been of the same owl hunting.

This species was seen again on 20th November 2023, this time with both observations occurring at HHVP2. The first observation occurred at 17:03, followed by the second at 17:09. Both recorded short-eared owls hunting in the 0-15m height band outside the 500m buffer over cutover bog, high bog and farmland. This activity occurred over woodland, cutover bog, high bog and farmland. Similarly to the observations on 30th October 2023, based on observed flight patterns and timing of observations, both of these records are likely to have been of the same owl hunting.

Short-eared owl was not observed during any other surveys.

7.3.2.1.23 Snipe

Vantage Point Surveys: Summer/Breeding Season (Summer 2021, 2022 and April 2024)

This red-listed species was observed on one occasion during summer 2021 VP surveys. This was recorded late in the breeding season (13th September 2021) from VP 3b and involved one bird flying in the 15-30m height band before landing.

There were two observations of this red-listed species during summer 2022 VP surveys. The first of these occurred on 17th April 2022, at VP 4 when one bird was recorded flying for in the 15-30m height band from the western edge towards the north/centre of the study area. The second observation was noted on 22nd June 2022, from VP 3 and recorded one bird drumming intermittently in the 0-15m height band over farmland to the southeast of the study area.

During the 2024 April Migration Surveys, there were no Snipe observations.

Vantage Point Surveys: Winter Season (Winter 2021/22, 2022/23, 2023/24 and 2024/25)

During the winter 2021/22 season VP surveys, there were eight observations of red-listed snipe. These occurred at VP 3 (28th October, 8th and 10th November and 5th December) and VP 1 (5th January). Time attribute to flight activity was low, with a total of 35 seconds flight time between 15-30m. There was a long observation that recorded eight birds feeding in pools for one hour from VP3 (5th December). Snipe were otherwise seen alone or in flocks of up to 26 individuals. There is suitable cutover bog habitat (Esker Bog Rathlumber) for snipe outside the Proposed Development site in the south of the study area where feeding activity has been observed from VP 3.

A total of three records of red-listed snipe were made during winter 2022/23 VP surveys. One of these occurred during autumn migration (30th September) from VP 3 and noted calls only from peatland in the south of the study area (Esker Bog Rathlumber). Another call was heard from the same bog on 4th November from VP 3. On January 5th, 2023, one bird was observed from VP 4 in the 30-100m height band flying across the centre of the study area in an easterly direction.

During the 2023/24 Winter VP Surveys, there were six records of Snipe (four visual records and two records of snipe calling) from HHVPs 1, 2 and 3 across January, February, October, November and December, with numbers ranging from 1-4 individuals observed. The majority of flight time was spent in the 15-30m height band.

During the 2024/25 Winter VP Surveys, there were two observations of Snipe from VP 3 and VP 4 in November and December. Both observations were of snipe being flushed and flying for five seconds in the 0-15m height band. One record northwest of T4 bordered the 500m buffer. The other, which involved a snipe being flushed by a dog, occurred in agricultural land outside the 500m buffer to the east of T7.

Breeding Wader Surveys (Summer 2021, 2022)

During summer 2021, breeding snipe activity was recorded at sites 1 and 3 located respectively 2.8km south and 4.8km west of the Proposed Development as indicated by drumming birds (minimum 20 birds). This species was also detected through an audio recording at site 5.

There was a single observation of this red-listed species during breeding wader surveys. This was on 17th June 2022 at W3 outside the Proposed Development site when one adult was flushed. This observation was recorded as an occupied territory.

Winter Transects (Winter 2021/22 and 2022/23)

There were no observations of Snipe in the 2021/22 Winter Transect Survey.

Snipe was observed on one occasion during winter transect surveys. This occurred on 18th December 2022 when two birds were noted within 25-100m of Transect 1.

Hinterland Surveys (2021, 2022, 2023 and 2024)

This red-listed species was recorded three times during summer 2021 surveys along TRs 19, 20 and 22. Confirmed breeding was noted at TR 20 on 18th May. A flock of approx. 20 individuals was observed at TR 19 (5th June). The record noted along TR 22 was heard only. There were also three observations of snipe during winter 2021/22 hinterland surveys. These were recorded at HVPs 7 and 8, and TR24.

This species was recorded four times during summer 2022 hinterland surveys. The records were made at HVPs 7 (4.63km west of study area) and 8 (2.17km southeast of study area) in August, July and September 2022. These were primarily individuals, but a group of four birds was also recorded at HVP 7 on September 10th, 2022. Snipe was observed on three occasions during winter 2022-23 hinterland surveys. These were recorded from HVPs 7 and 8 on 14th October, 9th November 2022 and 5th January 2023. During the first observation, two birds were recorded together. A group of five individuals was seen on the second occasion and the final observation recorded three birds.

There were no observations of Snipe in the 2023 or 2024 Hinterland Surveys.

7.3.2.1.24 Sparrowhawk

Vantage Point Surveys: Summer/Breeding Season (Summer 2021, 2022 and April 2024)

This green-listed species was observed on 12 occasions throughout summer 2021 VP surveys. Records were noted at every VP between May and August inclusive. Although flight activity was noted within every height band, the majority of flight time was spent in the 100-200m band. Sparrowhawks were primarily seen alone, however there was one group of three individuals sighted together. The majority of observations were recorded along the edge and on the outskirts of the study area.

A total of four observations of this green-listed species were recorded during summer 2022 VP surveys. One of these occurred during spring migration watches from VP 4 and noted one bird soaring for 120 seconds above 200m. The other records were noted from VPs 1, 4 and 3 on 18th April 2022, 11th July 2022 and 3rd August 2022, respectively. During the second of these observations, a sparrowhawk was seen soaring close to five buzzards. Flight activity occurred predominantly in the 30-100m height band and predominantly in the southern section of the study area. One observation (18th April 2022) was to the northeast of the study area.

During the April 2024 Migration period (see Appendices 7-3 and 7-4), there was one observation of Sparrowhawk on 11th April from VP4 within the flight height bands of 30-100m and 15-30m. This bird was observed being mobbed by corvids before dropping into the woods.

Vantage Point Surveys: Winter Season (Winter 2021/22, 2022/23, 2023/24 and 2024/25)

There was a total of five sightings of this green-listed raptor during winter 2021/22 VP surveys. These occurred at every VP (28th October, 2nd November, 1st December, 4th and 6th February). Flight activity was recorded at low height bands with the majority spent in the 0-15m band. Activity patterns were typical of sparrowhawks with hunting flight by confirmed male individuals observed on three occasions. The majority of observations were recorded outside the 500m buffer.

Green-listed sparrowhawk was observed on two occasions during winter VP surveys. One of these was during autumn migration watches (1st October 2022) from VP 4 and recorded one bird flying in the 30-100m height band towards the centre of the study area from the west. The second observation was noted on 4th November 2022 from VP 2 and involved one sparrowhawk seen chasing two jackdaws in the 0-15m height band to the northwest of study area.

During the 2023/24 Winter VP Surveys, there were 16 observations of sparrowhawk from all VPS across all months (see Appendices 7-3 and 7-4). Flight activity was mainly distributed in the southeast of the study area with activity in the northern study area also.

During the 2024/25 Winter VP Surveys there was one observation from VP 4 of a sparrowhawk being mobbed by hooded crows. Flight activity was recorded within the 30-100m height band.

Winter Transects (Winter 2021/22 and 2022/23)

Sparrowhawk was observed once in the 2021/22 winter transect within the 0-25m distance band of Transect 1 (Round 2, 5th January 2022).

There were no observations of Sparrowhawk in the 2022/23 Winter Transect Survey.

Hinterland Surveys (2021, 2022, 2023 and 2024)

This green-listed species was recorded eight times during summer 2021 hinterland surveys. Observations were made at HVPs 2, 3, 4, 9, 12 and 13. Confirmed breeding of this species was noted at HVP 4 on 26th July. There were three records of this species during the winter season at HVPs 7, 11 and TR 24. Display flight activity was noted at HVP 7 on 25th February.

During summer 2022 hinterland surveys, there were two records of this green-listed species. The first occurred at HVP 7 (4.63km west of study area) on 8th May 2022 and recorded one individual. The second observation was recorded at HVP 8 (2.17km southeast of study area) on 22nd June 2022 and noted a single bird. There was one observation of this green-listed species during winter 2022/23 hinterland surveys. This was recorded from HVP 7 on 3rd February 2023.

There are no records of Sparrowhawk from 2024 Hinterland surveys.

7.3.2.1.25 Whooper Swan

Vantage Point Surveys: Winter Season (Winter 2021/22, 2022/23, 2023/24 and 2024/25)

This amber-listed/Annex I species was recorded on two occasions during winter 2021/22 VP surveys. One record (26th October, VP3) flight activity was observed in the 0-15m height band for 25 seconds as three birds flew low between bog pools. The second record involved five birds flying northeast through the northwestern part of the study area, spending total of 58 seconds in the 30-100m flight band. Flight observations during this season indicated directional flight across the northwest (away from area in a northerly direction) and southwest (into the southern part of the study area in a north-westerly direction).

There were seven records of this Annex I species during winter VP surveys. One record was of swans calling but not seen. Whooper swans were observed from VPs 1, 3 and 4. Flight activity occurred primarily in the 15-30m and 30-100m height bands. Most activity occurred in the southern part of the study area over bog and woodland. This species was commonly seen in small numbers (single birds or groups of up to eight). however, larger flocks of 26 and 38 were also observed. These were both seen from VP 4 (16th and 18th November 2022) and were both recorded grazing on agricultural land in the centre of the northern section of the study area (in fields near T3). Both flocks were present throughout the entire watch period of three hours.

During the 2023/24 Winter VP Surveys, this species was recorded 12 times from VPs 1, 4, HHVP3 and 4 in October, November, December and January. Whooper swans were observed in flight and also on the ground on Esker Bog during this survey period. The flight activity patterns observed indicated flights to and from Esker Bog, and also flights traversing the study area as swans moved between roosting and grazing sites in the wider area (see whooper swan report in Appendix 7-7.

During the 2024/25 Winter VP Surveys, this species was recorded twice from VP 3 both observations occurring on 15th November 2024, with 4 individuals being noted overall. Both flights traversed the southern part of the 500m buffer before one proceeded east and the other proceeded southeast towards Cloncreen windfarm. There were also four casual/incidental observations of whooper swan during this season, recorded during audio device deployment visits. These included a group of seven flying east through the 500m buffer towards Esker bog. a group of 11 flying east/then north through the 500m buffer near T3 and calling, and a group of 16 commuting south through the 500m buffer before exiting the buffer and turning west/southwest.

The fourth incidental record was a static observation of a herd of 22 swans seen on the central/northern part of Esker Bog on 24th October 2024.

Winter Transects (Winter 2021/22 and 2022/23)

There were no observations of Whooper Swan in the 2021/22 Winter Transect Survey.

There was one record of Annex I whooper swan during winter 2022/23 transect surveys. This occurred on 12th December 2022 when seven individuals were observed flying over Transect 4.

Hinterland Surveys (2021, 2022, 2023 and 2024)

A group of 14 whooper swans (Annex I/amber-listed) was recorded once during the winter 2021/22 hinterland survey along TR 24.

This Annex I species was recorded four times during winter 2022/23 hinterland surveys. Observations were recorded from HVPs 7 (4.63km west of study area) and 8 (2.17km southeast of study area) in October, November 2022, January and February 2023. Whooper swans were observed in numbers between 2-15 birds. On 14th October 2022, at HVP 7, a group of three adults and four juveniles was recorded. The largest flock of 15 individuals was observed at HVP 7 on 3rd February 2023.

There were five whooper swan observations in the winter 2023/24 hinterland surveys – fours at HVP16 and one from HVP9. These observations were recorded in November, December 2023 and January 2024. Number of individuals observed ranged from 4-14.

During winter 2024/25 hinterland surveys, a total of 10 observations of whooper swan were made. The majority of these were observations swans roosting and/or grazing, with only one record of swans in flight (25th November 2024). These records, which encompass groups ranging from two to 46 swans were distributed throughout the wider area around the Proposed Development site. The site where whooper swans were most frequently observed were HVP9 (Esker Bog) (six records). The highest numbers of swans were recorded at HVP17 at Derryarkin (with herds of 45 and 46 noted on 1st January 2025 and 23rd January 2025 respectively) and HVP 16 (38 swans observed here on 15th January 2025).

Audio Surveys (Spring & Autumn 2024)

Audio surveys detected nocturnal whooper swan flight calls during both autumn and spring 2024 (see **Appendix 7-7**).

Table 7-19 indicates an autumn migration window extending from 9th October to the 25th of November 2024, based on the timing of first and last audio registrations during this period. The first visual record occurred after the first audio registration. Peaks in nocturnal call registrations occurred around early October and from late October to late November 2024. The scattered distribution of registrations, in addition to absence of a habitual roost site in the vicinity of the Proposed Development, indicates the activity recorded is likely to be the dispersed arrival of smaller groups, with no convergence on a roost site near the Proposed Development.

For spring 2024, a migration window extending from 8th March to 30th March 2024 is indicated by audio survey results. The last visual observation recorded (10th February 2023) is considered too early to be indicative of migration. The concentration of most registrations around late March (27th to 30th March 2024) indicates a build-up in outward migration during this period. It is possible that groups from the region coalesce to migrate together, and/or leave from various roosts distributed around the region.

These patterns of a longer and more dispersed inward migration window and buildup to a concentrated outward migration window are well-known and established patterns. however, the data obtained from audio surveys make these assumptions more robust and allows both spatial and temporal patterns to be defined with higher certainty.

The audio registrations from these surveys cannot be interpreted empirically in terms of numbers or exact locations of flight paths since there are no visual records associated with this type of survey. However, it can confidently be assessed based on the recorded data that whooper swans migrate through the wider area in which the Proposed Development is located and as such may traverse the Proposed Development at times.

No habitual night roost was identified in the vicinity of the proposed development; as such, the audio registrations recorded during surveys are likely to be indicative of dispersed migration to and from roost/wintering sites further south outside the hinterland survey area.

Table 7-19: Timing of Records Indicating Whooper Swan Migration Windows

Autumn 2024	
Audio (first) (2024)	09/10/2024
Visual (first) (all years)	14/10/2022 (HVP7)
Audio (last) (2024)	25/11/2024
Spring 2024	
Audio (first)	08/03/2024
Visual (last) (all years)	10/02/2023 (VP4)
Audio (last)	30/03/2024

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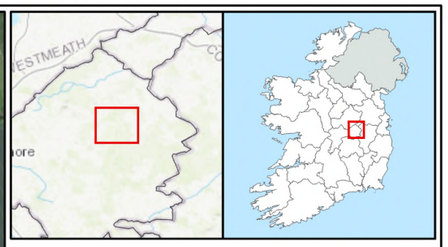

Legend

- Site Boundary
- Site Layout
- Turbine Locations
- Total Whooper Swan Registrations

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Kilometers
0 0.25 0.5 1

TITLE: Total Whooper Swan Registrations: Spring 2024			
PROJECT: Ballinla Wind Farm, Co. Offaly			
FIGURE NO:	7.11		
CLIENT:	Statkraft		
SCALE:	1:20,000	**REVISION:**	0
DATE:	11/08/2025	**PAGE SIZE:**	A3

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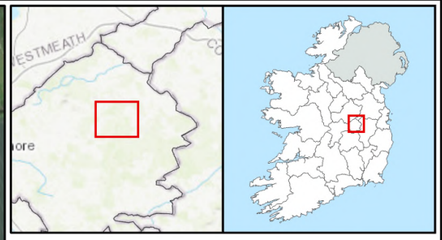

Legend

- Site Boundary
- Site Layout
- Turbine Locations
- Total Whooper Swan Registrations

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0 0.25 0.5 1 Kilometers

TITLE: Total Whooper Swan Registrations: Autumn 2024			
PROJECT: Ballinla Wind Farm, Co. Offaly			
FIGURE NO:	7.12		
CLIENT:	Statkraft		
SCALE:	1:20,000	**REVISION:**	0
DATE:	11/08/2025	**PAGE SIZE:**	A3

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Roosting Sites

The dawn/dusk VP surveys confirmed the absence of whooper swan roosting in the locality of the proposed development. Occasional use of Esker Bog for day roosting and grazing was observed; however surveys indicated no evidence of night roosting. Based on hinterland survey results, observed flight patterns, and desktop information, the primary night roost in the hinterland is assessed to be at Derryarkin adjacent to the Yellow River wind farm (HVP 17). Wintering whooper swans often roost at the same sites; however, they can also vary which night roost they use. Based on observed swan numbers and frequency of observations, there is also potential for sites such as the Bord Na Móna ash repository site (HVP 16) and Rathvilla Quarry Pond (VP 8) to be used by roosting whooper swans. An observation of six whooper swans in flight at 7:55 (25 minutes after dawn) on 25/11/2024 flying from the direction of the cutover bogs to the west near Ballyhugh (HVP 7) towards Esker Bog is also potentially indicative of night roosting on the bogs to the west, which provide suitable roosting habitat.

The landscape characteristics of the wider region contain abundant habitats for roosting and grazing whooper swan. As such, while some patterns can be inferred for the locality of the proposed development and surrounding hinterland, the opportunities for wintering whooper swans to avail of numerous suitable areas in the region give considerable scope for variation in use of roosting/grazing sites and also provides abundant opportunities for dispersed smaller groups to occupy the landscape.

It is noted that larger wintering whooper swan populations occur elsewhere in County Offaly, particularly along the Little Brosna and Shannon Callows in the west of the county which have mean populations of 100-300 wintering whooper swan. High numbers (240 swans) have also been recorded at Cloghanhill in the west of the county. The closest I-WeBS site (Raheen Lough, located 13.6km southwest of T7) has also previously been noted to hold up to 58 wintering whooper swans. Recent counts are not available for Cloghanhill and Raheen Lough.

7.3.2.1.26 Woodcock

Breeding Wader Surveys (2021, 2022)

There were two records of roding woodcock at breeding wader survey site 6 near the Grand Canal (17th May and 5th June 2021), confirming breeding activity in the study area. These observations were associated with an area of recently replanted forestry/scrub in the northeastern part of the study area, located outside the Proposed Development site c. 735m northwest of T1.

There were four observations of red-listed woodcock, all of which were recorded on 9th June 2022 along breeding wader transect W2. Woodcock was noted as occupying territory in this area and were recorded calling on three occasions and roding once.

Hinterland Surveys (2021, 2022)

Red-listed woodcock was recorded twice during summer 2021 hinterland surveys. One observation was noted at TR17/Wader survey site 6 on 17th May. Woodcock was also heard at TR22 on 6th June. During winter 2021/22, there was one observation of a single woodcock at HVP 7 (25th February 2022).

There were no records of woodcock during any other surveys.

7.3.2.2 Other Species

In addition to the target species detailed above, a number of other species of conservation concern were also recorded during surveys at the Proposed Development. These are listed in Table 7-20.

Table 7-20: Other Species of Conservation Concern

Common Name	Scientific Name	BoCCI	Annex I (Y/N)	Survey(s)
Common Coot	*Fulica atra*	Amber	N	VP (additional species)
Goldcrest	*Regulus regulus*	Amber	N	Breeding Bird Transects Winter Bird Transects
Greenfinch	*Chloris chloris*	Amber	N	VP (additional species) Breeding Bird Transects
House Martin	*Delichon urbicum*	Amber	N	VP (additional species) Breeding Bird Transects
House Sparrow	*Passer domesticus*	Amber	N	VP (additional species) Breeding Bird Transects Winter Bird Transects
Linnet	*Linaria cannabina*	Amber	N	VP (additional species) Breeding Bird Transects
Meadow Pipit	*Anthus pratensis*	Red	N	Breeding Bird Transects Winter Bird Transects
Redwing	*Turdus iliacus*	Red	N	VP (additional species) Winter Bird Transects
Sand Martin	*Riparia riparia*	Amber	N	VP (additional species)
Skylark	*Alauda arvensis*	Amber	N	VP (additional species) Breeding Bird Transects
Spotted Flycatcher	Muscicapa striata	Amber	N	VP (additional species)
Starling	Sturnus vulgaris	Amber	N	VP (additional species)
Stock Dove	Columba oenas	Red	N	Breeding Bird Transects
Swallow	Hirundo rustica	Amber	N	Winter Bird Transects
Swift	Apus apus	Red	N	VP (additional species)
Willow Warbler	Phylloscopus trochilus	Amber	N	Winter Bird Transects
Yellowhammer	Emberiza citrinella	Red	N	VP (additional species)
Spotted Flycatcher	Muscicapa striata	Amber	N	Breeding Bird Transects
Starling	Sturnus vulgaris	Amber	N	VP (additional species)

7.3.2.3 Grid Connection & TDR

As noted above in Section 7.3.1.3.1, The semi-natural habitats present within the footprint of proposed TDR works are limited to low-cut hedgerows, one mature tree and improved agricultural grassland. Grassy verges and an unmanaged hedgerow are also present at the R420/R402 junction but are outside the proposed TDR footprint. These habitats are of limited value for avifauna, due to intensive management and proximity to roads.

These areas and the habitats bordering the proposed grid connection route would provide moderate-quality foraging opportunities for small passerines but are of limited value for breeding birds and species of higher conservation concern.

7.3.2.4 Adjacent Peatland Habitats

The presence of two former peat harvesting areas – cutover bogs, to the west and east of the southern turbine cluster (T4 – T7) is noted. These are Esker Bog to the west of the Proposed Development and the smaller bog known as Esker Bog Rathlumber to the west of the Proposed Development. The majority of these bogs were cut away during industrial harvesting (now ceased) by Bord Na Móna, leaving bare peat. Small remnant areas high bog remain in some marginal areas. The smaller bog, Esker Bog Rathlumber, has been out of production for longer, and recolonisation by scrub/woodland and wetland vegetation has started in the north of this area. Excavation of ponds to promote flooding on the main Esker Bog to accelerate rehabilitation was undertaken in 2021, resulting in large areas now being covered in a grid of square flooded ponds. Revegetation of the main Esker Bog is still in the early stages, concentrated on the north, east and southern margins as indicated by recent orthophotography.

Neither of these cutover bogs are overlapped by any proposed infrastructure or subject to potential indirect effects; however, they are noted here due to their suitability for use by bird species, including those noted as utilising these areas during surveys (see Section 7.3.2.1).

7.4 Avifauna Evaluation

The basis of impact assessment should be a determination of which ornithological resources within the zone of influence of the Proposed Development are of sufficient value to be material in decision making and therefore, included in the assessment (NRA, 2009a and CIEEM 2019). Outlined in Table 7-21 are the key receptors selected for assessment and the rationale for the inclusion or exclusion of each target species recorded during field surveys as a key receptor based on NRA guidance (NRA, 2009a). the overall importance or sensitivity evaluation for each key receptor, taken from guidance such as Percival (2007) is also illustrated.

Table 7-21: Key Receptors Assessment

Species	BoCCI	Annex I (Y/N)	NRA Evaluation	Receptor Evaluation for Impact Assessment (Sensitivity)	Key Receptor	Rationale
Black-headed gull (*Larus ridibundus*)	Amber	N	Local Importance (High Value)	Medium	Yes	This species was recorded during the 2022 breeding season and the 2022/23 non-breeding season. They were recorded during vantage point (VP) surveys. foraging behaviour was observed.
Brambling (*Fringilla montifringilla*)	Amber	N	Local Importance (High Value)	Medium	No	This species was recorded during winter 2021/22. Feeds primarily in arable stubble during winter. This habitat is not present within the Proposed Development footprint.
Buzzard (*Buteo buteo*)	Green	N	County Importance	Low	Yes	This species was recorded across all seasons over the two-year survey period, including VP surveys.
Common Coot (*Fulica atra*)	Amber	N	Local Importance (High Value)	Medium	No	Recorded as an additional species near VP1 in summer 2021. No other observations. suitable habitats not present at Proposed Development.

Species	BoCCI	Annex I (Y/N)	NRA Evaluation	Receptor Evaluation for Impact Assessment (Sensitivity)	Key Receptor	Rationale
Common Gull (*Larus canus*)	Amber	N	Local Importance (High Value)	Medium	Yes	This species was recorded during the 2022/23 non-breeding season.
Cormorant (Phalacrocorax carbo)	Amber	N	County Importance	Medium	Yes	This species was recorded during the 2021/22 non-breeding season.
Goldcrest (*Regulus regulus*)	Amber	N	Local Importance (High Value)	Medium	Yes	This species was recorded during the breeding season of 2021 and also winter 2022-23 and may use wooded habitats subject to loss during the construction phase.
Golden Plover (*Pluvialis apricaria*)	Red	Y	County Importance	Very High	Yes	This species was recorded regularly during the non-breeding season and have been observed to winter in the locality. They were observed in large flocks of up to 1,000 in the flight activity study area, and flocks up to 1,500 birds in the surrounding hinterland.
Great Black-backed gull (*Larus marinus*)	Green	N	Local Importance (High value)	Low	Yes	Flight activity for this species was recorded during the 2021 breeding season.
Greenfinch (*Carduelis chloris*)	Amber	N	Local Importance (High value)	Medium	Yes	This species was recorded during the breeding and non-breeding seasons across multiple years and may use hedgerow habitat which will be lost during the construction phase.
Grey Heron (*Ardea cinerea*)	Green	N	Local Importance (High Value)	Low	Yes	This species occurs in the locality. potentially subject to construction disturbance and indirect effects via changes in water quality.
Greylag Goose (*Anser anser*)	Amber	N	National Importance	Medium	Yes	Greylag goose was recorded once in the 2023-2024 non-breeding season commuting over the Proposed Development site within the 500m buffer. There were no records of foraging or breeding within or adjacent to the site.
Hen Harrier (*Circus cyaneus*)	Amber	Y	County Importance	Very High	Yes	This species was observed during the non-breeding season with hunting behaviour observed over cutover bog and farmland habitats. There were also isolated observations of transitory/casual roosting to the east of the southern part of the proposed development site and within the Proposed Development site near T4.
House Martin (*Delichon urbicum*)	Amber	N	Local Importance (High value)	Medium	Yes	No breeding habitat present within proposed footprint or zone of influence. Potentially subject to barrier and displacement effects.
House Sparrow (*Passer domesticus*)	Amber	N	Local Importance (High value)	Medium	Yes	Potentially affected by habitat loss and disturbance.
Kestrel (*Falco tinnunculus*)	Red	N	National Importance	High	Yes	Kestrel were recorded throughout all seasons, indicating a resident population is present in the local region. Hunting behaviour was observed.
Kingfisher (*Alcedo atthis*)	Amber	Y	County Importance	Very High	Yes	One incidental record during hinterland surveys in Winter 2021-22 confirms this

Species	BoCCI	Annex I (Y/N)	NRA Evaluation	Receptor Evaluation for Impact Assessment (Sensitivity)	Key Receptor	Rationale
						species is present in the region. Potential for indirect effects via changes in water quality.
Lapwing (*Vanellus vanellus*)	Red	N	Local Importance (High Value)	High	Yes	This species was observed across all seasons, most commonly observed in groups. Attempted breeding on Esker Bog Rathlumber adjacent to Proposed Development.
Lesser Black-backed Gull (*Larus fuscus*)	Amber	N	Local Importance (High Value)	Medium	Yes	This species was observed across all seasons with foraging behaviour also observed.
Linnet (*Carduelis cannabina*)	Amber	N	County Importance	Medium	Yes	Potentially affected by habitat loss and disturbance.
Little Egret (*Egretta garzetta*)	Green	Y	Local Importance (High Value)	Very High	Yes	This species occurs in the locality. potentially subject to construction disturbance and indirect effects via changes in water quality.
Little Grebe (*Tachybaptus ruficollis*)	Green	N	Local Importance (High Value)	Low	Yes	There was one observation of flight activity during the 2022 breeding VP survey in the 30-100m height band.
Mallard (*Anas platyrhynchos*)	Amber	N	County Importance	Medium	Yes	Mallards were observed in all seasons. Flight activity traversed the 500m buffer. suitable habitats present on adjacent cutover bogs.
Meadow pipit (*Anthus pratensis*)	Red	N	County Importance	High	Yes	Observed during 2021 and 2022 breeding bird transect surveys and VP surveys.
Merlin (*Falco columbariu*)	Amber	Y	County Importance	Very High	Yes	Merlin were recorded in the 2021/22 and 2023/24 non-breeding seasons. The region in which the Proposed Development is located includes suitable foraging habitat mosaics for merlin.
Mute Swan (*Cygnus alor*)	Amber	N	County Importance	Medium	Yes	This species was recorded in the flight activity survey study area during the 2021 breeding season and the 2022/23 non-breeding season.
Peregrine (*Falco peregrinus*)	Green	Y	County Importance	Very High	Yes	This species was recorded in the flight activity survey study area during the breeding season. Hunting and landing on peat areas was also observed.
Redshank (*Tringa tetanus*)	Red	N	County Importance	High	Yes	Heard calling near VP3 during autumn migration VPs 2022.
Redwing (*Turdus iliacus*)	Red	N	County Importance	High	Yes	Recorded during VP surveys and wintering bird transects. May forage in hedgerows and agricultural habitats at the Proposed Development site.
Ringed Plover (*Charadrius hiaticula*)	Amber	N	Local Importance (High Value)	Medium	No	Observed and detected through audio recorders in the wider area during 2021 Breeding Wader Surveys. Not recorded at or near the Proposed Development.
Sand Martin (*Riparia riparia*)	Amber	N	Local Importance (High Value)	Medium	Yes	No breeding habitat present within proposed footprint or zone of influence. Potentially subject to barrier and displacement effects.
Short-eared Owl (*Asio flammeus*)	Amber	Y	County Importance	Very High	Yes	Observed hunting to east of Proposed Development during winter 2023/24. Some

Species	BoCCI	Annex I (Y/N)	NRA Evaluation	Receptor Evaluation for Impact Assessment (Sensitivity)	Key Receptor	Rationale
						flight activity overlapped the 500m buffer near T5.
Skylark (*Alauda arvensis*)	Amber	N	Local Importance (High Value)	Medium	Yes	Recorded at transects TR1, TR2 and TR4 during breeding bird surveys. Singing skylarks were also noted in field south of TR1 during spring 2024 audio device deployment.
Snipe (*Gallinago gallinago*)	Red	N	County Importance	High	Yes	This species was observed across all seasons with feeding activity recorded. Breeding activity was recorded in the wider area, and one occupied territory was recorded near the Proposed Development (along W3 in Esker Bog Rathlumber).
Sparrowhawk (*Accipiter nisus*)	Green	N	Local Importance (High Value)	Low	Yes	Sparrowhawk were recorded during both the breeding and non-breeding seasons, with hunting behaviour observed around the margins of the study area.
Spotted flycatcher (*Musicicapa striata*)	Amber	N	Local Importance (High Value)	Medium	Yes	This species was observed in the 2021 breeding season and may use hedgerow habitat subject to loss/disturbance during construction.
Starling (*Sturnus vulgaris*)	Amber	N	Local Importance (High Value)	Medium	Yes	Potential for breeding and wintering birds to be affected by habitat loss and disturbance.
Stock Dove (*Columba oenas*)	Red	N	County Importance	High	Yes	Confirmed to be present in study area during breeding and non-breeding seasons.
Swallow (*Hirundo rustica*)	Amber	N	Local Importance (High Value)	Medium	Yes	No breeding habitat present within proposed footprint or zone of influence. Potentially subject to barrier and displacement effects.
Swift (*Apus apus*)	Red	N	County Importance	High	Yes	No breeding habitat present within proposed footprint or zone of influence. Potentially subject to barrier and displacement effects.
Whooper Swan (*Aythya fuligula*)	Amber	Y	County Importance	Very High	Yes	Whooper Swans were recorded across multiple winter seasons. This species occasionally traversed the 500m buffer, and wintering herds are known to roost and graze in the surrounding region. Transient/casual use of fields near T3 for grazing was also recorded. Audio surveys detected nocturnal flight calls during the spring and autumn 2024 migrations periods.
Willow Warbler (*Phylloscopus trochilus*)	Amber	N	County Importance	Medium	Yes	Recorded during 2021 breeding season. Potential to use wooded habitats subject to construction loss/disturbance.
Woodcock (*Scolopax rusticola*)	Red	N	Local Importance (High Value)	High	Yes	Recorded during breeding wader surveys. Breeding/territorial behaviour noted in open woodland near T4 and near Grand Canal.
Yellowhammer (*Emberiza citronella*)	Red	N	Local Importance (High Value)	High	Yes	Recorded in agricultural areas during 2021 and 2022 Breeding Bird Transects. Potential to use hedgerows subject to construction loss/disturbance.

7.5 Assessment of Impacts and Effects

The effects of infrastructure such as wind farms on birds are highly variable and depend on a wide range of factors including the specification of the development, the topography of the surrounding land, the habitat affected and the numbers and species of birds present (Drewitt, A., and Langston, R., 2006). Developments such as wind farms in general have many effects on birds, including potential direct habitat loss and fragmentation, displacement due to disturbance, death, and injury due to collisions and disruption of local or migratory movements, with a consequent increase in energy expenditure (Drewitt, A., and Langston, R., 2008). However, the principal concerns in terms of adverse effects on birds are (1) disturbance/displacement, (2) collision, (3) habitat loss/change and (4) barriers to movement (Langston, R., 2010). Of these, only two are applicable during construction: 1) disturbance and/or displacement and 2) habitat loss/alteration. Habitat loss is the primary potential direct impact during construction and although disturbance and/or displacement could be viewed as effective habitat loss, it is essentially indirect (SNH, 2017) and therefore covered under Indirect Impacts.

With regard to impacts on bird species, it is considered that the main potential sources of impacts on avian fauna is the construction of the Proposed Development, particularly the construction of turbines and the associated road network, as well as the operational phase of the turbines.

7.5.1 Do Nothing Scenario

If the Proposed Development does not proceed, the 'do nothing' scenario is that the existing environment and key receptors identified in Table 7-21 associated with farmland and woodland habitats are likely to remain as described previously. This assumes the continuation of existing activities at the site, i.e. the continuation of existing agricultural activities and excludes forestry operations (thinning, harvesting and replanting).

If forestry management activities proceed, the plantation woodlands onsite will undergo changes as they are harvested and subsequently replanted. Although key ecological receptors can fluctuate in abundance and may be found in different locations during different stages of said forestry operations (e.g. post-felling, plantation habitats can be replaced by scrub habitats, which may cause animals that use wooded habitats to move to different locations in the forestry), overall, the habitats and species found at the project will likely remain as they are currently.

The former peat harvesting areas of Esker Bog to the west and Esker Bog Rathlumber to the east will continue to revegetate and will potentially begin regenerating (i.e. become a self-sustaining peat forming ecosystems), at least in certain areas. These two areas have different characteristics and future outlooks however.

Esker Bog Rathlumber, which is smaller and where peat harvesting ceased first, has begun to develop scrub/woodland in the north and west indicating drier conditions. There are signs of revegetation in the eastern sector of this bog, with aerial imagery indicating a mosaic of heathy or grassy vegetation and pools in wetter areas and colonisation of drain edges by trees in drier parts. The southern sector (based on recent aerial imagery) is more open, comprising a mosaic of bare peat, early successional vegetation and flooded areas, which are the largest on this bog.

Esker Bog, which is larger and where peat harvesting ceased more recently, is less vegetated. The main land cover is bare peat and open water, the latter of which is composed of rectangular cells intentionally excavated and flooded to accelerate rehabilitation and areas which flooded without intentional intervention to encourage flooding. Early successional vegetation has begun to recolonise the bare peat in the north, west and southwest of this bog.

In terms of the avian assemblage using these bogs, it is assessed that they already provide suitable habitat for a number of species, including lapwing which have attempted breeding on Esker Bog Rathlumber, mallard, potentially other duck species, and whooper swan which have been observed roosting and grazing on Esker Bog. Golden plover were occasionally observed flying over Esker Bog Rathlumber but have been more frequently recorded in association with surrounding agricultural habitats. In addition to these species, birds of prey including hen harrier, peregrine, kestrel, sparrowhawk and buzzard have been observed hunting (primarily over Esker Bog Rathlumber). It is likely that the current avian species assemblage will persist in these areas as they continue to revegetate and succeed to stable climax habitats. It is possible these habitats will become more favourable for these species, encouraging higher numbers and/or more frequent use. It is likely that habitat suitable for species such as meadow pipit and skylark will expand where peatland vegetation becomes re-established. In drier areas which become colonised by scrub and open woodland, species such as willow warbler would benefit.

7.5.2 Potential Effects on Designated Sites with Ornithological Interest

A total of seven designated sites within the potential zone of influence have ornithological interests. These include the European sites listed in Table 7-22, and national sites listed in Table 7-23.

European sites are assessed within the AA screening report which noted three SPAs were determined to lie within the potential ZoI of the Proposed Development:

- River Boyne and River Blackwater SPA (Site Code: 004232)
- Lough Ennell SPA (Site Code: 004044)
- Slieve Bloom Mountains SPA (Site Code: 004160)

The presence of a whooper swan population associated with the River Boyne and River Blackwater SAC (Site Code: 002299) was also noted.

Source-pathway-receptor connectivity was determined due to hydrological connectivity via the Leitrim Stream, Figile River, and Kinnafad Stream, and the presence of qualifying interests sensitive to water quality, hydrological changes, and disturbance. The AA identified the following potential impacts that could result in significant effects on the qualifying features and supporting habitats of these SPAs/SAC:

- Waterborne pollution during construction and operation, particularly from sediment, hydrocarbons, and concrete washout.
- Alteration of hydrological regimes, including changes to surface water flow, groundwater levels, and drainage patterns.
- Disturbance/displacement of qualifying species due to noise, vibration, lighting, and human activity during construction or impairment of water quality
- Fragmentation or degradation of riparian corridors, which serve as ecological linkages for mobile aquatic species.

These impacts were assessed in detail using the results of ecological surveys, hydrological analysis, and design documentation. Embedded and site-specific mitigation measures have been incorporated into the Proposed Development to ensure that these impacts are effectively managed.

On the basis of objective information and beyond reasonable scientific doubt, with the implementation of all mitigation measures, it is concluded that the Proposed Development, either alone or in combination with other plans or projects, will not result in adverse effects on the integrity of the River Barrow and River Nore SAC, the River Boyne and River Blackwater SAC or the River Boyne and River Blackwater SPA, in view of their conservation objectives.

Table 7-22: SPAs with Ornithological Interest

Designated Site	Site Code	Proximity of Designated Site to Nearest Point of Subject Site	Hydrological/Ecological Connection? (Yes/No)
River Boyne and River Blackwater SPA	004232	17 km north of the site	Yes
Lough Ennell SPA	004044	19.8 km northwest of site	No
Slieve Bloom Mountains SPA	004160	25.3km southwest of site	No

Table 7-23: National Sites with Ornithological Interest

Site Code	Site Name	Distance from closest proposed turbine	Qualifying Features
002104	Grand Canal pNHA	0.5km N	Hedgerow, calcareous grassland, reed fringe, open water, scrub and woodland
00570	Black Castle Bog NHA	3.3km NE	Peatlands [4]
000925	The Long Derries, Edenderry pNHA	8.6km E	Bird species include sand martin, whinchat, whitethroat and cuckoo have been recorded here during summer seasons. Red listed partridge and breeding Annex I nightjar
002033	Daingean Bog NHA	9.9km SW	Peatlands [4]
000582	Raheenmore Bog pNHA	11km W	Active raised bogs; Degraded raised bogs still capable of natural regeneration; Depressions on peat substrates of the Rhynchosporion; Within breeding territory of Annex I merlin. Other species include red grouse and snipe.
001388	Carbury Bog NHA	12.6km NE	Peatlands [4]
002323	Milltownpass Bog NHA	13.6km NW	Peatlands [4]
000917	Raheen Lough pNHA	13.5km SW	Wet pasture and marshland vegetation supports variety of wildfowl and waders. This site is of local importance to a number of species including whooper swan, goldeneye, pochard, mallard, shoveler, pintail, greenshank, jack snipe, purple sandpiper, grey heron, kingfisher and grebes.
000918	Rahugh Ridge pNHA (Kiltober Esker)	15.3 km W	Woodland providing potential habitat for raptor species.
000390	Ballina Bog pNHA	16.3 km NE	Raised bog
000677	Cloncrow Bog (New Forest) NHA	16 km NW	Peatlands [4]

7.5.2.1 Potential Construction Phase Effects

No indirect construction stage effects via impacts on the aquatic environment are predicted for any NHAs or pNHAs due to lack of a hydrological connection.

None of the NHAs designated for peatland habitats only (Black Castle Bog NHA, Daingean Bog NHA, Carbury Bog NHA, Milltownpass Bog NHA and Cloncrow Bog-New Forest NHA) include ornithological interests, and as such are not subject to potential effects in this category. Similarly, the Grand Canal pNHA and Ballina Bog pNHA do not have defined ornithological interests and as such are also not subject to potential effects in this category. While the wooded habitats at Rahugh Ridge pNHA may provide potential habitat for raptor species, due to absence of defined ornithological interests at this site, there is similarly no potential for effects in this category for this national site.

Within the species noted as occurring at The Long Derries, Edenderry pNHA, sand martin, whitethroat and cuckoo was recorded during surveys at the proposed development. Regarding sand martin; while there is potential for the proposed development and this pNHA to be within the range of the same birds (sand martin can occasionally forage up to 8-10km from nests sites, although they usually forage within 200m) (Garrison, 1998), potential effects on sand martin identified arising from the proposed development are limited to Short-term Imperceptible effects during construction (see Section 7.5.3). Considering this, in addition to the fact that long range foraging is likely to occur irregularly only, it is unlikely that sand martin associated with The Long Derries, Edenderry pNHA will be affected by the proposed development.

Whitethroat were recorded during breeding transect surveys in summer 2021 and 2022 (see Appendix 1 and 2). Any whitethroat occurring at the proposed development are likely to be resident within the locality of the proposed development during breeding season and as such there are not considered to be any potential links with The Long Derries, Edenderry pNHA for this species. Cuckoo was recorded twice during breeding bird transects in summer 2021, from TR2 and TR3, >100m from the transect in both instances. Breeding cuckoos can have large home ranges (over 10 x 10 km) during the breeding season (Williams et al., 2016), indicating potential for overlap of home range for this species between this pNHA and the proposed development.

However, since any potential effects arising from habitat loss would only affect birds residing at the proposed development, there is no potential for direct effects on any cuckoos associated with The Long Derries, Edenderry pNHA. No indirect effects are likely to occur either. Both whitethroat and cuckoo are not key ecological receptors due to their green-listed status.

Raheenmore Bog pNHA is within the breeding territory of a merlin pair and also notes snipe as an ornithological interest. Regarding merlin, only wintering merlin have been observed at the proposed development. The foraging range of merlin during the breeding season is 'within 5km' (SNH, 2016), putting the proposed development beyond the foraging range of any pair occurring at Raheenmore Bog pNHA. Similarly, any snipe breeding at Raheenmore Bog pNHA located 11 km west, are unlikely to occur at the proposed development.

Species which occur at Raheen Lough pNHA that have been observed at the proposed development include whooper swan, mallard, grey heron and little grebe. Due to the distance between the proposed development and this pNHA, no direct or indirect effects of habitat loss or disturbance affecting the pNHA site will occur.

While there is potential for these species to occur at both the proposed development and Raheen Lough pNHA, no significant construction effects have been identified for these species (see Section 7.5.3), with Short-term Imperceptible habitat loss and disturbance/displacement effects identified for little grebe, Short-term Imperceptible habitat loss and Short-term Not significant disturbance/displacement effects identified for mallard. A Short-term Slight habitat loss effect was identified for whooper swan, based on loss of improved agricultural grassland, an abundant habitat in the area. A Short-term Slight to Moderate disturbance/displacement was identified for whooper swan on a precautionary basis. Considering the potential for effects on whooper swan at the proposed development, and potential for swans to frequent both the proposed development and Raheen Lough pNHA, there is potential for a Short-term Slight to Moderate effect on Raheen Lough pNHA in terms of whooper swan prior to mitigation.

7.5.2.2 Potential Operational Phase Effects

No indirect construction stage effects via impacts on the aquatic environment are predicted for any NHAs or pNHAs due to lack of a hydrological connection.

Similarly to the construction phase, since none of the NHAs designated for peatland habitats only (Black Castle Bog NHA, Daingean Bog NHA, Carbury Bog NHA, Milltownpass Bog NHA and Cloncrow Bog-New Forest NHA), in addition to Grand Canal pNHA, Ballina Bog pNHA and Rahugh Ridge pNHA do not have defined ornithological interests, there is no potential for effects in this category for these national sites.

The primary concern in terms of potential operational effects on sand martin associated with The Long Derries, Edenderry pNHA would be barrier effect. However, this has been assessed as **Long-term Not Significant** (see Section 7.5.4). Considering this, in addition to the fact that long range foraging is likely to occur irregularly only, it is unlikely that sand martin associated with The Long Derries, Edenderry pNHA will be affected by the proposed development during operation. No operational phase effects have been identified for green-listed whitethroat and cuckoo.

Raheenmore Bog pNHA is within the breeding territory of a merlin pair and also notes snipe as an ornithological interest. Regarding merlin, only wintering merlin have been observed at the proposed development. The foraging range of merlin during the breeding season is within 5km, putting the proposed development beyond the foraging range of any pair occurring at Raheenmore Bog pNHA. An effective collision risk of zero was identified for merlin, due to lack of flight activity at potential collision height within the 500m turbine buffer. Operational phase disturbance/displacement and barrier effects for merlin are assessed as **Long-term Not Significant** (see Section 7.5.4). While **a Long-term Moderate** disturbance/displacement effect for snipe was identified at the proposed development, this localised effect would not impact any snipe breeding at Raheenmore Bog pNHA located 11 km west.

Species which occur at Raheen Lough pNHA that have been observed at the proposed development include whooper swan, mallard and little grebe. The predicted yearly collision rates (see Section 7.5.4 and appendix 7.8) for grey heron, mallard and whooper swan are respectively 0.0, 0.32 and 0.01, resulting in **Long-term Imperceptible** effects for grey heron and mallard and **Long-term Not significant** effects for whooper swan. Disturbance/displacement and barrier effects were assessed as **Long-term Imperceptible** for grey heron, and **Long-term Not significant** for mallard. **Long-term Not Significant** to **Slight** disturbance/displacement and barrier effects were identified for whooper swan (see Section 7.5.4). Considering the low magnitude of potential operational effects identified, potential for effects on these species potentially occurring at both the proposed development Raheen Lough pNHA remains similarly low.

7.5.2.3 Potential Decommissioning Phase Effects

During decommissioning, effects similar to those associated with construction are predicted, but at reduced magnitude.

7.5.3 Construction Phase

7.5.3.1 Direct Effects: Habitat Loss or Alteration

Habitat loss can be direct through land take of breeding or foraging habitats for key species or indirect such as effective habitat loss through avoidance or disturbance due to the above factors. For direct effects during construction, land take of potential breeding or foraging habitat is the primary effect. This may constitute land stripping or vegetation removal affecting ground nesting birds, hedgerow removal or trimming if this takes place during the breeding season and loss of nesting or roosting sites such as trees.

Effects on avifauna were assessed following guidance in Percival (2007). As outlined previously, key avian receptors have been assigned an evaluation of importance (or sensitivity) for assessment. Following this, the significance of potential effects is rated as a product of both the magnitude of the predicted effect and the importance value (sensitivity) of the key receptor affected, based on the probability of the likely effect occurring.

The construction of access tracks, turbine foundations and hardstanding, the substation compound, peat deposition area and temporary site compounds will result in some habitat damage and loss. The vast majority of the proposed Turbine Delivery Route (TDR) for the wind farm development will not require any construction works. However, minor and temporary works are proposed at three specific locations to facilitate the safe transport of wind turbine components.

These include two locations along the L-5006 and one at the junction of the R-402 and R-420 (see Figure 2 2 in Chapter 2). At these points, temporary interventions will involve limited hedge or tree cutting, topsoil stripping, and the placement of hardcore to support vehicle passage. All works are designed to be short-term. Upon completion of turbine deliveries, hedgerows will be reinstated and all disturbed areas will be allowed to naturally revegetate. As such, the Proposed TDR nodes will result in some temporary habitat damage and loss, primarily affecting improved agricultural grassland and short sections of hedgerow.

For the purpose of the consideration of the potential effects on birds, species have been grouped into four categories, namely passerines, doves/pigeons, birds of prey, game birds and waders/waterfowl.

A passerine is any bird of the order Passeriformes, which includes more than half of all bird species. A notable feature of passerines is the arrangement of their toes (three pointing forward and one back) which facilitates perching. The group are sometimes known as perching birds or, less accurately, as songbirds. Pigeons/doves belong to the order Columbidae composed of birds with stout bodies, short necks, and slender bills which primarily feed on seed, fruits, and plants. Birds of prey are raptors that actively hunt other bird species. Gamebirds are birds that traditionally could be hunted, and terrestrial species often include pheasants and inland wader species such as snipe and woodcock. Waders are primarily shorebirds with the majority of species eating small invertebrates picked out of mud or exposed soil. Waterfowl are swimming gamebird and are comprised of duck, geese, and swan

7.5.3.1.1 Passerines/Non-target Species

The loss of habitat due to the construction of the project has the potential to affect some passerines. Habitat loss is inevitable in the development of any windfarm, when the development of turbine foundations and hard stands, access roads and other associated construction is considered. This can result in reduced feeding and nesting opportunities for birds, in particular the loss of hedgerows or other wooded habitats for passerine species. However, direct habitat loss by the development of wind farms tends to be relatively small (Drewitt and Langston 2006).

The area in which the wind farm site is located is predominantly composed of improved agricultural grassland, mixed broadleaved/conifer woodland, recently felled woodland/scrub and conifer plantation. Hedgerows and treelines are present in agricultural land. Mixed broadleaved woodland is also present but is outside the Proposed Development footprint and as such there will be no loss of this habitat type.

The overall habitat survey study area is 120.39 ha in extent. The Proposed Wind Farm will result in the following habitat loss (% loss of total habitat within study area):

- Improved Agricultural Grassland (GA1) 4.74 ha (1.46%)
- Mixed Broadleaved-Conifer Woodland (WD2) 13 ha (24.73%)
- Conifer Plantation (WD4) 6.2 ha (7.57%)
- Scrub (WS1) 0.006 ha (0.14%)
- Recently Felled Woodland (WS5) 0.37 ha (3.22%)
- Recently-Felled Woodland – Scrub (WS5/WS1) 0.58 ha (3.89%)
- *Combined Woodland Habitats* *20.15 ha (11.25%)*
- WL1 Hedgerows 143m (0.89%)
- WL2 Treelines 192m (4.36%)
- *Combined Linear Wooded Habitats* *335m (1.64%)*

- Depositing/lowland river (FW2) 5m (0.14%)
- FW4 Drainage ditches 126m (0.91%)

Works along at TDR pinch points will result in temporary hedgerow loss (included in total above).

Within the habitats present onsite, goldcrest, greenfinch, spotted flycatcher and linnet (Percival sensitivity: Medium), typically use woodland, scrub and occasionally linear wooded habitats such as hedgerows and treelines. A variety of wooded habitats are present within the wind farm site, ranging from semi-natural to intensively managed types. The cumulative habitat loss across all semi-natural wooded habitat types (all wooded habitats combined, omitting WD4 Conifer plantation) will be 12.6%, equating to a Percival effect magnitude of Medium (5-20% habitat lost). Thus, the overall Percival significance for these species is **Low**. The corresponding EPA effect is a **Long-term Not significant** Effect in the local context which is **Reversible**.

House sparrow (Percival sensitivity: Medium) breeds throughout Ireland and usually stays close to human habitation-mainly around farm buildings and built-up areas including parks and gardens. Nests in cavities in buildings, especially under eaves or holes formed by missing brickwork. There is an absence of suitable nesting habitats on-site, and therefore no effects are predicted in terms of nesting habitat for this species. Percival impact significance is **Low** (1-5% habitat loss for open foraging habitats; 1-5% habitat loss for linear wooded habitats). As such, the corresponding EPA effect for house sparrow is a **Temporary, Not significant** Effect in the local context which is **Reversible**.

Swallow, house martin, sand martin (Percival sensitivity: Medium) and swift (Percival significance: High) are aerial species that forage over open habitats. Swallow, swift and house martin require buildings for nesting, and sand martin typically nest in sand banks or crevices in walls or bridges. There is no potential nesting habitat for these species within the Proposed Development footprint. Thus, a **Short-term, Imperceptible** Effect which is **Reversible** in the local context is predicted for these species.

Meadow Pipit (Percival sensitivity: High) and Skylark (Percival sensitivity: Medium) are ground-nesting birds, that use open habitats with some low-lying vegetative cover (typically grassland and heath) for breeding and foraging purposes. While peat harvesting and intensive agricultural management has limited the amount of suitable habitat for these species, the potential for these species to breed in artificial or disturbed habitats remains. Specifically, meadow pipit and skylark were recorded along TR2 which traverses improved agricultural grassland and were also noted along TR4 traversing the boundary between mixed conifer/broadleaved woodland and the open peat expanse of Esker Bog. Skylark were noted to be active along TR1, and further observations during audio detector deployment in the field south of TR1 noted multiple skylarks singing in this area. Considering these observations, there is potential for these species to breed in areas of agricultural grassland overlapped by proposed infrastructure (although breeding success would be threatened by the rotating schedule of high-density mob grazing practiced on the intensive dairy farm providing the majority of agricultural land for the Proposed Development). Considering the limited occurrence of potential but sub-optimal breeding habitat (1.46% of improved agricultural grassland), Percival effect magnitude is Low, equating to overall Percival significance of **Low**. The corresponding EPA effect for these species is a **Long-term, Not significant** effect in the local context which is **Reversible**.

Redwing (Percival sensitivity: High) are winter visitors which use trees/hedgerows and open habitats to forage in. This species has been added to the red list due to the severity of long and short-term declines in its wintering population. Loss of open foraging habitats remains below 5%, while loss of linear wooded habitats (treelines and hedgerow) remains below 5%. As such, Percival effect significance is **Low** (1-5% habitat lost).

Furthermore, suitable foraging habitat is generally abundant in agricultural landscapes which are common in the surrounding landscape. Thus, the corresponding EPA effect for redwing is a **Long-term, Not significant** effect in the local context which is **Reversible**.

Starlings (Percival sensitivity: Medium) primarily forage in grassland and open habitats, and typically nest in the eaves of old buildings, but also use cavities in mature trees and also roost in reedbeds. No suitable tree-nesting cavities were observed and no old buildings are present within the proposed footprint. Loss of open foraging habitats will remain below 5% (Low magnitude effect) (resulting in Percival effect significance of **Low**); thus, the corresponding EPA effect for starling is a **Temporary, Not significant** effect, which is **Reversible** in the local context.

Stock dove are typically found within farmland (usually associated with cereal production areas) and woodland habitats and prefer mature trees for nesting. Due to the absence of breeding evidence and suitable foraging and breeding habitats in the Proposed Development footprint, it is unlikely for stock dove to be affected by habitat loss. Thus, a **Temporary, Imperceptible** effect in the local context which is **Reversible** is predicted for stock dove.

Willow warbler (Percival sensitivity: Medium) are predominantly found in scrubby woodland and along the edges of bogs and marshes, and less frequently recorded in hedgerows, woodlands and well-vegetated gardens. An area of open/scrubby woodland near T4 which offers potential habitat for willow warbler will be lost within the proposed peat deposition area footprint. Percival effect significance is **Medium** (5-20% habitat loss) (overall significance is **Low**). The potential effects are **Long-term** and **Not significant** to **Slight** in the local context and are **Reversible** (Criteria: EPA, 2022).

Yellowhammer (Percival sensitivity: High) is a species associated with arable landscape and hedgerows. There will be some loss hedgerow and treeline habitat which could be used by this species. However, loss of these habitats is limited. Percival effect significance is Low (1-5% habitat loss affecting Treelines) to Negligible (<1% habitat loss affecting Hedgerows); therefore, overall significance is Negligible to Low. Thus, the corresponding EPA effect predicted for yellowhammer is a **Short-term, Not significant** Effect in the local context which is **Reversible**.

7.5.3.1.2 Target Species

Table 7-24 displays the effect character as well as the significance of direct construction phase effects for target species, without the implementation of mitigation.

7.5.3.2 Indirect Effects: Disturbance/Displacement

High levels of activity and disturbance during construction may cause birds to vacate territories close to works, especially for species vulnerable to disturbance. The displacement of birds from areas within and surrounding developments can effectively amount to habitat loss (Drewitt, A. L. and Langston, R. H., 2006). If a habitat is therefore avoided as a result of the disturbance, then effective habitat loss can occur. Examples of causes of disturbance during construction which may lead to displacement are vehicle and personnel movements, vibration and noise impacts from the construction process and visual intrusion (Drewitt, A. L. and Langston, R. H., 2006).

Indirect effects may occur on species linked to aquatic habitats through pollution events, sediment laden runoff and dust deposition.

7.5.3.2.1 Passerines/Non-target Species

The effect of disturbance/displacement for medium sensitivity species including goldcrest, greenfinch, spotted flycatcher, linnet, house sparrow, skylark, starling and willow warbler is assessed as **Temporary, Imperceptible** and **Reversible** in a local context.

The effect of disturbance/displacement for high sensitivity species including meadow pipit, redwing, yellowhammer and stock dove is assessed as **Temporary, Not Significant** and **Reversible** in a local context.

7.5.3.2.2 Target Species

Table 7-24 displays the effect character as well as the significance of indirect construction phase effects for target species, without the implementation of mitigation.

Table 7-24: Potential Construction Effects to Non-Passerine Target Species

Key Receptor (Sensitivity)	Direct Effect (Habitat Loss/Alteration)(local scale)	Indirect Effect (Disturbance/Displacement) (local scale)
Black-headed Gull (Medium)	There were low levels of black-headed gull activity recorded with a total of six observations. Two of which occurred during the 2022 breeding season and four during the 2022/23 non-breeding season. This species is a coastal breeder and generalist feeder. While the improved agricultural grassland overlapped by the Proposed Development could provide some black-headed gull foraging opportunities, the proposed permanent loss of this habitat type is limited to 4.74ha (1.46% of total within biodiversity study area)	Black-headed gull was an infrequent visitor to the study area. There was no evidence of regular use of the site for landing or foraging by this species. Therefore, potential for construction-related disturbance is negligible.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Low***. By cross-tabulating ***Medium*** sensitivity and ***Low*** magnitude, a ***Low significance*** effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Long term Not significant*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible***. By cross-tabulating ***Medium*** sensitivity and ***Negligible*** magnitude, a ***Very low significance*** effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term Imperceptible*** effect.
Buzzard (Low)	The Site is used frequently by buzzards, primarily for foraging and commuting with observations during both breeding season and non-breeding season. The study area provides suitable foraging and breeding habitat (woodland) within the site boundary. Territorial behaviour was observed in both the north and south of the study area which is indicative of breeding in the surrounding area. Hunting behaviour was observed during both breeding and non-breeding seasons and was widespread across the sites, in particular the south area of the red line boundary within the 500m buffer and northeast area just outside the boundary. The loss of all woodland habitats combined will be 20.15ha (11.25% of total within biodiversity study area). It is noted that not all of the wooded habitat present would provide suitable nesting opportunities for buzzard. The loss of combined linear wooded habitats will be 335m (1.64% of total).	Buzzards are an adaptable species often found in close proximity to humans and are not considered to be highly sensitive to human disturbance. Due to the high levels of activity in the study area, there is potential for noise or visual disturbance to buzzard within the Site.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is conservatively assessed as ***Medium***. By cross-tabulating ***Low*** sensitivity and ***Medium*** magnitude, a ***Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Long term Not significant*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Medium***. By cross-tabulating ***Low*** sensitivity and Medium magnitude, a ***Very Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Imperceptible*** effect.
Common Gull (Medium)	Common gull was observations were limited to two occasions during the 2022/23 non-breeding survey with 10 individuals overall seen commuting over the site with no evidence of landing or foraging.	Common gull was an infrequent visitor to the study area. There was no evidence of use of the site for landing or foraging by this species.

Key Receptor (Sensitivity)	Direct Effect (Habitat Loss/Alteration)(local scale)	Indirect Effect (Disturbance/Displacement) (local scale)
	While the improved agricultural grassland overlapped by the Proposed Development could provide some common gull foraging opportunities, the proposed loss of this habitat type is limited to 4.74ha (1.46% of total within biodiversity study area).	
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Low***. By cross-tabulating ***Medium*** sensitivity and ***Low*** magnitude, a ***Low significance*** effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Long term Not significant*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible***. By cross-tabulating ***Medium sensitivity*** and ***Negligible*** magnitude, a ***Very Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Imperceptible*** effect
Cormorant (Medium)	This species was only recorded on one occasion, during the 2021/22 non-breeding season commuting west along the Grand Canal in the northern part of the study area. Cormorants primarily breed and forage along the coast and feed on fish. The small watercourses in and around the Proposed Development are not suitable to support breeding or wintering populations of cormorant. This bird is likely to have been travelling between from the coast towards larger waterbodies to the west. Therefore, no effect from direct habitat loss is envisaged.	Cormorants were only found commuting over the lands bordering the site boundary which do not provide preferable habitat to this coastal feeder/breeder. The Site is not regularly used by cormorants and therefore construction related disturbance is not anticipated.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible***. By cross-tabulating ***Medium*** sensitivity and ***Negligible*** magnitude, a ***Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Short-term, Not Significant*** effect	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible***. By cross-tabulating ***medium*** sensitivity and ***Negligible*** magnitude, a ***Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Not Significant*** effect
Great black-backed gull (Low)	There were low levels of great black-backed gull activity, with a total of five observations in the 2021 breeding season only. This species is a coastal breeder and generalist feeder. Although the agricultural habitats present in the study area have some suitability for foraging great black-backed gull, no foraging behaviour was noted. the proposed loss of suitable foraging habitat is limited to 4.74ha (1.46% of total within biodiversity study area).	Great black-backed gull was not a frequent visitor to the lands within the site boundary. There was no evidence of regular use of the site for landing or foraging by this species. Therefore, potential for construction-related disturbance is negligible.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as **Low**. By cross-tabulating **Low sensitivity** and **Low** magnitude, a **Very Low significance** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Long term Imperceptible*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible***. By cross-tabulating **Low** sensitivity and Negligible magnitude, a ***Very low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term,*** **Imperceptible** effect.

Key Receptor (Sensitivity)	Direct Effect (Habitat Loss/Alteration)(local scale)	Indirect Effect (Disturbance/Displacement) (local scale)
Greylag Goose (Medium)	Greylag goose was recorded once only, during the 2022-2023 non-breeding season when a single goose was seen commuting in a south-westerly direction in the 100-200m height band, moving through the 500m buffer. No evidence of foraging by this species was recorded, and there is no breeding habitat present in the locality. There will be a loss of 4.74ha of potentially suitable foraging habitat (improved agricultural grassland) (1.46% of total within biodiversity study area).	There were no records of greylag goose using the habitats within the study area. Therefore, potential for construction-related disturbance is negligible.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Low***. By cross-tabulating **Medium** sensitivity and Low magnitude, a ***Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Long term Not significant*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible***. By cross-tabulating **Medium** sensitivity and Negligible magnitude, a ***Very Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Imperceptible*** effect.
Golden Plover (Very High)	Golden plover breed on open upland habitats where the species has a restricted breeding range in Ireland, breeding in upland areas in the northwest. Wintering golden plover were frequently recorded during the non-breeding seasons, and some observations around the spring migration period and autumn/post-breeding dispersal were also recorded. The local wintering golden plover population have been observed to frequent agricultural land in the local area. There will be a loss of 4.74ha of potentially suitable habitat (improved agricultural grassland) (1.46% of total within biodiversity study area).	Human-related disturbance for golden plover can occur at distances of 200-500m. Studies on this species note that disturbance is more limited during the non-breeding season, however flocks may be disturbed on foraging and roosting habitats (Goodship and Furness, 2022). Considering the abundance of suitable wintering habitat in the locality, and that the majority of golden plover flocks observed were concentrated at a remove to the northeast of the Proposed Development, potential for disturbance is low.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Low***. By cross-tabulating **Very High** sensitivity and Low magnitude, a ***Medium significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Long term Slight*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Low*** given the distribution patterns observed. By cross-tabulating **Very High** sensitivity and Low magnitude, a ***Medium significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Slight*** effect.
Grey Heron (Low)	Grey heron was recorded in both breeding seasons and the 2022/23 non-breeding season with a total of 10 observations. Most activity was focused around the Grand Canal area. The small rivers and drains present in the study area provide at best sub-optimal habitat for grey heron. There will be a loss of 5m of sub-optimal habitat (lowland river) (0.14% of total within biodiversity study area).	Grey heron was primarily observed flying over the study area, with just one non-flight record (recorded in 0-25m distance band along transect 4). There is potential for this species to use the bogs to the east and west of the southern part of the Proposed Development. Considering the limited number of ground-based records, in addition to the extensive displacement habitat available on these bogs further from the Proposed Development, potential construction-related disturbance is assessed as negligible.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible***. By cross-tabulating ***Low*** sensitivity and Negligible magnitude, a ***Very Low significance*** of effect is predicted.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible***. By cross-tabulating ***Low*** sensitivity and Negligible magnitude, a ***Very Low significance*** of effect is predicted.

Key Receptor (Sensitivity)	Direct Effect (Habitat Loss/Alteration)(local scale)	Indirect Effect (Disturbance/Displacement) (local scale)
	Significance (EPA, 2022): The proposed impact of habitat loss will be a ***Short-term, not significant*** effect.	***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Imperceptible*** effect.
Hen Harrier (Very High)	Foraging hen harrier were observed during the winter seasons (total of 20 observations, with five observations and three observations recording the same birds across extended hunting flights, resulting in a total of 14 observations of individual birds). Foraging activity was focused primarily on Esker Bog Rathlumber. There was also one record of a bird in flight in the vicinity of T4. Casual/opportunistic roosting of individual birds was observed on two occasions in early February 2022, both in the same area of scrubby woodland in the southwest of Esker Bog Rathlumber. There was also an unconfirmed potential hen harrier recorded flying into the woodland north of T4 at dusk on 11th December 2023. Identification was inconclusive due to low light. However, this is assessed as a record of roosting hen harrier on a precautionary basis. There is no suitable hen harrier breeding habitat within the study area. The area of recolonising cutover bog favoured by hunting hen harrier to the east for the Proposed Development is outside the proposed footprint, as is the area used for casual roosting in February 2022. c. 5ha of the open/scrubby mixed broadleaved/conifer woodland near T4 where casual unconfirmed hen harrier roosting was recorded on 11th December 2023 will be lost within the proposed peat deposition area and T4 hard standing. While this loss would equate to c. 9.5% of the overall resource of mixed broadleaved/conifer woodland within the biodiversity study area, when considering the scrubby sub-type in this particular woodland block (northern HH Roost Target Area in Figure 7.4), loss of potentially suitable roosting habitat affecting this area would be c. 58%.	Depending on the level of habituation to disturbance, a buffer zone of 300-750m is suggested to protect both breeding and non-breeding Hen Harriers from pedestrian and aircraft disturbance, but habituation to disturbance influences the size of the buffer required and further studies on the impacts of human disturbance are required to help inform such decisions (Goodship and Furness, 2022). The same study also noted that a buffer zone at the lower end of this range may be sufficient to protect individuals that have some habituation to disturbance. Based on the observed infrequent occurrence of casual roosting near the Proposed Development, some limited potential for disturbance to roosting birds exists. Considering the low number of observations/infrequent use of study area for roosting and the presence of similar habitat in the wider area, there is potential for Low to Medium magnitude disturbance effects to occur. There is limited potential for foraging hen harrier to be affected by noise and/or visual disturbance.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is conservatively assessed as ***Medium*** to ***High***. By cross-tabulating ***Very High*** sensitivity and either ***Medium*** or ***High*** magnitude, in the absence of mitigation, a ***Very High significance*** of effect is predicted. ***Significance (EPA, 2022):*** While a Very High significance is indicated by the Percival (2003) cross-tabulation, the realised effect of habitat loss will be lower, due to the isolated/casual use of this area for roosting observed, and the abundance of suitable displacement habitats in the locality and wider landscape. Considering these factors, the proposed impact of habitat loss will be a ***Long-term, Slight*** to ***Moderate*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Low*** to ***Medium***. By cross-tabulating **Very High** sensitivity and ***Low*** magnitude, a ***Medium significance*** of effect is predicted. By cross-tabulating **Very High** sensitivity and *Medium* magnitude, a ***Very High significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Moderate*** effect prior to mitigation
Kestrel (High)	There was consistent kestrel activity across all surveyed seasons, primarily associated with Esker Bog Rathlumber, but also distributed across other parts of the study area including concentrations to	Kestrel have a low to medium sensitivity to human disturbance and studies cite a buffer zone of between 100-200m during the breeding season and ≤ 50m during the non-breeding season (Goodship and Furness, 2022).

Key Receptor (Sensitivity)	Direct Effect (Habitat Loss/Alteration)(local scale)	Indirect Effect (Disturbance/Displacement) (local scale)
	the east and west of the northern part of the Proposed Development. The local area evidently provides hunting opportunities for this species, with a large concentration of hunting activity recorded in the southern part of the study area. The woodlands within the site have the potential to provide nesting habitat for kestrel. However, no nest sites were identified within the study area. The high levels of activity in the locality is indicative of a local breeding population. Kestrel territories can range from 2-10km in area, averaging 5km. They are known to be tolerant of overlapping territories, indicating the potential for multiple pairs and their offspring to utilise the same areas for hunting. This species was primarily observed flying, commuting and hunting. Considering the broad range of habitats potentially utilised by kestrel, loss of kestrel habitat is calculated as total loss across all habitat types excepting sub-optimal conifer plantation which equates to 4.99% loss, resulting in a Low magnitude effect.	The 100-200m buffer zone is suggested to protect nesting Kestrels from forestry operations. However, no nesting was observed in the study area. If the current baseline remains unchanged, potential disturbance/displacement affecting foraging kestrel will be a Low magnitude effect. In the event that a kestrel breeding site became established within 100-200m of the Proposed Wind Farm site prior to construction, a High magnitude effect could occur prior to mitigation.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Low***. By cross-tabulating ***High*** sensitivity and Low magnitude, a ***Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Long term Not significant*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Low*** if the current baseline remains unchanged but could be ***High*** if a new kestrel nest is established within 100-200m. By cross-tabulating ***High*** sensitivity and **Low** magnitude, a ***Low significance*** of effect is predicted (no change to baseline). By cross-tabulating ***High*** sensitivity and **High** magnitude, a ***Very High significance*** of effect is predicted (kestrel nest established within 100-200m). ***Significance (EPA, 2022):*** Disturbance and/or displacement affecting foraging kestrel will be a ***Short-term Not significant*** effect. In the event that breeding kestrel became established within 100-200m prior to construction, a ***Short-term Significant*** effect could occur prior to mitigation
Kingfisher (Very High)	There was one incidental record of this amber-listed/Annex I species across hinterland surveys which occurred on 5th December 2021 to the north of TR18. There will be a loss of 5m of lowland river habitat due to proposed stream crossings. however, the low and peaty banks along these small watercourses do not provide any nesting habitat for kingfisher. Suitable fishing habitat is not present in these streams either.	The lands within the site boundary are not utilised by kingfisher and do not contain suitable habitat for this species. Therefore, construction related disturbance is unlikely to occur (Negligible magnitude). There is potential for an indirect effect on kingfisher present in the wider hydrological network downstream, via potential reductions in water quality, giving rise to Medium magnitude effects prior to mitigation.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible.*** By cross-tabulating ***Very High*** sensitivity and ***Negligible*** magnitude, a ***Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Short-term, Not significant*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Medium*** based on potential reductions in water quality**.** By cross-tabulating ***Very High*** sensitivity and ***Medium*** magnitude, a ***Very High significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of displacement (via indirect effects on feeding habitat) will be a ***Short-term, Significant*** effect prior to mitigation.

Key Receptor (Sensitivity)	Direct Effect (Habitat Loss/Alteration)(local scale)	Indirect Effect (Disturbance/Displacement) (local scale)
Lapwing (High)	There was consistent lapwing activity (flock size averaged 19 birds; maximum was 65), particularly during the non-breeding seasons, but also during the breeding season, concentrated around Esker Bog Rathlumber and occasionally also Esker Bog and agricultural land to the northeast of the Proposed Development. The patterns of habitat use in the study area indicate lapwing do not use the Proposed Development site. However, it must be considered that the improved agricultural grassland within the Site provides some potentially suitable habitat for foraging birds. There will be a loss of 4.74ha of potentially suitable habitat (improved agricultural grassland) (1.46% of total within biodiversity study area).	There is some potential for lapwing using Esker Bog Rathlumber to be affected by disturbance during construction. However, the presence of existing trees and high bog (outside the Proposed Development) provides screening between the Proposed Development and the main area of the bog used by lapwing. As such, visual disturbance is unlikely. In addition, considering the low number of static/ground-based observations, distance of observed ground-based birds (closest record was c. 600m east of T7) and abundant displacement habitat, the magnitude of any potential disturbance remains low.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Low.*** By cross-tabulating ***High*** sensitivity and ***Low*** magnitude, a ***Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Long term Not significant*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Low.*** By cross-tabulating ***High*** sensitivity and ***Low*** magnitude, a ***Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Not significant*** to ***Slight*** effect prior to mitigation.
Lesser Black-backed Gull (Medium)	Lesser black-backed gull activity was relatively high compared with other gull species, mainly consisting of flying over the study area, but also occasionally foraging in agricultural land outside the Proposed Development site. This species is a coastal breeder and a generalist feeder. While the improved agricultural grassland overlapped by the Proposed Development could provide some lesser black-backed foraging opportunities, the proposed permanent loss of this habitat type is limited to 4.74ha (1.46% of total within biodiversity study area)	While lesser black-backed gull was frequently recorded, there was no evidence of regular use of the Proposed Development site for landing or foraging by this species. Therefore, potential for construction-related disturbance is negligible.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Low.*** By cross-tabulating ***Medium*** sensitivity and ***Low*** magnitude, a ***Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Long term Not significant*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible.*** By cross-tabulating ***Medium*** sensitivity and ***Low*** magnitude, a ***Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Not significant*** effect.
Little Egret (Very High)	Recorded flying in the study area twice during the 2022-23 non-breeding survey and once foraging in pools on Esker Bog during winter 2023-24. Little egrets winter on a variety of wetland habitats primarily lakes, riverbanks, lagoons and coastal estuaries. The infrequency of activity within the study area indicates that this species is not utilising the site regularly. Esker Bog and Esker Bog Rathlumber outside the Proposed Development are likely to contain the areas of highest value for this species in the locality. The small rivers and drains present in the study area provide at best sub-optimal habitat for little egret. There will be a loss of 5m of sub-optimal habitat	There is potential for this species to use the bogs to the east and west of the southern part of the Proposed Development. Considering the extensive displacement habitat available on these bogs further from the Proposed Development, potential construction-related disturbance is assessed as negligible.

Key Receptor (Sensitivity)	Direct Effect (Habitat Loss/Alteration)(local scale)	Indirect Effect (Disturbance/Displacement) (local scale)
	(lowland river) (0.14% of total within biodiversity study area).	
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible.*** By cross-tabulating ***Very High*** sensitivity and ***Negligible*** magnitude, a ***Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Short-term, Not significant*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible.*** By cross-tabulating ***Very High*** sensitivity and ***Negligible*** magnitude, a ***Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Not significant*** effect.
Little Grebe (Low)	Just one observation during the 2022 summer survey. There is no suitable habitat for little grebe at the Proposed Development site.	There is limited potential for this species to use the bogs to the east and west of the southern part of the Proposed Development. however, no observations of little grebe using these areas were recorded.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible.*** By cross-tabulating ***Low*** sensitivity and ***Negligible*** magnitude, a ***Very Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Short-term, Imperceptible*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible.*** By cross-tabulating ***Low*** sensitivity and ***Negligible*** magnitude, a ***Very Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Imperceptible*** effect.
Mallard (Medium)	Mallards were seen flying/circling and landing in the study area, with flight lines indicating most activity occurred in the southern part of the study area, focused on Esker Bog and Esker Bog Rathlumber, with flights between these two areas traversing the southern part of the 500m buffer. There is no suitable for mallard within the Proposed Development site.	According to Goodship and Furness (2022), a buffer zone of 50-100m is recommended to prevent disturbance to mallards. Observations indicate no activity observed within 100m of turbine locations and this species is known to be adaptable and tolerant of predictable human disturbance. Therefore, it is unlikely that mallard will be affected significantly by construction related disturbance.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible.*** By cross-tabulating ***Medium*** sensitivity and ***Negligible*** magnitude, a ***Very Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Short-term, Imperceptible*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Low.*** By cross-tabulating ***Medium*** sensitivity and ***Low*** magnitude, a ***Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Not significant*** effect.
Merlin (Very High)	Merlin were recorded during the 2021/22 and 2023/24 non-breeding survey with two observations per season. All observations involved birds in flight, and one also included perching. Traditionally nests on the ground on moorland, mountain and blanket bog. Also nests in woodland and has taken to nesting in forestry plantations adjacent to moorland. Forages in adjacent open habitats such as heathland, bog, and grassland habitats. Surveys confirmed the absence of breeding merlin. however, this species is likely to forage occasionally in the areas surrounding the Proposed Development, as demonstrated by the infrequent winter records.	Merlin are known to tolerate human disturbance, however studies show that tolerance of disturbance varies and merlin may be sensitive to disturbance (Goodship and Furness, 2022). This study cites a ≤ 200m buffer during the non-breeding season, and a 300-500m buffer during the breeding season. Based on the presence of suitable foraging habitat, there is limited potential for noise and/or visual disturbance to indirectly affect merlin.

Key Receptor (Sensitivity)	Direct Effect (Habitat Loss/Alteration)(local scale)	Indirect Effect (Disturbance/Displacement) (local scale)
	There will be no loss of suitable open foraging habitats. There will be a combined loss of 14.28% of potential breeding habitat (mixed conifer/broadleaved woodland and conifer plantation combined).	
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is conservatively assessed as ***Medium.*** By cross-tabulating ***Very High*** sensitivity and ***Medium*** magnitude, a ***Very High significance*** of effect is predicted. ***Significance (EPA, 2022):*** While a Very High significance is indicated by the Percival (2003) cross-tabulation, the realised effect of habitat loss will be lower, due to the absence of breeding season records, and the abundance of suitable displacement habitats in the locality and wider landscape. Considering these factors, the proposed impact of habitat loss will be a ***Long-term, Moderate*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Low.*** By cross-tabulating ***Very high*** sensitivity and ***Low*** magnitude, a ***Medium significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Slight*** effect.
Mute Swan (Medium)	Mute swans were occasionally seen flying over the study area but were not observed using the Proposed Development site. However, they were observed along transect 1 during winter 2021-22 and winter 2022-23, indicating occasional use of improved agricultural grassland in the study area. The proposed permanent loss of this habitat type is limited to 4.74ha (1.46% of total within biodiversity study area).	Based on the limited/very occasional use of improved agricultural grassland c. 500-600m northwest of the Proposed Development for winter grazing by low numbers of swans, significant disturbance effects are unlikely.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Low.*** By cross-tabulating ***Medium*** sensitivity and ***Low*** magnitude, a ***Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Short-term, Not significant*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible.*** By cross-tabulating ***Medium*** sensitivity and ***Negligible*** magnitude, a ***Very Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Imperceptible*** effect.
Redshank (High)	There was only one record of redshank across all survey periods, with this species noted calling for 20 seconds near VP3 on 1st October 2022. There was no visual record of this species. The timing of this record indicates a passage migrant. There is no suitable habitat for redshank at the Proposed Development site.	This species is unlikely to use the habitats at the Proposed Development or the surrounding lands, as demonstrated by surveys.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible.*** By cross-tabulating ***High*** sensitivity and ***Negligible*** magnitude, a ***Very low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Short-term, Imperceptible*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible.*** By cross-tabulating ***High*** sensitivity and ***Negligible*** magnitude, a ***Very low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of ddisturbance will be a ***Short-term, Imperceptible*** effect.

Key Receptor (Sensitivity)	Direct Effect (Habitat Loss/Alteration)(local scale)	Indirect Effect (Disturbance/Displacement) (local scale)
Peregrine (Very High)	Peregrines were observed a total of 23 times across all survey periods, with 8 of these observed in the 2022 breeding survey. They were mainly observed in flight with hunting behaviour also seen. There is no suitable breeding habitat for this species in the study area. Peregrine prefer to breed on mountain cliffs, quarries and tall buildings and are often found wintering on estuaries. The presence of a breeding pair known to use an artificial nesting structure at Edenderry power plant c. 4.3km southeast of the proposed site is noted.	Goodship and Furness (2022) cite buffer zones to protect breeding Peregrines from forestry operations in the UK ranging from 200m to 600m. A safe working distance for aircraft in Scotland is considered to be 500-750m (lateral). No breeding activities were observed, and there are no suitable nesting habitats at the Proposed Wind Farm. Therefore, it is unlikely for breeding peregrine to be affected by noise and/or visual disturbance. There is some limited potential for hunting birds to avoid construction areas. however, the potential effects associated with this are Negligible due to the limited areas being subject to transient disturbance in addition to abundance of suitable hunting habitat in the wider landscape.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible.*** By cross-tabulating ***Very High*** sensitivity and ***Negligible*** magnitude, a ***Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Short-term, Not significant*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible.*** By cross-tabulating ***Medium*** sensitivity and ***Negligible*** magnitude, a ***Very Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Not significant*** effect.
Short-eared Owl (Very High)	This species occurs in Ireland as a rare breeding species and widespread but scarce winter visitor. The observations recorded at Ballinla during winter 2023-24 involved owls hunting over esker Bog Rathlumber and adjacent conifer woodland. These observations occurred between 1st October and 20th November 2023. there were no other observations of this species, indicating infrequent use of the study area. The bogs to the east and west of the Proposed Development are the primary hunting habitats for this species in the area. As such, it is not anticipated that this species will be affected by habitat loss.	Due to infrequent use of the study area by hunting birds during winter and absence of optimal hunting and roosting habitats from the Proposed Development, potential for disturbance remains low.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible.*** By cross-tabulating ***Very High*** sensitivity and ***Negligible*** magnitude, a ***Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Short-term, Not significant*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible.*** By cross-tabulating ***Very High*** sensitivity and ***Negligible*** magnitude, a ***Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Short-term, Not significant*** effect.
Sparrowhawk (Low)	Sparrowhawk was observed frequently across all seasons with records of flying, hunting and mobbing with the majority of flight lines present in the southern part of the study area. This species requires mature trees for nesting and are commonly found in coniferous plantations. A second key requirement is an abundance of small birds, including meadow pipit and skylark. Although no nesting was observed, due to the presence of suitable habitats onsite and availability of suitable prey, there is potential for sparrowhawk to breed in the area in which the Proposed Development is located. Considering the broad range of habitats potentially suitable for sparrowhawk, loss of habitat is calculated	Although no breeding behaviour was detected, there are suitable habitats to support breeding sparrowhawk on-site. Additionally, there are suitable prey items, including meadow pipit, skylark and other small passerines available in the local area. As such, there is potential for hunting and potentially breeding sparrowhawk to be indirectly effected by noise and/or visual disturbance.

Key Receptor (Sensitivity)	Direct Effect (Habitat Loss/Alteration)(local scale)	Indirect Effect (Disturbance/Displacement) (local scale)
	as total loss across all habitat types which equates to 10.85% loss, resulting in a Medium magnitude effect.	
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Medium.*** By cross-tabulating ***Low*** sensitivity and ***Medium*** magnitude, a ***Very Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Long-term, Imperceptible*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Medium.*** By cross-tabulating ***Low*** sensitivity and ***Medium*** magnitude, a ***Very Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Imperceptible*** effect.
Snipe (High)	Frequent observations of snipe were recorded, primarily associated with the bogs near the Proposed Development and also bogs further afield in the surrounding hinterland. While the improved agricultural grassland overlapped by the Proposed Development may be of limited/occasional use to foraging snipe, the primary habitats for this species occur on the bogs to the east and west (outside) of the Proposed Development. A such the potential effect of habitat loss being limited to improved agricultural grassland which is widely available in the surrounding landscape results in negligible magnitude effects.	This species is known to be susceptible to disturbance with evidence of snipe population density reducing during the construction of windfarms (Pearse-Higgins et al., 2012). Considering snipe activity was recorded within the potential disturbance zone of the Proposed Development (500m) and noting the suitability of the adjacent bogs for breeding snipe, there is potential for construction-related disturbance to breeding snipe to occur prior to mitigation.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible.*** By cross-tabulating ***High*** sensitivity and ***Negligible*** magnitude, a ***Very Low significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Long-term, Imperceptible*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***High.*** By cross-tabulating ***High*** sensitivity and ***High*** magnitude, a ***Very High significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term Significant*** effect prior to mitigation.
Whooper Swan (Very High)	Whooper swan observations were limited to the non-breeding season, with a total of 19 observations across all flight activity and transect surveys. There were two records of casual/transient grazing in improved agricultural grassland near the Proposed Development site/T3, both occurring in short succession during winter 2022-23 (herds of 26 and 38 seen on 16th and 18th November 2022). Whooper swans were not recorded again in these fields during any subsequent surveys. Whooper swans were also recorded roosting and grazing during daytime on Esker Bog. No evidence of night roosting was recorded at or near the prosed development site, and sites used regularly for grazing were confirmed to be located further afield in the surrounding hinterland (i.e. HVP16 located 4.8km southeast and HVP7 located 5.1km west). HVP17 located 8.3km northwest had the highest numbers of grazing whooper swans recorded (46). There is abundant suitable habitat for this species in the local region, as indicated by the varying use of numerous areas. The proposed permanent loss of habitat of potential value to wintering whooper swans (improved agricultural grassland) within the Proposed	Goodship and Furness (2022) note whooper swans have a medium likely sensitivity to disturbance, but that they can habituate to some types of human disturbance, particularly where the source of disturbance is predictable. A non-breeding buffer of between 200-600m is suggested for whooper swan in Goodship and Furness (2022). Based on observed behaviour during surveys, there is considerable variability in the distribution of grazing whooper swans in the local area and wider region, indicating that the grazing resource is spread across a large territory encompassing areas closer to and further away from the Proposed Wind Farm. Considering that the observed grazing habits of the local wintering population indicate that habitual grazing sites are located at a remove from the Proposed Development site (i.e. HVP16 located 4.8km southeast and HVP7 located 5.1km west. also, the majority of Esker Bog, including areas where whooper swans were observed roosting and grazing, is located outside the 600m disturbance buffer) and that suitable temporary displacement habitats are available in the wider area, the magnitude of disturbance and/or displacement remains Low. In addition, habituation to regular works is likely to further reduce potential for disturbance of any whooper swan herds potentially occurring near the Proposed Development during construction.

Key Receptor (Sensitivity)	Direct Effect (Habitat Loss/Alteration)(local scale)	Indirect Effect (Disturbance/Displacement) (local scale)
	Development is limited to 4.74ha (1.46% of total within biodiversity study area).	
	Significance without mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Low.*** By cross-tabulating ***Very High*** sensitivity and ***Low*** magnitude, a ***Medium significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of habitat loss will be a ***Short-term, Slight*** effect.	**Significance without mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Low.*** By cross-tabulating ***Very High*** sensitivity and ***Low*** magnitude, a ***Medium significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Slight*** to ***Moderate*** effect prior to mitigation.
Woodcock (High)	Breeding woodcock activity (territorial display) has been recorded in woodland adjacent to the Grand Canal (outside Proposed Development), and also in an area of scrubby open mixed broadleaved/conifer woodland overlapped by the proposed peat deposition area north and west of T4. c. 5ha of this open/scrubby mixed broadleaved/conifer woodland near T4 where four records of woodcock were made on 9th June 2022 (three records of calling and one roding woodcock, noted as occupied territory) will be lost within the proposed peat deposition area and T4 hard standing. While this loss would equate to c. 9.5% of the overall resource of mixed broadleaved/conifer woodland within the biodiversity study area, when considering the scrubby sub-type in this particular woodland block (northern HH Roost Target Area in Figure 7.4), loss of potentially suitable woodcock breeding habitat affecting this area would be c. 58%.	Woodcock were recorded during targeted wader/woodcock surveys. Surveys indicate a low density of breeding and wintering woodcock occur within and surrounding the Proposed Wind Farm. Therefore, there is potential for breeding woodcock to be affected by noise and/or visual disturbance prior to mitigation.
	Significance without Mitigation: ***Significance (Percival, 2003):*** The magnitude of the effect is conservatively assessed as ***Medium*** to ***High***. By cross-tabulating ***High*** sensitivity and ***Medium*** magnitude, a ***High significance*** of effect is predicted. By cross-tabulating ***High*** sensitivity and ***High*** magnitude, a ***Very High significance*** of effect is predicted. ***Significance (EPA, 2022):*** While a High to Very High significance is indicated by the Percival (2003) cross-tabulation, the realised effect of habitat loss will be lower, due to the abundance of suitable displacement habitats in the locality and wider landscape. Considering these factors, the proposed impact of habitat loss will be a ***Long-term, Moderate*** effect.	**Significance without Mitigation:** ***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***High*** given the potential for breeding woodcock to occur within in or near the Proposed Development footprint. By cross-tabulating **High** sensitivity and High magnitude, a ***Very High significance*** of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of disturbance will be a ***Short-term, Significant*** effect prior to mitigation.

7.5.3.3 Grid Connection & TDR

The Proposed TDR nodes and the habitats bordering the Proposed Grid Connection would provide moderate-quality foraging opportunities for small passerines but are of limited value for breeding birds and species of higher conservation concern. There will be limited loss of low-growing hedges, one mature ash tree and areas f improved agricultural grassland. These will result in Short-term Not significant effects for avifauna. Construction stage disturbance arising from construction of the grid connection and TDR will result in Short-term Not significant to Slight effects for avifauna.

7.5.4 Operational Phase

7.5.4.1 Direct Effects: Collision Risk

Studies on operational impacts of wind farms (Pearce-Higgins et al., 2009) show that certain species exhibit levels of turbine avoidance during operational phases which may be extrapolated to reductions in breeding bird densities. however, this may not be as significant as previously thought, certainly in comparison to impacts during construction (Pearce-Higgins et al., 2012). It seems that there is little evidence for consistent post-construction population declines in any species, suggesting for the first time that wind farm construction can have greater effects on birds than wind farm operation. this is supported in the literature (Devereux et al., 2008).

A recent study on the effects of wind turbines on the distribution of wintering farmland birds (Devereux et al., 2008) did not find any consistent patterns of turbine avoidance across the species groups studied (corvids, seed-eaters, gamebirds, and skylark).

The primary cause of direct effects on birds during the operational phase of a development is collision risk. Collision risk behavioural observations of birds in relation to operational wind farms provide the basis of studies on collision risk. Fixed point observations of flight behaviour, flight lines into, through and out of the area and information about the birds' use of the area help to inform the environmental evaluation of the Proposed Development. Bird mortality may result from potential bird collision with turbine structures or turbine blades.

Not all bird species are equally susceptible to collision, and some species suffer proportionately high levels of collision mortality (Drewitt and Langston, 2008). Morphology, physical flight characteristics and differences in vision are all influencing factors. Martin and Shaw (2010) suggest that it is the characteristics of the section of a bird's visual field that projects forward and hence 'looks' that are the key factors.

In some species the vertical extent of the forward binocular vision is reduced and therefore the bird is rendered blind, if, whilst in the process of flying, it undertakes behaviour such as the detection of conspecifics (member of the same species), remote food sources, etc. (Martin, 2011 and Martin and Shaw, 2010).

Other species have reduced fovea (region of the eye responsible for sharp central vision), are emmetropic (default focus is distant) or may contain blind spots in their field of vision (as an evolutionary trait) which may cause susceptibility to collision. Flight height or the flight heights which birds habitually use along either migration or local flight paths is also an influencing factor. Relative size and high wing loading (or low manoeuvrability) are influencing factors as larger birds with poor manoeuvrability are generally perceived as at greater risk of collision with structures (see Brown et al., 1992, quoted in Drewitt and Langston, 2006). Various species therefore exhibit different morphological and behavioural attributes which may contribute to collision risk.

Recent studies show that modern, larger multi-MW turbines show comparable fatality estimates with older generation models and expected increases in fatalities due to increases in rotor surface are not as expected, possibly due to increased altitude, increased distance between turbines and slower rotation speeds (Krijgsveld et al., 2009). Appraisal of collision risk for the Proposed Development is based on a rotor diameter of 162m and hub height 104m, resulting in a maximum and minimum swept height of 185m and 23m respectively (see Chapter 2 Description of Development).

Relatively little is known about collision as a threat to birds. One problem is that most studies rely on the number of corpses found, but this can be extremely unreliable, since it is known that corpses are quickly removed by predators. At a wind farm site in Co. Tipperary in 2011, it was found that 72% of bird corpses left out were removed after five days. At this site in Co. Tipperary in 2012, scavengers were present at a bird corpse within forty-five minutes of it being placed in the vicinity of a turbine (J. Kearney principal ecologist FT, per. comm. 2022).

The colour, mode, intensity, and density of lighting has been shown to influence the degree to which birds (specifically, nocturnally migrating passerines) are attracted to wind turbines at night.

Studies have shown that red lighting is more attractive to birds, and that steady burning lights are more attractive than flashing ones, while structures with no lighting were the least attractive (Kerlinger et al., 2010. Gehring et al., 2009). The directional intensity of lighting is also a factor in reducing the attraction of birds. As such, specification of aviation obstruction lighting to minimise effects on birds is included under operational mitigation measures.

7.5.4.1.1 Collision Risk Model Analysis

The Collision Risk Model (CRM) Report (See Appendix 7.8) presents the results of collision risk modelling for the Proposed Wind Farm. This modelling used data from vantage point surveys carried out during the non-breeding winter seasons of 2021-22, 2022-23 and 2023-2024, as well as the breeding seasons of 2022, 2023 and 2024. The modelling was carried out using the NatureScot Collision Risk Model (Band, 2024). The spreadsheet accompanying the NatureScot report was used to calculate collision probabilities for birds transiting through the rotors.

The following target species were recorded during vantage point surveys (VPs 1-4): Black-headed gull, Buzzard, Common gull, Cormorant, Golden Plover, Great Black-backed gull, Greylag Goose, Grey Heron, Hen Harrier, Kestrel, Lapwing, Lesser-black backed gull, Little Egret, Little Grebe, Mallard, Merlin, Mute Swan, Peregrine, Redshank, Snipe, Sparrowhawk and Whooper Swan.

A total of 17 species were selected for collision risk modelling, namely Buzzard, Black-headed gull, Golden Plover, Great Black-backed gull, Greylag Goose, Grey Heron, Hen Harrier, Kestrel, Lapwing, Lesser Black-backed Gull, Little Egret, Mallard, Mute Swan, Peregrine, Snipe, Sparrowhawk and Whooper Swan. These species have been selected because they were recorded within the 500m buffer of the proposed turbines (the flight activity survey area) at rotor swept heights, and are of conservation concern: i.e., they are red or amber-listed in Birds of Conservation Concern Ireland 2020-2026 (Gilbert et al., 2021), and/or are listed on Annex I of the Birds Directive or green-listed and sensitive to wind farm developments (i.e., buzzard). For all the other species recorded but not included for collision risk modelling, the effective collision risk can be assumed to be zero.

As the Proposed Grid Connection will be buried underground there is no resultant collision risk associated with this element of the Proposed Development.

Passerines

Collision by resident passerines is not considered likely to be a significant issue as their flight activity is generally well below the height of rotor blades and the proposed impact of collision risk will be a Long-term Imperceptible Reversible Effect.

Non-Passerines

Potential collision risk to non-passerine target species is outlined in Table 7-25. Where potential for effects has been identified, potential effects at different population scales are examined (i.e. national, county and local scale) (please see CRM report Appendix 7.8 for details on how population sizes were determined). While the use of different population scales is utilised to provide a detailed and nuanced picture of effects, the basis of assessment is potential National scale population effects.

Table 7-25: Potential Collision Risk to Target Species

Key Receptor (Sensitivity)	Direct Effect (Collision Risk)	Significance without Mitigation
Black-headed gull (Medium)	SNH guidance (SNH, 2019) recommends an avoidance rate of 99.2% for smaller gulls such as black-headed gull. **Predicted number of collisions (assuming 99.2% avoidance) is 0.00 per year.**	***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible*** *(>1% population lost).* By cross-tabulating ***Medium*** sensitivity and ***Negligible*** magnitude, a ***Very Low*** significance of effect is predicted.

Key Receptor (Sensitivity)	Direct Effect (Collision Risk)	Significance without Mitigation
		Significance (EPA, 2022): The proposed impact of collision risk will be a ***Long-term, Imperceptible*** effect.
Buzzard (Low)	A total of 27 Buzzard fatalities have been recorded within the European Context, in a review of 46 wind farms up to 2004 (Hötker et al., 2006). However, this number is low in relation to the estimated European population of up to one million pairs (Gensbol, 2008) and best available knowledge suggests mortality due to wind farms is not sufficient to cause significant population declines of this green-listed species. A local population of 15 buzzards within a 5x5km square area overlapping the Proposed Wind Farm is estimated based on survey observations. It is noted that the county population is an estimate based on the proportion of the national population split by county area, used due to lack of a county estimate. Buzzard is a green-listed species of low conservation concern due to its ongoing expansion in population size and range. The national population estimate available for the species was taken from the Article 12 report covering the period 2008-2012. As this data is more 10 years old it does not account for the continued expansion of the species range throughout Ireland and therefore certainly underestimates the current population size for this species. **Predicted number of collisions per year (assuming 98% avoidance rate) is 0.5 per year (0.017% of national population, 0.7% county population and 3.33% local population)**	***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible*** (>1% population lost) at national and county scale and ***Low*** (1-5% population lost) at local scale. Cross-tabulating ***Low*** sensitivity and both ***Negligible*** and ***Low*** magnitude, a ***Very Low*** significance of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of collision risk will be a ***Long-term, Imperceptible*** effect.
Great black-backed **G**ull (**Medium**)	A published review of the number of bird fatalities owing to collision with wind turbines showed there were zero fatalities across 46 European wind farms (Hötker et al., 2006). Furthermore, the published avoidance rate is 99.56% (Furness, 2019), suggesting great black-backed gulls exhibit high levels of micro-avoidance at wind farms. **Predicted number of collisions per year (assuming 99.56% avoidance rate) is 0.00 per year.**	***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible*** (>1% population lost). Cross-tabulating ***Medium*** sensitivity with ***Negligible*** magnitude, a ***Very Low*** significance of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of collision risk will be a ***Long-term, Imperceptible*** effect.
Golden Plover (**Very High**)	Golden Plover have been recorded in low numbers as collision fatalities at wind farms (Hötker et al., 2006. Grunkorn 2011). The SNH guidance (SNH, 2018) does not provide a specific avoidance rate for Golden Plover, but states that for species not covered by the guidance "we recommend a default value of 98% ". However, the review study based on 3 years of post-construction monitoring sites included in the CRM (Appendix 7-8 and Gittings, 2022) indicates a much higher avoidance rate should be applied for non-breeding Golden Plover populations. The studies had robust survey methodologies and were carried out at wind farm sites with high levels of Golden Plover flight activity. The review considers that an avoidance rate of 99.8% is a suitable precautionary estimate for winter Golden Plover. In further support of a high micro-avoidance rate, a study in the Netherlands of three operational wind farms where Golden Plovers were both diurnally and nocturnally active found no fatalities (Krijgsveld et al., 2009). No breeding or	***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible*** (>1% population lost) for national and county populations. Effect magnitude is ***Low*** for the local population. Cross-tabulating ***Very High*** sensitivity with ***Negligible*** magnitude, a ***Low*** significance of effect is predicted. Cross-tabulating ***Very High*** sensitivity with ***Low*** magnitude, a ***Medium*** significance of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of collision risk will be a ***Long-term, Not significant*** effect for national

Key Receptor (Sensitivity)	Direct Effect (Collision Risk)	Significance without Mitigation
	roosting Golden Plover were recorded during surveys, reducing magnitude. While a collision rate of 3.96 per year is predicted, the predicted effects at county and national remain Negligible and Low at local level. It is noted that the local population estimate of 201 wintering birds is a conservative estimate based on average flock size observed. **Predicted number of collisions (assuming 99.8% avoidance) is 3.96 per year (0.005% of national population, 0.071% county population and** **1.97% local population).**	and county populations and ***Long-term Slight*** effect at local population level.
Greylag **G**oose (**Medium**)	SNH guidance (SNH, 2025) recommends an avoidance rate of 99.8% for all goose species. Due to the very limited amount of flight activity recorded for this species, no collision mortality is predicted. **Predicted number of collisions per year (assuming 99.8% avoidance rate) is 0.00 per year.**	***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible*** (>1% population lost). Cross-tabulating ***Medium*** sensitivity with ***Negligible*** magnitude, a ***Very Low*** significance of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of collision risk will be a ***Long-term, Imperceptible*** effect.
Grey Heron (Low)	SNH guidance (SNH, 2025) recommends the default avoidance rate of 98% for grey heron, due to absence of published evidence supporting a higher avoidance rate. Due to the very limited amount of flight activity and frequently low flight altitudes recorded for this species, no collision mortality is predicted. **Predicted number of collisions per year (assuming 98% avoidance rate) is 0.00 per year.**	***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible*** (>1% population lost). Cross-tabulating ***Low*** sensitivity with ***Negligible*** magnitude, a ***Very Low*** significance of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of collision risk will be a ***Long-term, Imperceptible*** effect.
Hen Harrier **(Very High)**	SNH guidance (SNH, 2025) recommends an avoidance rate of 99% for hen harrier, based on published evidence (Whitfield & Madders, 2006). No Hen Harriers were observed breeding onsite, so potential collision risk is significantly reduced due to the absence of the territorial display known as 'sky-dancing', which often occurs at heights within the predicted rotor envelope. Documented as occasionally soaring or arriving at winter roosts 'at height' (Watson, 1977). however, all infrequent/casual roosting observed involved low altitude flight. Literature suggests flying at low heights is a 'ubiquitous trait' supported by a number of studies (e.g. Whitfield and Madders, 2006). The species has a high published avoidance rate (99%) (SNH, 2017) in relation to wind turbines. Due to the absence of a breeding population, habitually low flight altitudes, in addition to the majority of flight activity being focused outside the 500m turbine buffer, predicted collision mortality for hen harrier is limited to less than one collision over the 35-year lifespan of the Proposed Development. A national population of 95.5 birds is estimated based on the national hen harrier survey undertaken in 2022 (Ruddock et. al 2024). While there is no breeding population in Co. Offaly, the population at the nearest SPA (Slieve Bloom Mountains	***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible*** (>1% population lost). Cross-tabulating ***Very High*** sensitivity with ***Negligible*** magnitude, a ***Low*** significance of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of collision risk will be a ***Long-term, Not significant*** effect.

Key Receptor (Sensitivity)	Direct Effect (Collision Risk)	Significance without Mitigation
	SPA) is considered to provide a useful county/SPA level population (5 pairs) (Ruddock et. al 2024). A conservatively low local wintering population of two birds is estimated based on survey observations in the study area. **Predicted number of collisions per year (assuming 99% avoidance rate) is 0.00 per year.**	
Kestrel (High)	Twenty-nine fatalities were recorded across 46 wind farms in a published review of the effects of turbine collision on birds in the European Context (Hötker et al., 2006). The published avoidance rate is 95% (SNH, 2016). **Kestrel has a predicted collision rate of 0.35 per year.** **At national level this represents an annual loss of 0.002% of the population. This represents a loss of 0.075% of the county population** (estimate based on proportion of national population split by county area, used due to a lack of a county estimate). **At local population level** (estimated proportionally based on national population), **this represents 1.522%.** As such, the predicted magnitude of collision effects for Kestrel remain Negligible at national and county scale, and Low at the local scale.	***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible*** (>1% population lost) at national and county scale, and ***Low*** (1-5 % population lost) at local scale Cross-tabulating ***High*** sensitivity with ***Negligible*** magnitude, a ***Very Low*** significance of effect is predicted. Cross-tabulating ***High*** sensitivity with ***Low*** magnitude, a ***Low*** significance of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of collision risk will be a ***Long-term, Not significant*** effect.
Lapwing (High)	SNH guidance (SNH, 2025) recommends the default avoidance rate of 98% for lapwing, due to absence of published evidence supporting a higher avoidance rate. Lapwing activity was regularly observed during both the winter and breeding seasons, with activity focused on Esker Bog Rathlumber. A proportion of the flights over this bog intersected the 500m turbine buffer, resulting in potential for collision risk. Lapwing is a gregarious species, often occurring in large flocks, particularly during winter. It can be susceptible to turbine collisions due to its tendency to gather in flocks and embark on meandering/wheeling flights. The estimated local population was calculated based on a highly conservative estimate based on average flock size (19 birds). **Predicted number of collisions per year (assuming 98% avoidance rate) is 2.88 per year (0.004% of national population, 0.076% county population and 15.158% local population.**	***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible*** (>1% population lost) at national and county scale. The local population estimate based on maximum flock size results in a ***Low*** magnitude effect (1-5 % population lost) at local scale, while the local population estimate based on average flock size results in a ***Medium*** magnitude effect (5-20 % population lost) at local scale. Cross-tabulating ***High*** sensitivity with ***Negligible*** magnitude, a ***Very Low*** significance of effect is predicted at national and county scale. Cross-tabulating ***High*** sensitivity with ***Low*** magnitude, a ***Low*** significance of effect is predicted (local max. population). Cross-tabulating ***High*** sensitivity with ***Medium*** magnitude, a ***High*** significance of effect is predicted (local avg. population). ***Significance (EPA, 2022):*** When considering effects at the national and county scale, the proposed impact of collision risk will be a ***Long-term, Imperceptible*** to ***Not significant*** effect. At the local scale the proposed impact of collision risk will be a ***Long-term, Slight*** to ***Moderate*** effect.

Key Receptor (Sensitivity)	Direct Effect (Collision Risk)	Significance without Mitigation
Lesser Black-backed Gull (Medium)	A published review of 46 European wind farms (Hötker et al., 2006) found 45 fatalities across wind farms. However, the published avoidance rate is 99.56% (Furness, 2019), suggesting birds exhibit a high level of micro-avoidance. **The predicted collision risk for Lesser Black-backed Gull is 0.26 per year (assuming 99.56% avoidance rate). This equates to 0.8% of the local population/0.129% of county population/0.004% of national population.**	***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible*** (>1% population lost). Cross-tabulating ***Medium*** sensitivity with ***Negligible*** magnitude, a ***Very Low*** significance of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of collision risk will be a ***Long-term, Imperceptible*** effect.
Little Egret (Very High)	SNH guidance (SNH, 2025) recommends the default avoidance rate of 98% for little egret, due to absence of published evidence supporting a higher avoidance rate. Due to the very limited amount of flight activity and frequently low flight altitudes recorded for this species, no collision mortality is predicted. **Predicted number of collisions per year (assuming 98% avoidance rate) is 0.00 per year.**	***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible*** (>1% population lost). Cross-tabulating ***Very High*** sensitivity with ***Negligible*** magnitude, a ***Low*** significance of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of collision risk will be a ***Long-term, Not significant*** effect.
Mallard (Medium)	A total of 18 fatalities were recorded across 46 wind farms in a published review of the effects of turbine collision on birds in the European Context (Hötker et al., 2006). **Predicted number of collisions per year (assuming 98% avoidance rate) is 0.32 per year (0.001% of national population, 0.048% county population and 0.9% local population.**	***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible*** (>1% population lost). Cross-tabulating ***Medium*** sensitivity with ***Negligible***, a ***Very Low*** significance of effect is predicted at national and county level. ***Significance (EPA, 2022):*** The proposed impact of collision risk will be a ***Long-term, Imperceptible*** effect.
Mute Swan (Medium)	A total of eight fatalities were recorded across 46 wind farms in a published review of the effects of turbine collision on birds in the European Context (Hötker et al., 2006). The published avoidance rate for swans is 99.5% (SNH, 2025), suggesting birds exhibit a high level of micro-avoidance. **Predicted number of collisions per year (assuming 99.5% avoidance rate) is 0.00 per year.**	***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible*** (>1% population lost). Cross-tabulating ***Medium*** sensitivity with ***Negligible***, a ***Very Low*** significance of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of collision risk will be a ***Long-term, Imperceptible*** effect.
Peregrine (Very High)	Evidence of collision fatality is low, with only two birds recorded in published reviews of wind farm fatalities (Hötker et al., 2006). The SNH recommended avoidance rate for collision-risk modelling is 98% (SNH, 2025). The local population is estimated conservatively as two birds, based on the presence of a breeding population in the region. **Predicted number of collisions per year (assuming 98% avoidance rate) is 0.01 per year (0.001% of national population, 0.042% county population and 0.5% local population.**	***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible*** (>1% population lost). Cross-tabulating ***Very High*** sensitivity with ***Negligible*** magnitude, a ***Low*** significance of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of collision risk will be a ***Long-term, Not significant*** effect.

Key Receptor (Sensitivity)	Direct Effect (Collision Risk)	Significance without Mitigation
Snipe (High)	Evidence of collision fatality is low, with only one bird recorded in published reviews of wind farm fatalities (Hötker et al., 2006). The SNH recommended avoidance rate for collision-risk modelling is 98% (SNH, 2025). The local population is estimated conservatively as 10 birds, based on survey observations. **The predicted collision risk for snipe (assuming 98% avoidance rate) is 0.01 per year (0. 0.000% of national population, 0.005% county population and 0.1% local population.**	***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible*** (>1% population lost). Cross-tabulating ***High*** sensitivity with ***Negligible*** magnitude, a ***Very Low*** significance of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of collision risk will be a ***Long-term, Imperceptible effect.***
Sparrowhawk (Low)	Sparrowhawk is a resident species of the wind farm study area, although no breeding has been recorded within the site. Published fatality rates are low, with two fatalities from a review of 46 wind farms across Europe (Hötker et al., 2006). The local population is estimated conservatively as 3 birds, based on survey observations. **The predicted collision risk for sparrowhawk (assuming 98% avoidance rate) is 0.01 per year (0.000% of national population, 0.003% county population and 0.1% local population.**	***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible*** (>1% population lost) at national and county scale, and ***Low*** (1-5% population lost) at local scale Cross-tabulating ***Low*** sensitivity with both ***Negligible*** and ***Low*** magnitude, a ***Very Low*** significance of effect is predicted at all scales. The proposed impact of collision risk will be a ***Long-term, Imperceptible effect.***
Whooper Swan (Very High)	Studies on wintering swans have found low levels of collision mortality, even in sites with a high degree of transit flights (n=1664 in one case) through operational wind farms and relatively high numbers (>500) of birds regularly present (Fijn et al., 2012). In a review of swan and goose fatalities at wind farms only one whooper swan fatality was recorded from monitoring undertaken at 46 different wind farms across 8 countries (Hötker et al., 2006). Recommended avoidance rates from SNH are 99.5% (SNH, 2010), based on literature reviews of recorded fatalities. this suggests a high micro-avoidance of turbines. In relation to nocturnal flight activity recent studies utilising radar on both offshore and coastal wind farms in Europe have recorded macro-avoidance rates in wildfowl at least as high, or higher at night than during the day, implying that diurnal avoidance rates are comparable to those in periods of lower visibility (Desholm, and Kahlert, 2005). Best scientific knowledge suggests comparable if not higher avoidance rates by wildfowl during perceived periods of poor visibility. Best scientific knowledge therefore suggests overall a high avoidance rate and consequent low fatality estimate for wind turbines in relation to Whooper Swans both in relation to diurnal flight activity and activity in crepuscular and nocturnal periods. **The predicted collision risk for whooper swan (assuming 99.5% avoidance rate) is 0.01 per year (0.000% of national population, 0.002% county population and 0.029% local population.**	***Significance (Percival, 2003):*** The magnitude of the effect is assessed as ***Negligible*** (>1% population lost). Cross-tabulating ***Very High*** sensitivity with ***Negligible*** magnitude, a ***Low*** significance of effect is predicted. ***Significance (EPA, 2022):*** The proposed impact of collision risk will be a ***Long-term, Not significant*** effect.

7.5.4.2 Indirect Effects: Disturbance and Displacement

There is evidence that the rotor blades of wind turbines during operation can displace or exclude some species, which effectively results in habitat loss for these birds. Habitat loss can be direct through land take of breeding or foraging habitats for key species or indirect such as effective habitat loss through avoidance or disturbance due to factors such as perceived collision risk.

Birds may therefore avoid areas proximal to turbines until habituation takes place. There are examples in the literature of habituation in species such as geese and swans (See Fijn et al., and Madsen and Boertmann, 2008).

Available evidence suggests that breeding passerines are not adversely affected by the presence of wind turbines, and for this reason they are omitted from Table 7-26. For example, a German study found no effect on numbers or spatial distribution of skylarks within 1km of turbines (Langston and Pullan, 2004).

Whitfield and Madders (2006), suggest that most studies do not detect any significant displacement of raptor species by wind turbines although there are occasional notable exceptions.

7.5.4.3 Indirect Effects: Barrier Effect

One of the potential operational effects of wind farms is avoidance where the wind farm may act as a barrier to movements (Masden et al., 2009). The effect of birds altering their migration flyways or local flight paths to avoid any infrastructure is a form of displacement (Drewitt and Langston, 2006). The primary effect of barrier effect is increased energy expenditure when birds have to fly further to circumvent an obstacle.

Effects can be highly variable and range from slight 'checks' in-flight direction, height, or speed, through to larger diversions around objects. Studies have shown that birds on migration may show avoidance of wind farms (Masden, 2009) but the observed distances involved were trivial in regard to total migration distances, and hence energy expenditure.

In relation to nocturnal flight activity recent studies utilising radar on both offshore and coastal wind farms in Europe have recorded macro-avoidance rates in wildfowl at least as high, or higher at night than during the day, implying that diurnal avoidance rates are comparable to those in periods of lower visibility (Desholm, and Kahlert, 2005). In the same study migrating flocks at night were recorded increasing their distance from individual turbines once inside the wind farm and also travelling in the corridors between turbines (Desholm, and Kahlert, 2005).

Potential disturbance and barrier effects due to the operation of the Proposed Wind Farm are outlined in Table 7-26.

Table 7-26: Potential Operational Effects to Non-Passerine Target Species

Key Receptor (Sensitivity)	Indirect Effect (Displacement/Barrier effects)	Significance without Mitigation
Black-headed gull (Medium)	**Disturbance/Displacement:** Of a literature review, carried out by Percival (2003), all studies which indicated gull species being significantly affected or being a species found to have collided, were identified at wind farms on coastal habitats. It is uncertain that disturbance may affect gull species inland. Gulls will be more at risk from collision impacts as a result of their flight behaviour, but less sensitive to disturbance and displacement effects (Humphreys et al., 2015). Due to the limited amount of Black-headed gull activity detected during surveys, the effect magnitude remains low. **Barrier Effect:** Barrier effects on either migration or regular flights of Black-headed gull were identified in just three out of eight studies examined in Hötker et al., 2006. The overall barrier effect results were shown to be not significant. Due to the limited amount of Black-headed gull activity detected during surveys and reduced susceptibility to barrier effect the effect magnitude remains negligible.	**Disturbance/Displacement:** Magnitude of effect is assessed as **Low**, species sensitivity is **Medium**, and the overall effect significance is **Low** (Criteria: Percival, 2003). The significance of effects is also assessed as Long-term **Not Significant** (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Medium**, and the overall effect significance is **Very Low** (Criteria: Percival, 2003). Significance of effects to migrating birds in terms of energy expenditure assessed as Imperceptible to Slight. significance of daily barrier effect assessed as Imperceptible to Slight. overall significance considered a Long-term **Imperceptible-Slight** effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Indirect Effect (Displacement/Barrier effects)	Significance without Mitigation
Buzzard (Low)	**Disturbance/Displacement:** In a review of the published impacts of wind farms on Buzzard populations (Hötker et al., 2006), it was found that overall, impacts on Buzzard populations post-construction, across both winter and breeding seasons was not significant and that Buzzards do show habituation to the presence of wind farms (Hötker et al., 2006). It should also be noted that just one case of habituation is documented in this study with a second case showing signs of a lack of habituation. Considering this, in conjunction with the high amount of displacement habitats in the surrounding area, the magnitude of disturbance effect is assessed as Negligible. **Barrier Effect:** Barrier effects on either migration or regular flights of Buzzard has been shown at two out of six studies to date (2004) in a European context (Hötker et al., 2006). The overall barrier effect results were shown to be not significant.	**Disturbance/Displacement:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Low**, and the overall effect significance is **Very Low** (Criteria: Percival, 2003). The significance of effects is also assessed as Long-term **Imperceptible** (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Low**, and the overall effect significance is **Very Low** (Criteria: Percival, 2003). Significance of effects to migrating birds in terms of energy expenditure assessed as Imperceptible to Slight. Significance of daily barrier effect assessed as Imperceptible to Slight. overall significance considered a Long-term **Imperceptible-Slight** effect (Criteria: EPA, 2022).
Common Gull (Medium)	**Disturbance:** Of a literature review, carried out by Percival (2003), all studies which indicated gull species being significantly affected or being a species found to have collided, were identified at wind farms on costal habitats. It is uncertain that disturbance may impact gull species in-land. **Barrier Effect:** Species such as gulls will be more at risk from collision impacts as a result of their flight behaviour, but less sensitive to disturbance and displacement effects (Humphreys et al., 2015). For gull species such as Lesser Black-Backed, Herring and Greater Black-Backed Gull, some studies indicate evidence for attraction, whereas others for displacement, with the remainder indicating no significant response (Cook et al., 2014. Humphreys et al., 2015).	**Disturbance:** Magnitude of effects is assessed as **Low**. Species sensitivity is **Medium**, overall effect significance is **Low** (Criteria: Percival 2003). Magnitude Not Significant due to published habituation to wind farms. Overall significance considered Long-term **Not Significant** effect (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effects is assessed as Negligible (<1% habitat lost), species sensitivity is Medium, overall effect significance is **Very Low** (Criteria: Percival, 2003). Magnitude to migrating birds in terms of energy expenditure assessed as Imperceptible. magnitude of daily barrier effect assessed as Imperceptible. Overall significance considered an **Imperceptible** Long-term effect (Criteria: EPA, 2022).
Cormorant (Medium)	**Disturbance:** In a review of the published impacts of wind farms on birds (Hötker et al., 2006), there was no information available on Cormorant populations post-construction. The limited number of Cormorants observed flying over site suggests any impacts will be low. **Barrier Effect:** Barrier effects on either migration or regular flights of Cormorant has been shown for 2 out of 6 studies to date (2004) in a European context (Hötker et al., 2006), with the overall effect significance being non-significant. The limited number of Cormorants observed flying over site suggests any impacts will be low.	**Disturbance:** Magnitude of effects is assessed as **Low**. Species sensitivity is **Medium**, overall effect significance is **Low** (Criteria: Percival 2003). Overall significance considered Long-term **Not Significant** effect (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effects is assessed as **Negligible**, species sensitivity is **Medium**, overall effect significance is **Very Low** (Criteria: Percival, 2003). Magnitude to migrating birds in terms of energy expenditure assessed as Imperceptible. magnitude of daily barrier effect assessed as Imperceptible. Overall significance considered an **Imperceptible** Long-term effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Indirect Effect (Displacement/Barrier effects)	Significance without Mitigation
Golden Plover (Very High)	**Disturbance/Displacement**: Literature suggests differences in densities pre-and post-construction of wind farms is significant (Pearce-Higgins et al., 2012). displacement is not significant but may occur up to 400m (Sansom et al. 2016). Pearce-Higgins et al. (2009) recorded a reduced occurrence of Golden Plovers within 200m of turbines across 12 upland wind farms. However, Fielding and Haworth (2010) and Douglas et al. (2011) suggest that under some circumstances, Golden Plovers may be more tolerant of wind farm infrastructure. At Farr wind farm, Fielding and Haworth (2010) showed that the median distance of 16 Golden Plover nests to the nearest turbine was 168.8m, with nine nests being less than 200m and three less than 100m from the nearest turbine. At Beinn Tharsuinn wind farm, Douglas et al. (2011) found that the distribution of breeding Golden Plovers appeared to be unaffected by proximity to turbines or tracks, with no evidence for this lack of association changing through time Depending on the level of habituation to disturbance, a buffer zone of 200-500m is suggested in Goodship and Furness (2022) to protect nesting Golden Plover as well as foraging and roosting birds during the nonbreeding season from pedestrian disturbance. However, the proposed development is outside the established range of breeding golden plover in Ireland. While some golden plover flight activity overlapped the proposed development, the majority was located to the east, and ground-based golden plover observations were focused to the north-west of the proposed development. The observations of Golden Plover activity recorded during VP surveys confirm this species winters in the locality, but that activity is focused the north-east and south-east of the proposed development. As such, the predicted magnitude for disturbance is Negligible. **Barrier Effect:** High published avoidance rates of wind farms (Krijgsveld et al., 2009) and changes in densities within wind farms post construction (Pearce-Higgins et al., 2012), suggests wind farms act as significant barriers to Golden Plover. Considering the regular occurrence of Golden Plover flocks during the non-breeding season, there is potential for this species to be affected by barrier effect. However, since activity is focused primarily the north-east and south-east of the proposed development, the potential for barrier effect is diminished. Considering these factors, the predicted magnitude for barrier effect is Low.	**Disturbance/Displacement**: Magnitude of effect is assessed as **Negligible**, species sensitivity is **Very High**, and the overall effect significance is **Low** (Criteria: Percival, 2003). Due to the observed patterns of site utilisation by golden plover, disturbance/displacement affecting wintering and/or foraging habitat is assessed as a **Long-term Not Significant** effect (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Low**, species sensitivity is **Very High**, and the overall effect significance is **Medium** (Criteria: Percival, 2003). The significance of effects to migrating birds in terms of energy expenditure is assessed as Slight to Moderate, and the daily barrier effect is assessed as Moderate, based on literature indicating high published avoidance rates of wind farms. Overall, the significance of effect is considered a Long-term **Slight to Moderate** effect (Criteria: EPA, 2022).
Great black-backed gull (Low)	**Disturbance/Displacement:** Of a literature review, carried out by Percival (2003), all studies which indicated gull species being significantly affected or being a species found to have collided, were identified at wind farms on coastal habitats. It is uncertain that disturbance may affect gull species inland. Furthermore, in a review of the published impacts of wind farms on bird populations (Hötker et al., 2006), it was found that common gulls do show habituation to the presence of wind farms (Hötker et al., 2006). Gulls will be more at risk from collision	**Disturbance/Displacement:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Low**, and the overall effect significance is **Very Low** (Criteria: Percival, 2003). The overall significance of effect is considered to be a Long-term **Imperceptible** effect (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Low**, and the overall effect significance is **Very Low** (Criteria: Percival, 2003).

Key Receptor (Sensitivity)	Indirect Effect (Displacement/Barrier effects)	Significance without Mitigation
	impacts as a result of their flight behaviour, but less sensitive to disturbance and displacement effects (Humphreys et al., 2015). **Barrier Effect:** Information on barrier effects on either migration or regular flights of Great Black-backed Gull is limited. Lack of barrier effect has been shown in a single study to date (2004) in a European context (Hötker et al., 2006). At the level of gulls as a grouping, 14 out of 22 studies indicated a lack of a barrier effect.	The significance of effects to migrating birds in terms of energy expenditure and daily barrier effect is assessed as Imperceptible, and the overall significance is considered a Long-term **Imperceptible** effect (Criteria: EPA, 2022).
Greylag Goose (Medium)	**Disturbance/Displacement:** Due to the absence of records of this species using the proposed development or surrounding lands detected during surveys, effect magnitude remains negligible. **Barrier Effect:** Barrier effects on either migration or regular flights of Greylag Goose were identified in both studies examined in Hötker et al., 2006. Due to the extremely limited amount of Greylag Goose activity detected during surveys (only one record of an individual) the effect magnitude remains negligible.	**Disturbance/Displacement:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Medium**, and the overall effect significance is **Very Low** (Criteria: Percival, 2003). The significance of effects is also assessed as Long-term **Imperceptible** (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Medium**, and the overall effect significance is **Very Low** (Criteria: Percival, 2003). Significance of effects to migrating birds in terms of energy expenditure assessed as Imperceptible to Slight. Significance of daily barrier effect assessed as Imperceptible to Slight. Overall significance considered a Long-term **Imperceptible-Slight** effect (Criteria: EPA, 2022).
Grey Heron (Low)	**Disturbance/Displacement:** In a review of the published impacts of wind farms on birds (Hötker et al., 2006), they found that typically, birds of open habitats were avoiding turbines by several hundred metres. Grey Herons were an exception to this rule and were frequently found close to or within wind farm sites, suggesting habituation. **Barrier Effect:** Hötker et al., 2006 found evidence of a barrier effect in four out of seven cases, with the remaining three showing no barrier effect. Results were deemed not significant.	**Disturbance/Displacement:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Low**, and the overall effect significance is **Very Low** (Criteria: Percival, 2003). The significance of effects is considered Imperceptible, based on published evidence of habituation to wind farms, and the overall significance is assessed as a Long-term **Imperceptible** effect (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Low**, and the overall effect significance is **Very Low** (Criteria: Percival, 2003). The significance of the daily barrier effect is assessed as Imperceptible, and the overall significance is considered to be a Long-term **Imperceptible** effect (Criteria: EPA, 2022).
Hen Harrier (Very High)	**Disturbance/Displacement:** The area of potentially suitable winter roosting habitat for hen harrier to the norther of T4 which would remain following proposed peat deposition is located between 210-350m from the closest turbine i.e. T4. Considering the suggested buffer of 300-750m for pedestrian and aircraft disturbance noted in Goodship and Furness (2022), there is some potential for disturbance of hen harrier potentially using this area to arise from operational noise from T4. However, due to the highly infrequent/transient use of this area observed, in addition to the abundance of suitable displacement habitats in the locality and wider landscape, the magnitude of this disturbance to roosting hen harrier remains negligible.	**Disturbance/Displacement:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Very High**, and the overall effect significance is **Low** (Criteria: Percival, 2003). Overall significance is assessed as a **Long-term Not Significant** effect (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Very High**, and the overall effect significance is **Low** (Criteria: Percival, 2003). The significance of effects to birds in terms of energy expenditure is assessed as **Not Significant**, and the magnitude of the daily barrier effect is assessed as **Not Significant** to **Slight**. The overall significance is

Key Receptor (Sensitivity)	Indirect Effect (Displacement/Barrier effects)	Significance without Mitigation
	Noise disturbance/visual intrusion unlikely to deter foraging hen harrier as evidence suggests birds may continue to utilise wind farms post construction (Robinson et al., 2012). **Barrier Effect:** Although barrier effect has been documented in at least one study in the European context. recent evidence suggests that birds continue to use wind farms post construction (Whitfield and Madders, 2006) (Robinson et al., 2012) indicating wind farms may not be significant barriers.	considered a Long-term **Not Significant** effect (Criteria: EPA, 2022).
House Martin (Medium)	**Disturbance/Displacement**: Studies on the impact of wind farms during both construction (Pearce-Higgins et al., 2012) and operation (Pearce-Higgins et al., 2009) have found little evidence of significant disturbance effects on passerine species. Evidence suggests that flying insects are attracted to turbines (Long, et. al, 2011. Scholz & Voigt, 2021) which in turn, attracts insectivorous birds, especially hirundines and Swifts (Ahlén, 2002). This evidence further suggests that construction of wind farms, instead of disturbing birds, may in fact actually lure such bird species into the rotor sweep zone, thus significantly increasing collision risk. House martin activity was observed incidentally during VP surveys and was also noted during Breeding Bird Transects. The predicted magnitude for disturbance is Low. **Barrier Effect:** Hötker et al., 2006 found evidence of a barrier effect in house martin in two cases. However, as mentioned above, attraction of insects to turbines may further attract insectivorous bird species, which would reduce/preclude barrier effect. The predicted magnitude for barrier effect is Low.	**Disturbance/Displacement:** Magnitude of effect is assessed as **Low**, species sensitivity is **Medium**, and the overall effect significance is **Low** (Criteria: Percival, 2003). The overall significance is assessed as a Long-term **Imperceptible** effect (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Low**, species sensitivity is **Medium**, and the overall effect significance is **Low** (Criteria: Percival, 2003). The significance of effects to migrating birds in terms of energy expenditure and daily barrier effect is assessed as Imperceptible, and the overall significance is considered to be a Long-term **Imperceptible** effect (Criteria: EPA, 2022).
Kestrel (High)	**Disturbance/Displacement:** Disturbance (in terms of minimal distance to wind farm) has been recorded in 14 studies on wind farms in Europe (Hötker et al., 2006). Habituation to wind farms has been recorded in one case, however the only other case recorded the opposite (Hötker et al., 2006). A case study on the impacts of wind farms on birds conducted in southern Spain (Farfán et al., 2009), found that raptors utilise the space around the wind farm with lower frequency than prior to its existence, which represented a displacement of the home range of these species. In particular, Kestrel was noted to decline sharply in the second year of operation, with other raptor species showing a decline in the first year. Other studies found less evidence of displacement. Whitfield and Madders (2006) rated kestrel as having a 'low' sensitivity to displacement. The related American kestrel (Falco sparverius) was also given a rating of 'low' sensitivity. Pearce-Higgins et al. (2009) found equivocal evidence for weak avoidance of turbines by kestrel (quote below). 'Previous analyses for raptors have generally found only low levels of turbine avoidance (Hötker 2006.	**Disturbance/Displacement:** Magnitude of effect is assessed as **Medium**, species sensitivity is **High**, and the overall effect significance is **High** (Criteria: Percival, 2003). The significance of effects is considered Slight to Moderate, based on the equivocal evidence of disturbance noted in published cases and the occurrence of the majority of kestrel flight activity away from turbine locations. The overall significance is assessed as a Long-term **Slight** to **Moderate** effect (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Medium**, species sensitivity is **High**, and the overall effect significance is **High** (Criteria: Percival, 2003). The significance of effects in terms of energy expenditure is considered Moderate. The magnitude of the daily barrier effect is assessed as Slight, as published literature indicates low avoidance rates of wind farms due to habituation. Overall, the significance is assessed as a Long-term **Slight to Moderate** effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Indirect Effect (Displacement/Barrier effects)	Significance without Mitigation
	Hötker et al. 2006. Madders & Whitfield 2006), with some species, such as kestrels, known to continue foraging activity close to turbines and to be susceptible to collision (Barrios & Rodríguez 2004, 2007). We found hen harrier and buzzard showed reduced flight activity around turbines, with equivocal evidence for weak avoidance by kestrel, broadly reflecting the sensitivity of these species anticipated by Madders & Whitfield (2006). Raptors did not appear to alter their flight height in response to turbine proximity, at least at the gross scale examined.' **Barrier Effect:** Barrier effects have been shown to a degree in either migrating or regular kestrel flight paths within the European context (3 of 5 studies. Hötker et al., 2006).	
Lapwing (High)	**Displacement/Disturbance:** Disturbance (in terms of minimal distance to wind farm) has been recorded for lapwing in 13 studies (breeding season)/32 studies (non-breeding season) on wind farms in Europe. Habituation to wind farms has been recorded in three out of five cases (non-breeding season) and two out six cases (breeding season). The height of turbines was found to have a statistically significant relationship with distance from wind farms for non-breeding lapwing (distance from wind turbines increased with turbine height) (Hötker et al., 2006). Lapwing were recorded frequently during surveys. The majority of activity was located away from proposed turbine locations, with the highest activity levels associated with Esker Bog Rathlumber and agricultural fields to the north-east of T3. As such, considering the distribution of lapwing records, and location of potential breeding habitat away from the Proposed Development, the predicted magnitude for disturbance is Low. **Barrier Effect:** Barrier effects have been shown to a degree in either migrating or regular lapwing flight paths within the European context (5 of 6 studies. Hötker et al., 2006).	**Disturbance/Displacement:** Magnitude of effect is assessed as **Low**, species sensitivity is **High**, and the overall effect significance is **Low** (Criteria: Percival, 2003). The significance of effect is assessed as **Long-term** and **Not Significant** (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Medium**, species sensitivity is **High**, and the overall effect significance is **High** (Criteria: Percival, 2003). Based on the observed low proportion of lapwing flights traversing the proposed turbine locations, the realised barrier effect will be reduced. Significance of effects in terms of energy expenditure assessed as Moderate. magnitude of daily barrier effect assessed as Slight as literature suggests low published avoidance rates of wind farms with habituation. overall significance considered a **Slight** to **Moderate** Long-term effect (Criteria: EPA 2022).
Kingfisher (Very High)	**Disturbance:** In a review of the published impacts of wind farms on birds (Hötker et al., 2006), there was no information available on Kingfisher populations post-construction. The species was not recorded on-site, so any effects are likely to be negligible. **Barrier Effect:** Barrier effects on either migration or regular flights of Kingfisher has not been shown to date (2004) in a European context (Hötker et al., 2006). Kingfisher fly low when commuting and mainly follow watercourses, making it unlikely that turbines would represent a barrier to movement.	**Disturbance:** Magnitude of effects is assessed as **Negligible**. Species sensitivity is **Very High**, overall effect significance is **Low** (Criteria: Percival 2003). The significance of effects is considered Long-term and **Imperceptible** (Criteria: EPA, 2022). **Barrier Effect:** Magnitude to commuting birds in terms of energy expenditure assessed as Imperceptible. magnitude of daily barrier effect assessed as Imperceptible. overall significance considered an **Imperceptible** Long-term Impact (Criteria: EPA 2022).
Lesser Black-backed gull (Medium)	**Disturbance/Displacement:** Of a literature review, carried out by Percival (2003), all studies which indicated gull species being significantly affected or being a species found to have collided, were identified at wind farms on coastal habitats. It is uncertain that disturbance may affect gull species inland. Gulls will be more at risk from collision impacts as a result of their flight behaviour, but less sensitive to	**Disturbance/Displacement:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Medium**, and the overall effect significance is **Very Low** (Criteria: Percival, 2003). Significance of effects is assessed as a **Long-term Imperceptible** effect (Criteria: EPA, 2022). **Barrier Effect:**

Key Receptor (Sensitivity)	Indirect Effect (Displacement/Barrier effects)	Significance without Mitigation
	disturbance and displacement effects (Humphreys et al., 2015). **Barrier Effect:** For gull species such as Lesser Black-backed, Herring and Great Black-backed, some studies indicate evidence for attraction, whereas others for displacement, with the remainder indicating no significant response (Cook et al., 2014. Humphreys et al., 2015).	Magnitude of effect is assessed as **Negligible**, species sensitivity is **Medium**, and the overall effect significance is **Very Low** (Criteria: Percival, 2003). Significance of effects to migrating birds in terms of energy expenditure assessed as Imperceptible. Significance of daily barrier effect assessed as Imperceptible. Overall significance considered a **Long-term Imperceptible** effect (Criteria: EPA, 2022).
Little egret (Very High)	**Disturbance/Displacement:** Little egret is a member of the heron genus (Ardea) and as such will have similar characteristics and sensitivities to grey heron. A review of the published impacts of wind farms on birds (Hötker et al., 2006) found that typically, birds of open habitats were avoiding turbines by several hundred metres. Grey Herons were an exception to this rule and were frequently found close to or within wind farm sites, suggesting habituation. Considering the close genetic, ecological and behavioural relationships between grey heron and little egret, this tendency towards habituation is similarly applicable for little egret. **Barrier Effect:** Hötker et al., 2006 found evidence of a barrier effect for grey heron (also applicable to little egret) in four out of seven cases, with the remaining three showing no barrier effect. Results were deemed not significant.	**Disturbance/Displacement:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Very High**, and the overall effect significance is **Low** (Criteria: Percival, 2003). Significance of effects **Imperceptible** due to published evidence of habituation of herons to wind farms. overall significance considered **Long-term Imperceptible** effect (Criteria: EPA 2022). **Barrier Effect:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Very High**, and the overall effect significance is **Low** (Criteria: Percival, 2003). Significance of daily barrier effect assessed as Imperceptible. Overall significance considered to be a **Long-term Imperceptible** effect (Criteria: EPA 2022).
Little Grebe (Low)	**Disturbance/Displacement:** There is no suitable habitat for little grebe within the proposed development site. There is limited potential for small numbers of this species to use bog pools in the cutover bogs to the east and west of the proposed development. **Barrier Effect:** There was just one little grebe record across all flight activity surveys, indicating this species does not habitually or frequently traverse the proposed development. As such, potential for barrier effects remains negligible.	**Disturbance:** Magnitude of effects is assessed as **Low**. Species sensitivity is **Low**, overall effect significance is **Very Low** (Criteria: Percival 2003). The significance of effects is considered Long-term and **Imperceptible** (Criteria: EPA, 2022). **Barrier Effect:** Magnitude to commuting birds in terms of energy expenditure assessed as Imperceptible. magnitude of daily barrier effect assessed as Imperceptible. overall significance considered an **Long-term Imperceptible** Impact (Criteria: EPA 2022).
Mallard (Medium)	**Disturbance/Displacement:** In a review of the published effects of wind farms on Mallard populations (Hötker et al. 2006), it was found that habituation to wind farms occurred across both winter and breeding seasons. **Barrier Effect:** Barrier effects on either migration or regular flights of Mallard have been shown for three out of five studies in a European context (Hötker et al. 2006). The overall barrier effect was not shown to be significant.	**Disturbance:** Magnitude of effect is assessed as **Medium**, species sensitivity is **Medium**, and the overall effect significance is **Low** (Criteria: Percival, 2003). The significance of effects is considered **Long-term** and **Not Significant** (Criteria: EPA, 2017). **Barrier Effect:** Magnitude of effect is assessed as **Low** , species sensitivity is **Medium**, and the overall effect significance is **Low** (Criteria: Percival, 2003). The significance of effects is considered **Long-term** and **Not Significant** (Criteria: EPA, 2022).
Merlin (Very High)	**Disturbance/Displacement:** Merlin were observed infrequently during surveys, with two observations during winter 2021-22 VP surveys, and two observations during winter 2023-24. This species was not recorded during any other surveys. Considering the observed low usage of the site by	**Disturbance/Displacement:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Very High**, and the overall effect significance is **Low** (Criteria: Percival, 2003).

Key Receptor (Sensitivity)	Indirect Effect (Displacement/Barrier effects)	Significance without Mitigation
	merlin, the predicted magnitude of disturbance/displacement is Negligible. **Barrier Effect:** Hötker et al., 2006 found evidence of a barrier effect for merlin in a single study.	Significance of effects Not Significant due to low number of sightings (four in total) during the total survey period. Overall significance considered as **Long-term Not Significant** effect (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Very High**, and the overall effect significance is **Low** (Criteria: Percival, 2003). Significance of effects to birds in terms of energy expenditure assessed as Not Significant. magnitude of daily barrier effect assessed as Not Significant. overall significance considered Long-term **Not Significant** effect (Criteria: EPA, 2022).
Mute Swan (Medium)	**Disturbance/Displacement:** Possible disturbance from feeding areas during wintering period (Oct-March) dependant on availability of food resources (e.g. improved agricultural grassland/stubble). Literature suggests possible short-term displacement of 200- 400m (Fijn et al., 2012) (Rees, 2012) followed by habituation (Fijn et al., 2012) with little evidence of permanent post construction displacement (Rees, 2012). This species was not recorded feeding within the flight activity or transect surveys study area. **Barrier Effect:** There are two types of barrier effect; those to migrating birds along migration routes and daily barrier effects due to placement of turbines between feeding and roosting sites. Barrier effect can be related to perceived collision risk (SNH, 2014). Barrier effects along migration routes of wildfowl have been shown to cause only small effects on total migration distance (Masden, 2009). Swans have been shown to exhibit horizontal avoidance as they fly past the outer edge of wind farms (Fijn et al., 2012) and distances of up to 200m have been noted for whooper swans (Rees, 2012). In the Netherlands, Bewicks Swans have been recorded adjusting their flight paths to the presence of turbines during both light and darkness, with no large deflections or panic reactions recorded and birds were recorded flying around and between rows of turbines (Fijn et al., 2012). Distances between turbines at the referenced site (300-400m) (Fijn et al., 2012) are lower than those at Ballinla (500 – 700m). In relation to nocturnal flight activity, recent studies utilising radar on both offshore and coastal wind farms in Europe have recorded macro-avoidance rates in wildfowl at least as high, or higher at night than during the day, implying that diurnal macro-avoidance rates are comparable to those in periods of lower visibility (Desholm, and Kahlert, 2005).	**Disturbance:** Magnitude of effects is assessed as **Low,** reducing to **Negligible** with habituation. Species sensitivity is **Medium**, overall effect significance is **Low** (Criteria: Percival 2003). Considering the limited occurrence of mute swan within the study area and habituation, significance of effects is considered **Long-term Not significant** reducing to **Long-term Imperceptible** with habituation (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Medium**, and the overall effect significance is **Very Low** (Criteria: Percival, 2003). Magnitude to commuting birds in terms of energy expenditure assessed as Imperceptible. magnitude of daily barrier effect assessed as Imperceptible. overall significance considered an **Imperceptible Long-term** Impact (Criteria: EPA 2022).
Peregrine (Very High)	**Disturbance/Displacement:** Possible disturbance to foraging birds through noise, visual intrusion. No displacement from breeding sites is likely due to none being recorded within the proposed site boundary or surrounding locality. Peregrine are known to nest in urban areas often in cathedrals with	**Disturbance/Displacement:** Magnitude of effect is assessed as **Negligible**, species sensitivity is Very High, and the overall effect significance is **Low** (Criteria: Percival, 2003). Significance of effects Not Significant due to absence of breeding sites within or near the proposed site

Key Receptor (Sensitivity)	Indirect Effect (Displacement/Barrier effects)	Significance without Mitigation
	loud ringing bells, as well as quarries where regular rock-breaking works are undertaken. For example, Moore et al. (1997), estimated that 65 quarries were occupied in Ireland between 1991 and 1993. Thus there is evidence to suggest that the species is tolerant of noise and human activity. **Barrier Effect:** Hötker et al., 2006 report one case of barrier effect in Peregrines. Barrier effects on either migration or regular flights of Peregrine has not been shown to date in a European context (Hötker et al., 2006). Observed flight path distribution, in addition to the large distance between proposed turbines mean the wind farm is unlikely to act as a significant barrier to a high-flying and far-ranging species such as Peregrine.	and evidence suggesting tolerance to noisy human activities. Overall significance considered **Long-term Not Significant** effect (Criteria: EPA 2022). **Barrier Effect:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Very High**, and the overall effect significance is **Low** (Criteria: Percival, 2003). Significance of effects to migrating birds in terms of energy expenditure assessed as Not Significant. significance of daily barrier effect assessed as Not Significant. overall significance considered to be a **Long-term Not Significant** effect (Criteria: EPA, 2022)
Sand Martin (Medium)	**Disturbance/Displacement:** Studies on the impact of wind farms during both construction (Pearce-Higgins et al., 2012) and operation (Pearce-Higgins et al., 2009) have found little evidence of significant disturbance effects on passerine species. Evidence suggests that flying insects are attracted to turbines (Long, et. al, 2011. Scholz & Voigt, 2021) which in turn, attracts insectivorous birds, especially hirundines and Swifts (Ahlén, 2002). This evidence further suggests that construction of wind farms, instead of disturbing birds, may in fact actually lure such bird species into the rotor sweep zone, thus significantly increasing collision risk. **Barrier Effect:** Hötker et al., 2006 did not include any studies on sand martin, but did review studies on the closely related species house martin, which found evidence of a barrier effect in in two cases. However, as noted above, attraction of insects to turbines may further attract insectivorous bird species, which would reduce/preclude barrier effect. The predicted magnitude for barrier effect is Low.	**Disturbance/Displacement:** Magnitude of effect is assessed as Low, species sensitivity is Medium, and the overall effect significance is **Low** (Criteria: Percival, 2003). Significance considered **Long-term Imperceptible** effect (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Low**, species sensitivity is **Medium**, and the overall effect significance is **Low** (Criteria: Percival, 2003). Significance of effects to migrating birds in terms of energy expenditure assessed as Imperceptible. Significance of daily barrier effect assessed as Imperceptible. Overall significance considered to be a **Long-term Imperceptible** effect (Criteria: EPA, 2022).
Short-eared Owl (Very High)	**Disturbance/Displacement:** A review of the published impacts of wind farms on birds (Hötker et al., 2006) did not note any studies which identified operational disturbance or displacement effects for short-eared owl. A study examining barn owl breeding success has shown no declines in areas of high disturbance levels in the UK, such as near military activity (Shawyer, 2011). It is unlikely that noise from turbines would significantly affect the foraging activites of wintering short-eared owl. **Barrier Effect:** Given the low population/activity levels indicated by surveys in addition to the limited size of the overall wintering population, avoidance of the proposed wind farm is unlikely to induce significant energetic expenditure on either flight daily patterns of birds or birds undertaking longer journeys such as migration. It is also noted the turbine layout features large gaps (minimum of 500m) between individual turbines, avoiding a 'wall' or barrier effect.	**Disturbance/Displacement:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Very High**, and the overall effect significance is **Low** (Criteria: Percival, 2003). Overall significance considered to be a **Long-term Not significant** effect (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Very High**, and the overall effect significance is **Low** (Criteria: Percival, 2003). Overall significance considered to be a **Long-term Not significant** effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Indirect Effect (Displacement/Barrier effects)	Significance without Mitigation
Sparrowhawk (Low)	**Disturbance/Displacement:** In a review of the published impacts of wind farms on Sparrowhawk populations (Hötker et al., 2006), it was found that overall, effects on Sparrowhawk populations post-construction, across both winter and breeding season was not significant. Sparrowhawk do show habituation to the presence of wind farms (Hötker et al., 2006). Breeding was not proven although the regular occurrence of sparrowhawk indicates that this species likely breeds locally outside the site. The predicted magnitude for disturbance is Negligible **Barrier Effect:** Sparrowhawk is considered to be less sensitive or less willing to change their original migration direction when approaching wind farms (Hötker et al., 2006). Three cases of no barrier effect are reported by Hötker et al., 2006, with one case of barrier effect. The predicted magnitude for barrier effect is Negligible	**Disturbance/Displacement:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Low**, and the overall effect significance is **Very Low** (Criteria: Percival, 2003). Overall significance considered to be a Long-term **Imperceptible** effect (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **Low**, and the overall effect significance is **Very Low** (Criteria: Percival, 2003). Overall significance considered to be a **Long-term Imperceptible** effect (Criteria: EPA, 2022).
Snipe (High)	**Disturbance/Displacement:** Literature suggests differences in densities pre- and post-construction of wind farms has a significant impact upon Snipe within an area (Pearce-Higgins et al., 2012). Snipe were also shown by Pearce-Higgins et al. (2009) to use areas of habitat within 400m of turbines less than expected, leading to an expected 48% decline in abundance within 500m of the turbines. The presence of snipe including records of breeding behaviours were recorded in peatland habitats including areas within 500m of proposed turbines. The predicted magnitude for disturbance is Medium. **Barrier Effect:** Recorded infrequent activity contains low level of flight activity within the 500m turbine buffer. The Proposed Wind Farm is unlikely to act as a significant barrier to a species such as Snipe. The predicted magnitude for barrier effect is Negligible.	**Disturbance/Displacement:** Magnitude of effect is assessed as **Medium**, species sensitivity is **High**, and the overall effect significance is **High** (Criteria: Percival, 2003). Due to the low number of records within the 500m buffer, in addition to abundant displacement habitat in the locality, overall significance considered a **Long-term Moderate** effect (Criteria: EPA 2022). **Barrier Effect:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **High**, and the overall effect significance is **Very Low** (Criteria: Percival, 2003). Overall significance considered to be a **Long-term Imperceptible** effect (Criteria: EPA, 2022).
Stock Dove (High)	**Disturbance/Displacement:** A review of the published impacts of wind farms on birds (Hötker et al., 2006) did not note any disturbance/displacement effects applicable to stock dove. Stock dove breed in lowland agricultural landscapes in the east and south of Ireland, utilising tree holes for nesting (Birdwatch Ireland, 2025d). No potential nesting features were identified within or near the Proposed Development during surveys. In the event of a nesting site occurring (outside) near the Proposed Wind Farm, there is limited potential for disturbance to occur. **Barrier Effect:** Hötker et al., 2006 found evidence of a barrier effect for stock dove in two studies.	**Disturbance/Displacement:** Magnitude of effect is assessed as **Low**, species sensitivity is **High**, and the overall effect significance is **Low** (Criteria: Percival, 2003). Overall significance considered to be a Long-term **Not significant** effect (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **High**, and the overall effect significance is **Very Low** (Criteria: Percival, 2003). Overall significance considered to be a Long-term **Imperceptible** effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Indirect Effect (Displacement/Barrier effects)	Significance without Mitigation
Swallow (Medium)	**Disturbance/Displacement:** Studies on the impact of wind farms during both construction (Pearce-Higgins et al., 2012) and operation (Pearce-Higgins et al., 2009) have found little evidence of significant disturbance effects on passerine species. Evidence suggests that flying insects are attracted to turbines (Long, et. al, 2011. Scholz & Voigt, 2021) which in turn, attracts insectivorous birds, especially hirundines and Swifts (Ahlén, 2002). This evidence further suggests that construction of wind farms, instead of disturbing birds, may in fact actually lure such bird species into the rotor sweep zone, thus significantly increasing collision risk. Swallow (amber listed) were recorded on the wing during breeding bird transect surveys and also during VP surveys, with individuals, pairs and flocks of 21 (observed over transect 2 near T1-T3) and 80 (feeding over bog outside wind farm) noted. There is no nesting habitat within or in close proximity to the Proposed Wind Farm. The predicted magnitude for disturbance is Low. **Barrier Effect:** Hötker et al., 2006 found evidence of a barrier effect for swallow in four cases. However, as mentioned above, attraction of insects to turbines may further attract insectivorous bird species, which would reduce/preclude barrier effect. The predicted magnitude for barrier effect is Low.	**Disturbance/Displacement:** Magnitude of effect is assessed as Low, species sensitivity is Medium, and the overall effect significance is **Low** (Criteria: Percival, 2003). Significance considered **Long-term Imperceptible** effect (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Low**, species sensitivity is **Medium**, and the overall effect significance is **Low** (Criteria: Percival, 2003). Significance of effects to migrating birds in terms of energy expenditure assessed as Imperceptible. Significance of daily barrier effect assessed as Imperceptible. Overall significance considered to be a **Long-term Imperceptible** effect (Criteria: EPA, 2022).
Swift (High)	**Disturbance/Displacement:** Evidence suggests that flying insects are attracted to turbines (Long, et. al, 2011. Scholz & Voigt, 2021) which in turn, attracts insectivorous birds, especially hirundines and Swifts (Ahlén, 2002). This evidence further suggests that construction of wind farms, instead of disturbing birds, may in fact actually lure such bird species into the rotor sweep zone, thus significantly increasing collision risk. Swift activity observed during surveys was limited, with four records at VP1, three records at VP2 and three at VP4. There is no swift nesting habitat within or in close proximity to the Proposed Wind Farm. The predicted magnitude for disturbance is Low. **Barrier Effect:** Hötker et al., 2006 found evidence of a barrier effect in Swift in two cases. However, as mentioned above, attraction of insects to turbines may further attract insectivorous bird species, which would reduce/preclude barrier effect. The predicted magnitude for barrier effect is Low	**Disturbance/Displacement:** Magnitude of effect is assessed as **Low**, species sensitivity is **High**, and the overall effect significance is **Low** (Criteria: Percival, 2003). Significance considered **Long-term Not significant** effect (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Low**, species sensitivity is **Medium**, and the overall effect significance is **Low** (Criteria: Percival, 2003). Significance of effects to migrating birds in terms of energy expenditure assessed as Imperceptible. Significance of daily barrier effect assessed as Imperceptible. Overall significance considered to be a **Long-term Not significant** effect (Criteria: EPA, 2022).
Whooper swan (Very High)	**Disturbance/Displacement:** Possible disturbance from feeding areas during wintering period (Oct-March) where suitable food resources are available (e.g. improved agricultural grassland/stubble). Literature suggests possible short-term displacement of 200- 400m (Fijn et al., 2012) (Rees, 2012) followed by habituation (Fijn et al., 2012) with little evidence of permanent post construction displacement (Rees, 2012).	**Disturbance/Displacement:** Magnitude of effect is assessed as **Low**, species sensitivity is **Very High**, and the overall effect significance is **Medium**, reducing to **Low** with habituation (Criteria: Percival, 2003). Significance considered **Long-term Not Significant** to **Slight** effect due to absence of regular grazing or roosting sites, in addition to habituation (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Indirect Effect (Displacement/Barrier effects)	Significance without Mitigation
	Considering that just two incidents of casual use of agricultural land at the proposed development by grazing whooper swans were observed across all surveys, it is assessed that there are no habitual whooper swan grazing sites within or in close proximity to the proposed development which could be disturbed due to operation of turbines. Considering this in conjunction with the potential for short-term displacement noted above, in addition to an abundance of suitable habitat in the local area, potential effects remains low prior to habituation. **Barrier Effect:** There are two types of barrier effect; those to migrating birds along migration routes and daily barrier effects due to placement of turbines between feeding and roosting sites. Barrier effect can be related to perceived collision risk (SNH, 2014). Barrier effects along migration routes of wildfowl have been shown to cause only small effects on total migration distance (Masden, 2009). Swans have been shown to exhibit horizontal avoidance as they fly past the outer edge of wind farms (Fijn et al., 2012) and distances of up to 200m have been noted for whooper swans (Rees, 2012). In the Netherlands, Bewicks Swans have been recorded adjusting their flight paths to the presence of turbines during both light and darkness, with no large deflections or panic reactions recorded and birds were recorded flying around and between rows of turbines (Fijn et al., 2012). Distances between turbines at the referenced site (300-400m) (Fijn et al., 2012) are lower than those at Ballinla (500 – 700m). In relation to nocturnal flight activity, recent studies utilising radar on both offshore and coastal wind farms in Europe have recorded macro-avoidance rates in wildfowl at least as high, or higher at night than during the day, implying that diurnal macro-avoidance rates are comparable to those in periods of lower visibility (Desholm, and Kahlert, 2005).	**Barrier Effect:** Magnitude of effect is assessed as **Low**, species sensitivity is **Very High**, and the overall effect significance is **Medium** (Criteria: Percival, 2003). Significance of effects to migrating birds in terms of energy expenditure assessed as Not significant. Significance of daily barrier effect assessed as **Not significant** to **Slight**. Overall significance considered to be a **Long-term Not significant** to **Slight** effect (Criteria: EPA, 2022).
Woodcock (High)	**Disturbance/Displacement**: There is potential for displacement arising from habitat alteration (turbine felling buffers) and from disturbance caused by operational turbines, and to a lesser extent occasional human presence associated with maintenance activities. A study of the impacts of wind turbines on woodcock undertaken in Kilkenny (Gittings, 2019) indicated that 'a displacement effect may occur within 250m of wind turbines, although there are confounding factors that affect the interpretation of the results. The surveys did not find any evidence of a displacement effect extending over the 250-500m distance band'. The potential displacement within the 0-250m distance band is in line with the results of a similar study carried out in Germany (Dorka et al., 2014). Based on observed woodcock breeding display behaviour, the potential for this species to nest within 250m of the proposed T4 location must be considered. The potential for intra-species audibility of roding calls to be affected by noise from operational turbines must also be considered.	**Disturbance/Displacement:** Magnitude of effect is assessed as **Low**, species sensitivity is **High**, and the overall effect significance is **Low** (Criteria: Percival, 2003). Significance considered a Long-term **Not Significant** effect (Criteria: EPA, 2022). **Barrier Effect:** Magnitude of effect is assessed as **Negligible**, species sensitivity is **High**, and the overall effect significance is **Very Low** (Criteria: Percival, 2003). Significance of effects to migrating birds in terms of energy expenditure assessed as Imperceptible. Significance of daily barrier effect assessed as Imperceptible. Overall significance considered to be a Long-term **Imperceptible** effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Indirect Effect (Displacement/Barrier effects)	Significance without Mitigation
	While displacement of nesting and roding birds could occur closer to proposed turbines located in wooded habitats, the availability of abundant displacement habitat in the local area reduces the magnitude of these effects. Disturbance/displacement of breeding birds at construction stage are of higher concern than operational disturbance/displacement. As such, a Low magnitude effect is predicted in this regard. **Barrier Effect:** Home ranges are small with birds recorded flying up to 1km from nests sites to forage (Hoodless and Hirons 2007). No published evidence of barrier effect to migrating birds is available (Hötker et al., 2006).	

7.5.4.4 Grid Connection & TDR

The Proposed Grid Connection and TDR will not give rise to operational effects since the grid connection cable will be buried underground and the TDR junctions will be reinstated. As such, operational phase collision, disturbance/displacement and barrier effects for avifauna will be Long-term Imperceptible.

7.5.5 Decommissioning Phase

The decommissioning phase of the Proposed Development poses similar risks to potential effects during the construction phase. There will be no additional habitat loss during the decommissioning phase. The magnitude and significance of disturbance are similar for each species as above for the construction phase in Table 7-24.

7.5.6 Cumulative Effects

Direct effects on avifauna during construction are primarily land-take related, mainly due to the loss of nesting habitats to key species. Other sources of land-take as outlined above, do have the potential for cumulative effects on nesting or resident farmland or woodland species (the typical landscape characters). Species such as robin may be affected cumulatively by further loss of hedgerows due to farming practices, etc. Even though cumulative land take is unlikely to result in range loss of any species which frequent the subject site, mitigation may be required to neutralise the effect of the Proposed Development.

Disturbance or effective habitat loss (indirectly caused by disturbance) is more difficult to quantify, especially as most species of birds may habituate to disturbance over time.

Direct effects on avifauna during operation which may be cumulatively added to by other existing pressures or Proposed Developments include collision related mortality, ongoing disturbance/displacement, and barrier effect. Flight height, or the flight heights which birds habitually use along either migration or local flight paths, is an influencing factor in determining whether the Proposed Development will combine with additional wind farms to produce additive, synergistic or antagonistic effects. These effects include increased Barrier Effect (potentially obstructing migratory flightpaths), increased collision risk (through combined mortality in susceptible species) and increased disturbance to birds utilising foraging grounds whilst on migration.

Direct and indirect cumulative effects were assessed as per Nature Scot guidance (SNH, 2012) which considers the following types of cumulative effects:

- *Additive:* a multiple independent additive model.
- *Antagonistic:* the sum of impacts are less that in a multiple independent additive model.
- *Synergistic*: the cumulative impact is greater than the sum of the multiple individual effects.

As part of this assessment, other offsite developments and proposed offsite developments were reviewed and considered for possible cumulative effects with the Proposed Development. These potential cumulative effects are considered below in terms of potential interactions with plans, projects and ongoing land-use activities.

7.5.6.1 Plans

The Proposed Grid Connection for the Proposed Development and Proposed TDR has also been assessed as part of this EIA and is therefore not considered cumulatively.

The Proposed Development was considered in combination with other plans and projects that could result in cumulative effects including:

- Offaly County Wind Energy Strategy (2021 - 2027).
- Offaly County Development Plan 2021-2027.

Any development under these plans will firstly have to be consented under planning and development legislation. Significant cumulative impacts are not predicted with the plans listed above, as each plan has a range of environmental and natural heritage policy safeguards in place. Furthermore, this Proposed Development has been developed in view of achieving the objectives of these plans. Therefore, development of the Proposed Development in combination with the scope of works required to achieve the objectives of these plans will not result in cumulative effects. In terms of the Proposed Development, the zoning in the development plans relates to wind energy development and there is no other contradictory zoning for other project types or infrastructure. In terms of the Offaly County WES, the area where the Proposed Development is to be located is deemed 'Open for consideration for Wind Energy development' in principle.

7.5.6.2 Ongoing Activities

7.5.6.2.1 Forestry

Poorly managed and inappropriately sited forest operations can negatively impact on water quality and aquatic habitats and species. The most common water quality problems arising from forestry relate to the release of sediment and nutrients and the impacts from acidification. Forestry may also give rise to changes in stream flow regimes caused by associated land drainage. In terms of the replacement forestry lands, there is no potential for significant cumulative effects associated with the site and forestry operations. The Applicant commits that the location of any replanting (alternative afforestation) associated with the Proposed Development will be at a distance so as to not create any potential cumulative effect and also outside any potential pathways of connectivity with the Proposed Development. This will ensure that there is no potential cumulative effect associated with this replanting. In addition, the Applicant commits to not commencing the Proposed Development until both felling and afforestation licences are in place and this ensures the afforested lands are identified, assessed and licensed appropriately by the relevant consenting authority.

Forestry operations within the planning boundary (apart from the operations required for the development) will also cease and will resume again post commissioning of the wind farm.

There is potential for the Proposed Development to contribute to a cumulative impact on water quality in local watercourses without the implementation of appropriate mitigations, within the site via increased sedimentation entering watercourses as a result of felling to accommodate new access tracks and construction activities in addition to ongoing forestry operations, and where they occur in proximity to watercourses. The Proposed Development is assessed as potentially having a likely, short-term, slight negative cumulative effect on water quality in relation to forestry without the implementation of appropriate mitigation measures.

7.5.6.2.2 Agriculture

Land management practices in the wider area which are considered in combination with the effects of the Proposed Development are agriculture and forestry. It is proposed that all agricultural activities within the planning boundary will cease for the duration of the construction and commissioning phase. Agricultural activities within the wider Study Area will continue and will be separated from construction activities by appropriate stock proof fencing.

Agriculture has been identified as a pressure for waterbodies in the Figile sub-catchment, including those located downstream of the Proposed Development. Agriculture in this subcatchment can produce elevated levels of sediment as well as diffuse phosphorus entering freshwater waterbodies.

Excess phosphorus is a key concern to surface waterbodies. Diffuse phosphorus losses from agriculture are particularly difficult to manage as the sources do not occur uniformly in the landscape, but from 'hot spots', or critical source areas where runoff pathways connect phosphorus sources to rivers and streams. It takes only very small amounts of phosphorus to be lost, relative to the amounts used in agriculture, to cause a water quality problem. Cattle in the area may use watercourses as a source of water for drinking or as a crossing point during drier conditions. Unrestricted access of cattle to watercourses can potentially result in increases in the levels of organic nutrients found in surface waters and can alter habitats as a result of access and impact water quality by way of faecal contamination.

The Proposed Development is assessed as having likely, short-term, moderate negative cumulative effect on water quality in combination with the surrounding agriculture in the environs, without mitigation measures. In the absence of suitable mitigation measures with regards to protection of water quality during the lifetime of the Proposed Development , but in particular during the construction phase, there is potential for significant cumulative water quality effects as a result of the proposal in-combination with agricultural activity in the surrounding area. However, the implementation of water quality mitigation measures and other measures designed to protect surface waters as detailed in Section 6.5.2 will prevent significant effects arising as a result of the proposal and therefore, significant cumulative effects in-combination with agriculture are not likely to occur.

7.5.6.3 Development

The material for the cumulative assessment was gathered through a search of relevant County Councils' Online Planning Registers, the ACPs website and the EIA Portal. A review of applications for the preceding 5 years was carried out during the EIA process. The search focused on the townlands common to the proposed development area. All other wind farm developments were considered within 15km of the site for cumulative impact on biodiversity. Finally, recent planning applications that are pending a decision from the planning authority, which were accompanied by an EIAR, were also considered. The projects in the surrounding areas mostly relate to small scale development including agricultural sheds and shed extensions, dwelling houses, and extensions to dwelling houses, attic conversions, domestic wastewater treatment systems, installation of photovoltaic for domestic purposes, garages, demolitions, and retention permission applications etc.

Such minor domestic and agricultural development will not introduce cumulative effects. These minor projects are either under the threshold for EIA or excluded from the list of projects requiring EIA and due to the nature and scale of these applications would not introduce complex or significant issues. Therefore, they are not considered in the cumulative assessment. The most relevant applications relate to the expansion of Ballinla Farm within the subject site. The remaining developments are ancillary applications for the nearby wind farms or Edenderry Power Station.

7.5.6.3.1 Proposed Solar Farm Developments

In assessing the cumulative impacts of the Proposed Development on bird populations, consideration has been given to other permitted renewable energy projects in the wider area. The two nearest proposed solar farms are:

- Kilcush Solar Farm (21/598) – c. 117.47 hectares to include PV panels mounted on metal frames, 22 No. MV power stations (Permitted by OCC but not yet constructed)
- Obton Limited Oldcourt Solar Farm (22/327) – c. 121.55 hectares of solar panels on ground mounted frames and other ancillary works (Permitted by Kildare County Council)

Both solar farms are situated on improved agricultural land and are expected to retain low-intensity grazing as part of their operational land management. These sites are geographically separated from the Proposed Wind Farm and do not overlap with key ornithological features or known flight paths of sensitive bird species.

Solar farms, once operational, typically generate minimal disturbance and pose no collision risk to birds. However, they can contribute to habitat modification, particularly for species that rely on open farmland or semi-natural grasslands. In contrast, wind farms may present a risk of disturbance, displacement, or collision for certain bird species, particularly those that use the airspace at rotor height.

Kilcush Solar farm is located approximately 7km south of the Proposed Development while Oldcourt is located approximately 10km east. The spatial separation between the developments reduces the likelihood of overlapping impacts on bird populations. Furthermore, the solar farms are located on land of low ornithological value and are not expected to significantly alter bird usage of the wider landscape. As a result, the cumulative effect of the Proposed Development and the nearby solar farms on avifauna is considered to be long-term and imperceptible.

7.5.6.3.2 Other Wind Farm Development

A search was undertaken within 25km of the Proposed Development to assess other wind farm developments in the area as noted in Table 7-27. The use of a 25 km search area is informed by the upper extent of the foraging ranges of wintering greylag (15-20 km) and barnacle goose (maximum 25 km) (SNH, 2016).

Table 7-27: Wind Energy Applications within 25km of the Proposed Development

Wind Farm	Number of Turbines	Distance to Closest Turbine and Direction from Proposed Development	Status
Ballivor	26	21.3 km NE	Consented
Cushaling	9	6.4 km E	Under Construction
Cloncreen	21	2.2km SE	Operational
Drehid	11	17.4 km E	In Planning
Dernacart	8	20.1 km SW	Consented
Moanvane	12	11.5 km SW	Operational
Mount Lucas	28	4.1km SW	Operational

Yellow River	29	4.2 km NW	Operational
Clonarrow Windfarm	4	6.3 km SW	FI requested 17/07/2025

7.5.6.3.2.1 Ballivor Wind Farm

The site of the Proposed Ballivor wind farm is located on Ballivor Bog, Carranstown Bog, Bracklin Bog, Lisclogher Bog and agricultural land adjacent to Bracklin Bog in the east of County Westmeath and the west of County Meath. The application site encompasses an area of approximately 1,170ha and 26 turbines. The NIS prepared by MKO Planning and Environmental Consultants (2024), was accessed via An Coimisiún Pleanála and reviewed.

7.5.6.3.2.2 Cushaling Wind Farm

The overall Cushaling windfarm site has a stated area of 63.9ha. The windfarm site comprises a mix of habitat types including cutover bog, wet grassland, improved agricultural grassland and conifer plantation with a pocket of bog woodland along the western extent of the site with a strip between proposed turbines T7 and T8. Ornithological surveys were carried out over 2 years. Golden Plover, Whooper Swan, Hen Harrier, Peregrine Falcon, Merlin, Great White Egret, Kingfisher, Lapwing, Woodcock, Long-eared Owl, Buzzard, Kestrel, Sparrowhawk, Snipe and Meadow Pipit were observed. The site was classified as being of conservation value for the bird populations which use it.

7.5.6.3.2.3 Cloncreen Wind Farm

The potential for the Proposed Development to result in cumulative effects with the operational Cloncreen Wind Farm was considered. This wind farm, commissioned in 2015, is located on Cloncreen bog (960ha) in eastern Co. Offaly. Cloncreen Bog is located within Bord na Mona's Derrygreenagh bog group. The land use/activities within the Cloncreen site (at the time of planning) comprised a mix of active peat extraction, bare cutaway peat, revegetation of bare peat and a former gravel pit, part of which is under water. The following Annex I species were noted: Hen Harrier, Peregrine Falcon, Golden Plover, Greenland White Fronted Goose and Whooper Swan.

7.5.6.3.2.4 Drehid Wind Farm

Drehid Wind Farm (consented) is located in County Kildare, approximately 1.2 km south of Johnstown Bridge. The proposed development spans the townlands of Ballynamullagh, Kilmurry, Killyon, Coolree, Mulgeeth and Drehid, comprising a mix of agricultural land, improved grassland, and coniferous forestry. The area in which the site is located supports a variety of bird species, including Kestrel, Woodcock and Whooper Swan.

In terms of habitat loss, the ornithological assessment identified a Medium-term Slight to Moderate residual effect for woodcock, Long-term Slight to Moderate Reversible Residual Barrier Effects to lapwing, golden plover and kestrel, Long-term Slight to Moderate Reversible Residual Disturbance/Displacement Effects to kestrel, and Long-term Moderate Reversible Residual Disturbance/Displacement Effects to snipe and a Short-term Slight to Moderate Disturbance/Displacement Effect to whooper swan followed by a Long-term Not significant effect with habituation. Collision risk ranged from Imperceptible to Not significant across all species assessed.

7.5.6.3.2.5 Dernacart

Dernacart Wind Farm is located in County Laois, approximately 1.8km north of Mountmellick and 7km west of Portarlington. The proposed development spans the townlands of Dernacart, Forest Upper, and Forest Lower, comprising a mix of agricultural land, improved grassland, and coniferous forestry. The site supports a range of bird species, including those of conservation concern such as Golden Plover, Merlin, and Woodcock. The ornithological assessment identified short-term moderate disturbance impacts for several species, with long-term moderate habitat loss impacts for Merlin and Woodcock. Collision risk was assessed as imperceptible across most

species, including Golden Plover, while barrier effects and displacement were considered to result in imperceptible to slight long-term impacts. Although the wind farm may introduce a new obstacle during its operational phase, the low frequency of high-risk species observations suggests no significant population-level effects. Overall, the residual impact of the development is considered to range from imperceptible to slight for most species, with no significant long-term effects anticipated at county or national levels.

7.5.6.3.2.6 Moanvane Wind Farm

Moanvane Wind Farm is located in County Offaly and has a stated area of 120.2ha. The site contains an area of relatively flat farmland, areas of cutover peat bog and coniferous forestry, while the land uses are made up of agricultural land, peat bogs and coniferous forestry at various stages of their lifecycle. The majority of proposed turbines are underlain by peat. A long-term imperceptible impact to passerines in the form of habitat loss was identified, while the site was noted to be of very limited value for waders and wildfowl. An indirect impact for kingfisher and potential loss of nest habitat in trees was noted for barn owl. Of the bird species recorded Golden Plover was considered to be of significant conservation concern. The CRM indicated that collision mortality may have a significant effect on Golden Plover population at local level but a long-term imperceptible impact on the county and national populations. With respect to other birds, a slight-imperceptible residual impact was identified. It was noted that during the operational phase the wind farm will present a new obstacle for birds in the area; however, this would not give rise to significant effects on bird populations.

7.5.6.3.2.7 Mount Lucas Wind Farm

The potential for the Proposed Development to result in cumulative effects with Mount Lucas Wind Farm was considered. Located on Mount Lucas bog, which consists of 1,100 hectares of cutaway Peatlands, the wind farm was installed in 2017. A total of 33 bird species were observed during surveys at this site. Notable raptors and waterbirds detected during field surveys included mallard, water-rail, snipe, sparrowhawk and woodcock. Whooper swans were observed off-site in low numbers (maximum flock size of 3 individuals). The majority of summer migrants observed comprised small passerines with low potential for risk of collision with operating turbines. Merlin, Reg Grouse and Snipe were recorded breeding in the area.

7.5.6.3.2.8 Yellow River Wind Farm

This operational wind farm comprises several unconnected plots of land located on either side to the R400 consisting of 32 turbines. A total of 42 species were recorded during breeding surveys and 34 in winter bird surveys. There were two red-listed species noted to be potentially breeding during the surveys: lapwing and yellowhammer, and six amber listed species noted as potentially breeding: little grebe, great crested grebe, tufted duck, stock dove, linnet and wheatear, in addition to six amber listed species confirmed breeding: black-headed gull, skylark, sand martin, swallow, starling and house sparrow. Overall there were 16 possible breeding species and 10 confirmed species breeding identified during surveys. Swans were found to use Derryarkin, in proximity to the Yellow River site, for feeding and roosting purposes. Other waterbirds and raptors observed included golden plover, hen harrier, kestrel, sparrowhawk and snipe.

7.5.6.3.2.9 Clonarrow Wind Farm

This proposed wind farm located c. 6.3 km south-west of the proposed development near Daingean, Co. Offaly, is currently subject to a further information request. For the erection of 4 wind turbines. The planning application notes that 10-year planning permission and 35 year operational life from the date of commissioning of the entire wind farm is being sought. The planning application will be accompanied by an Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS).

7.5.6.3.2.10 Cumulative Wind Farm Assessment Summary

This assessment evaluates the combined effects of multiple projects on key ornithological receptors, including potential effects from disturbance, habitat loss, collision risk, and barrier effects. The analysis draws on information available for proposed, consented and operational wind farms in the surrounding region.

In order to assess the potential cumulative impacts of wind energy developments on avian receptors, a review of key species recorded across multiple sites was undertaken. This includes data from wind farms where ornithological surveys have identified species of conservation concern and those potentially sensitive to wind farm-related pressures such as disturbance, habitat loss, collision risk, and barrier effects. Table 7-28 summarises the findings of assessments undertaken for the wind farms in the surrounding region.

Table 7-28 Cumulative Assessment Summary

Project	Year of Submission	EIS/EIAR Submitted?	Construction Effects (Avifauna) (prior to mitigation)	Operational Effects (Avifauna) (prior to mitigation)
Ballivor	2023	Yes	**Disturbance** *Affecting:* Golden Plover, Hen Harrier, Merlin, Peregrine, Whooper Swan, Barn Owl, Lapwing, Snipe, Woodcock, Buzzard, Long-eared Owl, Sparrowhawk (Short-term Slight Negative Effect) Hen Harrier (Short-term Imperceptible Negative Effect) Kestrel (Short-term Moderate Negative Effect) **Habitat Loss** *Affecting:* Golden Plover, Hen Harrier, Merlin, Peregrine, Barn Owl, Kestrel, Lapwing (Breeding), Snipe, Woodcock, Buzzard, Long-eared Owl, Sparrowhawk (Long-term Slight Negative Effect) King Fisher, Whooper Swan, Lapwing (Wintering) (Long-term Imperceptible Negative Effect)	**Collision Risk** *Affecting:* Golden Plover, Peregrine, Whooper Swan, Kestrel, Lapwing, Buzzard (Long-term Slight Negative Effect) Hen Harrier, Merlin, Snipe, Sparrowhawk (Long-term Imperceptible Negative Effect) **Barrier effect** *Affecting:* Golden Plover, Hen Harrier, Merlin, Peregrine, Whooper Swan, Barn Owl, Kestrel, Lapwing, Snipe, Woodcock, Buzzard, Long-eared Owl, Sparrowhawk (Long-term Slight Negative Effect) Kingfisher (Long-term Imperceptible Negative Effect) **Disturbance/Displacement** *Affecting:* Golden Plover, Hen Harrier, Merlin, Peregrine, Whooper Swan, Barn Owl, Kestrel, Lapwing, Snipe, Woodcock, Buzzard, Long-eared Owl, Sparrowhawk (Long-term Slight Negative Effect) Kingfisher (Long-term Imperceptible Negative Effect)
Cushaling	2020	Yes	**Disturbance** *Affecting:* Golden Plover, Whooper Swan, Peregrine, Woodcock, Long-eared Owl, Buzzard, Kestrel, Sparrowhawk, Snipe (Short Term, Slight Negative Effect) Lapwing (Short Term, Imperceptible Negative Effect) **Habitat Loss** *Affecting:* Golden Plover, Whooper Swan, Peregrine, Woodcock, Long-eared	**Collision Risk** *Affecting:* Golden Plover, Whooper Swan, Peregrine, Lapwing, Buzzard, Kestrel, Snipe (Long Term, Slight Negative Effect) **Disturbance/Displacement** *Affecting:* Golden Plover, Whooper Swan, Woodcock, Long-eared Owl, Buzzard, Kestrel, Sparrowhawk, Snipe (Long Term, Slight Negative Effect) Peregrine (Short Term, Slight Negative Effect) Lapwing

Project	Year of Submission	EIS/EIAR Submitted?	Construction Effects (Avifauna) (prior to mitigation)	Operational Effects (Avifauna) (prior to mitigation)
			Owl, Buzzard, Kestrel, Sparrowhawk, Snipe (Long Term, Slight Negative Effect) Lapwing (Long Term, Imperceptible Negative Effect)	(Long Term, Imperceptible Negative Impact)
Cloncreen	2016	Yes	**Disturbance:** *Affecting:* Whooper Swan, Golden Plover, Lapwing, Ringed Plover, Snipe, Woodcock, Peregrine, Hen Harrier, Mute Swan, Grey Heron, Mallard, Kestrel, Sparrowhawk, Buzzard. (Short-term, Slight Negative Effect) Sand Martin (Short-term, Moderate Negative Effect) **Habitat Loss:** *Affecting:* Whooper Swan, Golden Plover, Lapwing, Ringed Plover, Snipe, Woodcock, Peregrine, Hen Harrier, Mute Swan, Grey Heron, Mallard, Kestrel, Sparrowhawk, Buzzard, Sand Martin. (Long-term, Slight Negative Effect)	**Collision Risk:** *Affecting:* Whooper Swan, Snipe, Peregrine, Hen Harrier, Mute Swan, Grey Heron, Mallard, Sparrowhawk, Buzzard, Sand Martin (Long term, Imperceptible Negative Effect) Golden Plover, Lapwing, Ringed Plover, Woodcock, Kestrel (Long-term, Slight Negative Effect) **Barrier Effect** *Affecting:* Whooper Swan, Golden Plover, Lapwing, Ringed Plover, Snipe, Woodcock, Peregrine, Hen Harrier, Mute Swan, Grey Heron, Mallard, Kestrel, Sparrowhawk, Buzzard, Sand Martin (Short-term, Slight Negative Effect) **Disturbance/Displacement** *Affecting:* Whooper Swan, Golden Plover, Lapwing, Ringed Plover, Snipe, Woodcock, Peregrine, Hen Harrier, Mute Swan, Grey Heron, Mallard, Kestrel, Sparrowhawk, Buzzard, Sand Martin (Short-term, Slight Negative Effect)
Dernacart	2021	Yes	**Disturbance** *Affecting:* Golden Plover, Merlin, Woodcock, Kestrel (Short Term, Moderate Effect) Black-Headed Gull, Curlew, Herring Gull, Lapwing, Peregrine, Greenfinch, Jack Snipe, Linnet, Mistle Thrush, Robin, Sparrowhawk, Stonechat, Buzzard (Short Term, Slight Effect) Kingfisher, Meadow Pipit, Barn Swallow, House Martin, House Sparrow, Lesser Black-Backed Gull, Starling, Grey Heron (Short Term, Imperceptible Effect) **Habitat Loss** *Affecting:* Golden Plover, Black-Headed Gull, Herring Gull, Sparrowhawk, Buzzard	**Collision Risk** *Affecting:* Golden Plover, Black-Headed Gull, Curlew, Herring Gull, Kingfisher, Lapwing, Merlin, Peregrine, Woodcock, Jack Snipe, Kestrel, Lesser Black-Backed Gull, Snipe, Sparrowhawk, Buzzard, Grey Heron (Long term, Imperceptible Negative Effect) **Barrier Effect** *Affecting:* Golden Plover, Black-Headed Gull, Curlew, Herring Gull, Kingfisher, Lapwing, Peregrine, Woodcock, Jack Snipe, Kestrel, Lesser-Black Backed Gull, Sparrowhawk, Buzzard, Grey Heron (Long term, Imperceptible Negative Effect) Merlin (Slight-Moderate, Long term Negative Effect) **Disturbance/Displacement**

Project	Year of Submission	EIS/EIAR Submitted?	Construction Effects (Avifauna) (prior to mitigation)	Operational Effects (Avifauna) (prior to mitigation)
			(Long Term, Slight Negative Effect) Curlew, Kingfisher, Lapwing, Jack Snipe, Lesser Black-Backed Gull, Grey Heron (Long Term, Imperceptible Effect) Merlin, Woodcock (Long Term, Moderate Effect) Peregrine (Long Term, Not Significant Effect) Kestrel (Long Term, Slight-Moderate Effect)	*Affecting:* Golden Plover, Black-Headed Gull, Herring Gull, Peregrine, Woodcock, Kestrel, Lesser-Black Backed Gull, Sparrowhawk (Long term, Not Significant Effect) Curlew, Kingfisher, Lapwing, Buzzard, Grey Heron (Long term, Imperceptible Negative Effect) Merlin (Moderate, Long term Negative Effect) Jack Snipe (Slight, Long Term Negative Effect)
Drehid	2025		**<u>Disturbance</u>** *Affecting:* Buzzard, Curlew, Goshawk, Great Black-backed Gull, Grey Heron, Lapwing, Lesser Black-backed Gull, Sparrowhawk, Stock Dove and Swift. (Short Term, Imperceptible Effect) Hen Harrier, Herring Gull, Kestrel, Kingfisher, Little Egret, Long-eared owl and Peregrine. (Short Term, Not significant Effect) Golden Plover (Short Term, Not significant to Slight Effect) Merlin (Short Term, Slight Effect) Whooper Swan (Short Term, Slight to Moderate Effect) Snipe, Woodcock (Short Term, Significant Effect) **<u>Habitat Loss</u>** *Affecting:* Buzzard, Curlew, Goshawk, Great Black-backed Gull, Grey Heron, Hen Harrier, Kingfisher, Lapwing, Lesser Black-backed Gull, Long-eared owl, Snipe, Swift and Sparrowhawk. (Long Term, Imperceptible Effect) Golden Plover, Herring Gull, Kestrel, Little Egret, Peregrine and Stock Dove. (Long Term, Not significant Effect) Whooper Swan (Long Term, Imperceptible to Not significant Effect) Merlin (Long Term, Slight to Moderate Effect) Woodcock (Long Term, Moderate Effect)	**<u>Collision Risk</u>** *Affecting:* Buzzard, Great Black-backed Gull, Kestrel, Lesser Black-backed Gull, Sparrowhawk, Swift. (Long Term, Imperceptible Effect) Herring Gull (Long Term, Imperceptible to Not significant Effect) Golden Plover, Whooper Swan (Long Term, Not significant Effect) **<u>Disturbance/Displacement</u>** *Affecting:* Buzzard, Goshawk, Great Black-backed Gull, Grey Heron, Lesser Black-backed Gull, Little Egret, Red Kite, Sparrowhawk, Swift. (Long Term, Imperceptible Effect) Golden Plover, Hen Harrier, Lapwing, Long-eared owl, Merlin, Peregrine, Stock Dove, Woodcock. (Long Term, Not significant Effect) Kestrel, Whooper Swan (Long Term, Slight to Moderate Effect) Snipe (Long Term, Moderate Effect) **<u>Barrier Effect</u>** *Affecting:* Goshawk, Great Black-backed Gull, Grey Heron, Herring Gull, Little Egret, Lesser Black-backed Gull, Long-eared owl, Red Kite, Snipe, Swift, Sparrowhawk and Woodcock. (Long Term, Imperceptible Effect) Hen Harrier, Merlin, Peregrine, Stock Dove, Whooper Swan. (Long Term, Not significant Effect) Buzzard (Long Term, Imperceptible to Slight Effect) Golden Plover, Kestrel, Lapwing (Long Term, Slight to Moderate Effect)

Project	Year of Submission	EIS/EIAR Submitted?	Construction Effects (Avifauna) (prior to mitigation)	Operational Effects (Avifauna) (prior to mitigation)
Moanvane	2018	Yes	**Habitat Loss** *Affecting:* Whooper Swan, Greenland White-fronted Goose, Hen Harrier, Merlin, Peregrine, Lapwing, Golden Plover, Curlew, Kingfisher, Barn Owl, Mute Swan (Long Term, Imperceptible Negative Effect) Woodcock (Long Term, Moderate Negative Effect) Kestrel (Long Term, Slight-Moderate Negative Effect) Snipe, Sparrowhawk (Long Term, Slight Negative Effect)	**Collision Risk** *Affecting:* Whooper Swan, Hen Harrier, Merlin, Peregrine, Greenland White-fronted Goose, Golden Plover, Sparrowhawk, Mute Swan, Buzzard (Long Term, Imperceptible Negative Effect) **Disturbance/Displacement** *Affecting:* Whooper Swan (Slight, Long Term Negative Effect) Hen Harrier, Merlin, Peregrine, Greenland White-fronted Goose, Lapwing, Golden Plover, Curlew, Woodcock, Barn Owl, Kestrel, Buzzard, Sparrowhawk, Mute Swan (Long Term, Imperceptible Negative Effect) **Barrier Effect** *Affecting:* Whooper Swan (Slight, Long Term Negative Effect) Hen Harrier, Merlin, Peregrine, Greenland White-fronted Goose, Curlew, Kestrel, Buzzard, Sparrowhawk, Mute Swan (Long Term, Imperceptible Negative Effect) Lapwing, Golden Plover, Woodcock, Barn Owl (Imperceptible-slight Long-Term Effect)
Mount Lucas	2009	Yes	**Habitat Loss:** Habitat loss expected to be 1.5% and not of major concern as habitats such as scrub are widely available in the surrounding area allowing displaced birds to readily access habitats. **Disturbance:** Construction related disturbance on site is mainly impacting birds associated with scrub habitat which have similar habitats available within the site and surrounding area mitigating any significant impact.	**Collision Risk:** No CRM. The assessment noted that bird densities at rotor height are not at a high enough level for the collision risk to be considered significant for any species observed. **Disturbance and Displacement:** Disturbance and displacement is not considered to be at a significant level at Mount Lucas Wind Farm. **Barrier Effect:** There is no significant barrier effect for Avifauna at Mount Lucas Wind Farm.
Yellow River	2014	Yes	**Habitat Loss:** The development will result in permanent loss of habitats estimated at 20.58ha resulting in the removal of 1380m of hedgerow and treeline which are considered to be of local importance. The loss is rated as a significant impact. However, due to the availability of similar habitat in the surrounding area, the negative impact will be minimised. **Disturbance:** As there is already a significant level of disturbance through farming and	**Collision Risk:** No CRM. The assessment noted that given the prescribed mitigation measures put in place in the project design (e.g. restrictions on site works during certain months of the year and hazard warning lights on certain turbine hubs), collision risk was not found to be significant for any species observed during the study. **Disturbance and Displacement:** As there is already a significant level of disturbance through farming and quarrying in the area, disturbance is not considered to be significant.

Project	Year of Submission	EIS/EIAR Submitted?	Construction Effects (Avifauna) (prior to mitigation)	Operational Effects (Avifauna) (prior to mitigation)
			quarrying in the area, disturbance is not considered to be significant.	**Barrier Effect:** The barrier effect is not considered to be relevant at yellow river wind farm as each turbine will be in the region of 500m apart, encouraging birds to pass between them.

7.5.6.4 Cumulative Effect Assessment

7.5.6.4.1 Habitat Loss (Construction Phase)

Cumulative habitat loss effects potentially arising in conjunction with proposed/operational wind farms, proposed developments and land use activities described above are assessed as Long-term Short-term Not-significant to Slight at the County to National scale . No effects at local scale are predicted due to the distances separating the Proposed Development from other proposed projects.

7.5.6.4.2 Cumulative Disturbance/Displacement (Construction Phase)

Cumulative disturbance/displacement effects potentially arising in conjunction with proposed/operational wind farms, proposed developments and land use activities described above are assessed as Short-term Not-significant to Slight at the County to National scale. No effects at local scale are predicted due to the distances separating the Proposed Development from other proposed projects.

7.5.6.4.3 Cumulative Collision Risk (Operational Phase)

Potential cumulative effects in terms of collision risk are unlikely to exceed the highest effect magnitude (Long-term Slight effects) identified for the Proposed Development and the other wind farms in the surrounding region discussed above.

There is potential for cumulative Long-term Moderate effects at County scale to whooper swans migrating through the region at night during spring and autumn prior to mitigation.

7.5.6.4.4 Cumulative Disturbance/Displacement/Barrier Effect (Operational Phase)

Potential cumulative effects in terms of disturbance/displacement are unlikely to result in significant cumulative effects at regional or national level. There is potential for Long-term Not significant to Slight cumulative effects at local level due to the proximity of surrounding existing wind farms.

7.5.6.4.5 Cumulative Effects (Decommissioning)

The potential cumulative effects during decommissioning are considered to be the same as those described for the construction phase of the Proposed Development. The wind farms assessed above will be decommissioned at separate times, causing temporary disturbance. Decommissioning will not occur simultaneously and therefore cumulative effects are not anticipated in this regard.

7.6 Mitigation and Monitoring Measures

Mitigation measures are described below which will avoid, reduce and where possible, offset potential negative effects arising in relation to avifauna from the construction, operation and decommissioning of the Proposed Development. These mitigation measures will be implemented in full.

7.6.1 Mitigation by Avoidance and Design

The following measures were undertaken to reduce impacts on designated sites, flora and fauna through avoidance and design:

- The hard-standing areas of the Proposed Development have been kept to the minimum necessary (to allow for the accommodation of turbine manufacturer specifications), including all site clearance works to minimise land take of habitats.
- Site design and layout deliberately avoided direct impacts on designated sites and sensitive habitats.
- All cabling is to be placed underground. this significantly reduces collision risk to birds over the lifetime of the wind farm and is in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt and Langston, 2006).
- Where there will be unavoidable removal of hedgerow and treeline habitat, these areas of losses will be reinstated within the proposed site. A linear length of approximately 1km for hedgerow has been designed alongside the Proposed Development with a further minimum 0.76ha of additional potential enhancement and/or creation area provided (see drawing number 23882-MWP-00-00-DR-C-5426 landscaping plan). These areas will be rewilded or fully reinstated with native trees and shrub species and will be composed of at least 75% whitethorn and 25% of other native species in keeping with ideal hedgerow creation (NBDC, 2009). Some of the habitat creation area will be managed with shallow routing species as collector cable and grid connection cable will require a 3m buffer zone from trees.

7.6.2 Mitigation Measures during the Construction Phase of the Project

7.6.2.1 Project Ecologist/ECoW

A Project Ecologist/Ecological Clerk of Works (ECoW) with appropriate experience and expertise (in implementing ecological mitigation measure for wind farm developments) will be employed for the duration of the construction phase to ensure that all the mitigation measures outlined in relation to the environment are implemented. The Project Ecologist/ECoW will be awarded the authority to stop construction activity if there is potential for significant adverse ecological effects to occur.

7.6.2.2 Avifauna

During the construction phase of the Proposed Development, a range of mitigation measures will be implemented to minimise potential adverse effects on ornithological receptors. These measures are informed by best practice guidance, including Drewitt and Langston (2006), Scottish Natural Heritage (SNH, 2017), and Goodship and Furness (2022), and are tailored to the sensitivities of species recorded during baseline surveys.

To avoid disturbance to nesting birds, vegetation clearance, including removal of scrub and trimming of trees, will be undertaken outside the bird breeding season (March 1st to August 31st inclusive), subject to other environmental constraints such as runoff control. Where clearance is required during this period, a suitably qualified ecologist will carry out pre-clearance surveys to identify any active nests. If nesting birds are present, appropriate mitigation will be implemented, including the establishment of species-specific buffer zones and/or seasonal constraints based on the known breeding cycles of the species involved. For example, a minimum buffer of 10 metres will be applied around active small passerine nests, while raptor species such as kestrel, peregrine, or merlin will require a 500m buffer. Lower sensitivity raptors such as sparrowhawk and buzzard will be afforded a 200m buffer, and woodcock nests (if identified) will be protected by a 250m buffer zone.

A re-confirmatory ornithological survey will be undertaken in March or April prior to the commencement of construction to identify any new breeding territories or nesting activity, particularly for species such as snipe and woodcock. Should any active nests be identified, works in those areas will be delayed until the breeding season has concluded or until fledging has been confirmed through monitoring. A 500m buffer will be applied around any confirmed snipe territories, and a 250m buffer will be maintained for woodcock.

A re-confirmatory ornithological survey for wintering birds will also be undertaken during the winter months. In the event that grazing whooper swans are recorded within 600m of the Proposed Development prior to construction, targeted monitoring will be undertaken to assess potential disturbance or displacement. If significant disturbance is observed, or if regular use of the area by wintering swans is confirmed, a 600m exclusion zone will be implemented until the birds have departed in spring. Similar monitoring and exclusion protocols will be applied for lapwing (both breeding and non-breeding seasons) and golden plover (non-breeding season), based on their observed use of the site and surrounding habitats.

Where possible, works in the vicinity of areas (shown on Figure 7-4) which could potentially be used by roosting hen harrier on a casual basis during winter will avoided/minimised during the winter season. If works are required in these areas during winter, the ECoW will undertake roost watches to check for hen harrier activity and if required, working hours in the vicinity of these areas shall be restricted to avoid night, dawn and late afternoon/dusk.

Construction activities will generally be restricted to daylight hours to minimise disturbance to roosting and nocturnal bird species. Where night-time works are unavoidable, such as during concrete pours or turbine erection, these will be supervised by the project ecologist or ECoW. All construction personnel will receive toolbox talks on ornithological sensitivities and the importance of adhering to mitigation protocols.

Where hedgerows or treelines are removed, reinstatement will be carried out using native species of local provenance, enhancing habitat quality for species such as yellowhammer. Further details on hedgerow reinstatement are provided in Chapter 6 - Biodiversity. Measures to protect water quality, as outlined in Chapter 6 - Biodiversity and Chapter 8 - Hydrology and Hydrogeology, will also benefit aquatic bird species by safeguarding prey availability and habitat integrity.

The above measures are in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt, A. L. and Langston, R. H., 2006).

7.6.3 Mitigation Measures During the Operational Phase of the Project

7.6.3.1 Turbine Lighting

Turbine lighting will be designed to minimise attraction of nocturnal migrants and insects. White lights will not be used. Where required by the Irish Aviation Authority, turbines will be fitted with medium-intensity fixed red obstacle lights (2000 candelas), equipped with baffles to direct light skyward and reduce ground-level visibility.

7.6.3.2 Activity and Collision Monitoring

While no potential significant operational effects have been identified above local level, to ensure that the operational phase of the Proposed Development does not result in significant adverse effects on ornithological receptors, a comprehensive post-construction monitoring programme will be implemented. This programme is designed to assess the efficacy of mitigation measures, detect any unforeseen impacts, and inform adaptive management strategies.

The approach is consistent with best practice guidance from Drewitt and Langston (2006), which recommends the implementation of a structured post-development monitoring programme to assess collision risk, displacement, and barrier effects. Additionally, Rees (2012) highlights the importance of long-term monitoring for swan species to capture inter-annual variation and cumulative effects.

The monitoring programme will include several key components. A fatality monitoring scheme will be conducted during years 1, 2, 3, 5, 10, 15, 20, and 30 post-construction. This will follow established methodologies (e.g. Shawn et al., 2010; Fijn et al., 2012; Grünkorn, 2011), including carcass removal trials to determine scavenger bias, and systematic turbine searches using standardised transects or trained dogs. The search area will extend to at least the turbine hub height radius, and search intervals will be informed by carcass persistence rates. Recorded fatalities will be adjusted for scavenger removal to estimate true mortality rates. Reports will be submitted to the competent authority and the National Parks and Wildlife Service (NPWS) following each monitoring year.

Flight activity surveys will also be undertaken in years 1, 2, 3, 5, 10, and 15 post-construction, during both summer and winter periods. These surveys will include vantage point and hinterland observations in accordance with SNH (2017) guidance. The objective is to detect any barrier effects or changes in flight behaviour, particularly among raptors, owls, swans, wildfowl, and waders. Observations will focus on flight height, direction, and avoidance behaviour in proximity to turbines.

To assess potential displacement of wintering wildfowl, a monthly wildfowl census will be conducted during the winter months of each monitoring year. This will replicate the baseline methodology and will help determine whether swans and other species have altered their habitat use in response to turbine operation. Similarly, breeding bird surveys (Common Bird Census) will be repeated during April to July in each monitoring year to assess changes in breeding bird density and distribution. Dedicated breeding wader and woodcock surveys will also be undertaken during April to June, using the same methods as the baseline surveys.

Audio surveys for nocturnal migration activity will be conducted in years 1, 2, 3, 5, 10, 15, 20, and 30 post-construction, using the same methods as the baseline surveys.

All monitoring results will be reviewed annually, and any necessary adjustments to the mitigation strategy will be agreed with NPWS. This adaptive management approach ensures that the operational phase of the Proposed Development remains responsive to emerging data and continues to safeguard ornithological interests in line with national and international best practice.

7.6.3.3 Nocturnal Migration Monitoring and Curtailment

The collision risk assessment concluded that no species were predicted to experience significant collision mortality under the proposed turbine layout and operational parameters. This conclusion was based on low predicted collision rates, high species-specific avoidance rates, and the spatial distribution of flight activity relative to turbine locations.

However, in line with best practice and precautionary principles (Drewitt & Langston, 2006; Rees, 2012), a post-construction monitoring programme has been proposed to validate these predictions. This includes systematic fatality monitoring, flight activity surveys, and species-specific monitoring (e.g. for whooper swan, woodcock, and breeding waders). The results of this monitoring will inform whether adaptive mitigation, such as curtailment, is required.

In particular, curtailment measures have been proposed as a contingency for nocturnal migratory species, particularly whooper swan. If post-construction monitoring detects collision fatalities or increased migratory activity, a night-time (dusk to dawn) curtailment regime will be implemented during peak migration periods (15 September–15 December and 21 February–15 April). This approach reflects a conservative and responsive mitigation strategy, consistent with international best practice for high-sensitivity species.

All monitoring results will be reviewed annually, and any necessary adjustments to the mitigation strategy will be agreed with NPWS. This adaptive management approach ensures that the operational phase of the Proposed Development remains responsive to emerging data and continues to safeguard ornithological interests in line with national and international best practice.

7.6.4 Mitigation Measures during Decommissioning

The decommissioning phase of the Proposed Wind Farm will be carefully managed to minimise potential adverse impacts on avian species, particularly those of conservation concern. Drawing on best practices and similar mitigation strategies as those outlined for the construction phase.

Prior to the commencement of decommissioning works, a comprehensive ornithological survey will be undertaken to establish the presence and activity of breeding, wintering, and migratory bird species within and adjacent to the site. This will inform the timing and methodology of decommissioning activities. Where feasible, works will be scheduled outside of the bird breeding season to avoid disturbance to nesting birds. Should works be required during this period, pre-commencement checks by a qualified ornithologist will be mandatory, and appropriate buffer zones will be established around any active nests identified.

Decommissioning operations will take place during the hours of daylight to minimise disturbances to roosting birds, or active nocturnal bird species. This in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt, A. L. & Langston, R. H., 2006).

Mitigation measures will include the use of low-noise machinery and phased dismantling of infrastructure to reduce disturbance. Vegetation clearance will be minimised and confined to previously disturbed areas to avoid habitat loss. Additionally, reinstatement of habitats post-decommissioning will be prioritised, with native vegetation encouraged to reestablish, thereby supporting the long-term ecological integrity of the Site, in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt, A. L. & Langston, R. H., 2006).

Toolbox talks shall be held with construction staff on disturbance to key species during decommissioning. This will help minimise disturbance. This in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt, A. L. & Langston, R. H., 2006).

An Ecological Clerk of Works (ECoW)/Project Ecologist with ornithological expertise will oversee the implementation of these measures, ensuring adaptive management in response to any unforeseen ecological sensitivities encountered during the process.

7.6.5 Residual Effects on Avifauna

To minimise effects on those species which the literature suggests can be negatively impacted, a re-confirmatory preconstruction survey (March/April) will be conducted to assess any evidence of target species activity or the occupation of new territories. Should any new nests be recorded, works at these locations will be restricted to outside the breeding season (April-July) or until chicks are deemed to have fledged (following monitoring). Targeted surveys for waders/woodcock and wintering whooper swan will also be undertaken, triggering seasonal and spatial restrictions as required to minimise disturbance to these species.

A comprehensive monitoring program will also be implemented following construction of the Proposed Wind Farm. this will monitor the degree of displacement/disturbance and barrier effects, if any, on existing species as a result of the development, in addition to comprehensively monitoring any bird fatalities.

Residual effects for avifauna receptors are detailed in **Table 7-29**. Residual effects for the majority of species range from **Long-term Imperceptible** to **Slight Reversible** Residual Effects.

Slightly higher residual effects were identified for a number of species; however, none of these are Significant effects.

Long-term Moderate residual habitat loss effects are identified for merlin and woodcock based purely on assessment of habitat loss; however, the realised effect is likely to be lower (i.e. **Slight** to **Moderate**), particularly for merlin due to absence of breeding records. These assessments take into account the abundance of suitable displacement habitat in the local area, and the fact that assessment of habitat loss is based on the total habitat resource within the land ownership boundary rather than all suitable habitat in the locality.

A **Long-term Slight** to **Moderate** residual barrier effect is identified for golden plover and lapwing. **Long-term Slight** to **Moderate** residual disturbance/displacement and barrier effects are identified for kestrel. **Long-term Not significant** to **Slight** residual disturbance/displacement and barrier effects are identified for whooper swan. A **Long-term Moderate** residual disturbance/displacement effect is identified for snipe; however, the realised effect is likely to be lower (i.e. **Slight** to **Moderate**) due to the abundance of suitable habitat for breeding snipe present further from the proposed development within Esker Bog and Esker Bog Rathlumber.

It is noted that habituation over the lifetime of the Proposed Wind Farm is likely to reduce the magnitude of all of the above residual operational effects identified. A comprehensive operational monitoring regime is proposed to ensure that any changes to the baseline environment during operation can be identified, allowing for the implementation of mitigation measures if required.

No Significant residual effects have been identified for the operational phase of the Proposed Development.

Residual effects associated with the Proposed Grid Connection and Proposed TDR are assessed as **Long-term Imperceptible.**

Table 7-29: Summary Table of Residual Effects

KER	Effect (Pre-mitigation)		Mitigation Measures	Residual Effect (Post-mitigation)
	Construction	Operational		
Goldcrest, Greenfinch, Spotted flycatcher, Linnet Meadow Pipit, Skylark	Habitat Loss: Long-term Not significant	No effects identified	Minimise land-take by design. Hedgerow reinstatement.	**Long-term Imperceptible**
House sparrow, Starling	Habitat Loss: Temporary Not significant	No effects identified	Minimise land-take by design. Hedgerow reinstatement.	**Long-term Imperceptible**
Redwing, Yellowhammer	Habitat Loss: Short-term Not significant	No effects identified	Minimise land-take by design. Hedgerow reinstatement.	**Long-term Imperceptible**
Willow warbler	Habitat Loss: Long-term Not significant to Slight	No effects identified	Minimise land-take by design. Hedgerow reinstatement.	**Long-term Imperceptible**
Medium-sensitivity passerines	Disturbance/Displacement: Temporary Imperceptible	No effects identified	Pre-construction surveys. Avoid vegetation clearance in breeding season/Ecological supervision. Buffer zones for active nests. Restrict works to daylight.	**Long-term Imperceptible**
High-sensitivity passerines	Disturbance/Displacement: Temporary Not significant	No effects identified	Pre-construction surveys. Avoid vegetation clearance in breeding season/Ecological supervision. Buffer zones for active nests. Restrict works to daylight.	**Long-term Imperceptible**
Swallow, House martin, Sand martin	Habitat Loss: Short-term Imperceptible	Disturbance/Displacement: Long-term Imperceptible Barrier Effect: Long-term Imperceptible	Pre-construction surveys.	**Long-term Imperceptible**
Swift	Habitat Loss: Short-term Imperceptible	Disturbance/Displacement: Long-term Not significant Barrier Effect: Long-term Not significant	Pre-construction surveys.	**Long-term Not significant**
Black-headed Gull	Habitat Loss: Long term Not significant	Collision Risk: Long-term Imperceptible	Pre-construction surveys. Ecological supervision.	**Long-term Imperceptible to Slight**

KER	Effect (Pre-mitigation)		Mitigation Measures	Residual Effect (Post-mitigation)
	Construction	Operational		
	Disturbance/Displacement: Short-term Imperceptible	Disturbance/Displacement: Long-term Not significant Barrier Effect: Long-term Imperceptible to Slight	Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	
Buzzard	Habitat Loss: Long term Not significant Disturbance/Displacement: Short-term Imperceptible	Collision Risk: Long-term Imperceptible Disturbance/Displacement: Long-term Imperceptible Barrier Effect: Long-term Imperceptible to Slight	Pre-construction surveys. Avoid vegetation clearance in breeding season/Ecological supervision. Buffer zones for active nests. Restrict works to daylight. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**Long-term Imperceptible to Slight**
Common Gull	Habitat Loss: Long term Not significant Disturbance/Displacement: Short-term Imperceptible	Disturbance/Displacement: Long term Not significant Barrier Effect: Long-term Imperceptible	Pre-construction surveys. Ecological supervision. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**Long term Not significant**
Cormorant	Habitat Loss: Short-term Not Significant Disturbance/Displacement: Short-term Not Significant	Disturbance/Displacement: Long term Not significant Barrier Effect: Long-term Imperceptible	Pre-construction surveys. Ecological supervision. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**Long term Not significant**
Great black-backed Gull	Habitat Loss: Long term Imperceptible Disturbance/Displacement: Short-term Imperceptible	Collision Risk: Long-term Imperceptible Disturbance/Displacement: Long-term Imperceptible	Pre-construction surveys. Ecological supervision. Operational phase collision monitoring and activity surveys.	**Long-term Imperceptible**

KER	Effect (Pre-mitigation)		Mitigation Measures	Residual Effect (Post-mitigation)
	Construction	Operational		
		Barrier Effect: Long-term Imperceptible	Annual reporting to planning authority and NPWS.	
Greylag Goose	Habitat Loss: Long term Not significant Disturbance/Displacement: Short-term Imperceptible	Collision Risk: Long-term Imperceptible Disturbance/Displacement: Long-term Imperceptible Barrier Effect: Long-term Imperceptible to Slight	Pre-construction surveys. Ecological supervision. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**Long-term Imperceptible to Slight**
Golden Plover	Habitat Loss: Long term Slight Disturbance/Displacement: Short-term Slight	Collision Risk: Long-term Not significant Disturbance/Displacement: Long term Not significant Barrier Effect: Long-term Slight to Moderate	Pre-construction surveys. Ecological supervision. Buffer zones if required. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**Long-term Slight to Moderate (Barrier Effect)**
Grey Heron	Habitat Loss: Short-term Not Significant Disturbance/Displacement: Short-term Imperceptible	Collision Risk: Long-term Imperceptible Disturbance/Displacement: Long-term Imperceptible Barrier Effect: Long-term Imperceptible	Pre-construction surveys. Ecological supervision. Water quality protection measures. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**Long-term Imperceptible**
Hen Harrier	Habitat Loss: Long-term Slight to Moderate Disturbance/Displacement: Short-term Moderate	Collision Risk: Long-term Not significant Disturbance/Displacement: Long-term Not significant	Pre-construction surveys. Ecological supervision. Construction phase monitoring and where required restricted work hours.	**<u>Construction</u>** **Habitat Loss:** **Long-term Slight to Moderate** **Disturbance/Displacement:** **Short-term Not significant**

KER	Effect (Pre-mitigation)		Mitigation Measures	Residual Effect (Post-mitigation)
	Construction	Operational		
		Barrier Effect: Long-term Not significant	Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**<u>Operation</u>** **Long-term Not significant**
Kestrel	Habitat Loss: Long term Not significant Disturbance/Displacement: Short-term Not Significant to Significant	Collision Risk: Long-term Not significant Disturbance/Displacement: Long-term Slight to Moderate Barrier Effect: Long-term Slight to Moderate	Pre-construction surveys. Ecological supervision. Seasonal nest buffer if required. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**<u>Construction</u>** **Disturbance/Displacement:** **Short-term Not Significant** **<u>Operation</u>** **Long-term Slight to Moderate (Disturbance/Displacement & Barrier Effect)**
Kingfisher	Habitat Loss: Short-term Not significant Displacement: Short-term Significant	Disturbance/Displacement: Long-term Imperceptible Barrier Effect: Long-term Imperceptible	Pre-construction surveys. Ecological supervision. Water quality protection measures. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**Long-term Imperceptible**
Lapwing	Habitat Loss: Long term Not significant Disturbance/Displacement: Short-term Not significant to Slight	Collision Risk: Long-term Imperceptible to Not significant Disturbance/Displacement: Long-term Not significant Barrier Effect: Long-term Slight to Moderate	Pre-construction surveys. Ecological supervision. Disturbance buffer if required. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**<u>Construction</u>** **Disturbance/Displacement:** **Short-term Not significant** **<u>Operation</u>** **Long-term Slight to Moderate (Barrier Effect)**

KER	Effect (Pre-mitigation)		Mitigation Measures	Residual Effect (Post-mitigation)
	Construction	Operational		
Lesser Black-backed Gull	Habitat Loss: Long-term Not significant Disturbance/Displacement: Short-term Not significant	Collision Risk: Long-term Imperceptible Disturbance/Displacement: Long-term Imperceptible Barrier Effect: Long-term Imperceptible	Pre-construction surveys. Ecological supervision. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**Long-term Not significant**
Little Egret	Habitat Loss: Short-term Not significant Disturbance/Displacement: Short-term Not significant	Collision Risk: Long-term Not significant Disturbance/Displacement: Long-term Imperceptible Barrier Effect: Long-term Imperceptible	Pre-construction surveys. Ecological supervision. Water quality protection measures. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**Long-term Not significant**
Little Grebe	Habitat Loss: Short-term Imperceptible Disturbance/Displacement: Short-term Imperceptible	Disturbance/Displacement: Long-term Imperceptible Barrier Effect: Long-term Imperceptible	Pre-construction surveys. Ecological supervision. Water quality protection measures. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**Long-term Imperceptible**
Mallard	Habitat Loss: Short-term Imperceptible Disturbance/Displacement: Short-term Not significant	Collision Risk: Long-term Imperceptible Disturbance/Displacement: Long-term Not significant	Pre-construction surveys. Ecological supervision. Water quality protection measures. Operational phase collision monitoring and activity surveys.	**Long-term Not significant**

KER	Effect (Pre-mitigation)		Mitigation Measures	Residual Effect (Post-mitigation)
	Construction	Operational		
		Barrier Effect: Long-term Not significant	Annual reporting to planning authority and NPWS.	
Merlin	Habitat Loss: Long-term Moderate Disturbance/Displacement: Short-term Slight	Disturbance/Displacement: Long-term Not significant Barrier Effect: Long-term Not significant	Pre-construction surveys. Ecological supervision. Seasonal nest buffer if required. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**<u>Construction</u>** **Habitat Loss:** **Long-term Moderate** **Disturbance/Displacement:** **Short-term Not significant** **<u>Operation</u>** **Long-term Not significant**
Mute Swan	Habitat Loss: Short-term Not significant Disturbance/Displacement: Short-term Imperceptible	Collision Risk: Long-term Imperceptible Disturbance/Displacement: Long-term Not significant reducing to Long-term Imperceptible with habituation Barrier Effect: Long-term Imperceptible	Pre-construction surveys. Ecological supervision. Disturbance buffer if required. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**Long-term Imperceptible**
Redshank	Habitat Loss: Short-term Imperceptible Disturbance/Displacement: Short-term Imperceptible	No effects identified	Pre-construction surveys. Ecological supervision. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**Long-term Imperceptible**
Peregrine	Habitat Loss:	Collision Risk:	Pre-construction surveys.	**Long-term Not significant**

KER	Effect (Pre-mitigation)		Mitigation Measures	Residual Effect (Post-mitigation)
	Construction	Operational		
	Short-term Not significant Disturbance/Displacement: Short-term Not significant	Long-term Not significant Disturbance/Displacement: Long-term Not significant Barrier Effect: Long-term Not significant	Ecological supervision. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	
Short-eared Owl	Habitat Loss: Short-term Not significant Disturbance/Displacement: Short-term Not significant	Disturbance/Displacement: Long-term Not significant Barrier Effect: Long-term Not significant	Pre-construction surveys. Ecological supervision. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**Long-term Not significant**
Sparrowhawk	Habitat Loss: Long-term Imperceptible Disturbance/Displacement: Short-term Imperceptible	Collision Risk: Long-term Imperceptible Disturbance/Displacement: Long-term Imperceptible Barrier Effect: Long-term Imperceptible	Pre-construction surveys. Ecological supervision. Seasonal nest buffer if required. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**Long-term Imperceptible**
Snipe	Habitat Loss: Long-term Imperceptible Disturbance/Displacement: Short-term Significant	Collision Risk: Long-term Imperceptible Disturbance/Displacement: Long-term Moderate Barrier Effect: Long-term Imperceptible	Pre-construction surveys. Ecological supervision. Seasonal nest buffer if required. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**<u>Construction</u>** **Disturbance/Displacement:** **Short-term Not significant** **<u>Operation</u>** **Disturbance/Displacement:** **Long-term Moderate**

KER	Effect (Pre-mitigation)		Mitigation Measures	Residual Effect (Post-mitigation)
	Construction	Operational		
Stock Dove	Habitat Loss: Temporary Imperceptible Disturbance/Displacement: Temporary Not Significant	Disturbance/Displacement: Long-term Not significant Barrier Effect: Long-term Imperceptible	Pre-construction surveys. Ecological supervision. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**Long-term Not significant**
Whooper Swan	Habitat Loss: Short-term Slight Disturbance/Displacement: Short-term Slight to Moderate	Collision Risk: Long-term Not significant Disturbance/Displacement: Long-term Not Significant to Slight Barrier Effect: Long-term Not significant to Slight	Pre-construction surveys. Ecological supervision. Disturbance buffer if required. Operational phase collision monitoring and activity surveys. NocMig audio surveys. Annual reporting to planning authority and NPWS.	**<u>Construction</u>** **Disturbance/Displacement:** **Short-term Not Significant** **<u>Operation</u>** **Long-term Not Significant to Slight (Disturbance/Displacement & Barrier Effect)**
Woodcock	Habitat Loss: Long-term Moderate Disturbance/Displacement: Short-term Significant	Disturbance/Displacement: Long-term Not significant Barrier Effect: Long-term Imperceptible	Pre-construction surveys. Ecological supervision. Seasonal nest buffer if required. Operational phase collision monitoring and activity surveys. Annual reporting to planning authority and NPWS.	**<u>Construction</u>** **Habitat Loss:** **Long-term Moderate** **Disturbance/Displacement:** **Short-term Not Significant** **<u>Operation</u>** **Long-term Not Significant (Disturbance/Displacement)**

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7.8 Glossary of Terms

Annex I Species
Bird species listed under Annex I of the EU Birds Directive (2009/147/EC), requiring special conservation measures including the designation of Special Protection Areas (SPAs).

Avifauna
The bird life of a particular region, habitat, or geological period.

BoCCI (Birds of Conservation Concern in Ireland)
A classification system that categorizes bird species into Red, Amber, and Green lists based on their conservation status in Ireland.

Collision Risk Model (CRM)
A predictive model used to estimate the likelihood of bird collisions with wind turbines, based on flight activity data and turbine specifications.

Designated Site
An area protected by national or EU legislation for its ecological, geological, or landscape importance (e.g., SPA, SAC, NHA, pNHA).

Disturbance/Displacement
Indirect effects on birds caused by human activity or infrastructure, leading to avoidance of otherwise suitable habitat.

Do Nothing Scenario
A baseline scenario used in environmental assessments that assumes the proposed development does not proceed, allowing comparison of potential impacts.

Effect
The consequence of an impact, typically expressed in terms of its significance (e.g., slight, moderate, significant).

Flight Activity Survey Area
The area within a 500m buffer around proposed turbine locations used to assess bird flight activity and collision risk.

Habitat Loss
The removal or alteration of natural habitats due to development, which may be direct (e.g., land take) or indirect (e.g., disturbance).

Hen Harrier Roost Survey
A targeted survey to identify winter roosting sites of hen harriers, following specific national guidelines.

I-WeBS (Irish Wetland Bird Survey)
A national monitoring program that tracks the status and distribution of wintering waterbirds in Ireland.

Key Ecological Receptor (KER)
A species or habitat identified as being of sufficient ecological value to warrant detailed assessment in an Environmental Impact Assessment.

Magnitude of Effect
A measure of the scale or intensity of an impact, often expressed as a percentage of population or habitat affected.

Mitigation
Measures taken to avoid, reduce, or offset adverse environmental effects of a development.

NBDC (National Biodiversity Data Centre)
An Irish organization that collects, manages, and shares data on Ireland's biodiversity.

NRA (National Roads Authority) Guidelines
Ecological assessment guidelines used in Ireland, particularly for infrastructure projects, including criteria for evaluating ecological receptors.

Passerine
A member of the order Passeriformes, commonly known as perching birds or songbirds.

pNHA (Proposed Natural Heritage Area)
A site proposed for designation under the Wildlife Act for its ecological value but not yet legally protected.

Residual Effect
The environmental effect that remains after mitigation measures have been implemented.

Rotor-Swept Zone
The vertical space occupied by the rotating blades of a wind turbine, typically the area of highest collision risk for birds.

SPA (Special Protection Area)
A site designated under the EU Birds Directive for the protection of rare and vulnerable bird species and their habitats.

SNH (Scottish Natural Heritage)
Now known as NatureScot, a public body in Scotland that provides guidance on ecological assessments, including bird surveys for wind farms.

Target Species
Bird species selected for focused assessment due to their conservation status, sensitivity to wind farms, or presence in the study area.

Vantage Point (VP) Survey
A method of observing bird flight activity from fixed locations to assess potential collision risk with wind turbines.

Zone of Influence (ZoI)
The area within which a development may have significant ecological effects, either directly or indirectly.

7.9 List of Abbreviations

AA – Appropriate Assessment

AASR – Appropriate Assessment Screening Report

ARU – Autonomous Recording Unit

BAP – Biodiversity Action Plan

BoCCI – Birds of Conservation Concern in Ireland

BTO – British Trust for Ornithology

CBS – Common Bird Survey

CIEEM – Chartered Institute of Ecology and Environmental Management

CRM – Collision Risk Model

DoHPLG – Department of Housing, Planning and Local Government

EIAR – Environmental Impact Assessment Report

EPA – Environmental Protection Agency

FT – Fehily Timoney

GIS – Geographic Information System

HHVP – Hen Harrier Vantage Point

IHHWS – Irish Hen Harrier Winter Survey

IWeBS – Irish Wetland Bird Survey

ITM – Irish Transverse Mercator

KER – Key Ecological Receptor

NBDC – National Biodiversity Data Centre

NHA – Natural Heritage Area

NIS – Natura Impact Statement

NPWS – National Parks and Wildlife Service

NRA – National Roads Authority

pNHA – Proposed Natural Heritage Area

SAC – Special Area of Conservation

SNH – Scottish Natural Heritage (now NatureScot)

SPA – Special Protection Area

TDR – Temporary Development Route

TR – Transect Route

VP – Vantage Point

ZoI – Zone of Influence