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DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED DREHID WIND FARM, CO. KILDARE

VOLUME 2 - MAIN EIAR

CHAPTER 8.2 - ORNITHOLOGY

Prepared for:

North Kildare Wind Farm Ltd.

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8. [8-2] ORNITHOLOGY

8.1 Introduction

This chapter has been prepared to examine any potential effects of the Proposed Wind Farm, Proposed Substation and turbine delivery route on ornithological receptors in the local environment.

Mitigation measures to reduce or eliminate effects on ecological receptors are prescribed as necessary. The assessment also considers cumulative effects associated with other nearby developments.

A full description of the Proposed Development assessed in this EIAR is provided in Chapter 3 Development Description and comprises the following elements:

- The wind farm site (referred to in this EIAR as 'The Proposed Wind Farm');
- The grid connection, comprising a 110 kV substation and loop-in connection to the existing 110 kV overhead line (referred to in this EIAR as the 'The Proposed Substation');
- The turbine delivery route (referred to in this EIAR as the 'TDR').

8.2 Legislation and Policy

The species and habitats provided National and International protection under the following legislative and policy documents have been considered in this Impact Assessment.

8.2.1 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.

8.2.2 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).

8.2.3 *National Policy*

Ireland's fourth National Biodiversity Plan (2023-2030) was launched January 2024. The plan sets the national biodiversity agenda for the period 2023-2030 and aims to deliver the transformative changes required to the ways in which we value and protect nature. The 4th NBAP strives for a “whole of government, whole of society” approach to the governance and conservation of biodiversity. The aim is to ensure that every citizen, community, business, local authority, semi-state and state agency has an awareness of biodiversity and its importance, and of the implications of its loss, while also understanding how they can act to address the biodiversity emergency as part of a renewed national effort to “act for nature”.

This National Biodiversity Action Plan 2023-2030 builds upon the achievements of the previous Plan. It will continue to implement actions within the framework of five strategic objectives, while addressing new and emerging issues:

- Objective 1 - Adopt a Whole of Government, Whole of Society Approach to Biodiversity
- Objective 2 - Meet Urgent Conservation and Restoration Needs
- Objective 3 - Secure Nature’s Contribution to People
- Objective 4 - Enhance the Evidence Base for Action on Biodiversity
- Objective 5 - Strengthen Ireland’s Contribution to International Biodiversity Initiatives

8.3 Consultation

The consultation process carried out for the project began with previous iterations of the Proposed Development, starting with the 2018 application. A Scoping Update Letter was issued out to all consultees in 2024 to update them of amendments to the site layout, and the inclusion of the Proposed Substation, which differed from the proposed method of connecting to the grid in the 2018 design.

The full list of the bodies consulted as part of the environmental assessment of the project are presented in Chapter 2/5 - Background to the Proposed Development/Need for the Proposed Development. Specific to biodiversity, the environmental stakeholders listed in Table 8-1 were contacted. Their responses are detailed in Table 8-1.

Table 8-1: Environmental stakeholder consultation

Organisation/Stakeholder	Response (2018)	Response (2024)
An Taisce	No response to date	No response to date
Bat Conservation Ireland	No response to date	No response to date
Birdwatch Ireland	No response to date	No response to date
Department of Culture, Heritage and the Gaeltacht (2018) Department of Housing, Local Government & Heritage (2024) (via DAU)	Acknowledgement of receipt of correspondence. Information on consultation to be solely administered to DAU for distribution to the National Parks and Wildlife Service and the National Monuments Service. A further response outlining details of information to be supplied in advance of any meetings, and information which should not be supplied at pre-applications stage was issued on 13 November 2018.	Response from the DAU provided generic advice on the preparation of the Cultural Heritage Impact Assessment.
EPA	No response to date	No response to date
Inland Fisheries Ireland	Comments and observations of a general nature provided by IFI. Observations noted include potential impacts to fisheries waters, forming part of the Eastern River Basin District. The role of smaller watercourses as contributories to downstream habitats, of which have the potential to convey deleterious matter from development works and regard should be had to this. Temporary crossing structures should follow IFI recommendations.	No response to date
Irish Peatland Conservation Council	Consultation response identifies the Mulgeeth Bog, an intact raised bog remnant that must be protected. The consultation response requests detail on how the proposed development will be hydrologically managed to enhance and conserve the bog which is a refuge for Common Frog. The response also notes a proposed (now operational) Timahoe North Solar Farm, adjacent to the proposed development boundary. A response is sought for confirmation of provisioning of adequate setback from the wind turbines taking into account Curlew. Request also made for demonstrations of the proposals the developer is making to develop amenity value and how this dovetails with the solar project walk routes as proposed.	No response to date

Organisation/Stakeholder	Response (2018)	Response (2024)
Irish Raptor Study Group	No response to date	No response to date
Irish Red Grouse Association	No response to date	No response to date
Irish Wildlife Trust	No response to date	No response to date
South Eastern River Basin District	No response to date	No response to date

8.4 Statement of Authority

An ecological appraisal of the proposed project was undertaken by Fehily Timoney and Company (FT) to inform this chapter. The lead author of this chapter is Ben O'Dwyer (FT Senior Project Ecologist, BSc. Wildlife Biology). Ben has over eight years ecological consultancy experience and 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. This chapter was co-authored by Éimear Stephenson (FT Project Ecologist, MSc Biodiversity and Conservation, BSc Marine Science). She has extensive experience in aquatic and terrestrial ecological studies, including field work, laboratory work and desk-based studies.

The chapter was reviewed 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.

The full list of contributors to ecological baseline surveys and reporting is detailed in Appendix 8.2-1. Surveyor biographies and qualifications for all contributors are also included in Appendix 8.2-1.

8.5 Methodology

8.5.1 Relevant Guidance

The methodology for this appraisal has been devised in accordance with the following relevant guidance published by the Environmental Protection Agency (EPA) including '*Guidelines on the information to be contained in Environmental Impact Statements* (2022), and '*Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*' (DoHPLG, 2018).

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 adhered to. The appraisal also adheres to *CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (Version 1.2) published by the Chartered Institute of Ecology and Environmental Management (CIEEM) (2018; last updated April 2022).

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 (2010)*' and '*Assessing the cumulative impact of onshore wind energy developments (2012)*' have also been applied.

Relevant guidance published by the National Roads Authority (NRA), and applicable to assessing biodiversity, was also followed, including '*Guidelines for the Assessment of Ecological Impacts of National Road Schemes – Revision 2*' (NRA 2009a), '*Ecological surveying techniques for protected flora and fauna during the planning of National Road Schemes – Version 2*' (NRA 2009b), '*Environmental Impact Assessment of National Road Schemes – A practical guide*' (NRA 2008b),'*Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*' (NRA 2008a) and '*Guidelines on protection of fisheries during construction works in and adjacent to waters*' (IFI, 2016).

8.5.2 Desktop Study

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 project is situated. The following sections detail the desktop study methodologies utilised in the assessment.

8.5.2.1 Designated Nature Conservation Sites

Special Areas of Conservation (SACs) and Special Protection Areas for Birds (SPAs) 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 AA Screening Report (AASR) and Natura Impact Statement (NIS), respectively, that accompany this application.

Natural Heritage Areas (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 Appropriate Assessment Screening Report and 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 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 08/04/2025. The datasets were utilised to identify Designated Sites which could feasibly be affected by the Proposed Wind Farm. 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 10 Hydrology and Water Quality.

8.5.2.2 Avifauna

A desk study covering Avifauna was undertaken to collate and review available information, datasets and documentation sources pertaining to the natural environment in which the proposed project is situated.

Records available on the NPWS and the National Biodiversity Data Centre (NBDC) websites were reviewed (search updated 13th May 2025), in addition to records of rare/sensitive species within the hectads (10km grid squares) overlapping the Site obtained by request from NPWS (received 10th April 2024). Records were also investigated at a finer spatial scale by searching within the following 2 km grid squares overlapping the and adjoining the Proposed Development: N73N, N73I, N73T, N73P, N73M, N73H, N73G, N73B and N73U (most recent search completed 13th May 2025).

NBDC data for the 1 km grid squares overlapping the TDR accommodation works (N7640, N7135, N7134, N7234, N7333, N7437, N7438 and N7538) (search updated 13th May 2025) provided desktop information for these locations.

Other sources included:

- Kildare County Development Plan 2023-2029
- OSI Aerial photography and 1:50000 mapping;
- NPWS website (mapviewer; Article 12 reporting;)
- NPWS rare and protected species records obtained by request on 10th April 2024;
- Birdwatch Ireland I-WeBS mapping and site counts
- National Biodiversity Data Centre (NBDC) website and data obtained on 13th May 2025;
- Teagasc Soil area maps;
- Geological Survey Ireland (GSI) area maps;
- OPW drainage maps;
- EPA website datasets (soil, surface water quality, ground water quality, designated sites);

8.5.3 Field Study

8.5.3.1 Target Species

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

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

The list of target species was informed by Gilbert et al. (2021), species most at risk from particular effects such as disturbance and displacement (Nairn and Partridge, 2013) and a review of the bird species listed on Annex I on the EU Birds Directive (2009/147/EC). The process of target species selection is explored in-depth within the Baseline Ornithology Report in Appendix 8.2-2.

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.

In addition to the above, consideration was given to species identified as being of local or regional conservation concern, particularly those susceptible to effects from wind farm development. Note that not all species on the above lists are categorised as target species, e.g., most passerine species and general lowland farmland birds are not considered to be particularly susceptible to effects from wind farms (Scottish Natural Heritage Guidance, 2017).

8.5.3.2 Vantage Point Surveys

Vantage Point (VP) surveys were carried out at the proposed Drehid Wind Farm site during the breeding seasons of April to September 2022 and April to September 2023 and non-breeding seasons of October 2021 to March 2022 and October 2022 to March 2023, in accordance with Scottish Natural Heritage (SNH) methodology for onshore Wind Farms (Scottish Natural Heritage Guidance, 2017). Additional migration VP watches were also completed in Spring 2022 and 2023. A total of two VP locations overlooking the Drehid wind farm flight activity study area were used during the VP survey (see Figure 8-1). These were chosen to cover specific viewsheds of the Proposed Wind Farm and to encompass a 500m buffer zone around the proposed turbine layout of the wind farm. SNH (2017) guidance states that viewsheds should cover a 500 m circular buffer drawn around each proposed turbine location. This buffer is referred to as the 'SNH Buffer' (see Figure 8-1).

The flight activity study area, comprised of the combined viewsheds, overlaps the Proposed Wind farm and the Proposed Substation. This 'flight activity study area, or 'study area' is utilised as a geographic descriptor when detailing the results of flight activity surveys (Section 8.12).

The combined viewshed coverage of the SNH buffer is 95.9%.

The main purpose 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; and
- 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 (Scottish Natural Heritage Guidance, 2017) (Band et al. 2007 and Band, 2024), viewshed analysis was undertaken using ArcMap, 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 1.5 m. We note the following from SNH guidance in respect of priority areas for viewshed analysis (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, 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 was 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 vantage point and on departure is noted. The Vantage Point survey schedule can be found in Appendix 1 of Appendix 8.2-2, and Vantage Point survey results can be found in Appendix 2 of Appendix 8.2-2. Details of each flight-path observation are provided Appendix 3 of Appendix 8.2-2. Binoculars and telescopes are used to scan for target species. Dictaphones are utilised to dictate bird heights whilst tracking flight events.

Flight heights are 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.

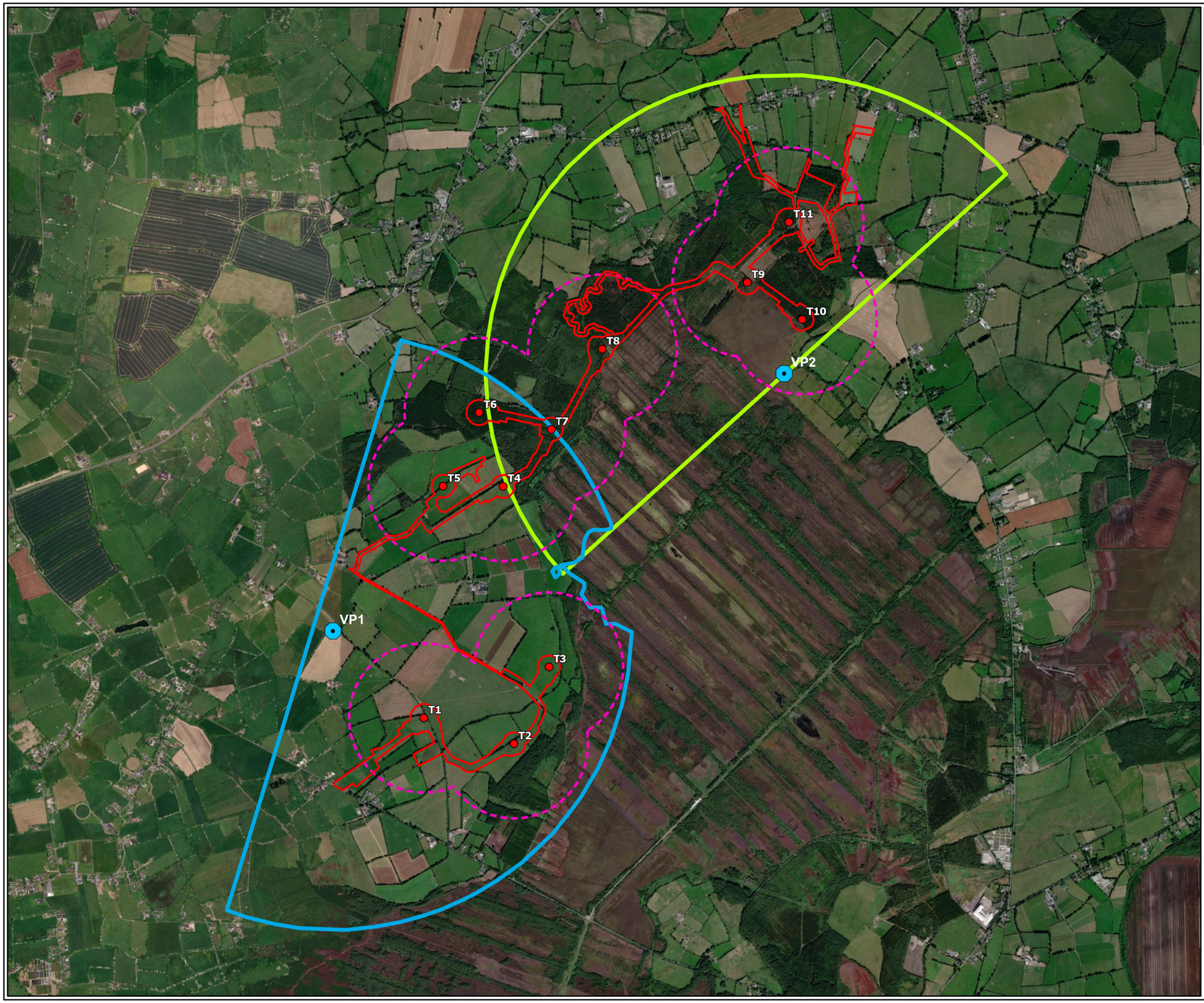
VP surveys involved carrying out 2 x 3-hour VPs at each VP every month. As per SNH guidance (2017), the requisite 36 hours were carried out at each vantage point during the breeding period, and 36 hours during the wintering period. Additional VP survey rounds (6 hours per VP) were conducted in April 2022 and April 2023 to cover the spring migration period, and an additional three hours of VP survey time was completed in July 2023, exceeding SNH (2017) requirements.

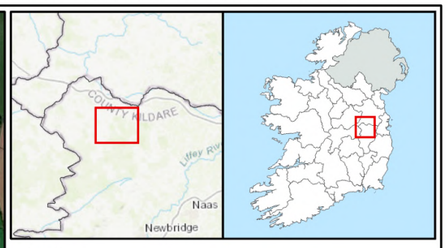
The bird activity recorded both inside and outside the Proposed Wind Farm and Proposed Substation site boundaries was used as part of the overall analysis and assessment of target species usage of the study area. Details of vantage point locations can be found in Table 8-2 below. All surveys were conducted during suitable weather conditions.

Table 8-2: Vantage Point Locations (ITM)

Vantage Point	Eastings (ITM)	Northings (ITM)
VP 1	673136	735084
VP 2	676257	736663

Path: R:\Map Production\2020\P20-326\Workspaces\P20_326_Report_Figures\P20_326_Report_Figures.aprx





Legend

- Proposed Development Boundary
- VP2 Viewshed
- VP1 Viewshed
- 500m
- VP Locations
- Turbine Locations

N
W E
S

0 0.5 1 2 Kilometers

TITLE:	Vantage Point Locations and Viewshed Analysis		
PROJECT:	Drehid Wind Farm and Substation		
FIGURE NO:	8.1		
CLIENT:	North Kildare Wind Farm Ltd.		
SCALE:	1:25,000	**REVISION:**	0
DATE:	13/05/2025	**PAGE SIZE:**	A3

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8.5.3.3 Breeding Bird Transect 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). In 2021, the study area comprised one c. 0.6 km and one 2.2 km transect centred on different habitats present within the subject site (see Figure 2-2 in Appendix 8.2-2). In 2022 and 2023, the study area comprised two transects centred on different habitats present within the subject site. Each transect was c. 2 km in length but was subdivided into two 1 km transects (see Figure 2-2 in Appendix 8.2-2).

Breeding bird transects were carried out over three years (2021, 2022 and 2023). Birds were counted over two visits per breeding season, each timed to coincide with the early part of the breeding season (April to mid-May) and later part of the season (mid-May to July). 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 25 m, between 25 m-100 m and over 100 m 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). Table 8-3 below details the breeding bird transect survey schedule, and includes the weather conditions for each survey.

Table 8-3: Breeding Bird Transect Survey Details

Date	Cloud (Oktas)	Precipitation	Visibility	Wind Speed (Beaufort)	Wind Direction	Transect	Start	End
Summer 2021								
23/04/2021	0	Dry	Good	1	E	4	07:00	09:30
07/05/2021	0	Dry	Good	1	E	3	09:00	11:00
25/05/2021	8	Dry	Good	1	W	4	07:00	09:00
29/05/2021	4	Dry	Good	0	-	3	07:00	09:00
Summer 2022								
14/05/2022	1	Dry	Good	1	-	1	07:20	07:55
14/05/2022	1	Dry	Good	1	-	1	08:15	08:50
14/05/2022	6	Dry	3-5km	2	-	2	10:10	10:35
14/05/2022	6	Dry	3-5km	2	-	2	09:30	10:00
01/07/2022	7	Dry	Good	1	-	1	08:00	08:30

Date	Cloud (Oktas)	Precipitation	Visibility	Wind Speed (Beaufort)	Wind Direction	Transect	Start	End
01/07/2022	7	Dry	Good	2	-	2	09:15	09:35
01/07/2022	6	Dry	Good	2	-	2	09:40	09:55
01/07/2022	8	Light Drizzle	3-5km	4	-	1	07:15	07:55
Summer 2023								
16/05/2023	-	Dry	Excellent	2	NW	1 + 2	08:00	10:00
08/06/2023	-	Dry	Excellent	3	NE	1 + 2	09:00	10:45

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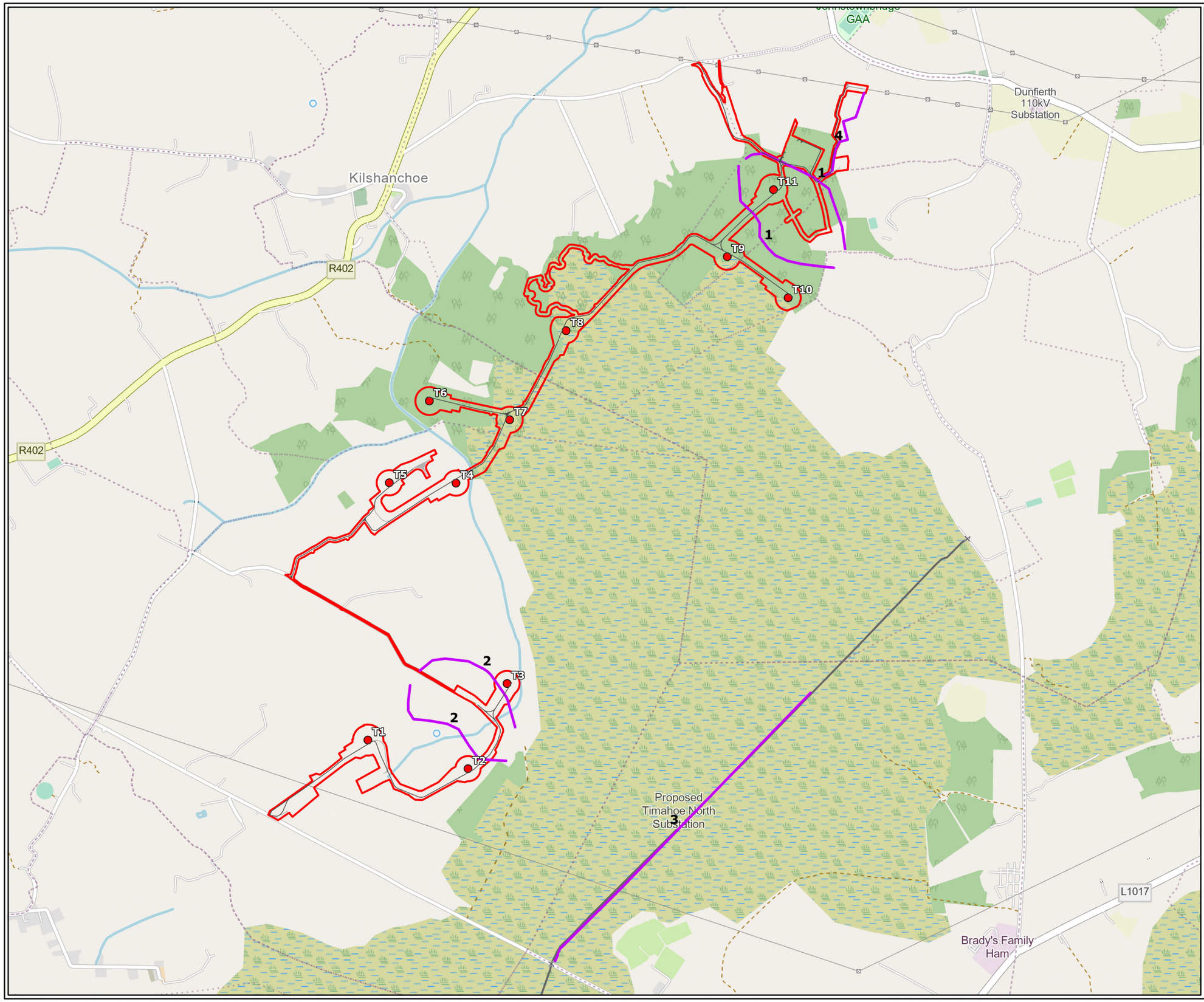

Legend

- Proposed Development Boundary
- Access Track
- Temporary Access Track
- Breeding and Wintering Bird Transects
- Turbine Locations

TITLE:	Breeding/Wintering Bird Survey Transects		
PROJECT:	Drehid Wind Farm and Substation		
FIGURE NO:	8.2		
CLIENT:	North Kildare Wind Farm Ltd.		
SCALE:	1:22,500	**REVISION:**	0
DATE:	15/05/2025	**PAGE SIZE:**	A3

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8.5.3.4 Transect Surveys during Winter Months

General wintering bird transects methodology followed the same methodology as the breeding bird transects. These transects were carried out during the 2021/22 non-breeding season, where three survey rounds were undertaken between December 2021 and March 2022.

The wintering bird transect schedule is available in Table 8-4:

Table 8-4: Wintering Bird Transect Survey Details

Date	Cloud (Oktas)	Precipitation	Visibility	Wind Speed (Beaufort)	Wind Direction	Transect	Start	End
15/12/2021	0	Dry	3-5km	1	SW	1	11:00	15:30
16/12/2021	8	Dry	3-5km	1	SW	2	10:30	14:30
03/01/2022	4	Dry	Good	2	S	2	10:00	13:00
03/01/2022	8	Dry	Good	3	S	1	13:15	14:45
15/02/2022	4	Dry	3-5km	2	W	2	11:50	14:00
15/02/2022	7	Dry	3-5km	2	NW	1	10:00	11:30

8.5.3.5 Breeding Wader Surveys

Survey transects to assess the presence of breeding wader populations were completed during the 2021, 2022 and 2023 breeding seasons. 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*, 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 (Table 8-5):

Table 8-5: 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
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 from roads, farm tracks or roadsides (where possible); larger areas of open ground not visible from easily 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. Count units were predefined for each target species and included in the method statement provided to surveyors (See Table 8-6).

Table 8-6: Count Units for each Wading Species

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

All suitable habitats for waders were visited and observations were made along four transects (Figure 8-3), between the months of April - May (2021), May - July (2022) and May - June (2023). 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.

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

Table 8-7: Breeding Wader Survey Details

Date	Transect	Cloud (Oktas)	Precipitation	Visibility	Wind Speed (Beaufort)	Wind Direction	Start	End
2021								
24/04/2021	3	7	Dry	Good	0	-	07:00	08:00
25/04/2021	3	7	Dry	Good	0	-	10:00	11:00
07/05/2021	3	0	Dry	Good	0	-	11:00	15:00
16/05/2021	3	8	Dry	Good	0	-	07:00	11:00
29/05/2021	3	4	Dry	Good	0	-	09:30	11:30
2022								
17/05/2022	A	2	Showers	Good	F2	-	07:30	08:30
17/05/2022	B	2	Showers	Good	F2	-	08:30	09:30
31/05/2022	A	2	Dry	5 + km	F2	S	05:50	07:05
31/05/2022	B	2	Dry	5 + km	F2	S	07:05	08:20
04/07/2022	A	8	Dry	Good	F2	-	21:30	22:30
04/07/2022	B	8	Dry	Good	F2	-	22:30	23:30
2023								
16/05/2023	A & B	-	Dry	Ex.	F2	-	10:00	12:00
08/06/2023	A & B	-	Dry	Ex.	F3	-	10:45	13:30
26/06/2023	A & B	7	Dry	3-5km	F1	-	21:44	22:55

8.5.3.6 Woodcock Surveys

Breeding season surveys were undertaken in 2021, 2022 and 2023 to determine the presence of breeding woodcock (*Scolopax rusticola*) and record any potential breeding activity. During the 2021 and 2022 breeding seasons, dusk surveys were carried out using transect-based recording to assess for the presence of woodcock following the methods set out in Bibby et al. (2000) and Gilbert et al., (1998) where the primary count unit for breeding birds is defined as a displaying male. Survey effort was focused wooded habitats and clearings potentially suitable for use by breeding woodcock. Surveys were timed to take in the dusk period.

Table 8-8: Woodcock Transect Survey Details 2021 & 2022

Date	Transect	Cloud (Oktas)	Precipitation	Visibility	Wind Speed (Beaufort)	Wind Direction	Start	End
Summer 2021								
14/05/2021	3	8	Dry	Good	0	N/A	20:15	22:00
26/05/2021	4	4	Dry	Good	0	N/A	21:10	22:30
Summer 2022								
13/05/2022	A + B	3	Dry	Good	F2	-	21:00	22:45
17/06/2022	A + B	7	Dry	Good	F1	-	21:00	23:15
06/07/2022	A + B	8	Dry	Good	F2	-	21:30	23:15

Dusk watches for woodcock were carried out from fixed points overlooking suitable woodcock breeding habitat during the 2023 breeding season. The survey methodology utilised was the method used for the UCC Breeding Woodcock Survey (adapted from Hoodless et al. 2009). Two points (see Figure 8-3) central to the site and located in a woodland clearing and facing a woodland edge were used as survey points from which the surveyor observed woodcock activity. All specimens encountered (seen or heard) were recorded and their abundance, behaviour, sex/age and breeding status noted. Table 8-9 details the survey dates and weather conditions.

Table 8-9: Woodcock Survey Details 2023

Date	VP	Cloud (Oktas)	Precipitation	Visibility	Wind Speed (Beaufort)	Wind Direction	Start	End
08/06/2023	W-1	7	Dry	Good	F1	NE	21:34	22:50
20/06/2023	W-2	8	Dry	Good	F1	-	21:43	22:58
26/06/2023	W-1	7	Dry	Ex.	F2	-	21:44	22:59

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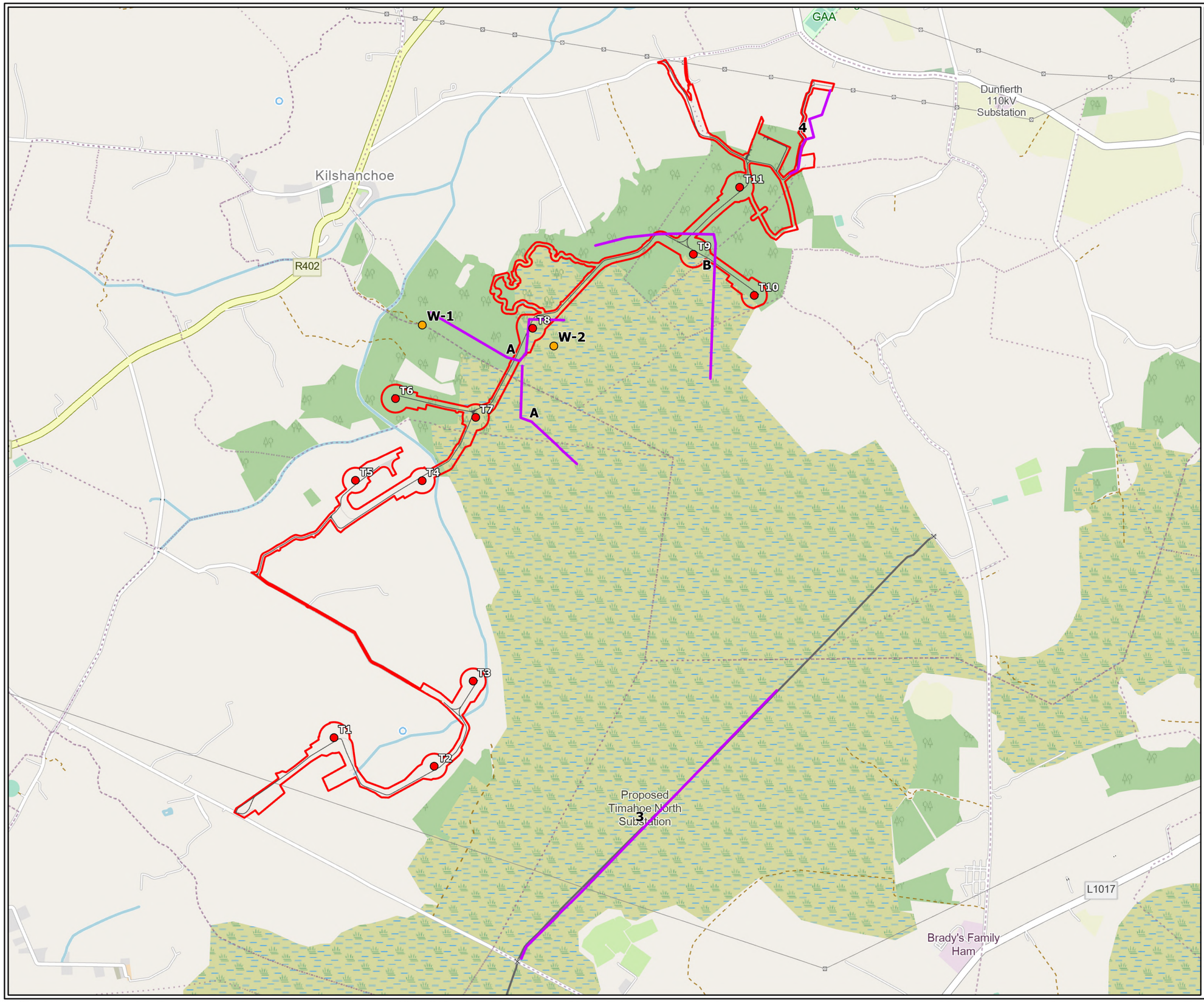

Legend

- Proposed Development Boundary
- Access Track
- Temporary Access Track
- Wader Transects
- Woodcock Survey Points 2023
- Turbine Locations

TITLE:	Breeding Wader Survey Locations		
PROJECT:	Drehid Wind Farm and Substation		
FIGURE NO:	8.3		
CLIENT:	North Kildare Wind Farm Ltd.		
SCALE:	1:22,500	**REVISION:**	0
DATE:	15/05/2025	**PAGE SIZE:**	A3

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8.5.3.7 Merlin Surveys

A survey to assess the presence of merlin populations was completed during the 2023 breeding season. Merlin surveys were centred on suitable habitat for the species and methods used are based on previous surveys in Ireland (Lusby et al. 2011 and Fernandez et al. 2010); developed in association with Dr. John Lusby of BirdWatch Ireland. The study area for merlin is defined as a 1km square centrally placed on suitable habitat. A total of two 1 km grid squares were surveyed for merlin (N7935 and N7536). A total of three survey rounds were completed during the 2023 merlin breeding season (May 18th, June 24th and July 15th 2023). Weather conditions were suitable for all surveys (dry, F2, 6 to 8 Oktas with good to excellent visibility).

8.5.3.8 Hinterland Surveys

The methodology used for wetland sites during 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 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, farmland) in the area surrounding the proposed development site. The survey was focused on nine sites within c. 10 km of the proposed development (see Figure 2-5 in Appendix 8.2-2). Hinterland surveys were carried out between April 2021 and September 2023. The sites detailed in Table 8-10 were checked regularly across this period. The survey schedule and weather conditions are detailed in Appendix 4 of the Baseline Ornithology Report (Appendix 8.2-2).

8.5.3.8.1 Barn Owl

A high level assessment of potential barn owl habitat was undertaken based on observations during hinterland surveys, desktop assessment and information from local residents.

A targeted survey for barn owl was caried out during 26-27th June 2023 between 23:00 - 01:30. The guidance documents 'Survey and Mitigation Standards for Barn Owls to inform the Planning, Construction and Operation of National Road Projects' (TII, 2021) and Shawyer (2012) 'Barn Owl *Tyto alba* Survey Methodology and Techniques for use in Ecological Assessment' informed the survey. The surveys searched suitable breeding and foraging habitats, including areas overlapped by HVP2, HVP3, and local access tracks and roads within 5km of the Proposed Development traversing and accessing suitable habitats.

A search for suitable habitats and nest locations was also carried out during 22nd-25th May 2021. Extensive enquiries with local Birdwatch Ireland members and farmers were also undertaken.

8.5.3.8.2 Raptor Surveys

Targeted surveys to assess the presence of raptor populations following Hardey et al. (2013) were completed during the 2023 breeding season. The surveys involved visits to suitable breeding habitats within c.8 km of the proposed development, examining the existing hinterland survey locations with an increased focus on raptor habitats. Following initial surveys covering HVP1 - HVP6, extended watches (2 - 2.5 hours length) were conducted at higher potential habitat locations.

These surveys were carried out on June 8th and 20th, July 15th, August 15th, and September 13th 2023.

Table 8-10: Hinterland Survey Locations & Schedule

Code	Site Name	Distance/Direction from Nearest Turbine (km)	Nearest Turbine
HVP1	Drehid	0.8km S & N	T1 & T5
HVP2	Coolree	0.72km SE	T11
HVP3	Timahoe North	1.8km SE	T10
HVP4	Hortland	3.1km E	T10
HVP5	Donadea Forest	8.2km SE	T10
HVP6	Ballynafagh Lake & Bog	8.7km SE	T2
HVP7	Lodge Bog	9.5km S	T2
HVP8	Lullymore & Lodge Bog	8.7km SW	T2
HVP 9	Lullymore Wetlands	9.9km SW	T2

8.5.3.9 Kingfisher Survey

Triturus Environmental Ltd. conducted a kingfisher survey for the proposed development during mid-April to mid-June 2022 in accordance with relevant guidance (e.g. SNH, 2017; NRA, 2009) (kingfisher baseline report included in Appendix 8.2-3). The survey aimed to locate kingfisher habitats, essential for breeding and feeding, and inform mitigation measures and stream crossing designs. The site's diverse habitats and river channels provide potential nesting areas, but historical human interventions have affected the natural hydrology and vegetation composition.

The methodology involved in the kingfisher survey included a desktop review of existing data and presence/absence surveys.

- **Desktop Review -** This entailed reviewing available kingfisher-related data within 5km of the proposed site boundary, including records from the National Biodiversity Data Centre and previous ecological surveys.
- **Presence/Absence Surveys -**

  Vantage Point Surveys: Fixed vantage points along the Fear English River were chosen for observing kingfisher distribution from mid-April to mid-June 2022. Surveys were conducted within a specific timeframe and recorded various behaviours and habitat usage.

  Bank Walkover Transect Surveys: These surveys, conducted in August 2022, involved walking along the Fear English River and adjoining water bodies to assess potential nesting and foraging habitats. GPS coordinates were recorded for kingfisher sightings or nests, and habitat characteristics were noted.

The surveys aimed to gather data on kingfisher distribution, behaviour, and habitat usage to inform mitigation measures for the proposed development.

It is noted that the 2022 kingfisher survey re-surveyed the same sites covered during the previous 2019 kingfisher survey (2019 survey was carried out to inform further information response for the original application).

An updated survey was carried out in December 2023 to reconfirm baseline conditions.

8.6 Ecological 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 10 km 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.

8.6.1 Assessing Effect Significance

Once the value of the identified avian receptors (features and resources) was determined, the next step was to assess the potential effects of the project on the identified key ecological receptors, following the EPA evaluation criteria utilised in this appraisal of the Environmental Factor, Biodiversity. This criteria is included in the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA 2022).

8.6.1.1 Assessment of Effect Type and Magnitude

Assessment of effects takes into account construction, operational and decommissioning effects with reference to the potential for direct, indirect and cumulative effects. The assessment also takes account of any residual effects that may persist following the implementation of any mitigation or best practice design.

The characterisation of effects reflects the ecological structure and function upon which the key ecological receptors depend. Detailed assessment of effects takes into account the magnitude of effects affecting populations.

This EIAR uses the EPA (2022) classification of effects in order to describe the quality, significance, duration and type of effect.

The ecological significance of the effects of the Proposed Development are determined following the precautionary principle and in accordance with the methodology set out in Section 5 of CIEEM Guidelines for Ecological Impact Assessment (2018).

For the purpose of Ecological Impact Assessment (EcIA), 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local (CIEEM, 2018).

When determining significance, consideration is given to whether:

- Any processes or key characteristics of key ecological receptors will be removed or changed
- There will be an effect on the nature, extent, structure and function of important ecological features
- There is an effect on the average population size and viability of ecologically important species.
- There is an effect on the conservation status of important ecological habitats and species.

8.6.1.2 Assessment of Cumulative Effects

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location (CIEEM, 2018). Different types of actions can cause cumulative impacts and effects. As such, these types of impacts may be characterised as;

- Additive/incremental – in which multiple activities/projects (each with potentially insignificant effects) add together to contribute to a significant effect due to their proximity in time and space (CIEEM, 2018); and,
- Associated/connected – a development activity 'enables' another development activity e.g. phased development as part of separate planning applications. Associated developments may include different aspects of the project which may be authorised under different consent processes. It is important to assess the potential impacts of the 'project' as a whole and not ignore impacts that fall under a separate consent process (CIEEM, 2018).

8.6.1.3 Assessment of Residual Effects

After characterising the potential impacts of the Development, and assessing the potential effects of these impacts on the 'Important ecological features', mitigation measures are proposed to avoid and / or mitigate the identified ecological effects.

Once measures to avoid and mitigate ecological effects have been finalised, assessment of the residual impacts and effects should be undertaken to determine the significance of their effects on the 'Important ecological features'.

The tables and matrices used to inform ecological resource evaluation and effect significance assessment are included in Appendix 8.2-4.

8.6.1.4 Avifauna-specific Assessment

The criteria applicable to avifauna outlined in Table 8-11 below 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 (Percival, 2003).

Table 8-11: 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. Significant 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 8-12.

Table 8-12: Significance matrix: combining magnitude and sensitivity to assess significance (Percival, 2003)

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

8.7 Description of Existing Environment

The ecology of the existing environment is described within this section.

8.7.1 Site Description

The Proposed Wind Farm site includes lands in the townlands of Ballynamullagh, Kilmurry, Killyon, Coolree, Mulgeeth, Drehid and Dunfierth. The Proposed Substation is located within the townland of Coolree. The site is located south of Johnstown Bridge, Co Kildare.

The site of the Proposed Development is located in relatively low-lying but undulating land with the majority of proposed turbines located beneath the 80m contour line. The landcover is classified in Corine as 2.3.1 Pastures; 3.1.2 Coniferous Forest and 3.2.4 Transitional Woodland shrub. The east of the Site is adjacent to a cutover bog (Timahoe Bog). The Fear English River passes through the Site and travels along its eastern boundary.

The GSI 1:100,000 scale bedrock geology map shows that Lucan Formation (Calp) underlies the Proposed Development site. Lucan Formation comprises varied dark grey to black basinal limestone and shale beds. Fieldwork confirmed the presence of peat over a large proportion of the site area; with peat depths varying between 0.2m to 5.4m with an average depth of peat of approximately 2.2m. The Fear English River also known as the Ballynamullagh (07_982) (EPA name/segment code) dissects the proposed development. This waterbody is a tributary of the River Blackwater. The main tributary of the River Boyne is the River Blackwater and a number of its small tributaries.

8.7.2 Designated Sites

The full list of designated sites considered within the ecological assessment is included in Chapter 8-1 Biodiversity. For Chapter 8-2 Ornithology the discussion of designated sites focuses on those site which have ornithological interests.

8.7.2.1 Sites of International Importance

An Appropriate Assessment (AA) Screening Report and Natura Impact Statement (NIS) have been completed in order to appraise the likely significant effects of the proposed development either alone or in combination with other plans or projects on European Sites (SACs, cSACs, SPAs and proposed SPAs); these accompany this planning application.

8.7.2.1.1 Special Areas of Conservation (SACs)

SACs are protected under the European Union (EU) 'Habitats Directive' (92/43/EEC), as implemented in Ireland by S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) and Part XAB of the Planning and Development Act 2000 (as amended). There are two SACs within 15km of the Proposed Development which have ornithological interests: River Boyne And River Blackwater SAC and Ballynafagh Bog SAC. A search for further SACs beyond 15km with potential ecological links to the proposed development was also undertaken.

The full NPWS site synopses for designated areas are available on www.NPWS.ie.

8.7.2.1.2 Special Protection Areas (SPAs)

SPAs are designated under the EU Birds Directive (2009/147/EC) ('The Birds Directive'). There is one SPA within 15km of the Proposed Development. A search for further SPAs beyond 15km with potential ecological links to the proposed development was also undertaken.

The full NPWS Site synopses for designated areas are available on www.NPWS.ie.

8.7.2.2 Sites of National Importance

Sites of National Importance in Ireland are termed Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs).

There is one pNHA within 15 km which has ornithological interest: Ballynafagh Bog pNHA.

It should be noted that Ballynafagh Bog SAC (site code 000391) overlaps with Ballynafagh Bog pNHA (site code 000391).

Ballynafagh Bog pNHA and SAC (site code 000391) is located ca. 8.7 km from the closest turbine (turbine 2) within the proposed development. The site is a raised bog situated c.1k m west of Prosperous, Co. Kildare. The site contains the priority habitat active raised bog along with degraded raised bog and rhynchosporion vegetation, the site also supports breeding merlin, curlew and snipe. Under the NRA site evaluation criteria (NRA, 2009a) this site would be rated as of 'International Importance' and is therefore a key receptor for the current assessment.

Table 8-13: European Sites with ornithological interest within 15 km of Proposed Development

Site	Code	Designated Features	Closest Turbine
Ballynafagh Bog SAC	000391	• Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] Site synopsis (NPWS, 2013) notes presence of breeding merlin, curlew and snipe.	8.7 km (turbine 2)
River Boyne And River Blackwater SAC	002299	• Alkaline fens [7230] • Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] • *Lampetra fluviatilis* (River Lamprey) [1099] • *Salmo salar* (Salmon) [1106] • *Lutra lutra* (Otter) [1355] Site synopsis (NPWS, 2014) notes presence of wintering whooper swan.	10.2 km (turbine 6)
River Boyne and River Blackwater SPA	004232	• Kingfisher (*Alcedo atthis*) [A229]	10.2 km (turbine 6)

Table 8-14: National Sites with ornithological interest within 15 km of Proposed Development

Site	Code	Features of Interest	Summary Description	Closest Turbine
Ballynafagh Bog pNHA (also an SAC)	000391	[7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation Merlin	The site is a raised bog situated c.1 km west of Prosperous, Co. Kildare. The site contains the priority habitat active raised bog and also supports breeding Merlin.	8.7 km (turbine 2)

8.7.2.3 Other Designated Sites

8.7.2.3.1 OPW Wildlife Sanctuaries

Ballynafagh Lake (Blackwood Lake) (Wildfowl Sanctuary Code: WFS-30) is located approximately 7.9 km south-east of the nearest infrastructure of the proposed development. This site is present under the OPWs List of Wildlife Sanctuaries Wildlife Service Report (1990) and is also classified as an SAC (Site Code: 1387), of the same name. Features of interest within this site includes Alkaline fens [7230], *Vertigo moulinsiana* (Desmoulin's Whorl Snail) [1016] and *Euphydryas aurinia* (Marsh Fritillary) [1065].

8.7.2.3.2 Ramsar Sites

The two closest Ramsar Sites are Pollardstown Fen and Raheenmore Bog, which overlap the NPWS nature reserves/SACs described above.

8.7.2.3.3 Wetlands Ireland Sites

The register of Irish wetland sites curated by Wetlands Ireland was also consulted. The primary sites of interest are the intact and partially drained sections of raised bog (Mulgeeth Bog) to the south of T9/T10 and east of T8. These have been surveyed in detail during the course of ecological surveys at the Proposed Development and are a core feature in the ecological assessment.

Other areas of remnant raised bog nearby include Hortland Bog (c. 3 km east of T10) and Drumachon bog c. 500m east of T2. Timahoe North Bog, located east and south of the Proposed Development, is dominated by recolonising cutover bog. Wetlands Ireland also notes a number of minor wetland sites in the wider area surrounding the Proposed Development, including wet woodlands, artificial ponds, springs and areas of wet grassland/marsh.

8.7.3 Desktop Study

A desktop study was undertaken to locate any records of rare or protected avian species that have previously been recorded in the site and the surrounding area. Examination of NPWS and NBDC records within grid square N73 indicates there are no avifauna records in the NPWS dataset, and a total of 111 avian species (regardless of conservation status or date) recorded within the NBDC dataset. Of these 111 species, 53 species are considered rare or protected.

A total of two records are considered to be historical records ranging from 1972 to 1991, namely corn crake (*Crex crex*) and red grouse (*Lagopus lagopus*).

Excepting the historical records listed above, Table 8-15 below details the 50 rare/protected species recently recorded within the grid square overlapping the study area.

The species recorded within Grid Square N73 include 16 red-listed species, 30 amber-listed species, two green-listed species and two non-resident species not assessed under BoCCI (red-footed falcon and common crane). Within these, a total of ten species are listed on Annex I of the EU Birds Directive, namely arctic tern, kingfisher, golden plover, hen harrier, little egret, little tern, merlin, peregrine falcon, red-footed falcon and whooper swan.

Red-footed falcon is considered a vagrant, while common crane breeding attempts have been noted in recent years breeding on cutover bogs, indicating potential for re-establishment of this species, which has been extinct in Ireland since the 1700s. The presence of cranes in Ireland is due to natural dispersal following reintroduction efforts in the UK.

It is noted that greylag goose is as amber-listed and protected under the wildlife act, but is also listed as an invasive species under Regulation S.I. 477. This is because the feral/resident population is classified as invasive. The Icelandic population which overwinters in Ireland is not invasive. During 2017-2020, the nearest greylag flocks recorded in the regions surrounding the proposed development were Icelandic flocks to the west and mixed feral/Icelandic flocks to the east (Burke et al., 2022).

The presence of the invasive rose-ringed parakeet (*Psittacula krameri*) (listed on Regulation S.I. 477) is also noted with grid square N73.

Table 8-15: Rare and protected species of avifauna recorded historically within the 10km square (N73) in which the Proposed Development is located

Species	Year of last record	BoCCI status	Annex I status	Legal Status
Arctic Tern (*Sterna paradisaea*)	2020	Amber	Yes	Wildlife Acts
Barn Owl (*Tyto alba*)	2023	Red	No	Wildlife Acts
Barn Swallow (*Hirundo rustica*)	2023	Amber	No	Wildlife Acts
Black-headed Gull (*Larus ridibundus*)	2011	Amber	No	Wildlife Acts
Brambling (*Fringilla montifringilla*)	2017	Amber	No	Wildlife Acts
Common Crane (*Grus grus*)	2021	N/A	No	Wildlife Acts
Common Gull (*Larus canus*)	2022	Amber	No	Wildlife Acts
Common Kestrel (*Falco tinnunculus*)	2023	Red	No	Wildlife Acts
Common Kingfisher (*Alcedo atthis*)	2022	Amber	Yes	Wildlife Acts
Common Linnet (*Carduelis cannabina*)	2021	Amber	No	Wildlife Acts
Common Redshank (*Tringa totanus*)	2021	Red	No	Wildlife Acts
Common Snipe (*Gallinago gallinago*)	2023	Red	No	Wildlife Acts
Common Starling (*Sturnus vulgaris*)	2023	Amber	No	Wildlife Acts
Common Swift (*Apus apus*)	2024	Red	No	Wildlife Acts
Eurasian Curlew (*Numenius arquata*)	2021	Red	No	Wildlife Acts
Eurasian Teal (*Anas crecca*)	2022	Amber	No	Wildlife Acts
Eurasian Tree Sparrow (*Passer montanus*)	2023	Amber	No	Wildlife Acts
Eurasian Wigeon (*Anas penelope*)	2023	Amber	No	Wildlife Acts
Eurasian Woodcock (*Scolopax rusticola*)	2023	Red	No	Wildlife Acts
European Golden Plover (*Pluvialis apricaria*)	2023	Red	Yes	Wildlife Acts
European Greenfinch (*Carduelis chloris*)	2023	Amber	No	Wildlife Acts
Goldcrest (*Regulus regulus*)	2023	Amber	No	Wildlife Acts
Great Cormorant (*Phalacrocorax carbo*)	2018	Amber	No	Wildlife Acts
Grey Partridge (*Perdix perdix*)	2021	Red	No	Wildlife Acts
Greylag Goose (*Anser anser*)	2011	Amber	No	Wildlife Acts

Species	Year of last record	BoCCI status	Annex I status	Legal Status
				Regulation S.I. 477
Hen Harrier (*Circus cyaneus*)	2015	Amber	Yes	Wildlife Acts
House Martin (*Delichon urbicum*)	2023	Amber	No	Wildlife Acts
House Sparrow (*Passer domesticus*)	2023	Amber	No	Wildlife Acts
Lesser Black-backed Gull (*Larus fuscus*)	2023	Amber	No	Wildlife Acts
Little Egret (*Egretta garzetta*)	2022	Green	Yes	Wildlife Acts
Little Tern (*Sternula albifrons*)	2021	Amber	Yes	Wildlife Acts
Mallard (*Anas platyrhynchos*)	2023	Amber	No	Wildlife Acts
Meadow Pipit (*Anthus pratensis*)	2023	Red	No	Wildlife Acts
Merlin (*Falco columbarius*)	2020	Amber	Yes	Wildlife Acts
Mute Swan (*Cygnus olor*)	2023	Amber	No	Wildlife Acts
Northern Lapwing (*Vanellus vanellus*)	2023	Red	No	Wildlife Acts
Northern Shoveler (*Anas clypeata*)	2011	Red	No	Wildlife Acts
Northern Wheatear (*Oenanthe oenanthe*)	2021	Amber	No	Wildlife Acts
Peregrine Falcon (*Falco peregrinus*)	2019	Green	Yes	Wildlife Acts
Red-footed Falcon (*Falco vespertinus*)	2010	N/A	Yes	Wildlife Acts
Redwing (*Turdus iliacus*)	2023	Red	No	Wildlife Acts
Ringed Plover (*Charadrius hiaticula*)	2011	Amber	No	Wildlife Acts
Sand Martin (*Riparia riparia*)	2023	Amber	No	Wildlife Acts
Sky Lark (*Alauda arvensis*)	2022	Amber	No	Wildlife Acts
Spotted Flycatcher (*Muscicapa striata*)	2022	Amber	No	Wildlife Acts
Stock Pigeon (*Columba oenas*)	2017	Red	No	Wildlife Acts
Whinchat (*Saxicola rubetra*)	2011	Red	No	Wildlife Acts
Whooper Swan (*Cygnus cygnus*)	2022	Amber	Yes	Wildlife Acts
Willow Warbler (*Phylloscopus trochilus*)	2023	Amber	No	Wildlife Acts
Yellowhammer (*Emberiza citrinella*)	2023	Red	No	Wildlife Acts

8.8 Target Species Observations (Flight Activity Surveys)

As per SNH guidance (2017) the site, for the purposes of flight activity surveys (vantage point surveys) is defined not by the planning boundary for the proposed wind farm but by a 500m radius circle (buffer) around the proposed wind turbine locations. The proposed turbine locations form the centre point of each of these 500m radius buffers. This study area 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 to occur within the wind farm site under the SNH (2017) guidance.

A total of 18 target species were recorded during flight activity surveys.

It is noted that all additional (non-target species) except sand martin (*Riparia riparia*) recorded during VP surveys were also recorded during other surveys at the Proposed Wind Farm and substation site (breeding and wintering bird transects, breeding wader and breeding woodcock surveys). Sand martin were recorded on four occasions from VP2 and once from VP1.

Target species recorded are shown below in Table 8-16.

Table 8-16: Target species and species of conservation concern recorded during Drehid vantage point surveys between November 2021 and September 2023 inclusive

Species	BoCCI	Annex I	Winter 2021-22	Winter 2022-23	Spring Mig. 2022	Spring Mig. 2023	Summer 2022	Summer 2023
Buzzard	Green	No	✓	✓	✓	✓	✓	✓
Golden Plover	Red	Yes	✓	✓		✓		✓
Goshawk	Amber	No		✓				
Great Black-backed Gull	Amber	No	✓	✓	✓		✓	✓
Grey Heron	Green	No		✓		✓	✓	
Herring Gull	Amber	Yes	✓	✓	✓	✓	✓	✓
Kestrel	Red	No	✓	✓	✓	✓	✓	✓
Lapwing	Red	No	✓					
Lesser Black-backed Gull	Amber	No	✓	✓		✓		✓

Species	BoCCI	Annex I	Winter 2021-22	Winter 2022-23	Spring Mig. 2022	Spring Mig. 2023	Summer 2022	Summer 2023
Little Egret	Green	Yes					✓	
Merlin	Amber	Yes	✓					
Peregrine	Green	Yes		✓				
Red Kite	Red	No						✓
Snipe	Red	No	✓		✓	✓	✓	✓
Sparrowhawk	Green	No	✓	✓	✓		✓	✓
Stock Dove	Red	No					✓	
Swift	Red	No					✓	✓
Whooper Swan	Amber	Yes	✓	✓				

8.9 Winter and Breeding Walkover Surveys

Transect surveys for all species were recorded during monthly surveys of the proposed wind farm site over three summers and one winter. This survey captured the baseline of avian species using the site as well as their abundance and includes seasonal visitors of the winter (i.e. whooper swan) and summer months.

A total of 52 bird species were recorded during breeding walkovers across summer 2021, 2022 and 2023. Of the 52 species, one is Annex I listed (Peregrine), five are red-listed (meadow pipit, redshank, stock dove, swift and yellowhammer) and 14 are amber-listed (goldcrest, greenfinch, grey heron, house martin, house sparrow, lesser black-backed gull, linnet, mallard, northern wheatear, skylark, spotted flycatcher, starling, swallow and willow warbler). The remaining 33 species are green-listed.

A total of 34 bird species were recorded during winter walkovers. Of the 34 species, two are Annex I listed (hen harrier and whooper swan), four are red-listed (kestrel, meadow pipit, redwing and snipe) and six are amber-listed (goldcrest, hen harrier, herring gull, merlin, starling and whooper swan). The remaining 23 species are green-listed.

The species recorded during breeding walkovers are provided in Table 8-17, and the species recorded during winter walkover surveys are provided in Table 8-18.

Table 8-17: Species and species of conservation concern recorded during Drehid transect surveys (breeding) during Summer 2021, Summer 2022 and Summer 2023

Species	Scientific Name	BoCCI	Annex I	Summer 2021		Summer 2022		Summer 2023	
				Total	Mean	Total	Mean	Total	Mean
Blackbird	*Turdus merula*	Green	No	10	2.50	19	2.71	11	1.83
Blackcap	*Sylvia atricapilla*	Green	No	5	2.50	23	2.30	17	3.40
Blue Tit	*Cyanistes caeruleus*	Green	No	1	1.00	5	1.00	2	1.00
Bullfinch	*Pyrrhula pyrrhula*	Green	No	1	1.00	7	2.33	1	1.00
Buzzard	*Buteo buteo*	Green	No	2	1.00	4	1.33	4	1.33
Chaffinch	*Fringilla coelebs*	Green	No	8	2.00	18	2.57	5	1.67
Chiffchaff	*Phylloscopus collybita*	Green	No	2	2.00	4	1.33	4	2.00
Coal Tit	*Periparus ater*	Green	No	2	1.00	12	3.00	1	1.00
Crossbill	*Loxia curvirostra*	Green	No	-	-	4	4.00	4	4.00
Cuckoo	*Cuculus canorus*	Green	No	-	-	3	1.00	4	1.33
Dunnock	*Prunella modularis*	Green	No	2	1.00	9	1.50	2	2.00
Goldcrest	*Regulus regulus*	Amber	No	-	-	16	3.20	7	3.50
Goldfinch	*Carduelis carduelis*	Green	No	-	-	4	1.33	4	2.00
Great Spotted Woodpecker	*Dendrocopos major*	Green	No	-	-	2	2.00	-	-
Great Tit	*Parus major*	Green	No	2	1.00	3	1.50	5	1.00
Greenfinch	*Carduelis chloris*	Amber	No	1	1.00	-	-	-	-
Grey Heron	*Ardea cinerea*	Amber	No	-	-	1	1.00	1	1.00
Hooded Crow	*Corvus cornix*	Green	No	1	1.00	10	1.67	3	3.00
House Martin	*Delichon urbicum*	Amber	No	-	-	3	1.50	-	-
House Sparrow	*Passer domesticus*	Amber	No	1	1.00	-	-	-	-

Species	Scientific Name	BoCCI	Annex I	Summer 2021		Summer 2022		Summer 2023	
				Total	Mean	Total	Mean	Total	Mean
Jackdaw	*Corvus monedula*	Green	No	-	-	3	1.50	6	3.00
Jay	*Garrulus glandarius*	Green	No	2	1.00	2	1.00	5	1.25
Lesser Black-backed Gull	*Larus fuscus*	Amber	No	-	-	1	1.00	-	-
Lesser Redpoll	*Carduelis cabaret*	Green	No	2	1.00	1	1.00	8	2.00
Linnet	*Carduelis cannabina*	Amber	No	2	1.00	5	2.50	3	1.50
Long-tailed Tit	*Aegithalos caudatus*	Green	No	1	1.00	4	2.00	9	4.50
Mallard	*Anas platyrhynchos*	Amber	No	-	-	2	2.00	-	-
Meadow Pipit	*Anthus pratensis*	Red	No	2	1.00	5	1.67	4	4.00
Mistle Thrush	*Turdus viscivorus*	Green	No	4	1.33	6	1.50	-	-
Northern Wheatear	*Oenanthe oenanthe*	Amber	No	-	-	4	4.00	-	-
Peregrine	*Falco peregrinus*	Green	Yes	-	-	1	1.00	-	-
Pheasant	*Phasianus colchicus*	Green	No	-	-	2	1.00	-	-
Pied / White Wagtail	*Motacilla alba*	Green	No	-	-	1	1.00	-	-
Raven	*Corvus corax*	Green	No	2	2.00	17	4.25	-	-
Redshank	*Tringa totanus*	Red	No	-	-	19	9.50	-	-
Reed Bunting	*Emberiza schoeniclus*	Green	No	2	2.00	2	1.00	4	4.00
Robin	*Erithacus rubecula*	Green	No	7	1.75	-	-	11	2.75
Rook	*Corvus frugilegus*	Green	No	1	1.00	27	3.38	-	-

Species	Scientific Name	BoCCI	Annex I	Summer 2021		Summer 2022		Summer 2023	
				Total	Mean	Total	Mean	Total	Mean
Siskin	*Carduelis spinus*	Green	No	2	1.00	2	1.00	8	2.00
Skylark	*Alauda arvensis*	Amber	No	4	1.33	6	2.00	-	-
Song Thrush	*Turdus philomelos*	Green	No	3	1.50	8	1.60	8	2.00
Spotted Flycatcher	*Muscicapa striata*	Amber	No	-	-	3	1.50	-	-
Starling	*Sturnus vulgaris*	Amber	No	-	-	24	4.80	-	-
Stock Dove	*Columba oenas*	Red	No	-	-	1	1.00	-	-
Stonechat	*Saxicola rubicola*	Green	No	-	-	1	1.00	-	-
Swallow	*Hirundo rustica*	Amber	No	1	1.00	26	6.50	-	-
Swift	*Apus apus*	Red		-	-	4	2.00	-	-
Treecreeper	*Certhia familiaris*	Green	No	-	-	3	1.50	-	-
Whitethroat	*Sylvia communis*	Green	No	2	2.00	2	2.00	-	-
Willow Warbler	*Phylloscopus trochilus*	Amber	No	8	2.00	13	2.17	11	3.67
Woodpigeon	*Columba palumbus*	Green	No	4	1.00	23	2.56	23	2.56
Wren	*Troglodytes troglodytes*	Green	No	7	1.75	35	3.89	8	2.67
Yellowhammer	*Emberiza citrinella*	Red	No	3	1.50	8	2.67	-	-

Table 8-18: Species and species of conservation concern recorded during Drehid transect surveys (winter) during winter 2021-22

Species	Scientific Name	BoCCI	Annex	Winter 2021-22	
				Total	Mean
Blackbird	*Turdus merula*	Green	No	10	1.67

Species	Scientific Name	BoCCI	Annex	Winter 2021-22	
				Total	Mean
Blue Tit	*Cyanistes caeruleus*	Green	No	2	1.00
Buzzard	*Buteo buteo*	Green	No	3	1.50
Chaffinch	*Fringilla coelebs*	Green	No	31	15.50
Coal Tit	*Periparus ater*	Green	No	2	1.00
Dunnock	*Prunella modularis*	Green	No	2	1.00
Fieldfare	*Turdus pilaris*	Green	No	212	53.00
Goldcrest	*Regulus regulus*	Amber	No	4	2.00
Great Black-backed Gull	*Larus marinus*	Green	No	5	5.00
Great Tit	*Parus major*	Green	No	1	1.00
Hen Harrier	*Circus cyaneus*	Amber	Yes	2	2.00
Herring Gull	*Larus argentatus*	Amber	No	5	5.00
Hooded Crow	*Corvus cornix*	Green	No	8	2.67
Jackdaw	*Corvus monedula*	Green	No	25	25.00
Jay	*Garrulus glandarius*	Green	No	4	4.00
Kestrel	*Falco tinnunculus*	Red	No	2	1.00
Lesser Redpoll	*Carduelis cabaret*	Green	No	28	7.00
Long-tailed Tit	*Aegithalos caudatus*	Green	No	11	3.67
Magpie	*Pica pica*	Green	No	1	1.00
Meadow Pipit	*Anthus pratensis*	Red	No	2	2.00
Merlin	*Falco columbarius*	Amber	No	1	1.00
Mistle Thrush	*Turdus viscivorus*	Green	No	1	1.00
Pied / White Wagtail	*Motacilla alba*	Green	No	1	1.00
Raven	*Corvus corax*	Green	No	4	1.00
Redwing	*Turdus iliacus*	Red	No	92	23.00
Reed Bunting	*Emberiza schoeniclus*	Green	No	2	2.00
Robin	*Erithacus rubecula*	Green	No	8	1.60

Species	Scientific Name	BoCCI	Annex	Winter 2021-22	
				Total	Mean
Rook	*Corvus frugilegus*	Green	No	25	25.00
Snipe	*Gallinago gallinago*	Red	No	1	1.00
Song Thrush	*Turdus philomelos*	Green	No	1	1.00
Sparrowhawk	*Accipiter nisus*	Green	No	2	1.00
Starling	*Sturnus vulgaris*	Amber	No	151	75.50
Whooper Swan	*Cygnus cygnus*	Amber	Yes	42	14.00
Woodpigeon	*Columba palumbus*	Green	No	1	1.00

8.10 Breeding Wader Surveys

Transect surveys to assess the presence of breeding wader populations were completed during the summers of 2021, 2022 and 2023. A number of methods were combined from published literature including Bibby et al, (2000), Gilbert et al, (1998), Brown & Shepherd (1993) and SNH (2017) to estimate numbers of target species breeding within the study area. A total of three transects were used to sample habitat deemed suitable for breeding waders on site.

During the 2021 breeding wader surveys, lapwing and snipe were recorded along Transect 3 (located outside the proposed development c. 1.1km south-east of T2). During the 2022 breeding wader surveys, woodcock and snipe were recorded along Transect B. During 2023 breeding wader surveys, one observation of common sandpiper was recorded along Transect A. This bird was assessed by the surveyor as likely to be a failed breeder passing over the Proposed Wind Farm as it travelled back to the coast. There is no potential habitat at the Proposed Wind farm or Proposed substation for this species (nests on the ground amongst stones and low vegetation, usually very close to water - often on rivers or lakeside beaches. Found breeding on inland lakes and the seacoast, mainly in northern and western counties) (Birdwatch Ireland, 2025a).

An additional species record comprised of a family unit of at least four to five long-eared owls (*Asio otus*) (green-listed), including both juveniles and adults, was observed along transect A in June 2023. Successful breeding was observed at this location.

The results of breeding wader surveys are summarised below in Table 8-19. Transect locations are detailed in Figure 8-3.

Table 8-19: Breeding waders survey results

Species	Scientific Name	Season/No. of Records			Locations Recorded	Behaviours/Breeding Status
		Summer 2021	Summer 2022	Summer 2023		
Lapwing	*Vanellus vanellus*	10	0	0	Tr3	Displaying/Breeding success unknown, but on suitable breeding habitat
Snipe	*Gallinago gallinago*	7	0	0	Tr3	Breeding success unknown, but on suitable breeding habitat
		0	4	0	TrB	Drumming snipe recroded on all 4 occasions
Woodcock	*Scolopax rusticola*	0	2	0	TrB	Roding/ Occupied territory
Common Sandpiper	*Actitis hypoleucos*	0	0	1	TrA	Failed breeder moving back to coast. Not breeding at proposed site.

8.11 Breeding Woodcock Surveys

The presence of breeding woodcock was confirmed across all three years of surveys (2021-2022 and 2023). No nesting sites were observed, however the presence of displaying males occupying territory confirms the presence of a breeding woodcock population in the area. The highest number of records was made during 2021 along Transect 3 located in cutover bog south-east of (outside) the Proposed Wind farm.

Surveys in 2022 confirmed the presence of breeding woodcock along Transects A and B which traverse woodland and bog in the vicinity of T7- T10, including areas of woodland overlapped by the Proposed wind Farm boundary. Surveys at static points (W-1 and W-2) in 2023 confirmed the presence of breeding woodcock in the areas of woodland where the proposed turbines T6, T7 and T8 are located.

Table 8-20: Breeding woodcock survey results

Year	No. of Records	Locations Recorded	Behaviours/Breeding Status	Habitat
2021	17	Tr3 (outside proposed development; c. 1.1km SE of T2)	Roding/ Occupied territory	Willow, Alder, Rowan, Birch woodland along bog track. Clearing between woodland.
2022	10	TrA & TrB	Roding/ Occupied territory	Woodland / Bog. Woodland.
2023	5	W-1 & W-2	Roding/ Occupied territory	Mixed Woodland.

8.12 Target species recorded during VP, transects and other species-specific surveys

The following target species were recorded during vantage point (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 site. 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. A proportion of observations of target species were outside of the flight activity survey area. However, the details of these observations were noted during the survey. The 'rotor sweep zone' is the band across 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.

For Turbine T1, based on the proposed hub height of 81.4m and a blade radius of 66.5m, the lower tip height is 14.9m and the upper tip height is 147.9m.

For Turbines T2- T11, based on the proposed hub height of 100.5m and a blade radius of 66.5m, the lower tip height is 34m and the upper tip height is 167m.

Theoretically, birds flying within this height range (14.9m-167m) would be at risk of collision without the consideration of avoidance.

8.12.1 Barn Owl

8.12.1.1 Barn Owl Surveys Summer 2021 & 2023

No barn owls or signs of nesting barn owl were observed during the barn owl surveys undertaken in summer 2021 and 2023. The presence of suitable hunting habitat in the local area was noted.

8.12.1.2 Barn Owl Nest Box Observation Summer 2023

A barn owl nest box located at the forestry track fork south-east of T11 was observed, during ecology surveys in 2023, to have fallen from the tree it had previously been attached to and destroyed by the fall. The box had deteriorated due to being constructed from wood; any such boxes made from wood are likely to have a relatively limited lifespan due to exposure to the elements.

8.12.2 Buzzard

Buzzards were observed during surveys throughout the two and a half-year survey period. Most records occurred within the 500m buffer zone, where buzzards were recorded flying at rotor-swept height. Buzzards were also recorded in the wider environment. No direct observations of breeding behaviour were detected over the course of the survey period; however, the activity levels recorded indicate buzzard are likely to breed in the local area.

8.12.2.1 Vantage Point Surveys: Summer Season (2022 spring migration and summer, 2023 spring migration and summer)

A total of 111 observations of buzzard were recorded across all breeding season VP surveys. Buzzards were recorded circling, soaring, and perching in trees. The majority of flight activity observed overlapped the 500m buffer. The majority of observations were of single birds; however, pairs were noted on 22 occasions, and occasionally larger groups of up to six individuals were observed. Occasional soaring and display flights were observed, in addition to buzzards perching in trees. No hunting was observed. No breeding behaviour outside of display flights was observed (buzzard display flights can be used for both territorial defence and courtship).

8.12.2.2 Vantage Point Surveys: Winter Season (2021-22 and 2022-23)

A total of 54 observations of buzzard were recorded across all winter season VP surveys. Most buzzard flights traversed the 500m buffer zone, and in winter 2021-22 flights were clustered within the southern portion of the buffer zone near turbines 1, 2 and 3. The majority of observations recorded individuals; there were three observations of pairs and two observations of groups of four across all winter VP season surveys. In addition to commuting flights, buzzards were observed calling, perching, displaying and soaring during these surveys. No hunting activity was observed across all winter VP season surveys.

8.12.2.3 Summer Walkover Surveys (2021, 2022 and 2023)

Across all three breeding seasons, buzzards were observed on eight occasions. There were two buzzard records during the 2021 breeding season, and four buzzard records each within the 2022 and 2023 breeding seasons. A total of three records were within the 0-25m distance band; two records were within the 25-100m distance band; one record was >100m from the transect, and two were observed flying over.

8.12.2.4 Winter Walkover Survey (2021/22)

During the winter walkover surveys, Buzzards were observed on two occasions. One observation recorded a pair on farmland (Transect 2), while the other recorded an individual (Transect 1), both within the 0-25m distance band.

8.12.2.5 Hinterland Surveys (including Raptor Surveys) (2021, 2022 and 2023)

Across all summer season hinterland surveys, a total of 34 records of buzzards were made. Of these, seven were noted during the 2021 breeding season, nine were noted during the 2022 breeding season, and 18 were noted during the 2023 breeding season. Records were made in April, May, June, July, August and September, throughout the hinterland survey area at HVPs 1, 2, 3, 4, 5, 6, 7, and 8. The majority of observations (20) were of single birds. A total of nine pairs were sighted across HVP 1 (0.8km S) in May and June 2022, at HVP 3 (1.8km E) in May and June 2023, at HVP 4 (3.1km E) in August 2023, and at HVP 8 (8.6km S) in May 2023. On two occasions, a group of three birds were noted at HVP 7 (9.5km S) in June 2022, and at HVP 4 (3.1km E) in May 2023. On one occasion, a group of four birds were sighted at HVP 4 (3.1km E) in July 2023. No hunting activity or breeding behaviours were recorded across these three breeding season survey periods.

Across all surveyed winter seasons, a total of seven records of buzzards were made. Six of which were noted during the 2021/22 non-breeding season, where five single birds were noted across HVP 1 (0.8km S) in December 2021 and January 2022, HVP 9 (9.8km S) in March 2022, and HVP 6 (8.7km SE) in February 2022. A group of four birds were sighted once at HVP 6 (8.7km SE) in March 2022. During the 2022/23 winter hinterland surveys, one record of Buzzard was made, where a lone bird was noted at HVP 3 (1.8km E) in February 2023. No hunting or nesting activity was noted.

Buzzard were noted four times during the 2023 merlin surveys, where single individuals were observed flying over the survey area.

During raptor surveys in Summer 2023, buzzard were recorded eleven times. Most records related to single individuals, however pairs and groups of three and four individuals were also sighted. Buzzards were recorded at HVP 3 (1.8km E), HVP 4 (3.1km E), HVP 6 (8.7km SE) and HVP 8 (8.6km S). One observation in July 2023 at HVP4 recorded an adult and a juvenile together. Buzzards were also observed hunting on two occasions, in June 2023 at HVP4 and September 2023 at HVP8.

8.12.3 Curlew

A total of seven records of curlew were noted during hinterland surveys across the three-year survey period. This species was not recorded during any other surveys and was not recorded at the proposed development site.

8.12.3.1 Hinterland Surveys (2021, 2022 and 2023)

During breeding season hinterland surveys, curlew were observed four times. Two of these occurred in the 2021 breeding season. In April 2021, a pair were sighted at HVP 7 (Lodge Bog) (9.5km south). In May 2021, another pair was sighted at HVP 7. The surveyor highlighted that this pair failed to successfully breed due to predation on their nests. During the 2022 breeding season, two records of curlew were made whereby a group of three birds were sighted at HVP 7 (9.5km south) in April 2022, and again at HVP 9 (Lullymore Wetlands) (9.8km south) in May 2022.

During the winter season hinterland surveys, curlew were noted on three occasions. Two of which were made during the 2021/22 winter season, both of which were noted at HVP 4 (Hortland) (3.1km east) in October 2021 and February 2022. The remaining record observed a pair of curlew at HVP 4 in January 2023.

Curlew were not recorded within the proposed development site or in adjacent lands during VP surveys, breeding and winter transect surveys, breeding wader surveys, or any other surveys conducted at the proposed development site. As such, surveys indicate that breeding curlew are not present at or near the proposed development site but are present on peatland habitats c. 9 km south-west. Similarly, surveys did not detect any wintering curlew at the proposed wind farm site but did note this species during winter at HVP4 (Hortland) c. 3.1 km east.

While curlew were not recorded at the proposed wind farm, there is potential curlew breeding habitat in the form of recolonising cutover bog (Timahoe North Bog) and intact raised bog adjacent to the proposed wind farm site.

8.12.4 Golden Plover

Golden plover were recorded occasionally during VP surveys. The majority of observations were during the winter season. Flight activity was also recorded during spring and autumn. The majority of flights observed overlapped the 500m turbine buffer. All golden plover activity observed consisted of flight activity; no roosting foraging or any other ground-based behaviour was observed.

8.12.4.1 Vantage Point Surveys: Summer Season (2022 spring migration and summer, 2023 spring migration and summer)

Golden plover were not observed during the 2022 summer or spring migration VP surveys. During the 2023 summer VP surveys, one record of golden plover was made. In September 2023, two individuals were observed flying over the study area and calling. The timing of this record indicates migratory activity. No breeding behaviours or activity were observed. During the 2023 spring migration surveys, two records of golden plover were made, where a distant flock of over 50 individuals was observed traversing the 500m buffer zone from VP 2 in April 2023. Later that day, a flock of 25 birds were observed within the 500m buffer zone near turbines 3, 4 and 7.

8.12.4.2 Vantage Point Surveys: Winter Season (2021-22 and 2022-23)

One record of golden plover was made during the 2021/22 winter VP surveys, where a flock of eight individuals were observed flying within the 500m buffer zone, near turbine 1. Six records of golden plover were made during the winter 2022/23 VP surveys. All six records overlapped the 500m buffer, with flocks of between three and 200 individuals recorded. Four of the six records observed birds flying at rotor-swept height. One record observed a flock of 200 individuals circling and calling over cutaway and intact raised bog, intersecting the 500m buffer near turbines 8, 9 and 10.

8.12.4.3 Summer Walkover Surveys (2021, 2022 and 2023)

There were no observations of golden plover during any of the breeding bird transect surveys.

8.12.4.4 Winter Walkover Survey (2021/22)

There were no observations of golden plover during any of the winter walkover surveys.

8.12.4.5 Hinterland Surveys (2021, 2022 and 2023)

Golden plover were observed five times across the three-year hinterland survey period. All observations occurred during the winter seasons. During the 2021/22 non-breeding season, golden plover were noted four times across HVP 1 (0.8km S) in November 2021 and January 2022, and HVP 6 (8.7km SE) in October and December 2021. During the 2022/23 non-breeding season, this species was observed once, where a flock of seven birds was observed at HVP 4 (3.1km E) in January 2023.

8.12.5 Goshawk

There was a single observation of goshawk during winter 2022-23 VP surveys. This species was not recorded during any other surveys.

8.12.5.1 Vantage Point Surveys: Winter Season (2022-23)

Goshawk was observed once during the 2022/23 winter VP surveys, in March 2023. An individual female was observed flying at rotor-swept height within the 500m buffer zone, between turbines 9 and 11. The surveyor noted this individual was recorded flying through and under a group of four soaring Buzzard, into the adjacent woodland. The surveyor noted there is potential breeding habitat in the general area for this species; however, no further observations were recorded and as such goshawk activity observed is limited to a single occurrence of a winter vagrant.

8.12.6 Great Black-backed Gull

Great black-backed gull were observed regularly during surveys, with numbers ranging from individuals up to a flock of 164 birds. A higher proportion of observations were during winter. The majority of observations were of birds flying through the study area, with only isolated records of small numbers of birds landing in fields.

8.12.6.1 Vantage Point Surveys: Summer Season (2022 spring migration and summer, 2023 spring migration and summer)

This species was observed on a total of 19 occasions across all breeding season surveys. During the 2022 spring migration surveys, six records were made. In April 2022, a flock of 19 individuals were observed circling near turbine 2 before heading in an easterly direction. The remaining spring migration 2022 records observed individuals or pairs. All five records from summer 2022 overlapped the southern portion of the 500m buffer zone, near turbines 1, 2 and 3. Lone individuals, pairs and groups of eight birds were observed during summer 2022 surveys. During the 2023 summer VP surveys, eight records of great black-backed gull were made. All observed individuals within the 500m buffer zone, with most records occurring in the southern portion of the study area near turbines 1, 2 and 3. One individual was noted landing in an agricultural field on May 9th 2023.

8.12.6.2 Vantage Point Surveys: Winter Season (2021-22 and 2022-23)

Great black-backed gull were noted on 45 occasions during the 2021/22 non-breeding season. All records overlapped the 500m buffer zone. Records of lone individuals and flocks of up to 164 birds were noted, most of which were seen flying at rotor-swept height. During the 2022/23 non-breeding season, seven records of great black-backed gull were made. Five of these observed between two and 13 birds flying at rotor-swept height within the 500m buffer zone. The remaining two records involved two birds landing in a nearby agricultural field in December 2022 and a lone first-year observed in March 2023.

8.12.6.3 Summer Walkover Surveys (2021, 2022 and 2023)

Great black-backed gull was not recorded during any of the breeding transect surveys.

8.12.6.4 Winter Walkover Survey (2021/22)

During the winter walkover surveys, a group of five great black-backed gulls was observed along Transect 2.

8.12.6.5 Hinterland Surveys (2021, 2022 and 2023)

Great black-backed gull was not recorded during hinterland surveys.

8.12.7 Grey Heron

Grey heron was observed occasionally during surveys. This species was observed flying through the study area; no static records were made, and no breeding forging activity was observed.

8.12.7.1 Vantage Point Surveys: Summer Season (2022 spring migration and summer, 2023 spring migration and summer)

Individual grey herons were observed on a total of three occasions across all breeding season surveys. All three observations recorded flights within the 500m buffer. Grey heron were not recorded during the 2022 spring migration or summer 2023 VP surveys.

8.12.7.2 Vantage Point Surveys: Winter Season (2021-22 and 2022-23)

One record of grey heron was noted during the 2021/22 non-breeding season, which observed a lone adult traversing the 500m buffer zone. One record of grey heron was noted during the 2022/23 non-breeding season, which also observed a lone adult within the 500m buffer zone. .

8.12.7.3 Summer Walkover Surveys (2021, 2022 and 2023)

Individual grey herons were observed once during summer 2022 breeding bird transects and once during summer 2023 breeding bird transects.

8.12.7.4 Winter Walkover Survey (2021/22)

Grey heron was not recorded during any of the winter transect surveys.

8.12.7.5 Hinterland Surveys (2021, 2022 and 2023)

Seven records of grey heron were made during the three-year hinterland survey period. Two of which occurred during the 2021 breeding season, and the remaining five occurred during the 2023 breeding season. During the 2021 summer hinterland surveys, single birds were noted twice at HVP 6 (8.7km SE) in May 2021.

During the 2023 summer hinterland surveys, two records of individual birds were made at HVP 6 (8.7km SE) during May and September 2023. A single grey heron was also recorded at HVP 2 (0.2km NE) in July 2023. An additional two records were made during this season, where pairs were noted at HVP 6 in June and July 2023.

8.12.8 Hen Harrier

A total of two observations of hen harrier were recorded across all surveys; both were observations of a flying bird which occurred during the same transect survey in December 2021 and the surveyor noted both observations potentially involved the same individual.

8.12.8.1 Winter Walkover Survey (2021/22)

On 16th December 2021, there were two records of hen harrier flying over along Transect 1 (recorded between 10:30 - 14:30). Both observations recorded a juvenile hen harrier; the first was seen flying over raised bog and the second was seen flying over forestry at Coolree. The surveyor noted both observations may have been of the same bird.

8.12.9 Herring Gull

Herring gull were observed regularly during surveys, with individuals and flocks recorded. A higher proportion of observations were during winter. The majority of observations were of birds flying through the study area, with only limited records of small numbers of birds landing in fields

8.12.9.1 Vantage Point Surveys: Summer Season (2022 spring migration and summer, 2023 spring migration and summer)

Herring gull was observed on a total of 10 occasions across all breeding season surveys. During the 2022 spring migration surveys, two records of herring gull were made, comprising an individual in the northern part of the 500m buffer and a flock of 20 circling the southern portion of the 500m buffer zone before heading east. During the 2022 breeding season, four records of herring gull were made, three of which traversed the northern portion of the 500m buffer zone. Two records were lone individuals, and one observed a group of six birds. A group of four birds was seen flying Outside of the 500m buffer zone.

Three records of herring gull were made during the summer 2023 VP surveys. All overlapped the 500m buffer zone. In May 2023, a flock of seven was observed soaring near T8-T11 in the north of the site. In July 2023, a flock of three was seen flying in the same area, made up of two first-year and one second-year birds. In June 2023, a flock of 42 birds was observed in the south of the Site, flying near turbines 1, 2, 3 and 4.

8.12.9.2 Vantage Point Surveys: Winter Season (2021-22 and 2022-23)

A total of 86 records of herring gull were made during the 2021/22 winter VP surveys. All of these overlapped the 500m buffer zone. Records were noted across the study area, with most clustered within the southern portion of the buffer zone near turbines 1, 2 and 3. Observations noted lone individuals, and flocks of up to 290 birds. The majority of records were of smaller flocks of less than 50 individuals. Flocks of 75, 120, 129 and 290 birds were observed flying through the southern portion of the 500m buffer, near turbines 1 and 2 in January 2022.

Herring gull were noted on 32 occasions during the 2022/23 winter VP surveys, all of which overlapped the 500m buffer zone. Lone individuals and flocks of up to 18 birds were noted across the study area. Two records noted flocks of three and four birds landing in agricultural fields. In March 2023, a flock of six birds made up of adults and first-years were recorded in the north of the Site near turbines 9, 10 and 11.

8.12.9.3 Summer Walkover Surveys (2021, 2022 and 2023)

Herring gull was not recorded during any of the breeding transect surveys.

8.12.9.4 Winter Walkover Survey (2021/22)

Herring gull was recorded once during winter transect surveys, whereby a group of five was seen along Transect 2 in association with flooded fields on 3rd January 2022.

8.12.9.5 Hinterland Surveys (2021, 2022 and 2023)

Herring gull were observed nine times during hinterland surveys across the three-year period. Two of which occurred during the 2023 breeding season, whereby two individuals were sighted at HVP 4 (3.1km E) and three individuals were sighted at HVP 8 (8.6km S) on 16th July 2023.

The remaining eight records were observed during the winter period. One of which was noted during the 2021/22 winter season, where an individual was observed at HVP 4 (3.1km E) in February 2022. Seven records were made during the 2022/23 winter season. Of which, six recorded observations of birds in groups of two to 13 individuals were made at HVP 3 (1.8km E). One record occurred at HVP 4, whereby seven individuals were noted in January 2023.

8.12.10 Kestrel

Kestrels were observed during surveys of the proposed wind farm site flight activity study area and also in the surrounding hinterland. Hunting behaviour was observed. No breeding activity or nest sites were observed. The record of one juvenile indicates the presence of a breeding population in the surrounding region, but no evidence of breeding at or near the proposed wind farm or proposed substation was recorded.

8.12.10.1 Vantage Point Surveys: Summer Season (2022 spring migration and summer, 2023 spring migration and summer)

Kestrel were observed a total of 22 times across all breeding season surveys.

One kestrel was noted during spring migration surveys 2022; a single individual was seen flying within the northern portion of the study area near turbine 10. Kestrel were noted on 11 occasions during the 2022 summer VP surveys. All 12 records observed lone individuals flying at rotor-swept height within the northern section of the 500m buffer near turbines 9, 10 and 11. No breeding behaviours or hunting activities were observed.

During 2023 spring migration VP surveys, two records of kestrel were made. Both noted lone individuals flying at rotor-swept height within the northern section of the 500m buffer zone near turbines 9, 10 and 11 on April 6th 2023. One observation recorded a single female, and the other recorded an individual hunting and feeding. During the 2023 summer VP surveys, eight records of kestrel were made. All noted lone individuals flying at rotor-swept height within the northern section of the 500m buffer zone near T8-T11. One of these records noted a juvenile kestrel in September 2023, and another observed a moulting male in August 2023. Hunting was observed on two occasions, in July and September 2023.

No breeding activity or nest sites were observed. The record of a juvenile indicates the presence of a breeding population in the surrounding region, but no evidence of breeding at or near the proposed wind farm or proposed substation was recorded.

8.12.10.2 Vantage Point Surveys: Winter Season (2021-22 and 2022-23)

A total of 12 records of kestrel were noted during the 2021/22 winter VP surveys. All 12 records overlapped the 500m buffer zone. All 12 of these observations recorded lone individuals flying at rotor-swept height within the northern section of the 500m buffer zone near turbines 9, 10 and 11. The remaining record occurred outside the 500m buffer zone north-west of T3.

A total of five records of kestrel were made during the 2022/23 winter VP surveys, all of which observed lone individuals flying at rotor-swept height within the northern section of the 500m buffer zone near turbines 9, 10 and 11. Hunting was observed on two occasions (single female hunting on March 22nd 2023; single individual hunting on March 20th 2023).

8.12.10.3 Summer Walkover Surveys (2021, 2022 and 2023)

Kestrel was not recorded during any of the breeding transect surveys.

8.12.10.4 Winter Walkover Survey (2021/22)

Kestrel was recorded twice during winter transect surveys. One kestrel was recorded within 25m of Transect 1 on 16th December 2021. Another was recorded within 25-100m of Transect 1 on 3rd January 2022.

8.12.10.5 Hinterland Surveys (including Raptor Surveys) (2021, 2022 and 2023)

Seven observations of kestrel were made across the three-year hinterland survey period. Most of which (six) occurred during the breeding seasons. During the 2021 breeding season, Kestrel were noted twice. Both of which observed lone individuals at HVP 1 (0.8km S). During the 2022 breeding season, one observation of kestrel was made, whereby a male and a female in flight was noted at HVP 1 (0.8km S). During the 2023 breeding season, two records of kestrel were observed. Both observations were at HVP 8 (8.6km S), and one of these noted a pair in September 2023. The remaining record occurred during the 2021/22 non-breeding season, whereby a single individual was noted at HVP 6 (8.7km SE).

Kestrel were recorded twice during targeted raptor surveys. In July 2023, one record of two juveniles and a single female was made at HVP 4 (3.1km E). In September 2023, a pair of kestrel were observed soaring and hunting at HVP 8 (8.6km S).

One record of kestrel was made during merlin surveys in May 2023, where a single individual was noted flying over the survey area.

The observations of pairs and juveniles during these surveys further confirm the presence of a breeding kestrel population in the region.

8.12.10.6 Nest Boxes

The presence of three kestrel nest boxes was noted during ecological walkover surveys in 2023; locations are detailed below in Table 8-21. These boxes appeared to be relatively new and none showed signs of occupancy during surveys.

Table 8-21: Kestrel Nest Boxes

ID	Description	Relative Distance/Infrastructure
1	Kestrel nest box in mature tree along existing Coillte access track leading into northern part of site. No signs of use when surveyed.	58m from proposed northern entrance access track.
2	Kestrel nest box in mature tree corridor along existing informal access route from north (Coolree Nature Reserve). No signs of use when surveyed.	7m from proposed substation felling buffer.
3	Kestrel nest box in mature beech treeline in eastern part of Coillte woodland.	258m from proposed grid connection.

8.12.11 Kingfisher

Targeted surveys for kingfisher comprised of riverine VP and bank transect surveys were carried out in summer 2022 (distinct from the main body of ornithological surveys). These confirmed the presence of foraging kingfisher in the local river network, but did not observe any breeding sites and observations indicated the banks of the Fear English river are unsuitable for nesting kingfisher.

8.12.11.1 Kingfisher Vantage Point Surveys: Summer 2022

A total of 2 no. kingfisher observations were recorded during vantage point (VP) surveys on the Fear English River throughout the monitoring period and are summarised in Table 3.1 and Figure 3.1 in Appendix 8.2-3. Kingfisher VP surveys resulted in single observations on the 25th April (flying & perching) and 19th May 2022 visits (flying), at Kingfisher VP2 and VP4, respectively (Table 3.1 in Appendix 8.2-3). Birds were also recorded at these locations in October and May 2019, respectively (Triturus, 2019; Figure 3.2 in Appendix 8.2-3). No kingfishers were observed during the VP surveys in mid-April or mid-June.

8.12.11.2 Bank transect surveys

Bank transect surveys undertaken in August 2022 along approximately 6.9km length of riverine channel resulted in a total of 1 no. additional kingfisher observation (Table 3.2, Figure 3.1 in Appendix 8.2-3). An adult bird was recorded in flight along the Fear English River channel near the confluence of the Kilcooney River (aka Clonkeeran Stream) on the 15th August 2022.

No kingfisher nesting sites (active or inactive) were located during bank transect surveys in 2022 (current survey) or the 2019 surveys (Triturus, 2019).

No kingfisher nesting sites were identified within the study area during vantage point surveys or bank walkover surveys along 6.9km of riverine channel. The banks of the lower reaches of the Kilcooney and Sweep Rivers were typically steep (historically deepened) and heavily scrubbed-over. Some localised, largely-unvegetated areas of bank were recorded along the Fear English River, particularly along a straightened section near site VP2. However, no nests (active or inactive) were observed, despite kingfisher activity in the area.

Kingfishers usually require soft, loamy banks into which to dig their burrows (Heneberg, 2013; Cummins et al., 2010; Crowe et al., 2008; Boag, 1982) and typically choose fine-particulate banks of at least 1-2 metres high with near-vertical banks for nesting, with a slight preference for some emergent and or fringing vegetation (Heneberg, 2004, 2009). Soil compaction and particle composition are key drivers of kingfisher nest locations (Heneberg, 2004), in addition to bank slope angle (Ward et al., 1994). In general, although superficially suitable areas were present along the middle survey reaches of the Fear English channel, the soils of the historically excavated, sloping banks would appear to be too compacted for kingfisher. Indeed, no active kingfisher nests (breeding areas) have been identified in the vicinity of the proposed development to date (this survey; Triturus, 2019; FTCO, 2018). In support of previous findings, the survey area is largely unsuitable for kingfisher nesting. Although kingfishers can adapt their nest site choice if other suitable conditions (i.e. prey availability, perching sites) are prevalent (Hopkins, 2001; Morgan & Glue, 1977), the watercourses within the vicinity of the proposed development can be best considered as foraging habitat rather than a breeding area for kingfisher.

8.12.12 Lapwing

Lapwing were recorded very infrequently, with a single winter record during flight activity surveys and the remaining 10 observations occurring along Transect 3 outside the proposed development c. 1.1km south-east of T2.

8.12.12.1 Vantage Point Surveys: Summer Season (2022 spring migration and summer, 2023 spring migration and summer)

There were no records of lapwing during breeding season VP surveys.

8.12.12.2 Vantage Point Surveys: Winter Season (2021-22 and 2022-23)

One record of lapwing was made during the 2021/22 winter VP surveys. In February 2022, a group of four individuals were noted flying at rotor-swept height within the 500m buffer zone between turbines 1 and 2. There were no records of lapwing during the winter 2022-23 VP surveys.

8.12.12.3 Summer Walkover Surveys (2021, 2022 and 2023)

Lapwing was not recorded during any of the breeding transect surveys.

8.12.12.4 Winter Walkover Survey (2021/22)

Lapwing was not recorded during any of the winter transect surveys.

8.12.12.5 Breeding Wader Surveys (2021, 2022 and 2023)

Lapwing were noted on ten occasions (all during summer 2021). All noted adults along pools, pool margins and wetland habitats along Transect 3, and observed Lapwing displaying. Six of the ten observations noted that Lapwing were seen on suitable breeding habitat, however successful breeding was not determined. It is noted that Transect 3 is located to the south-west of the study area on Timahoe North Bog, and that no lapwing habitat or breeding activity was observed within or adjacent to the Proposed Development. It is further noted that a solar array has been installed on Timahoe North Bog to the north-west of Transect 3 since surveys were completed there in 2021.

8.12.12.6 Hinterland Surveys (2021, 2022 and 2023)

Lapwing were noted six times across all hinterland surveys. Five of these observations were noted during the 2021 breeding season, where lone individuals and groups of two, six and twelve birds were observed. At HVP 1 (0.8km S), a flock of six lapwing were noted in April 2021. At HVP 7 (9.5km S), a flock of six were noted in April 2021, and a flock of twelve birds were noted at the same location in May 2021 where an attempt at breeding failed due to nest predation. At HVP 6 (8.7km SE), two records were made in May 2021 where a lone individual and a pair were noted. The remaining record occurred during the 2022 breeding season, where a pair were sighted at HVP 1 (0.8km S) in May 2022.

8.12.13 Lesser Black-backed Gull

Lesser black backed gull were recorded during surveys at the proposed wind farm site and surrounding hinterland.

8.12.13.1 Vantage Point Surveys: Summer Season (2022 spring migration and summer, 2023 spring migration and summer)

A total of 12 records of lesser black-backed gull were made during the 2023 summer VP surveys. Lone individuals and flocks of up to 43 birds were noted across the study area, most of which were observed at rotor-swept height. Lesser Black-backed Gull were noted landing in fields on four occasions, and soaring on two occasions. During the 2023 spring migration VP surveys, six records of this species were made, with three records occurring in the southern portion of the study area and two occurring in the northern portion of the study area. Records of lone individuals and flocks of up to 34 birds were observed flying, soaring and landing in fields.

There were no observations of lesser black-backed gull during spring migration VP and summer VP surveys in 2022.

8.12.13.2 Vantage Point Surveys: Winter Season (2021-22 and 2022-23)

Two records of lesser black-backed gull were made during the winter 2021-22 VP surveys. One involved a group of four individuals flying with a mixed flock of herring gull and great black-backed gull in January 2022. This observation overlapped the southern portion of the 500m buffer zone. In March 2023, a lone individual was sighted traversing the northern portion of the 500m buffer. During the 2022-23 winter VP surveys, a total of nine records of lesser black-backed gull were made. Most of these records occurred in the north of the study area near turbines 9, 10 and 11. Observations were predominantly of lone individuals, however groups of two and five birds were also noted.

8.12.13.3 Summer Walkover Surveys (2021, 2022 and 2023)

Lesser black-backed gull was recorded once during breeding transect surveys. An individual was recorded on 01st July 2022 along Transect 1 within the 25-100m distance band.

8.12.13.4 Winter Walkover Survey (2021/22)

Lesser black-backed gull was not recorded during any of the winter transect surveys.

8.12.13.5 Other Surveys (Raptor survey 2023)

Lesser black-backed gulls were observed on seven occasions during raptor surveys, alone or in flocks of up to 26 individuals. Four of these records were made at HVP 3 (1.8km E), and the remaining three occurred at HVP 4 (3.1km E).

8.12.13.6 Hinterland Surveys (2021, 2022 and 2023)

Five records of lesser black-backed gull were made during the three-year survey period. All occurred during the 2023 breeding season. At HVP 3 (1.8km E), two records of groups of three individuals were made. At HVP 4 (3.1km E), two records were made. One of which noted a flock of three gulls, and the other noted a flock of six. At HVP 6 (8.7km SE), a single individual was observed in July 2023.

8.12.14 Little Egret

There was a single observation of little egret during summer 2022 VP surveys. This species was not recorded during any other surveys.

8.12.14.1 Vantage Point Surveys: Summer Season (summer 2022)

One record of little egret was made during summer 2022 VP surveys. On September 10th 2022, a single little Egret was observed flying at rotor-swept height in the southern portion of the 500m buffer zone, near turbine 2.

8.12.15 Merlin

There were two observations of merlin during winter 2021-22 VP surveys, and a single observation during winter transects in 2021. This species was not recorded during any other surveys.

8.12.15.1 Vantage Point Surveys: Winter Season (2021-22)

Merlin were noted on two occasions during the 2021-22 winter VP surveys. Both records observed single individuals flying at rotor-swept height within the northern portion of the 500m buffer zone on November 30th 2021 near turbine 10. One of these observations recorded a single female being briefly chased by a male sparrowhawk.

8.12.15.2 Winter Walkover Survey (2021/22)

One record of merlin was made on 16th December 2021 where a single individual was observed in the 25-100m distance band along transect 2.

8.12.15.3 Merlin Surveys (2023)

No merlin or field signs indicating the presence of breeding merlin were found during summer 2023 merlin surveys undertaken in 1 km grid squares N7935 and N7536.

8.12.16 Peregrine

There was one observation of peregrine falcon during winter 2022-23 VP surveys, three observations during hinterland surveys, and one observation during breeding bird transect surveys. This species was not recorded during any other surveys.

8.12.16.1 Vantage Point Surveys: Winter Season (2022-23)

One record of peregrine was made during the 2022/23 winter VP surveys, where a lone individual was noted flying at rotor-swept height in the vicinity of turbines 1, 4 and 5, traversing the 500m buffer.

8.12.16.2 Summer Walkover Surveys (2021, 2022 and 2023)

This Annex I species was noted on one occasion across the three-year survey period. In May 2022, a single individual was observed flying over in the 25-100m buffer along Transect 1.

8.12.16.3 Hinterland Surveys (including Raptor Surveys) (2021, 2022 and 2023)

Peregrine were recorded on three occasions during the hinterland surveys. All of which observed lone individuals. Individual birds were noted at HVP 1 (0.8km S) in April 2023 and November 2022, and one bird was noted at HVP 8 (8.6km S) in May 2023.

There were no records of peregrine during targeted breeding raptor surveys.

8.12.17 Red Kite

There was a single observation of red kite during summer 2023 VP surveys. This species was not recorded during any other surveys and rarely occurs in Kildare.

8.12.17.1 Vantage Point Surveys: Summer Season (summer 2022)

One record of red kite was made during the 2023 summer VP surveys. On June 7th 2023, a single individual flew over the 500m buffer zone above the rotor swept height band (>170m altitude), between turbine 7 and 8. This red-listed species was re-introduced to Co. Wicklow relatively recently (2007) and is rare in Co. Kildare. Red kites have also been re-introduced in Co. Down. The reintroduced population is slowly expanding from its core range in Counties Wicklow, Dublin and Down (Birdwatch Ireland, 2025b).

8.12.18 Snipe

Snipe were observed across a number of surveys during both the breeding and non-breeding seasons. A number of observations are indictive of breeding activity in the area surrounding the proposed wind farm.

8.12.18.1 Vantage Point Surveys: Summer Season (2022 spring migration and summer, 2023 spring migration and summer)

Snipe were observed on five occasions during the 2022 spring migration VP surveys. Two of these were call-only records. The remaining three records were of lone individuals, traversing the 500m buffer zone. All records were clustered within the intact raised bog habitat located to the south of T9 and T10 (outside proposed development boundary). Five records of snipe were made during the 2022 summer VP surveys, three of these records occurred in May, one in April, and one in June. Three of the five observations were call only records, with one call originating from the intact bog south-west of T10 and two from semi-intact bog habitats (one north-west of T7 and one north-west of T8). The remaining two records traversed the 500m buffer zone, and were clustered within the intact bog south of T9-T10. Records were all of lone individuals, concentrated in bog habitats in the north of the study area. Chipping was noted.

A single record of snipe was made during the 2023 spring migration VP surveys, where on April 6th 2022, a single individual was observed in a display flight within the 500m buffer zone near turbines 9 and 10. Snipe were observed twice during the 2023 summer VP surveys. Both records were observed from VP 2 in in June 2023.Records were of lone individuals traversing the 500m buffer zone, near turbines 9 and 10. One flew overhead at VP2, and the other was observed performing a display flight and calling.

8.12.18.2 Vantage Point Surveys: Winter Season (2021-22 and 2022-23)

During the 2021/22 winter VP surveys, four records of snipe were made. All traversed the northern portion of the 500m buffer zone, occurring near turbines 9, 10 and 11. Three of these records noted lone individuals, and one record noted a pair (December 20th 2021).

8.12.18.3 Summer Walkover Surveys (2021, 2022 and 2023)

Snipe was not recorded during breeding transect surveys.

8.12.18.4 Winter Walkover Survey (2021/22)

Snipe was noted once during winter transect surveys, where a single individual was found along Transect 1 (0-25m distance band) in December 2021.

8.12.18.5 Breeding Wader Surveys (2021, 2022 and 2023)

This species was observed eleven times during the three-year survey period. No records of Snipe were made during the latest breeding wader surveys in 2023.

Seven observations were made during the 2021 breeding season (all recorded along Transect 3 located 1.1 km south-east of T2), where six records recorded chipping and/or drumming, and a single pair was observed flying together. Snipe were heard chipping and drumming on pool margins, bog margins and wetland habitats along Transect 3. Six of the seven records during this survey period noted snipe on suitable breeding habitats, however successful breeding was not confirmed.

Four observations of snipe were made during the 2022 breeding season. One record indicated snipe were heard drumming and occupying territory along transect B in May 2022 within intact raised bog habitat south of T9-T10. The remaining three records also occurred along transect B in bog habitats, where three individuals were heard drumming and occupying territory in July 2022.

8.12.18.6 Hinterland Surveys (2021, 2022 and 2023)

Twelve records of snipe were made during the three-year hinterland survey period. Most of which (eight) were noted during the breeding seasons. During the 2021 breeding season, snipe were observed on six occasions. Five of which occurred at HVP 1 (0.8km S), and one of which occurred at HVP 6 (8.7km SE). Three records noted lone individuals, and three records noted pairs. During the 2022 breeding season, two records of snipe were made whereby a pair was sighted at HVP 1 (0.8km S) in May 2022, and a pair were sighted at HVP 6 (8.7km SE) in April 2022.

During the winter 2021/22 non-breeding season, four records of snipe were noted. Two of which occurred at HVP 9 (9.8km S), where a lone individual was sighted in December 2021, and a group of eight were sighted in March 2022. The remaining two records observed lone individuals at HVP 1 (0.8km S) and HVP 6 (8.7km SE) in December 2021.

8.12.19 Sparrowhawk

Sparrowhawk was observed across a number of surveys encompassing the proposed development and surrounding hinterland.

8.12.19.1 Vantage Point Surveys: Summer Season (2022 spring migration and summer, 2023 spring migration and summer)

Sparrowhawk was observed a total of 14 times across all breeding season VP surveys.

During the 2022 spring migration VP surveys, three records of sparrowhawk were made in April 2022. All records noted lone individuals traversing the 500m buffer. Records were made across the study area, with one record occurring in the north of the Site near turbine 9, another occurring in the centre of the Site near turbines 7 and 8, and another occurring in the southern portion of the study area**.** A total of ten records of sparrowhawk were made during the 2022 summer VP surveys. All ten records observed lone individuals flying at rotor-swept height and all ten flight lines overlapped the 500m buffer zone. Four of these records overlapped the southern portion of the study area near turbines 1 and 3, and the remaining six records occurred in the northern portion of the study area, near turbines 7, 8, 9, 10 and 11.

During the 2023 summer VP surveys, four records of sparrowhawk were made. In June 2023, a single sparrowhawk was observed near turbines 8 and 9 in the northern portion of the buffer zone. In September 2023, a single female individual was mobbed by house martin within the southern portion of the buffer zone near T1. The remaining two records occurred in the southern part of the study area. On one of these occasions (June 7th 2023), a pair of sparrowhawk were observed flying to the south of the proposed development.

8.12.19.2 Vantage Point Surveys: Winter Season (2021-22 and 2022-23)

A total of 14 records of sparrowhawk were noted during the 2021/22 winter VP surveys. All 14 records overlapped the 500m buffer zone. Three of these observations were noted in the southern portion of the 500m buffer zone: a group of three sparrowhawks was observed there on November 29th 2021; a lone individual was noted on February 14th 2022, and a pair was observed on February 25th 2022. The remaining eleven records overlapped the northern portion of the 500m buffer zone near turbines 8, 9, 10, and 11, where ten records were of lone individuals and one record was of a pair.

During the 2022/23 winter VP surveys, twelve records of sparrowhawk were made.. The majority of records were observed within the northern portion of the buffer zone, near turbines 8, 9, 10 and 11. Ten of these records noted lone individuals, and two noted pairs. In March 2023, a single adult was noted with prey, flying low within the buffer zone.

8.12.19.3 Summer Walkover Surveys (2021, 2022 and 2023)

There were no observations of sparrowhawk during breeding bird transect surveys.

8.12.19.4 Winter Walkover Survey (2021/22)

Two records of sparrowhawk were noted within the 0-25m distance band along Transect 1 during the winter transect survey period. In December 2021, a single sparrowhawk was observed and in January 2022 a single individual was observed.

8.12.19.5 Hinterland Surveys (2021, 2022 and 2023)

Sparrowhawk were observed on two occasions during the hinterland surveys. In June 2022, a lone individual was sighted at HVP 7 (9.5km S). In January 2023, a single bird was observed at HVP 4 (3.1km E).

8.12.20 Stock Dove

Stock dove was observed during summer 2022 VP surveys and breeding bird transect surveys. This species was not recorded during any other surveys.

8.12.20.1 Vantage Point Surveys: Summer Season (summer 2022)

A total of two records of stock dove were made during the 2022 summer VP surveys. Both were noted on May 4th 2022, and were located in the south of the study area. One was observed within the 500m buffer zone, where a single individual was noted near turbine 1 and was observed landing in a tree. The other record was of a single individual flying inside the buffer zone.

8.12.20.2 Summer Walkover Surveys (2021, 2022 and 2023)

Stock Dove was noted once during the three-year breeding bird transect survey period. One individual was observed in the 25-100m distance band along Transect 2 in July 2022.

8.12.21 Swift

Swift were observed across a number of surveys encompassing the proposed development and surrounding hinterland. There is no potential breeding habitat for this species within the proposed development.

8.12.21.1 Vantage Point Surveys: Summer Season (2022 spring migration and summer, 2023 spring migration and summer)

Two records of swift were made during the 2022 summer VP surveys. Both of which occurred on June 6th 2022, and noted birds within the 500m buffer zone, in the north of the Site near turbines 8, 9, 10 and 11. One record observed five individuals flying together, and the other noted two individuals flying together. Swift were observed on three occasions during the 2023 summer VP surveys. All three records occurred in the northern portion of the 500m buffer zone, near turbines T7-T11 and observed swift hawking. Two of these records identified two individuals, and the other noted four individuals.

8.12.21.2 Vantage Point Surveys: Winter Season (2021-22 and 2022-23)

There were no records of swift during winter VP surveys.

8.12.21.3 Summer Walkover Surveys (2021, 2022 and 2023)

Swift were observed flying across the study area on three occasions during the three-year survey period. All three records were along Transect 1 during July 2022 breeding bird transect surveys. Two records observed single individuals, and one noted a pair.

8.12.21.4 Winter Walkover Survey (2021/22)

There were no records of swift during winter transect surveys.

8.12.21.5 Merlin Surveys (2023)

One record of swift was made in May 2023, where a pair of swift were sighted flying over the merlin survey area (1 km grid square N7935).

8.12.21.6 Hinterland Surveys (2021, 2022 and 2023)

One record of swift was made during the hinterland surveys. This occurred at HVP4 on 16th July 2023; seven birds were recorded.

8.12.22 Whooper Swan

Whooper swan were observed during winter VP surveys and hinterland surveys. Observations confirmed the regular occurrence of grazing flocks in the fields near T3, in addition to other fields further west of the proposed development. The patterns of occurrence of grazing birds observed indicate that that while fields closer to the proposed development are used, wintering whooper swan are not restricted to these fields and also utilise a number of other fields in the locality for grazing. No roosting was recorded.

8.12.22.1 Vantage Point Surveys: Winter Season (2021-22 and 2022-23)

A total of four records of Whooper Swan were made during the 2021/22 winter VP surveys. Three of these overlapped the 500m buffer zone. On December 21st 2022, a flock of seven adults and three juveniles were observed feeding in an agricultural field within the buffer zone near turbine 3. No flight activity occurred during this observation. Later that day, a flock of ten individuals was observed flying away from this the same area in a southeasterly direction. This is likely to be the same group noted feeding in the same area earlier. On January 22nd 2022, two individuals were sighted flying at rotor-swept height in the northern portion of the Site.

The remaining record occurred outside of the 500m buffer zone, near the south of the Site. This record noted a flock of 18 - 19 Whooper Swan feeding in an agricultural field immediately west of the buffer zone near turbines 1, 2 and 3.

During the 2022/23 winter VP surveys, three records of Whooper Swan were made. One of these records involved a flock of 13 whooper swans flying within the 500m buffer near turbine 1 before landing in a field to the south of VP1 and feeding on January 24th 2023.

The remaining two records were located outside of the 500m buffer zone, to the south-west of the Site, where flocks of 13 individuals were sighted landing and feeding in agricultural fields near VP1 on December 21st 2022 and February 13th 2022.

8.12.22.2 Hinterland Surveys (2021, 2022 and 2023)

Whooper swan were observed twice during hinterland surveys. Both of which occurred at HVP 3 (1.8km E) during the 2022/23 non-breeding season. In January 2023, a flock of 13 individuals, six of which were first-winters was observed. In February 2023, a flock of twelve individuals was sighted.

8.12.22.3 Incidental Observations (Winter 2023-24)

Whooper swan flocks were observed grazing in fields north of T1/west of T2-T3 during ecological surveys in March 2024. A flock of 27 adults was observed grazing in improved agricultural grassland c. 430m from T1 and T2 on 06th March 2024; a flock of 23 adults was observed grazing in the same habitat (in different field) c. 590m north-west of T3 on 20th March 2024.

8.12.22.4 Summary of Whooper Swan Grazing

Table 8-21 details the occurrence of grazing whooper swans relative to proposed turbine locations. The location of these records are shown in Table 8-21, alongside whooper swan flight activity across all survey seasons.

Table 8-22: Whooper swan: occurrence in fields near proposed wind farm

Record ID	Number of Swans	Description	Date	Distance to closest turbine
A	10	7 adults and 3 juveniles feeding in field. Flew off east after.	21/12/2021	183m (T3)
B	18-19	Swans feeding in field.	14/02/2022	600m (T3)
C	13	Flew in from south-west, turned north-west to land in field.	21/12/2022	1,115m (T1)
D	13	Flew in from south-east, landed in field, then feeding in field.	24/01/2023	577m (T1)
E	13	Flew in from west/north, feeding in field after landing.	13/02/2023	917m (T5)
F	27	Adults grazing in GA1 field.	06/03/2024	432m (T2)
G	23	Adults grazing in GA1 field.	20/03/2024	593m (T3)

Path: C:\Users\gavan.wallace\AppData\Local\Temp\ArcGISProTemp23908\Untitled\Untitled.aprx

Legend

Proposed Deveopment Boundary

SNH Buffer

Bird ID, Date, Time

- 2, 21/12/2021, 16:43
- 3, 22/01/2022, 08:48
- 5, 21/12/2022, 13:10
- 6, 24/01/2023, 11:27
- 7, 13/02/2023, 09:00

Grazing Whooper Flocks

Record ID, Date

- A, 21/12/2021
- B, 14/02/2022
- C, 21/12/2022
- D, 24/01/2023
- E, 13/02/2023
- F, 06/03/2024
- G, 20/03/2024

TITLE: Whooper Swan Activity			
PROJECT: Drehid Wind Farm			
FIGURE NO:	8.4		
CLIENT:	North Kildare Wind Farm Ltd.		
SCALE:	1:22,500	**REVISION:**	0
DATE:	08/05/2025	**PAGE SIZE:**	A3

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0 0.5 1 2 Kilometers

8.12.23 Woodcock

This cryptic wader species was recorded during targeted woodcock surveys across all survey years, and was also detected during the course of wader surveys in summer 2022.

8.12.23.1 Woodcock Surveys (2021, 2022 and 2023)

A total of 32 records of woodcock were made across the 2021, 2022 and 2023 targeted woodcock surveys.

During the 2021 breeding season, 17 sightings of woodcock were made, including four observations of breeding pairs flying together and calling.. All records observed woodcock roding and occupying territory along Transect 3. Six of which occurred within birch woodland habitat along the track, and the remaining eleven records occurred within a clearing between woodland habitats.

During the 2022 breeding season, a total of ten records of woodcock were made. In May 2022, five records of woodcock were made along transect A, and a further five records were made in June 2022 along transect B. All of which were observed roding, and occupying territory. In July 2022, a third round of surveys was undertaken. During which, no woodcock were observed.

During the 2023 woodcock surveys, five records of Woodcock were made in June 2023. Three of these observations noted roding males occupying territory in mixed woodland habitat (W-1), while two observations noted roding males occupying territory from W-2 (located in drained raised bog facing mixed woodland).

8.12.23.2 Breeding Wader Surveys (2022)

Woodcock were observed twice during the breeding wader surveys. Both records were noted in July 2022, and noted individual woodcock roding over bog (adjacent to conifer plantation), along transect B. Breeding status was assessed as 'Occupied Territory'.

8.12.23.3 Hinterland Surveys (2021, 2022 and 2023)

Woodcock was sighted on one occasion during the three-year hinterland survey period, where a single individual was observed at HVP 1 (0.8km S) in December 2021.

8.12.23.4 Ecological Walkover Surveys (2023)

Woodcock were flushed from woodland around T8, T10 and T11 during non-avian ecology surveys in winter 2023-24.

8.13 Other Species

The following species were recorded as secondary target species during Vantage Point (flight activity), breeding transect, winter transect and /or hinterland surveys.

8.13.1 Goldcrest

Goldcrest (amber-listed) was recorded along Transects 1 and 2 during both breeding bird survey rounds in Summer 2022, and was also recorded along both transects during round 2 (08th June) in Summer 2023. It was also recorded a total of 18 times during VP surveys (17 times at VP2, once at VP1) with records dispersed across both breeding and non-breeding seasons.

8.13.2 Greenfinch

This amber-listed species was recorded during summer 2021 breeding bird transect surveys in the 0-25m distance band along Transect 4. Greenfinch was also recorded as an additional species during flight activity surveys at VP1, with one record on 11th July 2022 and another on 03rd July 2023.

8.13.3 House Martin

This amber-listed species was recorded during summer 2022 breeding bird transect surveys along Transect 2. It was also recorded during flight activity surveys at VP1 and 2 during summer 2022 and 2023 (total of 16 records), including a record pf 35 birds feeding over the bog at VP2 on 09th August 2022.

8.13.4 House Sparrow

This amber-listed species was recorded in the 0-25m distance band during summer 2021 breeding bird transect surveys along Transect 4. It was also recorded during flight activity surveys at VP1 and 2 during summer 2022 and 2023.

8.13.5 Linnet

This amber-listed species was recorded during breeding bird surveys in summer 2021 (Transect 3), 2022 and 2023 (Transect 2). It was also recorded a total of 37 times during VP surveys across both VPs, primarily during breeding season.

8.13.6 Long-eared Owl

There was a single observation of green-listed long-eared owl, involving a pair with 2-3 juveniles observed during dusk wader transects in summer 2023.

8.13.6.1 Breeding Wader Surveys (2023)

This species was observed on one occasion, during the 2023 breeding wader surveys carried out at dusk. A family unit of at least four to five individuals, comprised of 2-3 juveniles and a pair of adults was observed along Transect A on 26th June 2023 at 22:20. The surveyor noted these birds were calling and confirmed breeding status as successful breeding.

8.13.6.2 Hinterland Surveys (2021, 2022 and 2023)

Long-eared owl was observed once during the three-year survey period, where a family group was sighted at HVP 5 (8.2km SE) in June 2021 near Donadea Forest Park beside the castle.

8.13.7 Meadow Pipit

A total of 56 observations of red-listed meadow pipit were recorded during VP surveys across all seasons.

8.13.7.1 Vantage Point Surveys: Winter and Summer Seasons (2021-2023)

The presence of meadow pipit (noted as an additional species) was recorded a total of 56 times during both summer and winter VP surveys across both VP locations. The majority of observations (39) were at VP2. The surveyor noted 8-10 pairs visible at VP2 on 05th May 2022, and noted a fledgling at VP2 on 15th May 2023.

8.13.8 Redshank

This red-listed wader species was recorded during breeding bird transect surveys on 14th May 2022. Three birds were observed within the 25-100m distance band and 16 were observed in the 100+ distance band. No further records or evidence of breeding onsite was recorded during any other surveys. It is likely these birds were stopping en route to summer breeding grounds in the midlands or northern part of Ireland.

8.13.9 Redwing

A total of four observations of red-listed redwing were recorded, all during winter 2021-22 transect surveys.

8.13.9.1 Winter Walkover Survey (2021/22)

Four records of redwing were made during this survey period. Three of which occurred along Transect 2, where two individual birds and a flock of 30 birds were seen on farmland and flooded agricultural fields. One record was made along Transect 1, where a flock of 60 birds was observed in in the 25-100m buffer during December 2021.

8.13.9.2 Vantage Point Surveys: Winter Season (2021-22 and 2022-23)

The presence of redwing was recorded a total of 28 times during winter VP surveys across both VP locations (recorded as an additional species). In most cases, number of individuals was not recorded; however, a flock of 150 redwing was noted from VP1 (located in farmland) on one occasion (21st December 2021).

8.13.10 Sand Martin

This amber-listed species was only recorded during summer VP surveys.

8.13.10.1 Vantage Point Surveys: Summer Season (2022 spring migration and summer, 2023 spring migration and summer)

Sand martin were observed a total of five times across summer 2022 and summer 2023. Four of these observations were at VP2 and one was at VP1.

8.13.11 Skylark

Skylark (amber listed) was noted as an additional species during VP surveys.

8.13.11.1 Vantage Point Surveys: Winter and Summer Seasons (2021-2023)

The presence of skylark (noted as an additional species) was recorded a total of 38 times during both summer and winter VP surveys across both VP locations. The majority of observations were at VP2. The surveyor noted four singing birds around VP2 on 05th May 2022.

8.13.12 Spotted Flycatcher

Spotted flycatcher (amber listed) was recorded during breeding bird transects in Summer 2022 along Transect 2 during both rounds 1 and 2. This species was also recorded at VP1 on 01st August 2023 and at VP2 on 06th July 2023.

8.13.13 Wheatear

This species (amber listed) was recorded once during breeding bird transect surveys.

8.13.13.1 Summer Walkover Surveys (2021, 2022 and 2023)

Wheatear were observed once during breeding bird surveys, on 14th May 2022. This record comprised a group of four birds which were observed in a ploughed field in the 25-100m distance band. The surveyor noted these birds were likely to be on migration.

This breeding migrant travels from wintering grounds in southern Africa to breed in uplands and scrubland throughout Ireland. Breeds in a variety of habitats, typically in areas with exposed rock and short vegetation, such as along rocky coasts, pasture with stone walls and bogs in the uplands (Birdwatch Ireland, 2025c). These habitats are absent from the proposed development.

8.13.14 Starling

This amber listed species was recorded during breeding bird transects in Summer 2022 (Transects 1 and 2); individuals and one flock of 20 were recorded. Starling were also recorded during Winter 2021-22, with an individual and a flock of 150 recorded along Transect 2.

In addition, there were 40 observations of starling during VP surveys, primarily at VP1 with records across the breeding and wintering seasons.

8.13.15 Swallow

Swallow (amber listed) were recorded on the wing during breeding bird transect surveys in summer 2022 along both Transects 1 and 2; records consisted of a individual, pairs and one flock of 21. One individual recorded flying over Transect 4 during summer 2021.

This species was also recorded during flight activity surveys at VPs 1 and 2 during the breeding season including one record of 80 birds feeding over the bog at VP2 on 09th August 2022.

8.13.16 Willow Warbler

Willow warbler (amber listed) was recorded during breeding bird transects in summer 2021 (Transects 3 and 4), summer 2022 (Transects 1 and 2) and summer 2023 (Transect 1). This species was also recorded during flight activity surveys with a total of 23 records during breeding season, primarily at VP2.

8.13.17 Yellowhammer

This red-listed finch often associated with areas under cereal production was recorded during breeding bird transect surveys.

8.13.17.1 Summer Walkover Surveys (2021, 2022 and 2023)

Six records of Red-listed Yellowhammer were made across the three-year survey period. No records were made during the latest breeding bird transect surveys in 2023. In 2021, three records of single individuals were noted flying across farmland habitats along Transect 4. In 2022, three records were made along Transect 2. Two of these observed single individuals along this transect, and one observed a group of six birds.

8.13.17.2 Vantage Point Surveys: Winter and Summer Seasons (2021-2023)

The presence of yellowhammer (noted as an additional species) was recorded a total of 35 times during both summer and winter VP surveys across both VP locations. The majority of observations were at VP1. The surveyor noted a minimum of two birds singing near VP1 on 13th April 2022.

8.13.17.3 Hinterland Surveys (2021, 2022 and 2023)

Two records of yellowhammer were made during the hinterland surveys. In May 2021, a record was made at HVP 6 (8.7km SE) where this species was noted as being locally common. In June 2021, Yellowhammer were observed at HVP 1 (0.8km S). The surveyor noted that this species was widespread along hedgerows in this area.

8.14 Avifauna Evaluation

The basis of impact assessment should be a determination of which ecological 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 2018). Table 8-22 outlines the key receptors selected for assessment and the rationale for same 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 8-23: Avifauna Evaluation

Species	BoCCI	Annex I	NRA Evaluation	Sensitivity	Key Receptor	Rationale
Buzzard	Green	No	Local Importance (Higher Value)	Low	Yes	Buzzard are active at the proposed wind farm site; typically high levels of flight activity were recorded for this species.
Curlew	Red	No	National Importance	High	Yes	Not recorded at proposed wind farm, but potential curlew breeding habitat present adjacent to the proposed site.
Goldcrest	Amber	No	County Importance	Medium	Yes	Potentially affected by habitat loss and disturbance.
Golden Plover	Red	Yes	National Importance	Very High	Yes	Wintering golden plover were recorded overlying the proposed wind farm site.
Goshawk	Amber	No	National Importance	High	Yes	One record of goshawk occurring as winter vagrant; flight activity within rotor envelope.
Great Black-backed Gull	Green	No	Local Importance (Higher Value)	Low	Yes	High numbers of this species recorded overflying the site. Small numbers or individuals occasionally landed in fields.
Greenfinch	Amber	No	County Importance	Medium	Yes	Potentially affected by habitat loss and disturbance.
Grey Heron	Green	No	Local Importance (Higher Value)	Low	Yes	Occasional grey heron flight activity within study area; may use local rivers.

Species	BoCCI	Annex I	NRA Evaluation	Sensitivity	Key Receptor	Rationale
Hen Harrier	Amber	Yes	National Importance	Very High	Yes	Observed during winter transects. Potential to hunt at proposed wind farm site.
Herring Gull	Amber	No	County Importance	Medium	Yes	High numbers of this species recorded overflying the site during winter.
House Martin	Amber	No	County Importance	Medium	Yes	No breeding habitat present within proposed footprint or zone of influence. Potentially subject to barrier and displacement effects.
House Sparrow	Amber	No	County Importance	Medium	Yes	Potentially affected by habitat loss and disturbance.
Kestrel	Red	No	National Importance	High	Yes	Kestrel are active within the flight activity survey area.
Kingfisher	Amber	No	County Importance	Medium	Yes	This species forages in the Fear English River which receives water from the catchment in which the proposed wind farm and substation are located.
Lapwing	Red	No	National Importance	High	Yes	One record of flight activity within rotor envelope.
Lesser Black-backed Gull	Amber	No	County Importance	Medium	Yes	Recorded overflying the site. Occasionally landed in fields.
Linnet	Amber	No	County Importance	Medium	Yes	Potentially affected by habitat loss and disturbance.

Species	BoCCI	Annex I	NRA Evaluation	Sensitivity	Key Receptor	Rationale
Little Egret	Green	Yes	National Importance	Low	Yes	One record of little egret during summer 2022; flight activity within rotor envelope; may use local rivers.
Long-eared Owl	Green	No	Local Importance (Higher Value)	Low	Yes	This species breeds in the local area; may be subject to disturbance.
Meadow Pipit	Red	No	National Importance	High	Yes	Could potentially breed in longer grass in fields or field margins near T1, T4 and T5.
Merlin	Amber	Yes	County Importance	Very High	Yes	Single individuals observed flying at rotor-swept height within the 500m buffer zone. Also recorded during wintering bird transects.
Peregrine	Green	Yes	Local Importance (Higher Value)	Very High	Yes	Observed once during flight activity surveys and once flying over during breeding bird transects.
Red Kite	Red	No	National Importance	High	Yes	Observed once during flight activity surveys. Flying above potential collision height. Rarely occurs in Co. Kildare. Potentially subject to barrier effect.
Redwing	Red	No	National Importance	High	Yes	May be subject to construction disturbance and affected by hedgerow loss.

Species	BoCCI	Annex I	NRA Evaluation	Sensitivity	Key Receptor	Rationale
Redshank	Red	No	National Importance	High	No	No evidence of breeding on or near proposed site. Recorded once on passage.
Sand martin	Amber	No	County Importance	Medium	Yes	No breeding habitat present within proposed footprint or zone of influence. Potentially subject to barrier and displacement effects.
Skylark	Amber	No	County Importance	Medium	Yes	Could potentially breed in longer grass in fields or field margins near T1, T4 and T5.
Snipe	Red	No	National Importance	High	Yes	Potential for nesting snipe to occur within 500m of turbines. Breeding activity was detected within the 500m turbine buffer during VP and breeding wader surveys.
Sparrowhawk	Green	No	Local Importance (Higher Value)	Low	Yes	Sparrowhawk are active within the flight activity survey area; a higher number of records were made during the winter seasons.
Starling	Amber	No	County Importance	Medium	Yes	Potential for breeding and wintering birds to be affected by habitat loss and disturbance.
Stock Dove	Red	No	National Importance	High	Yes	Flight activity recorded within rotor envelope.

Species	BoCCI	Annex I	NRA Evaluation	Sensitivity	Key Receptor	Rationale
Swallow	Amber	No	County Importance	Medium	Yes	No breeding habitat present within proposed footprint or zone of influence. Potentially subject to barrier and displacement effects.
Swift	Red	No	National Importance	High	Yes	Flight activity recorded within rotor envelope.
Wheatear	Amber	No	County Importance	Medium	Yes	Recorded on migration; may occasionally use habitats at proposed wind farm.
Whooper Swan	Amber	Yes	County Importance	Very High	Yes	Flight activity recorded within rotor envelope; known to habitually graze in agricultural fields to north/west of T1-T3.
Willow Warbler	Amber	No	County Importance	Medium	Yes	Potentially affected by habitat loss and disturbance.
Woodcock	Red	No	National Importance	High	Yes	Roding birds observed during surveys, indicating presence of breeding population. Suitable breeding habitat is present in areas surrounding T8-T11. Wintering birds are also present.
Yellowhammer	Red	No	National Importance	High	Yes	May be subject to construction disturbance and affected by hedgerow and arable cropland loss.

8.15 Potential Effects on Designated Sites with Ornithological Interest

A total of three designated sites within the potential zone of influence have ornithological interests.

These are:

- Ballynafagh Bog pNHA (00391) (also an SAC) (ornithological interest: merlin) (8.7 km)
- River Boyne and River Blackwater SAC (002299) (ornithological interest: whooper swan) (10.2 km)
- River Boyne and River Blackwater SAC (004232) (ornithological interest: Kingfisher) (10.2 km)

8.15.1 Potential Construction Phase Effects

No construction stage effects are predicted for Ballynafagh Bog pNHA due to lack of a hydrological connection with the proposed development.

There is potential for effects arising from changes in water quality to affect aquatic habitats in both the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA. It is unlikely that whooper swan occurring within the River Boyne and River Blackwater SAC would be affected, although appraisal of potential indirect effects is required due to the mobility of this species. There is potential for kingfisher occurring within the River Boyne and River Blackwater SPA to be affected, due to it's reliance on aquatic prey and associated habitats.

Potential disturbance/displacement and collision risk affecting whooper swans at the proposed development must also be considered in light of potential links between the swans occurring at the proposed development and the population associated with the SAC.

Potential effects on these species are discussed in detail in Section 8.16. The assessment of European sites is detailed within the accompanying NIS.

The NIS concluded that, in the light of the conclusions of the assessment on the implications for the European sites concerned (River Boyne and River Blackwater SAC, River Boyne and River Blackwater SPA) that the proposed project will not adversely affect the integrity of any European site either individually or in combination with other plans or projects.

8.15.2 Potential Operational Phase Effects

Ballynafagh Bog pNHA is noted to support breeding merlin, curlew and snipe. The potential collision risk for merlin has been assessed as Long-term Imperceptible based on zero predicted collisions over the 35-year lifespan of the proposed development. A Long-term Not Significant impact in terms of operational disturbance and barrier effect was identified for merlin. It is noted that the foraging range of breeding merlin in 5km (SNH, 2016), putting the proposed development beyond the range of any breeding merlin occurring at Ballynafagh Bog pNHA. Similarly, curlew and snipe breeding at Ballynafagh Bog would be restricted to the pNHA and it's immediate surroundings. There is abundant suitable snipe foraging habitat at the pNHA, and curlew are noted to have a respective core/maximum foraging range of 1km/2km during he breeding season. As such, the predicted effect for Ballynafagh Bog pNHA is a **Long-term Imperceptible** effect.

No potential operational effects were identified for kingfisher and as such there are no operational effects in this regard related to the River Boyne and River Blackwater SPA.

Potential operational effects on whooper swan include collision risk and disturbance/displacement of swans using the proposed wind farm site.

Potential operational effects on whooper swan are discussed in detail in Section 1.16. The assessment of European sites is detailed within the accompanying NIS.

The NIS concluded that, in the light of the conclusions of the assessment on the implications for the European sites concerned (River Boyne and River Blackwater SAC, River Boyne and River Blackwater SPA) that the proposed project will not adversely affect the integrity of any European site either individually or in combination with other plans or projects.

8.15.3 Potential Decommissioning Phase Effects

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

8.16 Potential Effects on Avifauna

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 effect during constructions and although disturbance and / or displacement could be viewed as effective habitat loss, it is essentially indirect (SNH, 2017) and therefore covered under Indirect effects.

With regard to effects on bird species, it is considered that the main potential source of impacts on avian fauna is the construction of the proposed wind farm and substation , particularly the construction of turbines and the associated road network.

The potential effects of wind turbines and associated infrastructure on birds may be considered as:

- Potential turbine collision
- Potential overhead line collision
- Possible loss or deterioration of habitats; and
- Disturbance or displacement of birds.

Consideration of the survey data against Table 8-22 indicates that six ‘Very High’ sensitivity species have been recorded within the project study area:

- Golden Plover (red-listed, annex I)
- Hen Harrier (amber-listed, annex I)

- Little Egret (green-listed, annex I)
- Merlin (amber-listed, annex I)
- Peregrine Falcon (green-listed, annex I)
- Whooper Swan (amber-listed, annex I)

Consideration of the survey data against Table 8-22 indicates that ten 'High' sensitivity species have been recorded within the project study area:

- Curlew (red-listed)
- Kestrel (red-listed)
- Lapwing (red-listed)
- Meadow Pipit (red-listed)
- Redwing (red-listed)
- Snipe (red-listed)
- Stock Dove (red-listed)
- Swift (red-listed)
- Woodcock (red-listed)
- Yellowhammer (red-listed)

Consideration of the survey data against Table 8-22 indicates that 12 'Medium' sensitivity species have been recorded within the project study area:

- Goldcrest (amber-listed)
- Goshawk (amber-listed)
- Greenfinch (amber-listed)
- Herring Gull (amber-listed)
- House Sparrow (amber-listed)
- Kingfisher (amber-listed)
- Lesser Black-backed Gull (amber-listed)
- Linnet (amber-listed)
- Skylark (amber-listed)
- Starling (amber-listed)
- Wheatear (amber-listed)
- Willow Warbler (amber-listed)

Consideration of the survey data against Table 8-22 indicates that five 'Low' sensitivity species have been recorded within the project study area:

- Buzzard (green-listed)
- Great Black-backed Gull (green-listed)

- Grey Heron (green-listed)
- Long-eared Owl (green-listed)
- Sparrowhawk (green-listed)

8.16.1 Potential Construction Effects

Potential construction effects relate to the direct effects caused by habitat loss or alteration, in indirect effects (disturbance/displacement) caused by construction noise, human presence etc. The following sections assess the potential effects on Avifauna associated with land-take/infrastructure footprint and associated felling buffers in terms of habitat loss and alteration effects arising from the proposed wind farm, substation and TDR.

Activities such as vegetation clearance/trimming, construction activities, operation of machinery and delivery of turbine components have the potential to cause disturbance. The potential for disturbance/displacement effects to arise from activities associated with construction of the proposed wind farm, proposed substation and delivery of turbine components are assessed in the following sections.

8.16.1.1 Direct Effects: Habitat Loss or Alteration (Proposed Wind Farm)

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. Some species (for example sand martin) may also be affected through material extraction requirements for construction purposes.

Effects on avifauna are to be 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 are 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 the wind farm tracks, turbine foundations and hard standings, temporary site compound, blade set down area, TDR (site entrances) and other infrastructure will result in some habitat damage and loss. For further details on predicted habitat losses please see Chapter 8-1: Biodiversity.

For the purpose of the consideration of the potential effects on birds, species have been grouped into four categories namely passerines, 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. Pigeon/dove belong to the order Columbidae comprised of birds with stout bodies, short necks, and slender bills which primarily feed on seed, fruits, and plants. Bird 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.

8.16.1.1.1 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 wind farm, especially 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. 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 comprised of Improved agricultural grassland (39%), Conifer plantation (26%), Raised bog (7%) and Mixed broadleaved/conifer woodland (6%). The remaining 22% is comprised of Buildings and artificial surfaces, Dystrophic lakes, Dry meadows and grassy verges, Wet heath, (Mixed) broadleaved woodland, (Mixed) conifer woodland, Bog woodland, Scrub, Immature woodland, Tilled land, Amenity grassland, Dense bracken and an assortment of mosaics made up of the above habitats.

The following linear habitats are also present: Buildings and Artificial Surfaces, Spoil and bare ground, Depositing/lowland rivers, Drainage ditches Dry Meadows & Grassy Verges/Scrub Mosaic, Hedgerows, Hedgerows/Treelines Mosaic and Treelines.

The proposed wind farm will result in the loss of the following habitats (% loss of total habitat within study area):

- GS2 - Dry meadows and grassy verges 0.03 ha / 4%
- WD2 Mixed broadleaved/conifer woodland 3.25 ha / 14%
- WD3 (Mixed) Conifer woodland 1.32 ha / 8%
- WS2 Immature woodland 0.32 ha / 16%
- WN7 Bog woodland 1.31 ha / 13%
- WN7/WS1 Bog woodland/Scrub Mosaic 0.16 ha / 3%
- WD4/WN7 Conifer plantation/Bog woodland Mosaic 0.18 ha / 9%
- WD1 Mixed broadleaved woodland 0.65 ha / 6%
- WS1/PB1 Scrub/Raised bog Mosaic 0.33 ha / 68%
- WD4 Conifer plantation 13.82 ha / 14%
- GA1 Improved agricultural grassland 5.21 ha / 4%
- BC3 Tilled land 0.77 ha / 4%
- WL1 Hedgerows 16m/0.4%
- WL2 Treelines 70 m / 3 %
- WL1/WL2 Hedgerows/Treelines Mosaic 690 m / 5%
- FW4 Drainage ditches 356 m / 5 %

Additional works along the TDR will result in the removal of trees at the northern site entrance as well as the trimming of branches along the corridor of the route.

Within the habitats present onsite, goldcrest, greenfinch 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. Habitat loss within semi-natural wooded habitats types will range from 3 - 13%, equating to a Percival effect magnitude of Medium (5-20% habitat lost). Thus, the overall Percival significance for these species is Low. This results in a **Long-term Not significant** Effect in a local context which is Reversible (Criteria: EPA, 2022).

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 cavity 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), however, there is an abundance of grassland habitats in the surrounding area with ample trees and buildings for nesting. As such, a **Temporary Imperceptible** Effect and Reversible in a local context is predicted for house sparrow.

Swallow, house martin and sand martin (Percival significance: Medium) are aerial species that forage over open habitats. Swallow and house martin require buildings for nesting, and sand martin typically nest in sand banks or crevices in walls or bridges.

A disused swallow's nest was observed in a small derelict shed located within the footprint of the proposed northern entrance access track. The limited area of nesting space in this shed means it is of minor importance relative to the wider pool of potential nesting areas associated with houses and sheds in the local area. In addition, the absence of signs of recent use indicate it has not become established as a traditional nest site (a site which would be used year after year). No other potential breeding habitats/features were identified during surveys. With potential breeding habitat limited to a single minor feature, and loss of open foraging habitats limited to 4%, Percival effect magnitude remains Low in the event that breeding swallow are absent from the derelict shed at the time of construction. A **Long-term Not significant** Effect in a local context which is Reversible is identified for this group (Criteria: EPA, 2022).

In the event that the nest in the shed came into use prior to construction, population-level effects would remain Low/Not significant for swallow, but potential interference with a nest during breeding season would give rise to a **Temporary Significant** effect for the individuals directly affected (prior to mitigation).

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 habitats subject to loss or disturbance remains. Specifically, there is some potential for these species to breed in longer Improved agricultural grassland near T4 and T5. Aside from this however, potential for breeding in areas overlapped by the proposed wind farm footprint is extremely low. Higher quality breeding habitat is present outside the proposed wind farm in the adjacent peatland habitats. Considering the limited occurrence of potential but sub-optimal breeding habitat (>1% of potentially suitable habitat), Percival effect magnitude is Negligible, equating to overall Percival significance of Very Low. The corresponding EPA effect is a **Long-term Imperceptible** effect (Criteria: EPA, 2022).

In the event that breeding birds were present within or close to the proposed footprint at the time of construction, this would result in a **Temporary Significant** effect for any individuals directly affected (prior to mitigation).

Redwing (Percival sensitivity: High) are winter visitors which uses 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 treeline/hedgerow mosaic) ranges between 3-5%. 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, a **Short-term Not significant** Effect which is Reversible in a local context is predicted for redwing.

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%; Percival impact significance is Low (1 - 5% habitat loss for open foraging habitats), however, there is an abundance of grassland habitats in the surrounding area with ample trees and buildings for nesting, thus a **Temporary Imperceptible** effect and Reversible in a local context is predicted for starling.

Wheatear (Percival sensitivity: Medium) are associated with a variety of habitats, typically found breeding in areas with some areas of exposed rock and short vegetation, such as along rocky coasts, pasture with stone walls and bogs in uplands (Birdwatch Ireland, 2025). The birds observed at Drehid are assessed as passage migrants en route to their breeding grounds, based on a single observation of four birds during late spring 2022. The proposed development is likely to offer suitable habitats for this species to rest/replenish during migration. Suitable habitat for this purpose will remain following construction, and similar habitats are also widely available in the locality. The potential effects are **Long-term** and **Imperceptible** in a local context which is Reversible (Criteria: EPA, 2022).

Willow warbler (Percival sensitivity: Medium) are predominantly found in scrubby woodland ad along the edges of bogs and marshes, and less frequently recorded in hedgerows, woodlands and well-vegetated gardens. Percival effect significance is Medium (5-20% habitat loss) (overall significance is Low). The potential effects are **Long-term** and **Slight** in a local context which is Reversible (Criteria: EPA, 2022).

Yellowhammer (Percival sensitivity: High) is a species associated with arable landscape and hedgerows. There will be some loss of arable land and hedgerow and hedgerow/treeline mosaic habitat which could be used by this species; however, loss of these habitats is limited. Percival effect significance is Low (1-5% habitat loss) (overall significance is Low). Thus, a **Short-term Not significant** Effect which is Reversible in a local context is predicted for yellowhammer.

8.16.1.1.2 Target Species

Table 8-23 below displays the direct effect character during construction as well as the significance of effects without the implementation of mitigation.

Table 8-24: Effect of habitat loss to target species

Key Receptor (Sensitivity)	Construction Direct Effect Character	Significance without mitigation
Buzzard (Low)	Typically high levels of flight activity were recorded for buzzards during VP surveys. This species was recorded 111 times across all breeding season VP surveys, and 54 times across all winter season VP surveys. The majority of which observed buzzards traversing the 500m buffer zone. Buzzards were observed circling, soaring and perching in trees. No hunting was observed. No breeding behaviour was observed, excluding display flights (display lights can be used for both territorial defence and courtship). Although no breeding activity was recorded, there is suitable potential habitat for breeding buzzards on-site. Effects on open agricultural habitats used for foraging and wooded habitats for breeding will be minimal (loss of 21.7 ha of wooded habitats/ 6 ha open agricultural habitats). This equates to 12.7 % of total wooded habitats and 3.7% of open agricultural habitats, resulting in low to medium magnitude effects.	**Sensitivity:** Low **Magnitude:** Low -Medium **Overall significance:** Very Low (Criteria: Percival, 2003) Loss of habitat will be a **Long-term Imperceptible** effect due to low magnitude/species sensitivity and abundance of suitable habitats in the local area (Criteria: EPA, 2022)
Curlew (High)	Curlew were exclusively recorded during hinterland surveys, and were not observed at the proposed wind farm site. Records observed curlew c. 9 km south-west of the Site during the breeding seasons, and c. 3.1 km east of the Site during the winter seasons. With no records of curlew within the Site, and a lack of suitable on-site breeding and foraging habitats, the resultant habitat loss will not be significant. Habitat loss is not envisaged to effect this species.	**Sensitivity:** High **Magnitude:** Negligible **Overall significance:** Very Low No loss of habitat will occur, resulting in a be a **Long-term Imperceptible** effect (Criteria: EPA, 2022)
Golden Plover (Very High)	Golden plover were observed on ten occasions across all VP surveys. The majority of which (seven) occurred during the winter season, where all records observed golden plover traversing the 500m buffer zone. One observation during the winter 2022/23 VP surveys recorded a flock of 200 individuals circling and calling over cutaway and intact raised bogs adjacent to the proposed wind farm. The remaining three records occurred during the breeding season (during spring and autumn, indicative of migration and/or post breeding dispersal from other regions). No breeding behaviours or activity was observed across the breeding season VP surveys. There was no evidence of breeding or roosting within the study area and immediately surrounding areas.	**Sensitivity:** Very High **Magnitude:** Negligible **Overall significance:** Low Loss of habitat will be a **Long-term Not significant** effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Construction Direct Effect Character	Significance without mitigation
	Typically, this species forages in arable fields, wetlands, and short-cropped heath. The loss of 0.77 ha (4%) of tilled land which is also representative of arable land would be a low magnitude effect in isolation. However, due to this area of agricultural land making up a smaller proportion of the wider habitat resource for this species onsite including peatland habitats, the overall effect magnitude is assessed as Negligible.	
Goshawk (Medium)	A single observation of Goshawk was recorded during the 2022/23 VP surveys. No hunting, breeding or roosting behaviours were observed. As no further observations were made, this record is characterised as a single occurrence of a winter vagrant. Effects on wooded foraging habitats will be low (loss of 21.7 ha of wooded habitats/ 12.7 % of total wooded habitats) resulting in Medium magnitude effects. Due to the vagrant status of this species and highly infrequent occurrence, the resultant habitat loss will not be significant.	**Sensitivity**: Medium **Magnitude:** Medium **Overall significance**: Low Loss of habitat will be a **Long-term, Imperceptible** effect, based on the fact this species was sighted once, and was noted as a winter vagrant (Criteria: EPA, 2022).
Great Black-backed Gull (Low)	Regular observations of great black-backed gull were made across all VP surveys, with the majority of records occurring during the winter seasons. A total of 19 records were made during the breeding season VP surveys. All of which observed individuals traversing the 500m buffer zone. In April 2022, a flock of 19 individuals were recorded circling over the Site. No breeding or foraging activity was observed. During the winter seasons, great black-backed gulls were observed 45 times, where records of lone individuals and flocks of up to 164 birds were observed. No foraging behaviour was recorded. One record in May 2023 noted a lone individual landing in a nearby agricultural field. No records exist of this species landing in or using the habitats within the 500m buffer zone. Although great black-backed gulls primarily nest on the coast, they are also known to nest on buildings in larger towns and cities. Birds nesting inland occur near larger waterbodies. Therefore, there is no potential for breeding on-site. While this species could occasionally forage in open agricultural habitats on site, this would be a rare occurrence and these habitats would be secondary foraging habitats. Therefore, habitat loss is not predicted to effect this species.	**Sensitivity**: Low **Magnitude:** Negligible **Overall significance:** Very Low Loss of habitat will be a **Long-term Imperceptible** effect, based on minimal sightings within the Site, lack of suitable breeding habitats and sub-optimal/secondary foraging habitats (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Construction Direct Effect Character	Significance without mitigation
Grey Heron (Low)	Grey heron were observed on five occasions across all VP surveys. Three of which occurred during the summer season, where all three observed grey heron flying over the 500m buffer zone. The remaining record noted lone adults flying across the 500m buffer zone during the 2021/22 and 2022/23 winter season. Grey heron may use local river habitats for foraging purposes. However, habitats on-site are unsuitable for foraging and breeding. As such, habitat loss is not envisaged to effect this species.	**Sensitivity:** Low **Magnitude:** Negligible **Overall significance**: Very Low Loss of habitat will be a **Long-term Imperceptible** effect, based on minimal sightings within the Site, and a lack of suitable breeding and foraging habitats (Criteria: EPA, 2022).
Hen Harrier (Very High)	Two records of hen harrier were made across all surveys. Both of which occurred observed a single lone individual during the same transect survey in December 2021. It was noted that both observations likely involved the same individual. No evidence of breeding, roosting or nesting was recorded. Hen Harrier typically forage over heath, bog, low intensively farmed grassland with well-established hedgerows and areas of scrub (Irwin et al., 2012). Heath and bog habitats are important hunting grounds for Hen Harrier. Although no evidence of hunting was observed, there are suitable hunting grounds on-site. There will be no loss of open peatland habitats which could be used by foraging hen harrier. Loss of agricultural grassland will affect intensively managed habitats.	**Sensitivity:** Very High **Magnitude:** Negligible **Overall significance:** Low (Criteria: Percival, 2003) Loss of habitat will be a **Long-term Imperceptible** effect based on no loss of suitable foraging habitat (Criteria: EPA, 2022)
Herring Gull (Medium)	Herring gulls were recorded on 128 occasions during VP surveys, with the majority of observations (118) occurring during the winter seasons. All ten records during the 2022 and 2023 breeding seasons noted lone individuals or flocks of up to 42 birds in flight. No breeding or foraging activities were observed. During the winter seasons, 118 observations were made. Only 32 of which occurred during the 2022/23 winter VP surveys. The majority of records observed individuals flying over and traversing the 500m buffer zone. Two records noted flocks of three and four birds landing in nearby agricultural fields. No foraging activities were recorded. Effects on open agricultural habitats potentially used for foraging (loss of 6 ha open agricultural habitats). This equates to loss of 3.7% of open agricultural habitats, resulting in a Low magnitude effect.	**Sensitivity:** Medium **Magnitude:** Low **Overall significance:** Low (Criteria: Percival, 2003) Loss of habitat will be **a Long-term Not significant** effect based on the low magnitude of secondary foraging habitat loss, absence of breeding habitat and absence of records of herring gull foraging on-site (Criteria: EPA, 2022)

Key Receptor (Sensitivity)	Construction Direct Effect Character	Significance without mitigation
Kestrel (High)	Kestrel were observed 22 times during the breeding season VP surveys, and 17 times during the winter season VP surveys. The majority of records observed kestrel flights intersecting the 500m buffer zone. This species typically breeds and forages in woodland, dry heath, dry meadows, grassy verges, improved agricultural grassland, recently felled woodland and scrub - thus kestrel is rather flexible in its habitat needs and can utilise a broad mosaic of different habitat types. The site was observed to be used by commuting individuals. No foraging, hunting, breeding or nesting was observed, although the landscape-scale habitat mosaic in which the proposed wind farm is located is suitable for these activities. 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 3.7% loss, resulting in a Low magnitude effect.	**Sensitivity:** High **Magnitude:** Low **Overall significance:** Low (Criteria: Percival, 2003) Loss of habitat will be **a Long-term Not significant** effect (Criteria: EPA, 2022)
Kingfisher (Medium)	Kingfisher were observed twice during targeted kingfisher VP surveys on the Fear English River. Kingfisher were also recorded during transect surveys along this riverine channel. All records were of birds in flight. Despite kingfisher activity in the area, no kingfisher nesting sites (active or inactive) were observed. Based on the habitat assessment undertaken during kingfisher surveys, the soils of the historically excavated, sloping banks of the Fear English River appear to be too compacted for kingfisher nest excavation. As such, this area can be considered as foraging habitat, rather than breeding grounds for kingfisher. No direct loss of riverine habitat will occur. As such, this species will not be effected by habitat loss.	**Sensitivity:** Medium **Magnitude:** Negligible **Overall significance:** Very Low (Criteria: Percival, 2003) Loss of habitat will be a **Long-term Imperceptible** effect based on the absence of records of kingfisher using the habitats on-site, lack of suitable breeding and foraging habitats on-site, and avoidance of direct impacts on riverine habitats (Criteria: EPA, 2022)
Lapwing (High)	Lapwing were recorded once during the 2021/22 winter VP surveys, where four individuals were observed flying over the 500m buffer zone. This species was observed on ten occasions during the breeding wader surveys, utilising peatland habitats to the south east of the proposed wind farm. No lapwing habitat or breeding activity was observed within or adjacent to the proposed wind farm. As such, habitat loss is not predicted to affect this species.	**Sensitivity:** High **Magnitude:** Negligible **Overall significance:** Very Low (Criteria: Percival, 2003) Loss of habitat will be a **Long-term Imperceptible** effect based on the fact that there were minimal sightings of lapwing, and due to the absence of suitable foraging and breeding (Criteria: EPA, 2022)

Key Receptor (Sensitivity)	Construction Direct Effect Character	Significance without mitigation
Lesser Black-backed Gull (Medium)	Lesser black-backed gull were observed on 18 occasions during summer VP surveys, and 11 occasions during winter VP surveys. The majority of which observed birds traversing the 500m buffer zone. Breeding and roosting were not observed within the site over the survey period. Although this species nests primarily on the coast, it is also known to nest on buildings, in larger towns and cities. Birds nesting inland occurs near larger waterbodies, and therefore there is no potential for breeding on-site. Open agricultural habitats on site could be used occasionally as secondary foraging habitats. Effects on open agricultural habitats potentially used for foraging (loss of 6 ha open agricultural habitats). This equates to loss of 3.7% of open agricultural habitats, resulting in a Low magnitude effect.	**Sensitivity:** Medium **Magnitude:** Negligible **Overall significance:** Very Low (Criteria: Percival, 2003) Loss of habitat will be a **Long-term Not significant** effect based on the low magnitude of secondary foraging habitat loss, absence of breeding habitat and absence of records of herring gull foraging on-site (Criteria: EPA, 2022)
Little Egret (Very High)	A single little egret was observed flying at rotor-swept height within the 500m buffer zone on one occasion, during the 2022 summer VP surveys. This species was not observed during any other survey type. No foraging or breeding behaviours were observed. This species may use the local rivers in the surrounding environment for foraging purposes. However, due to the minimal sightings, and the fact that no direct loss of riverine habitat will occur, this species will not be effected by habitat loss.	**Sensitivity**: Very High **Magnitude:** Negligible **Overall significance:** Low (Criteria: Percival, 2003) Loss of habitat will be a **Long-term Not significant** effect based on the absence of records of little egret using the habitats on-site, and avoidance of direct effects on riverine habitats (Criteria: EPA, 2022)
Long-eared Owl (Low)	A long-eared owl breeding population is present within the surrounding hinterland, based on the record of a family unit during 2023 transect surveys, and another record of a family unit at HVP 5 c. 8.2km from the proposed wind farm during hinterland surveys. Long-eared owl were not observed during any other survey type, and were not recorded within the proposed wind farm. This species typically breeds in lowland habitats, typically in stands of conifers and can be found in a range of habitats including woodlands, farmlands and wetlands. Although no records of long-eared owl within the Site were made, there is suitable habitat for breeding and foraging birds.	**Sensitivity:** Low **Magnitude:** Medium **Overall significance:** Very Low (Criteria: Percival, 2003) Loss of habitat will be a **Long-term Imperceptible** effect (Criteria: EPA, 2022)

Key Receptor (Sensitivity)	Construction Direct Effect Character	Significance without mitigation
	There will be a loss of 13.82 ha of conifer plantation, equating to 14.5% of the total conifer plantation within the study area, resulting in a Medium magnitude effect. Loss of potential foraging habitat is assessed as negligible due to the abundance of similar habitats within the local area.	
Merlin (Very High)	Merlin were observed on two occasions during the 2021/22 winter VP surveys. Both records observed lone individuals flying at rotor-swept height within the 500m buffer zone. Merlin were observed on one other occasion, whereby a single individual was sighted during a 2021/22 winter transect survey. This species was not observed during any other survey. 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 at the proposed wind farm site, as demonstrated by the infrequent winter records. Loss of open foraging habitats will be minimal: no loss of optimal foraging habitat represented by peatland habitats, and loss of 3.7% of open agricultural habitats, resulting in a Low magnitude effect.	**Sensitivity:** Very High **Magnitude:** Low **Overall significance:** Medium (Criteria: Percival, 2003) Loss of secondary foraging habitat will be a **Long-term Not significant** to **Slight** effect (Criteria: EPA, 2022)
Peregrine (Very High)	Peregrine were observed infrequently across the survey period. This species was recorded once during the winter 2022/23 VP surveys, three times during hinterland surveys, and once during breeding bird transect surveys. The observations consisted of adult individuals flying over the 500m buffer zone, and surrounding hinterland. No hunting or breeding activities were observed. Peregrine require tall cliff-faces or man-made structures which resemble these, for breeding. No such habitats or structures occur on site. Peregrines are aerial hunters which dive on prey from above and as such are not strictly limited to any particular habitat, instead they require sufficient numbers of avian prey. As such, there are no predicted habitat loss effects on this species.	**Sensitivity:** Very High **Magnitude:** Negligible **Overall significance:** Low (Criteria: Percival, 2003) Loss of habitat will be a **Long-term Not significant** effect based on the absence of records of peregrine using the habitats on-site, and absence of suitable breeding habitats on-site (Criteria: EPA, 2022)
Snipe (High)	Snipe were observed on six occasions during the spring migration VP surveys, seven times during summer VP surveys, and four times during the winter	**Sensitivity:** High **Magnitude:** Negligible

Key Receptor (Sensitivity)	Construction Direct Effect Character	Significance without mitigation
	VP surveys. The majority of records observed snipe traversing the 500m buffer zone. Snipe were also observed during winter walkover, breeding wader, and hinterland surveys. During surveys, snipe were noted chipping and/or drumming in bog habitats adjacent to the proposed wind farm, south of T9 – T10. In both 2022 and 2023, breeding was confirmed in the local area as snipe near turbines T9-10 were observed drumming and occupying territory. Snipe are ground-nesting birds that breed in grassy tussocks in or adjacent to bog habitats. Snipe are commonly found in bog and wet grassland habitats during the breeding season, as well as wetland habitats and lowland lake shores during the non-breeding season. While suitable habitats for snipe are present in the vicinity of the proposed wind farm, there will be no loss of intact and semi-intact bog habitats suitable for breeding snipe.	**Overall significance:** Very Low (Criteria: Percival, 2003) No loss of habitat will occur, resulting in a be a **Long-term Imperceptible** effect (Criteria: EPA, 2022)
Sparrowhawk (Low)	Sparrowhawk were recorded a total of 17 times during breeding season VP surveys, and 26 times during winter season VP surveys. The majority of records observed lone individuals or pairs of sparrowhawks traversing the 500m buffer zone. All records were exclusively of birds in flight. No breeding or hunting activities were observed. This species was also observed twice along Transect 1 during winter walkover surveys, and twice during hinterland surveys (at HVP 7 – 9.5 km S; and at HVP 4 – 3.1 km E). 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 breeding, nesting or hunting was observed, due to the presence of suitable habitats on-site and availability of suitable prey, there is potential for sparrowhawk to breed, nest and hunt in the area in which the proposed wind farm is located. Considering the broad range of habitats potentially suitable for sparrowhawk, loss of habitat is calculated as total loss across all habitat types which equates to 7.4% loss, resulting in a Medium magnitude effect.	**Sensitivity:** Low **Magnitude:** Medium **Overall significance:** Very Low (Criteria: Percival, 2003) Loss of habitat will be a **Long-term Imperceptible** effect (Criteria: EPA, 2022)
Stock Dove (High)	Three observations of this species were made during the survey period. One of which noted a lone individual along Transect 2 during breeding season	**Sensitivity:** High **Magnitude:** Low

Key Receptor (Sensitivity)	Construction Direct Effect Character	Significance without mitigation
	transect surveys. The remaining two records observed a lone individual on the same day, during summer VP surveys. Stock dove are typically found within farmland (usually associated with cereal production areas) and woodland habitats, and prefer mature trees for nesting. While no breeding or foraging was observed, there is potentially suitable habitat for nesting stock dove at the proposed wind farm site. Loss of potentially suitable habitats including 4% of tilled land, and loss of 5 % of suitable linear wooded habitats will result in Low magnitude effects. Mixed broadleaved woodland with mature trees providing higher quality nesting habitat will not be affected.	**Overall significance:** Low (Criteria: Percival, 2003) Loss of habitat will be a **Long-term Not significant** effect (Criteria: EPA, 2022)
Swift (High)	Minimal observations of swift were made across all surveys. This species was observed on five occasions during breeding season VP surveys, three times during breeding walkover surveys, once during a merlin survey, and once during hinterland surveys. Three records in 2023 observed swift hawking within the 500m buffer zone. Swift feed exclusively on various invertebrates (midges, flies, spiders) caught in flight. Therefore, there is no scope for direct effects on foraging habitat. There is no swift breeding habitat present at the proposed wind farm site.	**Sensitivity:** High **Magnitude:** Negligible **Overall significance:** Very Low (Criteria: Percival, 2003) Loss of habitat will be a **Long-term Imperceptible** effect based on the absence of swift nesting habitat and no potential for effects on foraging (Criteria: EPA, 2022)
Whooper Swan (Very High)	Whooper swan were observed on seven occasions during the winter season VP surveys. This species was observed habitually grazing in agricultural fields outside of the 500m buffer zone to the north and west of turbines T1-3. Flocks of between 10 to 27 swans were observed grazing in this area. There will be a loss of 5.21 ha (3.7%) of improved agricultural grassland potentially of use to grazing whooper swan, resulting in a Low magnitude effect. It is noted however that the areas observed to be used by grazing swans are located outside the proposed wind farm footprint, indicating the effect identified above is overly conservative.	**Sensitivity:** Very High **Magnitude:** Low **Overall significance:** Medium (Criteria: Percival, 2003) Loss of habitat will be a **Long-term Imperceptible** to **Not significant** effect based on the low proportion of habitat loss and location of preferred/traditional grazing areas outside the proposed wind farm footprint. (Criteria: EPA, 2022)
Woodcock (High)	Woodcock were recorded during targeted woodcock surveys across all survey years, as well as breeding wader surveys in summer 2022. 32 records of woodcock were made during the 2021, 2022 and 2023 targeted woodcock surveys, and records typically observed woodcock roding. This	**Sensitivity:** High **Magnitude:** Medium **Overall significance:** High (Criteria: Percival, 2003)

Key Receptor (Sensitivity)	Construction Direct Effect Character	Significance without mitigation
	indicates a breeding population is present in wooded areas in which the proposed wind farm is located. The recorded observations of displaying males indicate breeding woodcock are distributed across the areas of woodland overlapped by the proposed wind farm. The majority of wooded habitats present are potentially suitable for breeding woodcock. Based on a combined loss of 27.5 ha (7.4%) across all wooded habitats, a Medium magnitude effect will occur.	Loss of habitat will be a **Long-term Moderate** effect based on the proportion of wooded habitat loss, while considering the abundance of suitable displacement habitat within in the local area. (Criteria: EPA, 2022)

8.16.1.2 Indirect Effects: Disturbance and Displacement (Proposed Wind Farm)

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).

Studies both during construction (Pearce-Higgins et al., 2012) and during operational effects of wind farms (Pearce-Higgins et al., 2009) have shown that certain species (e.g. large wading species such as curlew) can be affected particularly as a result of construction impacts (in that the affected species fail to recover to pre-construction densities).

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

Table 8-25: Indirect Construction Effects on Avifauna

Key Receptor (Sensitivity)	Construction Indirect Effect Character	Significance without mitigation
Buzzard (Low)	Buzzards were recorded on 111 occasions during breeding season VP surveys, and 54 occasions during winter season VP surveys. The majority of records observed buzzards flying and soaring within the 500m buffer zone. No breeding behaviours were observed, outside of display flights which can be used for both courtship and territorial defence. Due to the high levels of activity within the proposed wind farm, there is potential for noise or visual disturbance to buzzard within the Site.	**Sensitivity:** Low **Magnitude:** Medium **Overall significance:** Very Low (Percival, 2003) Disturbance and/or displacement will be a **Short term Imperceptible** effect (Criteria: EPA, 2022).
Curlew (High)	Curlew were exclusively recorded during hinterland surveys, and were not observed within the proposed wind farm site. During the breeding season hinterland surveys, curlew were recorded on peatland habitats c. 9 km south-west of the Site. At this location, a pair failed to breed successfully due to nest predation in May 2021, and a group of three birds were sighted in May 2022. No successful breeding was observed. Due to the presence of recolonising cutover bog and intact raised bog immediately adjacent to the proposed wind farm, there is potential curlew breeding habitat adjacent to the proposed wind farm. However, the habitats within the wind farm site are not suitable for breeding curlew. During the winter season, curlew were observed four times in the wider environment, c. 3 km east of the proposed wind farm site. No records were made within the wind farm site. It is considered on a precautionary basis that due to the close proximity of suitable curlew breeding habitat, there is potential for disturbance to occur in the event that breeding curlew became established prior to construction. However, if the baseline remains unchanged no disturbance will occur due to absence of breeding curlew.	**Sensitivity**: High **Magnitude:** Negligible (baseline unchanged); in the event that habitat adjacent to proposed wind farm was used by breeding curlew, a High magnitude effect could occur. **Overall significance:** (baseline unchanged); Very Low; (breeding curlew present); Very High. (Percival, 2003) Based on current baseline, disturbance and/or displacement will be a **Short-term Imperceptible** effect. In the event that breeding curlew established within 200-300m of proposed wind farm prior to construction, a **Short-term Significant** effect could occur, prior to mitigation. (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Construction Indirect Effect Character	Significance without mitigation
Goldcrest (Medium)	Goldcrest were observed on 18 occasions across winter and summer season VP surveys as secondary target species and was also observed along Transects 1 and 2 during the 2022 and 2023 breeding season transect surveys. This species typically uses woodland, treeline and scrub habitats to forage. Due to the presence of suitable habitats on-site and sightings within the area, there is potential for goldcrest to be indirectly effected by noise and/or visual disturbance.	**Sensitivity:** Medium **Magnitude:** Medium **Overall significance**: Low (Percival, 2003) Disturbance and/or displacement will be a **Short-term Not Significant** effect (Criteria: EPA, 2022).
Golden Plover (Very High)	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). However, the aforementioned studies centre around breeding sites, roosting sites and established foraging habitats. All records for this species were exclusively of birds in-flight, commuting over the site. Golden plover breed in the north-west of Ireland, but do not breed in the midlands where the proposed wind farm is located. Based on current surveys, there is limited potential for wintering or migratory golden plover to occasionally stop over and feed in peatland habitats adjacent to the proposed wind farm site. Any potential disturbance would be of Low magnitude.	**Sensitivity:** Very High **Magnitude:** Low **Overall significance:** Medium (Percival, 2003) Disturbance and/or displacement will be a **Short-term Not significant** to **Slight** effect (Criteria: EPA, 2022).
Goshawk (Medium)	Goshawk was sighted on one occasion during the winter 2022/23 VP surveys. This species was not observed during any other survey, and no evidence of breeding, roosting or hunting was recorded. As such, the single record of this species represents a single occurrence of a winter vagrant. Therefore, it is unlikely that this species will be effected by noise or visual disturbance.	**Sensitivity:** Medium **Magnitude:** Negligible **Overall significance:** Very Low (Percival, 2003) Disturbance and/or displacement will be a **Short-term Imperceptible** effect (Criteria: EPA, 2022).
Great Black-backed Gull (Low)	This species was regularly recorded across all VP surveys. The majority records occurred during the winter season, and most observed great black-backed gulls traversing the 500m buffer zone. No evidence of foraging or breeding was detected on-site. As there are no suitable habitats for such activities within or adjacent to the proposed wind farm site, there is no potential to indirectly effect foraging or breeding birds.	**Sensitivity:** Low **Magnitude:** Low **Overall significance:** Very Low

Key Receptor (Sensitivity)	Construction Indirect Effect Character	Significance without mitigation
	While no foraging was recorded, there is potential for this species to forage occasionally in agricultural habitats at the proposed wind farm site. Therefore, there is limited potential for disturbance of foraging birds to occur.	Disturbance and/or displacement will be a **Short-term Imperceptible** effect (Criteria: EPA, 2022).
Greenfinch (Medium)	This species was observed twice during VP surveys, as an additional or secondary target species. Greenfinch were also observed during summer 2021 breeding bird transect surveys. Studies on the impact of wind farms during construction (Pearce-Higgins et al., 2012) have found little evidence of significant disturbance effects on passerine species. The main effect during the construction phase is that of direct habitat loss. As such, it is unlikely that greenfinch would be indirectly effected by visual or noise disturbance.	**Sensitivity**: Medium **Magnitude:** Negligible **Overall significance:** Very Low Disturbance and/or displacement will be a **Short-term Imperceptible** effect (Criteria: EPA, 2022).
Grey Heron (Low)	Grey heron were recorded on four occasions across all VP surveys. Three of which observed grey heron within the 500m buffer zone, and all four records recorded grey heron in-flight. No breeding was detected. Although no foraging was observed, this species may occasionally use local rivers, drains or ponds for such purposes. As such, there is limited potential for grey heron to be indirectly effected by noise or visual disturbance.	**Sensitivity**: Low **Magnitude**: Negligible **Overall significance**: Very Low (Percival, 2003) Disturbance and/or displacement will be a **Short-term Imperceptible** effect (Criteria: EPA, 2022).
Hen Harrier (Very High)	Hen harrier was observed twice during surveys, with a juvenile recorded flying around the site on two occasions during the same day in December 2021 (both sightings are considered likely to be the same individual). As such, current surveys indicate potential for occasional/casual use of the proposed wind farm site by foraging hen harrier. No breeding or winter roosting behaviour was observed. This species is most likely to be disturbed at nest sites and communal roosting sites during the winter season, and potentially foraging grounds during the non-breeding season. 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.	**Sensitivity:** Very High **Magnitude:** Negligible **Overall significance:** Low (Percival, 2003) Disturbance and/or displacement will be a **Short-term Not significant** effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Construction Indirect Effect Character	Significance without mitigation
	However, the studies in question relate to breeding sites, roosting sites and established foraging habitats. There was no evidence during any surveys of breeding, roosting or regular foraging on-site. Hen harrier were only recorded twice across the entire survey period. As such, there is no potential for breeding or winter roosting hen harrier to be indirectly effected by construction works. There is limited potential for foraging hen harrier to be affected by noise and/or visual disturbance; however, considering the low number of observations, the proposed wind farm site is assessed as being likely to form a minor component within a larger landscape-scale mosaic of foraging habitats.	
Herring Gull (Medium)	Herring gull were regularly recorded during VP surveys, with the majority of records occurring during the winter seasons. Herring gull were predominantly observed flying over and traversing the 500m buffer zone. On two occasions, flocks of three and four birds were observed landing in nearby agricultural fields, outside of the 500m buffer zone. No foraging activities were recorded within the buffer zone; however, there is potential for this species to forage occasionally in agricultural habitats at the proposed wind farm site. Therefore, there is limited potential for disturbance of foraging birds to occur.	**Sensitivity**: Medium **Magnitude:** Low **Overall significance:** Low (Percival, 2003) Disturbance and/or displacement will be a **Short-term Not Significant** effect (Criteria: EPA, 2022).
House Sparrow (Medium)	This secondary target species was observed during flight activity surveys in summer 2022 and 2023, as well as breeding bird transect surveys in summer 2021. House sparrow are found in a variety of habitats, including urban and sub-urban areas, pastures and arable lands, woodlands, and coastal habitats. This species also breeds throughout Ireland, but typically remains close to human habitation including farm buildings and built-up areas such as parks and gardens. This species nests in cavities in buildings, especially under eaves or holes formed by missing brickwork. Due to the absence of records of and potential for breeding, in addition to tolerance of human presence, it is unlikely that house sparrow would be indirectly effected by visual or noise disturbance.	**Sensitivity:** Medium **Magnitude:** Negligible **Overall significance:** Very Low Disturbance and/or displacement will be a **Short-term Imperceptible** effect (Criteria: EPA, 2022).
Kestrel (High)	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).	**Sensitivity:** High **Magnitude:** Low (foraging kestrel)/ High (breeding kestrel within 100-200m)

Key Receptor (Sensitivity)	Construction Indirect Effect Character	Significance without mitigation
	Kestrel were observed 22 times during the breeding season VP surveys, and 17 times during the winter season VP surveys. The majority of records observed kestrel flights intersecting the 500m buffer zone. The 100-200m buffer zone is suggested to protect nesting Kestrels from forestry operations. However, the proposed wind farm site was observed to be used exclusively by commuting individuals. No foraging, hunting or breeding was observed. The presence of a kestrel nest box (currently unoccupied) c. 58m from the northern site entrance access track is noted. 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.	**Overall significance**: Low (foraging kestrel)/ Very High (breeding kestrel within 100-200m) (Percival, 2003) 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 (Criteria: EPA, 2022).
Kingfisher (Medium)	Kingfisher activity was observed within the surrounding environment. Surveys found that although kingfisher do not breed or nest within or surrounding the proposed wind farm, kingfisher are present along watercourses in in the local area. This species likely forages in the local river systems. As such, there is potential for foraging kingfisher to be indirectly effected by noise and/or visual disturbance.	**Sensitivity:** Medium **Magnitude**: Medium **Overall significance**: Low (Percival, 2003) Disturbance and/or displacement will be a **Short-term Not Significant** effect (Criteria: EPA, 2022).
Lapwing (High)	This species was observed within the 500m buffer zone on one occasion during the 2021/22 winter VP surveys, where a group of four individuals were recorded flying across the proposed wind farm site. Breeding wader surveys noted ten observations of lapwing along Transect 3 (c. 1.1 km south-west of the proposed wind farm). No lapwing habitat or breeding activity was observed within or adjacent to the proposed wind farm. Due to the absence of suitable lapwing habitat and minimal sightings in the flight activity survey area, it is unlikely that lapwing would be indirectly effected by visual or noise disturbance.	**Sensitivity:** High **Magnitude**: Negligible **Overall significance:** Very Low Disturbance and/or displacement will be a **Short-term Imperceptible** effect (Criteria: EPA, 2022).
Lesser Black-backed Gull (Medium)	Lesser black-backed gull were observed a total of 29 times across all flight activity VP surveys, with most records observing individuals traversing the 500m buffer zone. No nesting, breeding or foraging was observed; however, there is potential for this species to forage occasionally in agricultural habitats at the proposed wind farm site. Therefore, there is limited potential for disturbance of foraging birds to occur.	**Sensitivity**: Medium **Magnitude**: Medium **Overall significance**: Low (Percival, 2003)

Key Receptor (Sensitivity)	Construction Indirect Effect Character	Significance without mitigation
		Disturbance and/or displacement will be a **Short-term Not Significant** effect (Criteria: EPA, 2022).
Linnet (Medium)	Linnet were observed 37 times during VP surveys. The majority of records occurred during the breeding season. This species was also recorded during breeding bird transect surveys. Linnet typically prefer breeding in rough grasslands in upland and coastal areas with gorse. As such, it is unlikely for this species to breed within the proposed wind farm site. This species predominantly forages in woodland, treeline and scrub habitats, but may also forage in heathland, moorland and bogland habitats. Therefore, due to the presence of this species on-site and potential suitable foraging habitats on-site, there is potential for foraging linnet to be indirectly effected by visual or noise disturbance.	**Sensitivity:** Medium **Magnitude:** Low **Overall significance:** Low (Percival, 2003) Disturbance and/or displacement will be a **Short-term Not Significant** effect (Criteria: EPA, 2022).
Little Egret (Very High)	A single record of little egret was made during the 2022 summer VP surveys, where a lone individual was observed flying within the 500m buffer zone. No other records of this species were made. No foraging, breeding or nesting was detected. Although no foraging was observed, this species may occasionally use local rivers, drains or ponds for such purposes. As such, there is limited potential for little egret to be indirectly effected by noise or visual disturbance.	**Sensitivity:** Very High **Magnitude:** Negligible **Overall significance**: Low (Percival, 2003) Disturbance and/or displacement will be a **Short-term Not Significant** effect (Criteria: EPA, 2022).
Long-eared Owl (Low)	A long-eared owl breeding population is known to be present in the surrounding hinterland, with a record of a family group being recorded along Transect A in summer 2023, c. 288m from T6 and another record of a family group at HVP 5 (Donadea Forest Park, 8.2km SE) in June 2021. No breeding sites were recorded within or adjacent to the proposed wind farm. A buffer of 100-300m for both breeding and non-breeding long-eared owl is identified in Goodship and Furness (2022). In the event that breeding long eared owl were disturbed, the predicted magnitude of effect would be High.	**Sensitivity:** Low **Magnitude**: High **Overall significance:** Low (Percival, 2003) Disturbance and/or displacement will be a **Short-term Not Significant** effect (Criteria: EPA, 2022).
Meadow Pipit (High)	Meadow pipit were recorded a total of 56 times during VP surveys. Meadow pipit are ground-nesting birds that use open habitats with low-lying vegetation, such as grassland and heathland to breed and forage.	**Sensitivity:** High **Magnitude:** Low **Overall significance**: Low (Percival, 2003)

Key Receptor (Sensitivity)	Construction Indirect Effect Character	Significance without mitigation
	Although no breeding or foraging was detected, there is some sub-optimal habitat within the proposed wind farm site for meadow pipit to use for breeding and foraging purposes. As such, there is limited potential for meadow pipit to be indirectly effected by visual or noise disturbance.	Disturbance and/or displacement will be a **Short-term Not Significant** effect (Criteria: EPA, 2022).
Merlin (Very High)	This species was observed exclusively during the non-breeding season, where it was observed twice during winter VP surveys, and once during winter transect surveys. No other records of merlin were made during the survey period, and no evidence of foraging or breeding was detected. 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 effect merlin.	**Sensitivity:** Very High **Magnitude:** Low **Overall significance:** Medium (Percival, 2003) Disturbance and/or displacement will be a **Short-term Slight** effect (Criteria: EPA, 2022).
Peregrine (Very High)	A single record of peregrine was made within the 500m buffer zone during the winter 2022/23 VP surveys. Peregrine were also observed once flying over during the breeding bird transect surveys, and three times during the hinterland surveys. This species was not observed during any other surveys. Goodship and Furness (2022) cite buffer zones to protect breeding Peregrines from forestry operations in the UK range from 200 to 600m. A safe working distance for aircraft in Scotland is considered to be 500-750m (lateral). No hunting or breeding activities were observed, and there are no suitable nesting habitats at the proposed wind farm site. Therefore, it is unlikely for peregrine to be effected by noise and/or visual disturbance.	**Sensitivity:** Very High **Magnitude:** Negligible **Overall significance:** Low Disturbance and/or displacement of hunting peregrine will be a **Short-term Not significant** effect (Criteria: EPA, 2022).
Redwing (High)	This species was observed during winter VP surveys and winter transect surveys. There is potential for foraging redwing to be indirectly effected by visual and/or noise disturbance; however, due to the wide availability of suitable displacement habitats in the local area, effect magnitude remains Low.	**Sensitivity:** High **Magnitude**: Low **Overall significance:** Low Disturbance and/or displacement will be a **Short-term Not significant** effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Construction Indirect Effect Character	Significance without mitigation
Skylark (Medium)	Skylark were recorded 38 times across summer and winter VP surveys. Potential breeding habitat is present within taller grassland and field margins near turbines T1, T4 and T5. Studies on the impact of wind farms during construction (Pearce-Higgins et al., 2012) have found little evidence of significant disturbance effects on passerine species. The main effect during the construction phase is that of direct habitat loss. As such, it is unlikely that indirect visual or noise disturbance would give rise to significant effects on skylark.	**Sensitivity:** Medium **Magnitude:** Low **Overall significance**: Low Disturbance and/or displacement will be a **Short-term Not significant** effect (Criteria: EPA, 2022).
Snipe (High)	Studies indicate construction works cause a significant decline in densities of snipe (Pearce-Higgins et al, 2012), which may lead to density declines post construction. Pearce-Higgins et al. (2009) states snipe use habitats within 400m of turbines less than expected, leading to an expected 48% decline in abundance within 500m of turbines. Surveys indicate there are breeding snipe present in the surrounding environment within, potentially including areas of raised bog within 500m of turbines T9-10. As such, there is potential for breeding snipe to be indirectly effected by noise and/or visual disturbance prior to mitigation.	**Sensitivity:** High **Magnitude:** High **Overall significance:** Very High (Percival, 2003) Disturbance and/or displacement will be a **Short-term Significant** effect prior to mitigation (Criteria: EPA, 2022).
Sparrowhawk (Low)	Sparrowhawk were observed within the proposed wind farm on 43 occasions during VP surveys. Most observations recorded sparrowhawk traversing the 500m buffer zone. All records were of birds in-flight, and no breeding or foraging activities were recorded. 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 and skylark available in the local area. As such, there is potential for commuting, and potentially also foraging and breeding sparrowhawk to be indirectly effected by noise and/or visual disturbance.	**Sensitivity**: Low **Magnitude**: Medium **Overall significance**: Very Low (Percival, 2003) Disturbance and/or displacement will be a **Short-term Imperceptible** effect (Criteria: EPA, 2022).
Starling (Medium)	Starling were recorded 40 times during VP surveys, and were also observed occasionally during breeding and winter transect surveys. No foraging or breeding was recorded on-site and records indicate this species was commuting through the proposed wind farm site. However, the open agricultural habitats onsite are potentially suitable as foraging resources. As such, there is a potential for visual and/or noise disturbance to affect foraging starling.	**Sensitivity:** Medium **Magnitude:** Low **Overall significance**: Low (Percival, 2003) Disturbance and/or displacement will be a

Key Receptor (Sensitivity)	Construction Indirect Effect Character	Significance without mitigation
		Short-term Not Significant effect (Criteria: EPA, 2022).
Stock Dove (High)	Stock doves were observed twice during summer VP surveys in 2022. Both records were noted on the same day, observed a single individual. One of these records observed a lone stock dove flying and landing in a tree within the 500m buffer zone, and the other record observed an individual flying outside of the 500m buffer zone. This species was also recorded on one occasion during breeding bird transect surveys, where a single individual was recorded in the 25-100m distance band along Transect 2 in 2022. This species was not observed during any other surveys. Due to the minimal sightings, and the absence of evidence of breeding within or surrounding the proposed wind farm, it is unlikely for stock dove to be affected by noise and/or visual disturbance.	**Sensitivity:** High **Magnitude:** Negligible **Overall significance**: Very Low Disturbance and/or displacement will be a **Short-term Imperceptible** effect (Criteria: EPA, 2022).
Swift (High)	A total of nine observations of swift were made over the survey period. No breeding activity or suitable breeding habitat was recorded. Swift feed exclusively on various invertebrates (midges, flies, spiders) caught in flight. Three records of foraging (i.e. hawking) were recorded within the 500m buffer zone. Foraging swift are unlikely to be effected by disturbance/displacement.	**Sensitivity**: High **Magnitude**: Negligible **Overall significance:** Very Low (Percival, 2003) Disturbance and/or displacement will be a **Short-term Imperceptible** effect (Criteria: EPA, 2022).
Whooper Swan (Very High)	Whooper swan were observed on seven occasions during the winter season VP surveys. Of which, three observed whooper swan traversing the 500m buffer zone. No breeding within the proposed wind farm was observed. Groups of wintering whooper swan are known to use the fields to the north/west of T1-T3 for grazing. 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). Observed feeding areas in the locality range from between 183m to 1,115m from proposed turbine locations. Based on observed behaviour during surveys, there is considerable variability in the distribution of grazing whooper swans in the local area, indicating that the grazing resource is spread across a large number of fields encompassing areas closer to and further away form the proposed wind farm.	**Sensitivity:** Very High **Magnitude**: Low **Overall significance:** Medium (Percival, 2003) Disturbance and/or displacement will be a **Short-term Slight** to **Moderate** effect prior to mitigation (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Construction Indirect Effect Character	Significance without mitigation
	Considering that the observed grazing habits of the local wintering population indicate suitable temporary displacement habitats are available in the local area, in addition to the presence of screening vegetation separating the majority of grazing areas from the proposed wind farm, the magnitude of disturbance and/or displacement remains Low. In addition, habituation to regular works is likely to further reduce potential for disturbance during construction.	
Willow Warbler (High)	This species was recorded on 23 occasions during breeding season VP surveys, predominantly at VP2. Willow warbler were also recorded during breeding bird transect surveys, across all seasons. This species typically breeds along the edges of bogs and marshes, and can be found in heath and moor habitats. Although there were no observations of foraging or breeding within the proposed wind farm, there is potential for such activities. Therefore, willow warbler may potentially be affected at Low magnitude by noise and/or visual disturbance.	**Sensitivity:** High **Magnitude**: Low **Overall significance**: Low (Percival, 2003) Disturbance and/or displacement will be a **Short-term Not Significant** effect (Criteria: EPA, 2022).
Woodcock (High)	Woodcock were recorded during targeted woodcock surveys across all survey years, as well as breeding wader surveys in summer 2022. Surveys indicate a breeding population is present 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.	**Sensitivity**: High **Magnitude:** High **Overall significance:** Very High (Percival, 2003) Disturbance and/or displacement will be a **Short-term Significant** effect prior to mitigation (Criteria: EPA, 2022).
Yellowhammer (High)	Yellowhammer were observed during VP surveys, breeding transect surveys and hinterland surveys. Records indicate there is a breeding population present within and surrounding the proposed wind farm. Therefore, breeding yellowhammer may may potentially be affected at Low magnitude by noise and/or visual disturbance.	**Sensitivity**: High **Magnitude**: Low **Overall significance:** Low (Percival, 2003) Disturbance and/or displacement will be a **Short-term Not Significant** effect (Criteria: EPA, 2022).

8.16.1.3 Direct Effects: Habitat Loss or Alteration (Turbine Delivery Route)

Habitat loss effects associated with the TDR will be minor. The primary habitat loss associated with the TDR will be removal of treeline/hedgerow at the proposed site entrances; however, considering the small scale of these losses, the effect for avian species is assessed as **Long-term Imperceptible.**

8.16.1.4 Disturbance and Displacement (Turbine Delivery Route)

Construction stage disturbance/displacement associated with the TDR caused by vegetation trimming, human presence and use of machinery could occur, likely affecting small passerine species which breed and forage in linear wooded habitats. However, due to reduced potential for nesting in trees along roadside due to traffic disturbance, in combination with the minimally invasive and temporary nature of works at TDR nodes, the effect for avian species is assessed as **Temporary Imperceptible** to **Slight**, with foraging small passerines being the group most likely to experience potential effects.

8.16.1.5 Direct Effects: Habitat Loss or Alteration (Proposed Substation)

Construction of the Proposed Substation will lead to some permanent loss of habitat. The total predicted habitat loss as a result of the Proposed Substation is 3.71 ha or c. 1 % of the habitat survey study area; of this, 29 % of the land-take is from habitat classified as low ecological value (conifer plantation).

The majority of habitat loss is comprised of Mixed broadleaved/conifer woodland (1.72 ha / 7% of total in study area). Some Mixed broadleaved woodland will also be lost (0.22 ha or 2% of total WD1 in study area). Hedgerows: length of linear habitat loss (9m) is negligible. The short section of hedgerow which will be lost is low, close-cropped and over-managed, resulting in it being unsuitable for nesting, and of reduced importance as a food source. Loss of this hedgerow section is predicted to be of negligible significance for any species potentially using hedgerows in the local area to forage.

Non-wooded habitat loss is comprised of GA1 Improved agricultural grassland. There will be a permanent loss of 0.53 ha (0.37%) of this habitat associated with the gid connection and access track; however, this habitat is not of high ecological value.

Passerine species such as goldcrest, linnet and greenfinch (Percival sensitivity: Medium) could occasionally use woodland within the proposed substation footprint to forage; however, nesting potential for these species within the proposed substation footprint is negligible due to the age/structure of trees present (tall, closely spaced, mature and lacking structure and cover required for small passerine nesting) and high percentage of conifers present. The woodland within the substation footprint is also unsuitable for willow warbler (Percival sensitivity: Medium), both in terms of nesting and foraging potential. As such, Percival effect magnitude is Negligible, resulting in an overall significance of Very Low. A **Long-term Imperceptible** Effect in a local context which is Reversible is identified for this group (Criteria: EPA, 2022).

Swallow, house martin and sand martin (Percival significance: Medium) are aerial species that forage over open habitats. There is no nesting habitat for these species within the proposed substation and grid connection footprints. Potential effects in terms of loss of foraging habitat are Negligible. A **Long-term Imperceptible** effect in the local context which is Reversible is identified for this group (Criteria: EPA, 2022).

Redwing (Percival sensitivity: High) are winter visitors which use trees/hedgerows and open habitats to forage in. Loss of open foraging habitats remains below 1%, while loss of linear wooded habitats (treelines and treeline/hedgerow mosaic) is 0.2% of the total for this habitat type. As such, Percival effect significance is Negligible (<1% habitat lost). Furthermore, suitable foraging habitat is generally abundant in agricultural landscapes which are common in the surrounding landscape. Thus, a **Short-term Imperceptible** effect which is Reversible in the local context is predicted for redwing.

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 buildings are present within the postponed footprint. Loss of open foraging habitats will remain below 1%; Percival impact significance is Negligible (<1% habitat loss for open foraging habitats). There is an abundance of grassland habitats in the surrounding area with ample trees and buildings for nesting, thus a **Temporary Imperceptible** effect and Reversible in the local context is predicted for starling.

Yellowhammer (Percival sensitivity: High) is a species associated with arable landscape and hedgerows. Due to the absence of arable land from the proposed substation and grid connection footprint, in addition to hedgerow loss being limited to a small quantity of low quality habitat, Percival effect significance is Negligible (<1% habitat loss) (overall significance is Low). A **Short-term Imperceptible** effect and Reversible in the local context is predicted for yellowhammer.

There is no suitable habitat for meadow pipit, skylark or house sparrow within the footprint of the proposed substation and grid connection. A **Long-term Imperceptible** effect in the local context is identified for this group (Criteria: EPA, 2022).

Woodcock (Percival sensitivity: High) was not recorded in the area of the proposed substation and grid connection, either during breeding surveys or ecological walkover surveys in winter (closest wintering record was near T11). Despite the absence of woodcock records in the proposed substation site, the wooded habitats in this area are potentially suitable for breeding woodcock. In terms of the percentage of combined wooded habitat loss, the loss of wooded habitats potentially suitable for woodcock associated with the proposed substation amounts to 3.03 ha (comprised of WD1, WD2 and WD4), which equates to 1.8% of the total area of wooded habitats potentially suitable for woodcock (171.1 ha). Percival effect significance is Low (1-5% habitat loss), resulting in an overall Percival significance of low. Considering the abundance of suitable habitat in the local area and absence of recorded woodcock activity from the proposed substation footprint, loss of woodland within the proposed substation footprint is assessed to be a **Long-term Not significant** effect in the local context for woodcock (Criteria: EPA, 2022).

There is limited potential for raptors to use the wooded habitats overlapped by the proposed substation footprint. Kestrel (Percival sensitivity: High) and sparrowhawk (Percival sensitivity: Medium) could potentially use these habitats to nest; however no raptor nests were detected here during surveys. These habitats could potentially be used by goshawk (Percival sensitivity: Medium) to hunt; however, the occurrence of this species being limited rare vagrant status means potential effects are negligible. Trees in these habitats could occasionally be used for perching by buzzard (Percival sensitivity: Low). No potential nesting features for long-eared owl (Percival sensitivity: Low) are present in this area. Considering the abundance of suitable habitat in the local area and absence of recorded raptor activity from the proposed substation footprint, loss of woodland within the proposed substation footprint is assessed to be a **Long-term Not significant** effect in the local context for raptors (Criteria: EPA, 2022).

8.16.1.6 Indirect Effects: Disturbance and Displacement (Proposed Substation)

The effect of potential disturbance on passerine species including goldcrest, greenfinch, linnet, redwing, starling, willow warbler and yellowhammer is anticipated to be negligible. A **Short-term Imperceptible** effect and Reversible in the local context is predicted for these species.

Similarly, house martin, sand martin and swift are unlikely to be affected by disturbance, due to absence of breeding habitat, small area of foraging habitat affected and abundance of foraging habitat in the local area. A **Short-term Imperceptible** effect and Reversible in the local context is predicted for these species.

There potential for disturbance of nesting woodcock, the event that this species established breeding territory in this area prior to construction. There is potential for displacement arising from disturbance caused by vegetation clearance, construction noise and human presence. A study of the impacts of wind turbines on woodcock undertaken in Kilkenny (Gittings, 2019) indicated that 'a displacement effect may occur within 250 m 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 250-500 m distance band'. The potential displacement within the 0-250 m distance band is in line with the results of a similar study carried out in Germany (Dorka et al., 2014). While this study focused on operational wind turbines, the 250m distance band is likely to provide a useful rule of thumb for woodcock in the absence of published guidance on nest buffer requirements. In the event that nesting woodcock were present in this area prior to construction, a **Short-term Significant** effect could occur if breeding birds were disturbed due to construction activities (prior to mitigation).

While potential for these areas to be used by raptors is low based on low structural suitability of trees for nesting, the possibility that kestrel or sparrowhawk could establish nests in the area exists, including uptake of the kestrel nest box located 7m from the proposed substation felling buffer. In the event that kestrel or sparrowhawk nests became established in this area prior to construction, a **Short-term Significant** effect could occur prior to mitigation if breeding birds were disturbed due to construction activities. Potential disturbance/displacement effects on any raptors using the open habitats traversed by the grid connection are assessed as **Temporary Imperceptible** (prior to mitigation).

Potential for polluted or silted runoff to enter the hydrological network via drainage ditches, with potential for onward transport into the river network implies potential for effects on kingfisher via pollution of aquatic habitats causing effects on prey resources. It is assessed that a **Short-term Significant** effect could occur for Kingfisher in this regard prior to mitigation.

8.16.2 Potential Operational Effects

8.16.2.1 Direct Effects: Collision Risk (Proposed Wind Farm)

Studies on operational impacts of wind farms (Pearce-Higgins et al., 2009) have shown that certain species do 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).

The primary cause of direct effects on birds during the operational phase of a wind farm 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 wind farm 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 birds 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, remote food sources, etc. (Martin, 2011 and Martin and Shaw, 2010).

Other species have reduced fovea, 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 predicted rotor envelope of 14.9m -167m.

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 Technical Director of Ecology FT, pers. comm. 2025).

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.

8.16.2.2 Collision Risk Model Analysis

The Collision Risk Model Report (see Appendix 8.2-5) presents the results of collision risk modelling for the proposed Drehid Wind Farm, Co. Kildare. This modelling used data from vantage point surveys carried out in the winters of 2021/22 and 2022/23 as well as the summers of 2022 and 2023. 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.

A total of 17 species were selected for collision risk modelling: buzzard, golden plover, great black-backed gull, grey heron, kestrel, lesser black-backed gull, peregrine, snipe, sparrowhawk, swift, herring gull, whooper swan, goshawk, merlin, little egret, lapwing and stock dove.

These species have been selected because they were recorded within the 500 m buffers of the proposed turbines (the flight activity survey area) and 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 (2009/147/EC) 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 there was no activity recorded within the collision risk zone over the survey period.

8.16.2.2.1 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 effect of collision risk will be a ***Long-term Imperceptible Reversible*** Effect.

8.16.2.2.2 Non-Passerines

Potential collision risk to non-passerine target species is outlined in Table 8-26 below. The Collision Risk Model Report (see Appendix 8.2-5) provides further information on the predicted collision rate as a percentage of the populations of those species with a predicted collision risk per annum of 0.1 or greater, namely: buzzard, great black-backed gull, golden plover, herring gull, kestrel, lesser black-backed gull, sparrowhawk, swift and whooper swan

The other species analysed in the CRM (goshawk, grey heron, lapwing, little egret, merlin, peregrine, snipe and stock dove) are predicted to be subject to less than one collision over the proposed 35-year lifespan of the wind farm. As such the magnitude of effects for all of these species can be assessed as Negligible.

There was no red kite flight activity at potential collision height (PCH) and as such the predicted collision risk for this species is zero.

Table 8-26: Potential collision risk to target species

Key Receptor (Sensitivity)	Operational Direct Effect Character	Significance without mitigation
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. The predicted annual collision rate for Buzzard equates to 0.015% of the national population and 0.620% of the county population. The predicted annual collision rate is equivalent to 9.44% of a conservative local population (10km^2) estimate of 18 birds based on VP and hinterland 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 it 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.	**Sensitivity:** Low. **Magnitude (National/County):** Negligible – based on predicted 1.8 collisions per year (0.620% of county population/0.015% of national population). **Magnitude (Local):** Medium – based on predicted 1.8 collisions per year (10% of local population). **Overall significance:** Very Low (National/County/Local) (Criteria: Percival, 2003). The proposed impact of collision risk will be **a Long-term Imperceptible** effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Operational Direct Effect Character	Significance without mitigation
	Predicted number of collisions per year (assuming 98% avoidance rate) is 1.68 per year (0.620 % of the of county population/0.015% of national population/9.33% of local population).	
Great Black-backed Gull (Low)	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 2.4 per year (2 % of the of county population/0.049% of national population/2.9% of local population).**	**Sensitivity:** Low. **Magnitude (National/County):** Negligible. **Magnitude (Local):** Low. **Overall significance:** Very Low. (National/County/Local) (Criteria: Percival, 2003). The proposed impact of collision risk will be a **Long-term Imperceptible** effect (Criteria: EPA, 2022).
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 8.2-5 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 roosting Golden Plover were recorded during surveys, reducing magnitude. While a collision rate of 0.6 per year is predicted, the predicted effects at county, national and local level remain Negligible.	**Sensitivity:** Very High. **Magnitude (National/County/Local):** Negligible. **Overall significance:** Low. (National/County/Local) (Criteria: Percival, 2003). The proposed impact of collision risk will be a **Long-term Not Significant** effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Operational Direct Effect Character	Significance without mitigation
	Predicted number of collisions (assuming 99.8% avoidance) is 0.56 per year (0.56% of the local population, 0.010 % of the county population and 0.001% of the national population).	
Herring Gull (Medium)	A published review of the number of bird fatalities owing to collision with wind turbines showed there were 189 fatalities across 46 European wind farms (Hötker et al., 2006). The published avoidance rate is 99.56% (Furness, 2019), suggesting herring gulls exhibit high levels of micro-avoidance at wind farms. Within 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 in coastal habitats. **The predicted collision risk for Herring Gull (assuming 99.56% avoidance rate) is 8.02 per year. This equates to 5.53% of the local population/3.43% of county population/0.082% of national population.**	**Sensitivity:** Medium. **Magnitude (National):** Negligible. **Magnitude (Local):** Low. **Magnitude (Local):** Medium. **Overall significance:** Very Low (national) Low (county/local) (Criteria: Percival, 2003). The proposed impact of collision risk will be a **Long-term Imperceptible** effect at national level and a **Long-term Not significant** at county and local level (Criteria: EPA, 2022).
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 0.7 per year; this represents a loss of 0.18% 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 national level this represents an annual loss of 0.004% of the population. At local population level (estimated proportionally based on national population), this represents 3.04%. As such, the predicted magnitude of collision effects for Kestrel remain Negligible at national and county scale, and Low at the local scale.	**Sensitivity:** High. **Magnitude (National/County):** Negligible. **Magnitude (Local):** Low. Overall significance: **Very Low** (national/county) to **Low** (local). (Criteria: Percival, 2003).

Key Receptor (Sensitivity)	Operational Direct Effect Character	Significance without mitigation
	Predicted number of collisions (assuming 95% avoidance) is 0.7 per year (3.04% of the local population, 0.18 % of the of the county population and 0.04 % of the national population).	The proposed impact of collision risk will be a **Long-term Imperceptible** effect at national and county level and **Long-term Not significant** at local level (Criteria: EPA, 2022).
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 0.49 per year (assuming 99.56% avoidance rate). This equates to 2.28% of the local population/0.279% of county population/0.007% of national population.**	**Sensitivity:** Medium. **Magnitude (National/County):** Negligible. **Magnitude (Local):** Low. **Overall significance:** Very Low (national/county) to Low (local). (Criteria: Percival, 2003). The proposed impact of collision risk will be a **Long-term Imperceptible** effect at national and county level and **Long-term Not significant** at local level (Criteria: EPA, 2022).
Sparrowhawk (Low)	Sparrowhawks are 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 predicted collision risk for sparrowhawk (assuming 98% avoidance rate). is 0.2 per year. This equates to 1.176% of the local population/0.070% of county population/0.002% of national population.**	**Sensitivity:** Low. **Magnitude (National/County):** Negligible. **Magnitude (Local):** Low. **Overall significance:** Very Low (national/county/local). (Criteria: Percival, 2003). The proposed impact of collision risk will be a **Long-term Imperceptible** effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Operational Direct Effect Character	Significance without mitigation
Swift (High)	A published review of the number of bird fatalities owing to collision with wind turbines showed there were 14 recorded fatalities across wind farms from eight European countries (Netherlands, Belgium, Spain, Sweden, Austria, Britain, Denmark, and Germany) (Hötker et al., 2006). However, the published avoidance rate is 98% (SNH 2010), suggesting birds exhibit high levels of micro-avoidance at wind farms. **The predicted collision risk for swift (assuming 98% avoidance rate). is 0.1 per year. This equates to 0.091% of the local population/0.005% of county population and 0.0001% of national population.**	**Sensitivity:** High. **Magnitude (National/County/Local):** Negligible. **Overall significance:** Very Low (Criteria: Percival, 2003). The proposed impact of collision risk will be a **Long-term Imperceptible** effect (Criteria: EPA, 2022).
Whooper Swan (Very High)	Observations of this species were primarily of grazing flocks and birds flying in or out of grazing areas near T1-T3 and also further north/west near VP1. Local movements are often likely to occur at lower heights depending on topography. 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.	**Sensitivity:** Very High. **Magnitude (National/County/Local):** Negligible. **Overall significance:** Low (Criteria: Percival, 2003). The proposed impact of collision risk will be a **Long-term Not significant** effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Operational Direct Effect Character	Significance without mitigation
	The predicted collision risk for whooper swan (assuming 99.5% avoidance rate). is 0.05 per year. This equates to 0.185% of the local population/0.015% of county population and 0.000% of national population.	

8.16.2.3 Direct Effects: Collision Risk (Proposed Substation)

Predicted collision risk associated with the proposed substation is negligible. The proposed substation infrastructure is low in height, and will be surrounded by existing/retained woodland and treelines which will be taller than the substation infrastructure. As such, it will not present any obstacles at greater height than the existing trees in that area. In considering potential for collision risk both with existing trees in place and without these trees, the potential collision risk is negligible, resulting in a **Long-term Imperceptible** effect for Avifauna.

As the proposed grid connection will be buried underground there is no resultant collision risk associated with this element of the Proposed Substation.

8.16.2.4 Direct Effects: Collision Risk (TDR)

There is no predicted collision risk associated with the TDR.

8.16.3 Potential Operational Effects

8.16.3.1 Indirect Effects: Disturbance and Displacement (Proposed Wind Farm)

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., 2012 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 8-26. 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.

Generally speaking, displacement of birds by the presence of turbines is not considered to be a significant effect on the species assemblage given the limited amount of habitat available onsite and the availability of habitat in the greater area. However, a **Long-term Moderate** effect may occur for Kestrel and a **Long-term Moderate** effect may occur for Snipe.

Considering the distribution patterns of grazing whooper swans in the local area observed during surveys, there is adequate displacement habitat available locally to ensure operatorial disturbance/displacement prior to habituation is limited to a **Short-term Slight** to **Moderate** effect. With habituation, the effect will reduce to a **Long-term Not significant** effect (with habituation) has been identified for whooper swan.

Displacement of birds by the presence of turbines is not considered to be a significant effect on the species assemblage given the limited amount of habitat available onsite and the availability of habitat in the greater area.

8.16.3.2 Indirect Effects: Barrier Effect (Proposed Wind Farm)

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 8-26 below:

Table 8-27: Disturbance and Barrier effect on target species

Key Receptor (Sensitivity)	Operational Indirect Effect Character	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.	<u>Disturbance/Displacement:</u> **Magnitude**: Negligible **Sensitivity**: Low **Overall Significance:** Very Low (Criteria: Percival 2003). Significance of effects is assessed as a **Long-term Imperceptible** (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
	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.	Barrier Effect: **Magnitude:** Negligible Sensitivity: Low **Overall Significance:** 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).
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 400 m (Sansom et al. 2016).	Disturbance/Displacement: **Magnitude:** Negligible **Sensitivity**: Very High **Overall significance**: Low (Criteria: Percival, 2003) Due to lack of site utilisation by Golden Plover, loss of wintering and/or foraging habitat will be a **Long-term Not Significant** effect (Criteria: EPA, 2022). Barrier Effect: **Magnitude:** Low **Sensitivity:** Very High **Overall Significance**: Medium (Criteria: Percival 2003).

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
	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 100 m 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, no nesting or roosting activity was noted over the two years of surveys. The observations of Golden Plover activity recorded during VP surveys confirm this species commutes through the proposed site, but does not use the site for roosting or foraging. 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 periodic occurrence of Golden Plover flocks of up to 130 birds during the non-breeding season and three observations of flocks ranging from 14-43 birds during the spring migration period, there is potential for this species to be affected by barrier effect. The small scale of the proposed wind farm will however limit barrier effect to a relatively small locality. Considering these factors, the predicted magnitude for barrier effect is Low.	Significance of effects to migrating birds in terms of energy expenditure assessed as Moderate; significance of daily barrier effect assessed as Moderate as literature suggests high published avoidance rates of wind farms; overall significance considered **a Long-term Slight** to **Moderate** effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
Goshawk (Medium)	**Disturbance/Displacement:** Based on the occurrence of goshawk as a winter vagrant, it considered that this species does not habitually use the habitats in and around the proposed wind farm and as such the magnitude of disturbance effects is assessed as Negligible. **Barrier Effect:** Barrier effects on either migration or regular flights of Goshawk has been shown at one out of two studies to date (2004) in a European context (Hötker et al., 2006). Based on the extremely low and transitory occurrence of this species at the proposed wind farm site, potential barrier effects are assessed as Negligible.	Disturbance/Displacement: **Magnitude**: Negligible **Sensitivity**: Medium **Overall Significance:** Very Low (Criteria: Percival 2003). Significance of effects is assessed as a **Long-term Imperceptible** (Criteria: EPA, 2022). Barrier Effect: **Magnitude:** Negligible **Sensitivity:** High **Overall Significance:** 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).
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 impacts as a result of their flight behaviour, but less sensitive to disturbance and displacement effects (Humphreys et al., 2015).	Disturbance/Displacement: **Magnitude:** Negligible **Sensitivity:** Low **Overall Significance**: Very Low (Criteria: Percival 2003). Overall significance considered be a **Long-term Imperceptible** effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
	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.	Barrier Effect: **Magnitude:** Negligible **Sensitivity:** Low **Overall Significance:** 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).
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:** Negligible **Sensitivity**: Low **Overall Significance:** Very Low (Criteria: Percival 2003). Significance of effects Imperceptible due to published evidence of habituation to wind farms; overall significance considered **Long-term Imperceptible** effect (Criteria: EPA 2022). Barrier Effect: **Magnitude:** Negligible **Sensitivity:** Low **Overall Significance:** Very Low (Criteria: Percival 2003).

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
		Significance of daily barrier effect assessed as **Imperceptible**; overall significance considered to be a **Long-term Imperceptible** effect (Criteria: EPA 2022).
Hen Harrier (Very High)	**Disturbance/Displacement:** Considering the absence of hen harrier records from flight activity survey observations, and recorded hen harrier activity being limited to two observations on the same day in winter 2021-22 and that no roosts or breeding sites were detected within the 2 km turbine buffer, beyond providing habitat for the occasional foraging Hen Harrier, the proposed wind farm site and surrounding area was not found to be important for Hen Harriers. Noise disturbance/visual intrusion unlikely to deter foraging 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.	Disturbance/Displacement: **Magnitude:** Negligible **Sensitivity:** Very High **Overall Significance:** Low (Criteria: Percival 2003). Significance of effects **Not Significant** due to scarcity (two in total) sightings during the total survey period; overall significance considered as **Long-term Not Significant** effect (Criteria: EPA, 2022). Barrier Effect: **Magnitude:** Negligible **Sensitivity:** Very High **Overall Significance:** 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** to **Slight**; overall significance considered **Long-term Not Significant** effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
Herring 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). **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).	Disturbance/Displacement: **Magnitude:** Negligible **Sensitivity:** Medium **Overall Significance:** Very Low (Criteria: Percival 2003). Significance of effects is assessed as a **Long-term Imperceptible** effect (Criteria: EPA, 2022). Barrier Effect: **Magnitude:** Negligible **Sensitivity:** Medium **Overall Significance:** 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).
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.	Disturbance/Displacement: **Magnitude:** Low **Sensitivity:** Medium **Overall Significance:** Low (Criteria: Percival 2003).

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
	House martin activity was observed incidentally during VP surveys at both VP1 and 2. This species was observed to occur in higher numbers (flock of 35 observed in this area) over the intact raised bog near VP2. 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.	Significance of effects **Imperceptible** due to observed preference for habitat outside proposed wind farm, lack of breeding habitat and possible attraction of wind farms to insectivorous species which feed on the wing; overall significance considered **Long-term Imperceptible** effect (Criteria: EPA, 2022). Barrier Effect: **Magnitude:** Low **Sensitivity:** Medium **Overall Significance:** 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).
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.	Disturbance/Displacement: **Magnitude:** Medium **Sensitivity:** High **Overall Significance:** High (Criteria: Percival 2003). Significance of effects **Slight** to **Moderate** due to published cases of disturbance, and low to moderate usage of the site by Kestrel; overall significance considered a **Long-term Slight** to **Moderate** effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
	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; 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).	Barrier Effect: **Magnitude**: Medium **Sensitivity:** High **Overall Significance:** High (Criteria: Percival 2003). 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).
Lapwing (High)	**Displacement/Disturbance:** Disturbance (in terms of minimal distance to wind farm) has been recorded for lapwing 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).	Disturbance/Displacement: **Magnitude:** Low **Sensitivity:** High **Overall Significance:** Low Significance of effects considered **Long-term Not significant** (Criteria: EPA, 2022). Barrier Effect: **Magnitude**: Medium **Sensitivity:** High

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
	Lapwing were recorded occasionally near the proposed wind farm in the vicinity of T1-T3 (one record during VP surveys at VP1, and two during hinterland surveys at HVP 1 near T1-T3). The majority of records were concentrated along Transect 3 (summer 2021) which traverses suitable breeding habitat c. 1.1 km south-east of T2. As such, considering the limited number and distribution of lapwing records, absence of breeding records from the proposed wind farm and location of potential breeding habitat away from the proposed wind farm, 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).	**Overall Significance:** High (Criteria: Percival 2003). 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).
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 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).	Disturbance/Displacement: **Magnitude:** Negligible **Sensitivity:** Medium Overall Significance: **Very Low** (Criteria: Percival 2003). Significance of effects is assessed as a **Long-term Imperceptible** effect (Criteria: EPA, 2022). Barrier Effect: **Magnitude:** Negligible **Sensitivity**: Medium Overall Significance: **Very Low** (Criteria: Percival 2003).

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
		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 (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 (applicable to little egret) in four out of seven cases, with the remaining three showing no barrier effect. Results were deemed not significant.	<u>Disturbance/Displacement:</u> **Magnitude:** Negligible **Sensitivity**: High **Overall Significance:** 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). <u>Barrier Effect:</u> **Magnitude:** Negligible **Sensitivity:** High **Overall Significance:** 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).

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
Long-eared Owl (Low)	**Disturbance/Displacement:** A long-eared owl breeding population is known to be present in the surrounding hinterland, with a record of a family group being recorded along Transect A in summer 2023, c. 288m from T6 and another record of a family group at HVP 5 (Donadea Forest Park, 8.2km SE) in June 2021. No breeding sites were recorded within or adjacent to the proposed wind farm. A buffer of 100-300m for both breeding and non-breeding long-eared owl is identified in Goodship and Furness (2022). Potential disturbance associated with operation of the proposed wind farm is likely to be less severe than potential construction-stage disturbance; as such, the predicted magnitude of effect would be Medium. **Barrier Effect:** Owls are not considered to be susceptible to either collision or barrier effects from wind turbines due to their low altitude flight patterns. A study of the impacts of wind turbines on Avifauna in Europe (Hötker et al., 2006) contained no information on owls. The Barn Owl Trust (UK) notes there is no evidence of a significant effect on barn owls due to wind farms, with higher-flying raptor species more likely to be affected (Barn Owl Trust, 2025). Long-eared owl are similar in their flight patterns and altitude to barn owl.	Disturbance/Displacement: **Magnitude:** Medium **Sensitivity:** Low **Overall Significance:** Low (Criteria: Percival 2003). Significance of effects based on a worst-case scenario in which a long-eared owl breeding site subject to operational distance is assessed as a **Not significant** effect (Criteria: EPA, 2022). Barrier Effect: **Magnitude:** Low **Sensitivity:** Low **Overall Significance:** Very Low (Criteria: Percival 2003). Significance of effects to 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).
Merlin (Very High)	**Disturbance/Displacement:** Merlin were observed infrequently during surveys, with two observations during winter 2021-22 VP surveys, and a single observation during winter transects in 2021. This species was not recorded during any other surveys. Considering the observed low usage of the site by 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.	Disturbance/Displacement: **Magnitude:** Negligible **Sensitivity:** Very High **Overall Significance:** Low (Criteria: Percival 2003).

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
		Significance of effects **Not Significant** due to scarcity (three in total) of sightings during the total survey period; overall significance considered as **Long-term Not Significant** effect (Criteria: EPA, 2022). Barrier Effect: **Magnitude:** Negligible **Sensitivity:** Very High **Overall Significance:** 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).
Peregrine (Very High)	**Disturbance/Displacement:** Possible disturbance to foraging birds through noise, visual intrusion. No displacement from breeding sites due to none being recorded within the proposed site boundary. Peregrine are known to nest in urban areas often in cathedrals with 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.	Disturbance/Displacement: **Magnitude:** Negligible **Sensitivity:** Very High **Overall Significance:** Low (Criteria: Percival 2003). Significance of effects **Not Significant** due to low level of sightings within the site and evidence suggesting tolerance to noisy human activities; overall significance considered **Long-term Not Significant** effect (Criteria: EPA 2022).

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
	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 (Hoetker et al., 2006). Recorded infrequent flight activity suggests the wind farm is unlikely to act as a significant barrier to a far-ranging species such as Peregrine.	Barrier Effect: **Magnitude**: Negligible **Sensitivity:** Very High **Overall Significance:** 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)
Red Kite (High)	**Disturbance/Displacement:** Due to the highly infrequent occurrence of red kite at the proposed wind farm (one record over 2.5 survey-years) indicating this species may traverse the area occasionally but is not resident, it is unlikely that red kite will be subject disturbance or displacement. Hötker et al., 2006 found evidence of negative effects arising from wind farms for non-breeding red kite in four cases, and no negative effects in three cases. A single study reviewed in Hötker et al. (2006) observed no habituation. Considering the observed low usage of the site by red kite, the predicted magnitude of disturbance/displacement is Negligible. **Barrier Effect:** Hötker et al., 2006 found evidence of a barrier effect for red kite in three studies. Considering the low recorded amount of flight activity and absence of a local red kite population, in addition to observed flight height occurring above the rotor-swept height band, predicted magnitude of barrier effect is Negligible.	Disturbance/Displacement: **Magnitude:** Negligible **Sensitivity:** High **Overall Significance:** Very Low (Criteria: Percival 2003). Significance of effects **Imperceptible** due to low level of sightings within the site (Criteria: EPA 2022). Barrier Effect: **Magnitude**: Negligible **Sensitivity:** High **Overall Significance:** Very Low (Criteria: Percival 2003).

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
		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)
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. Infrequent sand martin activity was observed incidentally during VP surveys at VP1 and 2. The predicted magnitude for disturbance is Low. **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.	<u>Disturbance/Displacement:</u> **Magnitude:** Low **Sensitivity:** Medium **Overall Significance:** Low (Criteria: Percival 2003). Significance considered **Long-term Imperceptible** effect (Criteria: EPA, 2022). <u>Barrier Effect:</u> **Magnitude:** Low **Sensitivity:** Medium **Overall Significance:** 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)	Operational Indirect Effect Character	Significance without mitigation
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 minimal 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:** Medium **Sensitivity:** High **Overall Significance:** High (Criteria: Percival 2003). Overall significance considered a Long-term **Moderate** effect (Criteria: EPA 2022). Barrier Effect: **Magnitude:** Negligible **Sensitivity:** High **Overall Significance:** Very Low (Criteria: Percival 2003). Overall significance considered to be a **Long-term Imperceptible** effect (Criteria: EPA, 2022)
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 reglar 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.	Disturbance/Displacement: **Magnitude:** Negligible **Sensitivity:** Low **Overall Significance:** Very Low (Criteria: Percival 2003). Overall significance considered to be a **Long-term Imperceptible** effect (Criteria: EPA, 2022). Barrier Effect: **Magnitude:** Negligible **Sensitivity:** Low **Overall Significance:** Very Low (Criteria: Percival 2003).

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
	The predicted magnitude for barrier effect is Negligible	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 wind farm footprint 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:** Low **Sensitivity:** High **Overall Significance:** Low (Criteria: Percival 2003). Overall significance considered to be a **Long-term Not significant** effect (Criteria: EPA, 2022). Barrier Effect: **Magnitude:** Negligible **Sensitivity:** High **Overall Significance:** Very Low (Criteria: Percival 2003). Overall significance considered to be a **Long-term Imperceptible** effect (Criteria: EPA, 2022).
Swallow (High)	**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.	Disturbance/Displacement: **Magnitude:** Low **Sensitivity:** High **Overall Significance:** Low (Criteria: Percival 2003). Significance considered **Long-term Imperceptible** effect (Criteria: EPA, 2022).

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
	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.	Barrier Effect: **Magnitude:** Low **Sensitivity:** Medium **Overall Significance:** 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; a total of five observations of individuals and groups of up to five birds flying and foraging in the northern part of the proposed site. There were three records of swift individuals and one pair) during breeding bird transect surveys, one record during merlin surveys (pair flying over 1 km grid square N7935) and one record during hinterland surveys (group of seven a HVP4. There is no swift nesting habitat within or in close proximity to the proposed wind farm. The predicted magnitude for disturbance is Low.	Disturbance/Displacement: **Magnitude:** Low **Sensitivity:** High **Overall Significance:** Low (Criteria: Percival 2003). Significance considered **Long-term Imperceptible** effect (Criteria: EPA, 2022). Barrier Effect: **Magnitude:** Low **Sensitivity:** Medium **Overall Significance:** Low (Criteria: Percival 2003).

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
	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	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).
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). A wintering flock of up to 35 whooper swans has been recorded around Drehid (I-WeBS count for 2016/17). Current surveys detected a maximum of 27 grazing birds in winter 2023-24. Observed feeding areas in the locality range from between 183m to 1,115m from proposed turbine locations. Based on observed behaviour during surveys, there is considerable variability in the distribution of grazing whooper swans in the local area, indicating that the grazing resource is spread across a large number of fields encompassing areas closer to and further away form the proposed wind farm. Considering that the observed grazing habits of the local wintering population indicate suitable temporary displacement habitats are available in the local area, the magnitude of disturbance and/or displacement remains Low, and will reduce to Negligible with habituation.	<u>Disturbance/Displacement:</u> **Magnitude:** Low (short-term), reducing to Negligible with habituation **Sensitivity:** Very High **Overall Significance:** Medium, reducing to Low with habituation (Criteria: Percival 2003). Significance considered **Short-term Slight** to **Moderate,** followed by a **Long-term Not significant** effect with habituation (Criteria: EPA, 2022). <u>Barrier Effect:</u> **Magnitude:** Low **Sensitivity:** Very High **Overall Significance:** 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).

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
	is known to graze in improved agricultural grassland within 400-500m of proposed turbine locations (T1-T3). Considering the potential for short-term displacement noted above, in addition to an abundance of suitable habitat in the local area, there is potential for a Medium magnitude effect prior to habituation. It is noted that this would represent the worst-case scenario, with this magnitude of effect unlikely due to the identified grazing areas already being located several hundred metres from proposed turbine locations. **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 smaller than those located in areas used by whooper swans at Drehid (565 - 630m, T1 - T3). 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).	
Woodcock (High)	**Disturbance/Displacement:**	<u>Disturbance/Displacement:</u> **Magnitude:** Low **Sensitivity:** High

Key Receptor (Sensitivity)	Operational Indirect Effect Character	Significance without mitigation
	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 250 m 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 250-500 m distance band'. The potential displacement within the 0-250 m 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 proposed turbine locations must be considered. The potential for intra-species audibility of roding calls to be affected by noise from operational turbines must also be considered. While displacement of nesting and roding birds could occur closer to proposed turbine locations, 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 1 km from nests sites to forage (Hoodless and Hirons 2007). No published evidence of barrier effect to migrating birds is available (Hoetker et al., 2006).	**Overall Significance:** Low (Criteria: Percival 2003). Significance considered a **Long-term Not significant** effect (Criteria: EPA, 2022). <u>Barrier Effect:</u> **Magnitude:** Negligible **Sensitivity:** High **Overall Significance:** 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).

8.16.3.3 Indirect Effects: Disturbance and Displacement (Proposed Substation)

Operational disturbance/displacement effects for associated with the proposed substation are assessed as negligible. The occasional presence of humans for maintenance activities is unlikely to result in significant disturbance to any target species occurring in surrounding habitats. As such, a **Long-term Imperceptible** effect is predicted for Avifauna regarding operational disturbance/displacement associated with the proposed substation.

8.16.3.4 Indirect Effects: Barrier Effect (Proposed Substation)

Predicted barrier effect associated with the proposed substation is negligible. The proposed substation infrastructure is low in height, and will be surrounded by existing/retained woodland and treelines which will be taller than the substation infrastructure. As such, it will not present any obstacles at greater height than the existing trees in that area and will therefore not constitute any additional barrier to flying birds beyond the current baseline barrier effect caused by existing trees.

As the majority of the proposed grid connection will be buried underground there is no resultant barrier effect associated with this element. The grid connection cables will emerge from underground to climb two pylons at existing overhead line loop-in locations. The loop-in will comprise emergence of the grid connection cables at two existing high voltage pylons, and connection to the existing high voltage lines via the new pylons. In forming the 'loop-in' connection, the existing section of high voltage line between the two existing pylons will be removed and replaced with the underground cabling which will run as a loop from the existing high voltage line to and from the substation.

As such, there will be new vertical infrastructure which will increase the width covered by vertical structures at the two existing pylon/loop-in locations but there will also be a reduction in the length of existing overhead line due to removal of the section between the two existing pylons. Considering the relatively low risk of collision associated with small scale overhead lines, in addition to offsetting of the minor increase in vertical barriers due to removal of the existing line section, the overall collision risk associated with the grid connection is assessed as neutral.

Considering these factors, the predicted barrier effect associated with the proposed substation is negligible, resulting in a **Long-term Imperceptible** effect for Avifauna.

8.16.3.5 Indirect Effects: Disturbance and Displacement/Barrier effect (TDR)

There is no potential barrier effect associated with the TDR. Potential use of the TDR during the operational phase would be limited to the eventuality that new turbine components were required to be transported to the proposed wind farm to facilitate potential turbine repairs. If this occurred, disturbance/displacement effects similar to the construction phase could occur if tree trimming was required, primarily affecting foraging small passerines and resulting in a **Temporary Imperceptible** to **Slight** effect for avian species.

8.16.4 Potential Decommissioning Effects

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

8.16.4.1 Potential Decommissioning Effects (Proposed Wind farm)

The decommissioning phase of the proposed wind farm would give rise to potential effects similar to the construction phase. However, it should be noted that the magnitude of the effect of decommissioning is normally reduced as all infrastructure is already in situ. No works will be required along the haul route as the turbine components will be broken up on site and therefore require less clearance to remove along the same route.

8.16.4.2 Potential Decommissioning Effects (Proposed Substation)

It is not proposed to decommission the proposed substation, which will be left in place as part of the national grid infrastructure. Grid connection cables will be left in the ground; therefore no potential impacts during decommissioning stage are likely to occur.

8.16.4.3 Potential Decommissioning Effects (TDR)

Decommissioning of the TDR is limited to activities such as removal of temporary hard surfaces adjacent to existing roads and is unlikely to result in disturbance to avifauna.

8.16.5 Potential Cumulative Effects

8.16.5.1 Overview of Cumulative Impact Sources

The planning search encompassed a search for wind farm developments within 25 km, and a search for solar farm and other large-scale developments within 5 km. The results of these searches are summarised in Table 8-27 to Table 8-29. The ongoing forestry management applicable to the northern part of the Proposed Development is also considered.

8.16.5.1.1 Wind Farm Developments

Cushaling Wind Farm is currently under construction and when complete will comprise a 9-turbine wind farm; it is located 10.2 km southwest of the Proposed Wind Farm. The 21- turbine operational Cloncreen Wind Farm is located 15.2 km southwest of the Proposed Wind Farm. Mount Lucas wind farm, located c. 22.7 km southwest of the Proposed Wind Farm.

The Yellow River wind farm located north of Rhode Co Offaly is a 29-turbine wind farm (17.4 km north-west of Proposed Wind Farm) is operational. The consented Ballivor Wind Farm is located 17.3 km north-west of the Proposed Development and comprises 26 turbines. Both of these wind farms are located within the same catchment (River Boyne) as the Proposed Wind Farm, with drainage from Yellow River, Ballivor and the Proposed Development site ultimately draining to the River Boyne.

While Yellow River wind farm, Ballivor wind farm and the Proposed Development are all located in the Boyne catchment, the in-stream distance between these projects and the section of the Boyne where the downstream flows from these project locations converge is such that any potential cumulative effects on water quality are assessed as **Short-term Imperceptible**. As such, potential effects on kingfisher inhabiting the Boyne River are also assessed as **Short-term Imperceptible**. In addition, it is unlikely that the construction phases for these wind farms will overlap.

The potential for cumulative effects arising from these wind farm developments from to occur at construction, operational and decommissioning stages is discussed below in in Sections 8.16.5.2 to 8.16.5.4. The particular effects applicable to each receptor are detailed in Sections 8.16.5.2 to 8.16.5.4

Table 8-28: Wind Farm Developments within 25 km of the Proposed Wind Farm

Development	Distance/Direction	Catchment	(No. of Turbines)	Current Status
Cushaling Wind Farm	10.2 km South-west	Barrow	9	Under Construction
Cloncreen Wind Farm	15.2 km South-west	Barrow	21	Operational
Yellow River Wind Farm	17.4 km North-west	Boyne	29	Operational
Ballivor Wind Farm	17.3 km North-west	Boyne	26	Consented
Mount Lucas Wind Farm	22.7 km South-west	Barrow	28	Operational

8.16.5.1.2 Solar Developments

A number of solar farm developments are located within 5 km. These include projects which are operational, under construction, consented and in planning. All of these developments are located within the same catchment (River Boyne) as the Proposed Development. There is potential for cumulative effects arising from these solar farm developments to occur at construction, operational and decommissioning stages. The particular effects applicable to each receptor are detailed in Sections 8.16.5.2 to 8.16.5.4.

Table 8-29: Solar Farm Developments within 5 km of the Proposed Development

Development	Distance/Direction	Catchment	Development Site Size (ha)	Current Status
Mulgeeth Solar Farm	95m East of T10	Boyne	81 ha	Refused Feb. 2025 - may be appealed
Timahoe North Solar Farm	220m South-east of T3	Boyne	200 ha	Operational
Dysart Solar Farm	2.5 km North-east	Boyne	35 ha	Consented
Coolcarrigan Solar Farm	3.7 km	Boyne	114 ha	Consented

Development	Distance/Direction	Catchment	Development Site Size (ha)	Current Status
	South-east			
Hortland Solar Farm	3.9 km East	Boyne	31 ha	Operational

8.16.5.1.3 Other Large-Scale Developments

There are a number of significant developments in the vicinity of the Proposed Development including a number of large housing developments, mixed use developments, landscaping developments and the extension of the existing Drehid Landfill. Details of these cumulative developments are presented in Table 8-29.

Potential cumulative effects arising from these developments are most likely to be applicable to the construction phase, in the event of any of these developments being constructed concurrently with the Proposed Development. There is also potential for operational and decommissioning phase cumulative effects in this category, although they are predicted to be of lower magnitude than potential construction stage cumulative effects. The particular effects applicable to each receptor are detailed in Sections 8.16.5.2 to 8.16.5.4.

Table 8-30: Other Developments within 5 km

Development	Direction from Proposed Development site	Distance from Proposed Development site (km)	Status
A number of residential developments	North	2.8 km	Granted consent
There are a number of consented large residential developments in Enfield which have been integrated into one large project. The planning references are Meath Co. Co. Reg Ref. 21/1449, 21/1461, 21/1462, 23/272. The consents include 99 residential units (21/1449), 67 residential units (21/1461) 77 residential units (21/1462) and a further 77 residential units (23/272); all with ancilliary infrastructure such as public open space, car parking, bicycle parking etc.			
Johnstown Estate Renovations	North	2 km	Granted consent
Kildare planning reference 23/613. The proposed works are principally to the existing banquet hall and conference centre located to the south of the main hotel building and associated external landscaped areas. The proposed external works comprise: (i) the provision of a new 210 sq.m. store room extension; (ii) a 136 sq.m. extension to the south east corner of the building to provide a new glazed orangery bar; (iii) demolition of existing single storey draught lobby (30 sq.m.) and construction of a new 60 sq.m. extension (4.050m in height) on the northern side of the building to provide for a bar area (44 sq.m.) and 2 no. store rooms (8sq.m. each); (iv) a new 20 sq.m. entrance lobby with an external canopy to the southern side of the building; (v) 2 no. new external seating areas to the east and west of the proposed entrance lobby; (vi) a new vehicular circulation layout with roundabout and water feature to the front of the proposed entrance lobby, loading bay, access ramp, external stair case, footpaths; (vii) relocation of the approved bike store located in the service yard (Reg. Ref. 22/1089) underneath proposed store building; and, (viii) the provision of a landscaped seating deck to the south of the building.			

Development	Direction from Proposed Development site	Distance from Proposed Development site (km)	Status
Proposed internal works comprise reconfiguration of existing conference and banqueting accommodation to provide (a) 2 no. conference banqueting suites (320sq.m. and 280 sq.m.), (b) 2 no. meeting rooms (180 sq.m. and 110 sq.m.). (c) reception lobby (135 sq.m.) and (d) associated toilets, storage, cloakrooms and staff areas. Retention permission is sought for 4 no. accessible car parking spaces provided to the front of the hotel (southwest facade) and existing landscaping works comprising an existing timber pergola structure to south of the hotel development. The development also includes all other associated engineering works, landscaping, and ancillary works necessary to facilitate the development.			
Restoration of 5 ha of agricultural land	North	3.2 km	Granted Consent
Meath planning reference TA200121. The development comprises: a) use of existing stockpiles for site restoration (b) importation of inert excavation spoil comprising natural materials of clay, silt, sand, gravel or stone for the purposes of restoration of a previously extracted area (QY/54) to restore the site to a beneficial agricultural and ecological afteruse (5.85 hectares) (c) Temporary Portacabin Offices and Staff Facilities 100sqm. (d) Wheel Wash and weighbridge 134m2 (e) Site entrance and access road (f) Lockable access gate at the pit entrance (g) All other ancillary buildings, plant and facilities for the restoration, and all ancillary site works. The application is accompanied by an Environmental Impact Statement (Environmental Impact Assessment Report) and associated documents. The application relates to a restoration development for the purpose of an activity requiring a Waste Permit to be issued by the Meath County Council. Significant further information/revised plans submitted on this application			
Blackwood Equestrian Centre	South-East	2.5 km	Granted consent
Kildare planning reference 191031. Proposed two storey stable block, consisting of 6 no. horse stables & 7 no. pony stables, a wheelchair accessible toilet & two no. stairwells at ground floor level, tack room, kitchen/dining/lounge area for refreshment purposes (for staff and patrons of the livery centre only), male and female changing rooms and toilets and an office at first floor level (total floor area 494.6 sq.m), proposed horse walker (305.8 sq.m) and horse lunge (305.8sq.m) with proposed dungheap/effluent tank (18.5 sq.m). Existing concrete slab to be demolished and removed off site to authorised waste facility and to install proposed exercise area (1732 sq.m) to include 6 no. floodlights & equine fencing along the existing driveway and proposed exercise area. Permission is sought to install a septic tank and percolation area, 8 no. car parking spaces, gravel pathway to forest, proposed signage (2m sq) at existing gate and all associated site works at the above address. Permission is also sought to retain existing storage shed (24sq.m) and existing driveway.			
Drehid Landfill Extension	South	0.5 km	Granted consent
ABP reference 317292. Increase in waste material at disposal facility at Drehid Waste Management Facility to accept 440,000 tonnes per annum of non-hazardsous waste material.			
Mixed Use Development in Enfield	North	3.9 km	Granted consent

Development	Direction from Proposed Development site	Distance from Proposed Development site (km)	Status
The development will consist of: The construction of a mixed-use development including a 4 storey over ground floor level mixed use building (c.7,953 sq. m) comprising ground floor lobby (c.169 sq. m), bulky goods retail at ground (c.1,062sq,m) and first floor (c.l,219sq.m), ground floor cafe (c.304 sq. m), ground floor gym (c.352sq. m), first floor health centre (c.822 sq. m), second, third and fourth floor office and conference space (c.2,733 sq. m), core, circulation and plant facilities across all levels (c.1,292 sq.m) and 227 no. car and 80 no. cycle parking spaces to serve the building; 80 no. residential units comprising 1 3 no. 2 storey four-bedroom terraced housing units, 67 no. 2 storey three- bedroom terraced housing units with associated private open space in the form of rear gardens and terraces, 164 no. car and 320 no. cycle residential parking spaces plus 60 visitor cycle parking spaces; c.4,224 sq. m of landscaped public open space; a 2 storey creche facility (c.400 sq. m) with 12 no. car parking spaces; green roofs; solar panels; a two-lane access road linking the development to the roundabout where the R148 meets Dublin Road, providing 2 no. multimodal, priority-controlled junctions and segregated pedestrian and cyclist facilities with a controlled crossing; provision of roadway to access the development from the south via the existing roundabout on the Dublin Road; an internal road and shared surface network, including walkways and its associated infrastructure; watermain, foul and surface water drainage, extension to the proposed foul network and connection to the pump station (permitted under ABP-308357- 20), extension to the proposed watermain, connecting to the existing DN 300 HDPE adjacent to the R148 roundabout, an attenuation pond at the north east of the site (1770 sq.m); and all other ancillary site development works including hard and soft landscaping, boundary treatments, lighting, SuDs, and above and below ground services to facilitate the development.			
Royal Oaks Residential Development	North	3.9 km	Granted consent
Meath planning reference 2492, which is an extension of duration of reference SH304296. Construction of 133 no. dwelling units, creche and associated site works.			
68 residential units in Johnstown Bridge	North	1.8 km	Granted consent
Kildare planning reference 22488. Development of 68 No residential units comprising 59 No houses (10 No. 2 bed, 31 No. 3 bed and 18 No. 4 bed) and 9 No. maisonette apartments (8 No. 1 bed and 1 No. 2 bed) and a retail unit/cafe measuring 77.2 sq m, with heights ranging from two storeys to two storeys with attic accommodation over. The development also proposes a new vehicular entrance off Johnstown Road, ancillary car-parking; cycle parking; a pump station; hard and soft landscaping; lighting ;balconies; solar panels; boundary treatments; bin storage; ESB substation and all associated site works above and below ground.			

8.16.5.1.4 Forestry Management

The blocks of woodland overlapped by the northern section of the Proposed Development are subject to various forestry management interventions. These range from clear-felling and replanting commercial conifer areas to removing confers and replanting with broadleaved species, primarily pedunculate oak. Scots pine is also prevalent in more recently replanted areas. Forestry management can give rise to negative impacts such as disturbance associated with harvesting, habitat loss, establishment of densely-shaded low-biodiversity conifer monoculture woodland, sedimentation and nutrient runoff. However, other aspects of forestry management can have positive ecological effects, particularly when close to nature silviculture is used or where the aim of management is to restore more natural woodland types and improve biodiversity. For example, replacement of commercial conifer blocks with native broadleaved species as recorded during current habitat surveys, or invasive species management to improve ecological functioning of woodland ecosystems.

In some cases, unintentional positive affects can also arise during intensive timber production, such as increased structural diversity and complex habitat mosaics during the pre-thicket stage, and establishment of semi natural woodland in areas which escape management such as marginal areas and wind thrown stands. Red squirrel also notably benefits from the presence of conifers as a food source.

8.16.5.1.5 Rehabilitation of Adjacent Bord Na Móna Bog

The draft rehabilitation plan for Timahoe North Bog concluded that the progress of natural revegetation is sufficiently advanced to forego interventions such as drain blocking and rewetting. The Proposed Development is not anticipated to give rise to significant indirect effects on this bog, due to the road setback distance, use of floating road construction and presence of existing drainage. As such, no cumulative effects in this regard are predicted.

8.16.5.2 Potential Cumulative Impacts - Construction Phase

8.16.5.2.1 Designated Nature Conservation Sites

8.16.5.2.1.1 European sites

An accompanying Natura Impact Statement (NIS) has been prepared for the Proposed Development and accompanies this EIAR.

The NIS identified potential for cumulative (in-combination) effects on water quality which could contribute to indirect effects on conservation objectives for Kingfisher which is an SCI for the River Boyne and River Blackwater SPA. Similarly, potential for cumulative effects on water quality which could contribute to indirect effects on conservation objectives for river lamprey, Atlantic salmon and otter which are QIs for the River Boyne and River Blackwater SAC were identified in the NIS. Potential for cumulative effects on conservation objectives for alluvial woodland (QI habitat) via spread of invasive species were also identified in relation to the River Boyne and River Blackwater SAC.

With the implementation of mitigation, the NIS concluded the proposed development works will not adversely affect the integrity of the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA.

8.16.5.2.1.2 NHAs/pNHAs

As no direct or indirect impacts are predicted on NHAs and pNHAs during construction of the Proposed Development, no additive effects in this category are predicted.

8.16.5.2.2 Avifauna

Potential effects on avifauna arising from habitat removal have been identified during the construction phase of the Proposed Development. There is potential for breeding birds to be disturbed prior to mitigation if nests are not buffered.

Other existing or planned sources of land take in the vicinity of the Proposed Development may result in cumulative impacts. However, land take from built development in the area is not sufficient to result in a significant in combination effect due to the relatively low ecological value of the habitats targeted for development i.e. intensively managed habitats.

Other Development

Construction activities associated with Ballivor wind farm could potentially overlap the construction period of the Proposed Development. Avifauna disturbance effects identified for the construction phase of Ballivor wind farm are **Short-term Slight** for golden plover, hen harrier, merlin, peregrine, whooper swan, barn owl, lapwing, snipe, woodcock, buzzard, long-eared owl and sparrowhawk, and **Short-term Imperceptible** for hen harrier. Avifauna habitat loss construction effects identified for Ballivor wind farm are **Long-term Slight** for golden plover, hen harrier, merlin, peregrine, barn owl, kestrel, lapwing (breeding), snipe, woodcock, buzzard, long-eared owl, sparrowhawk, and **Long-term Imperceptible** for kingfisher, whooper swan and lapwing (wintering).

Cumulative effects potentially arising in conjunction with Ballivor wind farm in terms of habitat loss and disturbance are assessed as **Long-term Slight** at the **Regional scale.** No effects at local scale are predicted due to the distance separating the Proposed Development form Ballivor wind farm.

A noted above in Section 8.16.5.1.1, cumulative effects on water quality in association with Yellow River or Ballivor wind farms are not predicted due to the large instream distances separating these projects with the Boyne catchment, in addition to their location on different watercourses within the catchment. There is no potential cumulative impact on water quality and kingfisher therefore as there is no cumulative risk from an increase in sediment to waterbodies.

In terms of other developments in the local area, there are two consented and one proposed solar farms, including the adjacent Mulgeeth solar farm (Refused Feb. 2025 - may be appealed) and a number of other large-scale developments noted in Table 8-29 including housing developments. Therefore, there is potential for a cumulative effect in terms of habitat loss associated with these developments. Since the habitat loss at the Proposed Development affects common habitats which are widespread in the landscape, and the other developments noted are also likely to affect common/widespread habitats, the majority of cumulative effects are assessed as relatively benign. One area where cumulative effects are higher is where hedgerow and treeline removal occurs. Ongoing and consented loss of hedgerows, treelines and scrub is evident as the nearby urban centres of Enfield and Johnstown bridge expand into surrounding farmland due to construction of housing developments. While less benign than the loss of intensive agricultural habitats, these losses of linear wooded habitats remain relatively small-scale and localised, resulting in **Long-term Slight** to **Moderate** cumulative effects prior to mitigation.

There is also potential for cumulative effects on water quality to occur in conjunction with these planned developments in the locality in the event of overlapping construction phases (prior to mitigation).

Cumulative operational effects could arise in conjunction with the nearby operational Hortland and Timahoe North solar farms, resulting in **Long-term Slight** cumulative displacement effects for avifauna.

Forestry

Afforestation and clear-felling is ongoing in the area in which the Proposed Development is located, and are likely to continue. Although proven to promote diversity in species such as birds during pre-thicket stages, mature conifer plantations may have less diversity than other semi-natural or natural habitats such as Bog Woodland or Raised Bog. While the habitat variability created by the forestry cycle may benefit bird species over the medium and long term, temporary and short-term effects may be negative, particularly where nesting birds are affected. Woodcock in particular would be a species of concern; if multiple woodland blocks in the local area used by nesting woodcock were affected by felling for construction of the proposed development and forestry harvesting simultaneously or short periods apart, **Short-term** to **Long-term Moderate** to **Significant** cumulative effects on breeding woodcock could occur in terms of both habitat loss and disturbance to breeding birds, prior to mitigation.

Run-off from forestry activities may contribute to water quality impacts in the area which may be added to cumulatively by the Proposed Development, potentially affecting kingfisher aquatic foraging habitat.

8.16.5.3 Potential Cumulative Impacts - Operational Phase

8.16.5.3.1 Designated Nature Conservation Sites

8.16.5.3.1.1 European sites

An accompanying Natura Impact Statement (NIS) has been prepared for the Proposed Development and accompanies this EIAR.

There is potential for similar effects to those identified for the construction phase detailed above in Section 8.16.5.2.1.1 to occur during the operational phase, but at lower magnitude.

With the implementation of mitigation, the NIS concluded the proposed development works will not adversely affect the integrity of the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA.

8.16.5.3.1.2 NHAs/pNHAs

As no direct or indirect impacts are predicted on NHAs and pNHAs or associated avian species during operation of the Proposed Development, no additive effects in this category are predicted.

8.16.5.3.2 Avifauna

The potential for cumulative effects relating to collision risk and operational disturbance/displacement to occur in conjunction with other wind farms is a key consideration in the operational phase cumulative assessment for avifauna.

The following potential collision risk effects were identified for target species during the operational phase of the proposed development:

Table 8-31: Potential collision risk effects identified for target species during the operational phase of the Proposed Wind Farm

Long-term Not Significant effect	Long-term Imperceptible effect
Golden Plover	Buzzard
-	Great Black-backed Gull
Herring Gull (county and local level)	Herring Gull (national level)
Kestrel (county and local level)	Kestrel (national level)
Lesser Black-backed Gull (county and local level)	Lesser Black-backed Gull (national level)
Whooper Swan	Sparrowhawk
-	Swift
-	Buzzard

The EIAR for Cushaling wind farm (under construction) (10.2 km SE) identified a **Long-term Slight** effect in terms of collision risk for golden plover, whooper swan, peregrine, lapwing, buzzard, kestrel and snipe.

The EIAR for Cloncreen wind farm (operational) (15.2 km SE) identified a **Long-term Imperceptible** effect in terms of collision risk for whooper swan, snipe, peregrine, hen harrier, mute swan, grey heron, mallard, sparrowhawk, buzzard and sand martin, and a **Long-term Slight** effect in terms of collision risk for golden plover, lapwing, ringed plover, woodcock and kestrel.

The EIS for Yellow River wind farm (operational) (17.4 km NW) did not undertake collision risk modelling but did identify potential collision effect magnitude for target species based on known flight characteristics and established behaviours. A low risk of collision was assessed for whooper swan and black headed gull; a negligible to low risk was identified for golden plover, and it was assessed that hen harrier would not be subject to any significant collision effects.

The EIAR for the consented Ballivor wind farm (17.3 km NW) identified a **Long-term Imperceptible** effect in terms of collision risk for hen harrier, merlin, snipe and sparrowhawk, and a **Long-term Slight** effect in terms of collision risk for golden plover, peregrine, whooper swan, kestrel, lapwing and buzzard.

The EIS for Mountlucas wind farm (operational) (22.7 km SW) did not undertake collision risk modelling, but did include an appraisal of potential for collision risk. This appraisal noted that turbine collision would be likely to result in significant effects where flight activity of regularly occurring large raptors, large concentrations of seabirds, large bird concentrations at wetlands and/or migrating birds overlapped a proposed wind farm site. The assessment concluded that none of these high risk bird distribution and flight activity patterns were present at Mountlucas.

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

The following operational disturbance/displacement effects were identified for the operational phase of the proposed development:

Table 8-32: Disturbance/displacement effects identified for the operational phase of the Proposed Wind Farm

Short-term Slight to Moderate	**Long-term Moderate effect**
Whooper Swan (Reducing to Long-term Not significant)	Snipe
Kestrel	
Long-term Not Significant effect	**Long-term Imperceptible effect**
Golden Plover	Buzzard
Hen Harrier	Goshawk
	Great Black-backed Gull
Lapwing	Grey Heron
Long-eared Owl	Lesser Black-backed Gull
Merlin	Herring Gull
	House Martin
Peregrine	Little Egret
Stock Dove	Red Kite
Woodcock	Sand martin
-	Sparrowhawk
-	Swallow
-	Swift

The EIAR for Cushaling wind farm (under construction) (10.2 km SE) identified a **Long-term Slight** effect in terms of disturbance/displacement for golden plover, whooper swan, woodcock, long-eared owl, buzzard, kestrel, sparrowhawk and snipe. A **Short-term Slight** effect in this regard was identified for peregrine. A **Long Term, Imperceptible** effect was identified for lapwing.

The EIAR for Cloncreen wind farm (operational) (15.2 km SE) identified a **Short-term Slight** effect in terms of disturbance/displacement for whooper swan, golden plover, lapwing, ringed plover, snipe, woodcock, peregrine, hen harrier, mute swan, grey Heron, mallard, kestrel, sparrowhawk, buzzard and sand martin.

The EIS for Yellow River wind farm (operational) (17.4 km NW) noted that whooper swans would be likely to be displaced from grassland and peatland feeding areas within 200-500m of turbines during the early operational phase, with the timeline and probability of habituation remaining unknown. Potential displacement of golden plover was assessed as not significant due to absence of a breeding population.

The EIAR for Ballivor wind farm (consented) (17.3 km NW) identified a **Short-term Slight** effect in terms of disturbance/displacement for golden plover, hen Harrier, merlin, peregrine, whooper swan, barn owl, kestrel, lapwing, snipe, woodcock, buzzard, long-eared owl and sparrowhawk, and a **Short-term Imperceptible** effect for kingfisher.

The EIS for Mountlucas wind farm (operational) (22.7 km SW) noted that the primary effect of disturbance would occur at construction stage. The potential for swans to be displaced during the operational phase was noted, but due to low recorded numbers number of whooper swan using the site (maximum 3 swans), no significant effects in this regard were predicted.

Potential cumulative effects in terms of disturbance/displacement are unlikely to result in significant effects at regional or national level, and no cumulative effects will occur at local level due to the distances separating the proposed the wind farm and surrounding wind farms assessed cumulatively.

The following operational barrier effects were identified for the operational phase of the proposed wind farm:

Table 8-33: Barrier effects identified for the operational phase of the Proposed Wind Farm

Long-term Slight to Moderate effect	
Golden Plover	Kestrel
-	Lapwing
Long-term Not Significant effect	**Long-term Imperceptible to Slight effect**
Hen Harrier	Buzzard
Merlin	-
Peregrine	-
Whooper Swan	-
Long-term Imperceptible effect	
Goshawk	Red Kite
Great Black-backed Gull	Sand martin
Grey Heron	Snipe
Herring Gull	Sparrowhawk
House Martin	Stock Dove
Lesser Black-backed Gull	Swallow
Little Egret	Swift
Long-eared Owl	Woodcock

The EIAR for Cushaling wind farm (under construction) (10.2 km SE) did not assess potential barrier effects.

The EIAR for Cloncreen wind farm (operational) (15.2 km SE) identified a **Short-term Slight** effect in terms of barrier effect for whooper swan, golden plover, lapwing, ringed plover, snipe, woodcock, peregrine, hen Harrier, mute swan, grey heron, mallard, kestrel, sparrowhawk, buzzard and sand martin.

The EIS for Yellow River wind farm (operational) (17.4 km NW) noted that whooper swans would be unlikely to be subject to barrier effect due to the absence of regular flight paths such as migratory or commuting routes, and also due to large spacing (c. 500m) between turbines. No barrier effects were identified for golden plover, hen harrier, lapwing or golden plover.

The EIAR for Ballivor wind farm (consented) (17.3 km NW) identified a **Long-term Slight** effect in terms of disturbance/displacement for golden plover, hen harrier, merlin, peregrine, whooper swan, barn owl, kestrel, lapwing, snipe, woodcock, buzzard, long-eared owl and sparrowhawk.

The EIS for Mountlucas wind farm (operational) (22.7 km SW) noted that barrier effects in an Irish context are more likely to affect migrating wildfowl populations, which are absent from the Mountlucas site.

Potential cumulative effects in terms of barrier effects are assessed as **Long-term Not significant** at the national and regional scales, with migrating birds being the group most likely to be affected. No cumulative effects are predicted at local scale.

8.16.5.4 Potential Cumulative Impacts - Decommissioning

The potential cumulative effects during decommissioning are considered to be similar to those described for the construction phase of the Proposed Development, but reduced.

8.17 Mitigation Measures for Avifauna

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 site. These mitigation measures shall be implemented in full.

8.17.1.1 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 with the exception of the locations of the high voltage line loop-in 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).

8.17.2 Mitigation measures during the construction phase

8.17.2.1 Introduction

Construction of this project is expected to cause temporary (disturbance) adverse effects on local ecological receptors, as outlined in Section 8.16 above. The mitigation measures described below will reduce these effects significantly.

8.17.2.2 Project Ecologist/ECoW

A Project Ecologist/Ecological Clerk of Works (ECoW) with appropriate experience and expertise (in implementing ecological mitigation measures 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.

8.17.2.3 Avifauna

Subject to other environmental concerns (e.g., run-off), the removal of vegetation and scrub as well as trimming of trees to facilitate the proposed development will be undertaken outside of the bird breeding season (March 1st to August 31st inclusive). This will help protect nesting birds.

Where vegetation removal is required outside this period, vegetation will be inspected for nesting birds by a suitably qualified Ecologist. In the event of birds nesting within areas required to be felled, suitable mitigation including implementation of buffer zones and/or seasonal constraints (based on known breeding cycle of species) and nest monitoring will be put in place. Similarly for swallow, the shed within the proposed northern access track footprint will be checked for evidence of re-occupation by swallows and if any are present, a seasonal restriction on demolition will be implemented. It is noted that nest buffer zones required for different bird species can vary widely. Birds which could be encountered during vegetation clearance include small passerines, woodcock and raptors. On a precautionary basis, a minimum buffer of 10m will be implemented around any active small passerine nests. A 500m buffer will be applied for nests of higher sensitivity raptor species such as kestrel, peregrine or merlin if any become established within the ZoI prior to construction. A 200m buffer will be applied in the same category for lower sensitivity species such as sparrowhawk and buzzard. (Goodship and Furness, 2022). A buffer of 250m is specified for woodcock nests.

A re-confirmatory survey (March/April) will be conducted of the proposed infrastructure to assess any evidence of target species activity or occupation of new territories (e.g. in the case of breeding Snipe or Woodcock). Should any nesting locations be recorded, works at these locations will be restricted to outside the breeding season (March 1st to August 31st inclusive) or until chicks are deemed to have fledged (following monitoring). A 500m buffer is required for breeding snipe. A buffer of 250m is specified for woodcock nests.

Grazing whooper swans using the fields near T1-T3 will be monitored prior to and during construction to detect if any disturbance/displacement occurs, and also to investigate whether habituation to construction disturbance occurs. In the event that wintering whooper swan are regularly using areas within or in close proximity to the proposed wind farm prior to construction, or if significant disturbance/displacement occurs (as determined by the ECoW/Ornithologist), a 600m exclusion zone around winter grazing areas will be implemented until wintering whooper swans have left in spring.

Based on the established absence of breeding kingfisher and poor suitability of riverbank soils along the Fear English River for kingfisher nesting, it is unlikely that breeding kingfisher will move into the ZoI prior to construction. A preconstruction kingfisher survey will be undertaken to reconfirm the baseline. In the event that breeding kingfisher did become established in the ZoI prior to construction, a 50-100m (buffer size dependent on occurrence of existing screening features) exclusion zone will be implemented around active kingfisher nests during the kingfisher breeding season (March - August inclusive), with ecological monitoring to confirm the start and end of the exclusion period.

Construction operations will take place during the hours of daylight to minimise disturbances to roosting birds, or active nocturnal bird species. This 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). Limited operations such as concrete pours, turbine erection and installation of the grid connection may require night-time operating hours; these works will be supervised by the project ecologist/ECoW.

Toolbox talks will be undertaken with construction staff on disturbance to key species during construction. This will help minimise disturbance.

Where removed or altered, re-instated hedgerows will be planted with native species of native provenance. This will result in habitat enhancement for local species of conservation importance such as yellowhammer. Further information relating to hedgerow planting are included in Sections 8.10.1..7.3 and 8.12.5 in Chapter 8-1 Biodiversity.

The measures to protect water quality described in Chapter 8-1 Biodiversity and Chapter 10 Hydrology and Water Quality will benefit kingfisher through protection of aquatic habitats and associated aquatic prey resources.

The use of “white lights” on the turbines will not occur as these can attract night flying birds such as migrants, and insects, which in turn can attract bats. Certain turbines will be illuminated with medium intensity fixed red obstacle lights of 2000 candelas where required by the IAA Lighting will be fitted with baffles to ensure that the light is directed skywards and will not be discernible from the ground.

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).

8.17.3 Habitat Management Plan (HMP)

A Habitat and Species Management Plan (HSMP) has been prepared for the Proposed Development, as detailed in Section 8.12 in Chapter 8-1 Biodiversity. Within this plan, the following measures are applicable to avifauna;

Revegetation of access track buffers and berms in wooded areas through natural recolonisation and targeted planting will offset the potential effect of wooded habitat loss for woodcock and other species. Within wooded areas, bog woodland bare root whips (60-90cm in height), sourced from native stock and disease free will be planted on selected berms outside bat felling buffers. Whips will be planted at 1m centres with the following mix: 20% downy birch (*Betula pubescens*), 10% holly (*Ilex aquifolium*), 15% rowan (*Sorbus aucuparia*), 20% scots pine (*Pinus sylvestris*), 10% pedunculate oak (*Quercus robus*), 10% sessile oak (*Q. petraea*) and 15% willow (*Salix cinerea*). Rabbit/hare protection will be put in place alongside weed suppressing leaf mulch. Any whips that die will be replaced (during the operational phase).

Berms in open agricultural habitats will be planted with native pollinator-friendly species. This will also provide benefits for foraging birds in the form of seeds and insect prey.

Bird boxes (5 No.) will be placed within the limited treelines within the site. This will help to provide further breeding habitat for birds on the site.

8.17.4 Mitigation measures during operation

A post construction monitoring programme is to be implemented at the proposed wind farm in order to confirm the efficacy of the mitigation measures; the results of this will be submitted annually to the competent authority and NPWS. Published guidance on assessing the impacts of wind farms on birds from English Nature and the Royal Society for the protection of birds recommends the implementation of an agreed post development monitoring programme as a best practice mitigation measure (Drewitt and Langston, 2006).

In addition, published recommendations on swans and wind farms (Rees, 2012) suggests that systematic post construction monitoring; adapted to quantify collision, barrier, and displacement, be conducted over a period of sufficient duration to allow for annual variation or in combination effects. The following individual components are proposed:

1. Fatality Monitoring (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction)- A comprehensive fatality monitoring programme is to be undertaken following published best practice (Shawn et al., 2010; Fijn et al., 2012 and Grunkorn, 2011); the primary components are as follows:

    a) Initial carcass removal trials to establish levels of predator removal of possible fatalities.
    b) This is to be done following best recommended practice and with due cognisance to published effects such as predator swamping, whereby excessive placement of carcasses increases predator presence and consequently skews results (Shawn et al., 2010).
    c) Turbine searches for fatalities are to be undertaken following best practice (Fijn et al., 2012 and Grunkorn, 2011) in terms of search area (minimum radius hub height) and at intervals selected to effectively sample fatality rates based on carcass removal rates (e.g. 1 per month). To be conducted during years 1, 2, 3, 5, 10 and 15 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring to be agreed with NPWS.
    d) A standardised approach with a possible control group and/or variation in search techniques such as straight line transects/ randomly selected spiral transects/ dog searches will be undertaken. This will provide a means of robustly estimating the post construction collision fatality impact (if any).
    e) Recorded fatalities to be calibrated against known predator removal rates to provide an estimate of overall fatality rates.

Reports will be submitted to the competent authority and NPWS following each round of surveys.

2. Flight Activity Survey (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction) - A flight activity survey is to be undertaken during the summer and winter months to include both vantage point and hinterland surveys as Per SNH (2017) guidance:

    a) Record any barrier effect i.e. the degree of avoidance exhibited by species approaching or within the wind farm (Drewitt and Langston, 2006). Target species to be all raptors and owls, all wild goose and duck species, all swan species, and all wader species.
    b) Record changes in flight heights of key receptors post construction.

Reports will be submitted to the competent authority and NPWS following each round of surveys. This survey is to be conducted during years 1, 2, 3, 5, 10 and 15 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring requirements will be agreed with NPWS.

3. Monthly Wildfowl Census (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction). A monthly wildfowl census, following the methods utilised for the baseline survey, is to be repeated on a monthly basis during the winter period in the monitoring years listed above. This aims to:
   a) Assess displacement levels (if any) of wildfowl such as swans post construction
   b) Assess overall habitat usage changes within the vicinity of the Proposed Wind Farm post construction.

This survey is to be conducted during years 1, 2, 3, 5, 10 and 15 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring requirements will be agreed with NPWS. Reports will be submitted to the competent authority and NPWS following each round of surveys.

4. Breeding Bird Survey (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction). A breeding bird survey (Common Bird Census), following methods used in the baseline survey to be repeated in each monitoring year listed above between early April to early July. This aims to:
   a) Assess any displacement effects such as those recorded on breeding birds. Overall density of breeding birds to be annually recorded.

5. Breeding Wader Survey (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction). A breeding bird survey, following methods used in the baseline survey to be repeated in each monitoring year listed above during April-May-June.
6. Breeding Woodcock Survey (to be conducted during years 1, 2, 3, 5, 10 and 15 post construction). A breeding bird survey, following methods used in the baseline survey to be repeated in each monitoring year listed above during April-May-June.

The above surveys are to be conducted during years 1, 2, 3, 5, 10 and 15 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring requirements will be agreed with NPWS.

8.17.5 Mitigation Measures during the Decommissioning

The same mitigation measures will apply for the decommissioning phase as for the construction phase.

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). Turbines components will be broken up onsite prior to removal, and as such vegetation trimming requirements to facilitate turbine removal will be minimal (reduced in comparison to construction stage) or not required.

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).

Any re-instated habitats will include native species where possible to enhance diversity of birds. 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).

8.18 Residual Effects for 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.

It is considered that with the implementation of mitigation, the proposed wind farm will have an **Imperceptible** to **Slight Reversible** Residual Effect in the local context on avifauna.

It will result in a **Long-term Moderate Reversible** Residual Effect to woodcock in terms of construction-stage habitat loss. However, the abundance of suitable displacement habitat in the local area, 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, in addition to operational recolonisation of road felling buffers and berms by wooded habitats, the realised effect of habitat loss arising from construction more closely aligns with a **Medium-term Slight** to **Moderate** effect.

Residual effects associated with the operational phase of the proposed wind farm are comprised of: **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. It is noted that habituation over the lifetime of the wind farm is likely to reduce effects for all of the above residual operational effects identified.

Residual effects associated with the operational phase of the proposed wind farm are **Short-term Slight** to **Moderate** Disturbance/Displacement Effects to whooper swan followed by a **Long-term Not significant** effect with habituation.

It is considered that with the implementation of mitigation, the proposed substation will have an **Imperceptible** to **Slight Reversible** Residual Effect in the local context on birds. A **Long-term Not significant** Residual Effect in the local context will remain for woodcock. A **Long-term Not significant** Residual Effect in the local context will remain for raptors (Criteria: EPA, 2022).

Residual effects associated with the TDR are assessed as **Long-term Imperceptible.**

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