MWP

Chapter 07 Ornithology

Ballycar Wind Farm

7. Ornithology

7.1 Introduction

This chapter assesses any likely potentially significant effects that the proposed development may have on Ornithology and sets out the mitigation measures proposed to avoid, reduce or offset any potential significant effects that are identified. The residual effects on ornithological interests are then assessed. The proposed development refers to all elements of the application for the construction, operation and decommissioning (as described in detail in **Chapter 2 Description of the Proposed Development**). The assessment considers the potential effects during the following phases of the proposed development:

- Construction of the Development;
- Operation of the Development; and
- Decommissioning of the Development.

This chapter is supported by several appendices included in **Volume III** of the **EIAR** (**Appendix 7A – 7K**).

A preliminary **Construction and Environmental Management Plan (CEMP)** can be found within **Appendix 2A** in **Volume III** of the **EIAR**. This document will be a key construction contract document, which will ensure that all mitigation measures, which are considered necessary to protect the environment, including ornithological interests, are implemented.

7.1.1 Outline Site Description

A detailed ecological description of the proposed development site is given in **Chapter 6 Biodiversity**.

The proposed development site is located in rural southeast County Clare, over 3km northwest of Limerick City and suburbs. Lands within the site are managed for agriculture under varying levels of farming practice intensity, with areas of conifer plantation throughout. Commercially owned forestry plantations make up a considerable portion of the north part of the site. Access to the western section of the site is via a local road connected to Meelick/Knockalisheen Road (Local Road) to the south, and access to the eastern section of the site is via a private farm track connected to Ballycar South Road (Local Road) to the east.

The proposed development site is located within the Shannon River Basin District and is encompassed within two catchment areas, Shannon Estuary North catchment (Owenogarney_SC_020 sub-catchment) to the west and Lower Shannon catchment (Shannon [Lower]_SC_100 sub-catchment) to the east. There are five EPA registered watercourses within the planning boundary that drain lands within the site and are fed by numerous field and track ditches that criss-cross the site. These ditches are associated with field boundaries, hedgerows and treelines.

The principal habitats within the site are, by far, Improved agricultural grassland (GA1) and Conifer plantation (WD4). Other habitats include Wet grassland (GS4), Scrub (WS1), Hedgerows (WL1), and patches of natural or semi-natural woodland (WN/WD). A small area of Upland blanket bog (PB2) and Wet heath (HH3) occurs in the north-west of the study site.

While no part of the site for the proposed wind farm is designated for nature conservation, there are designated sites of conservation importance present in the wider landscape, notably the River Shannon and River Fergus Estuaries SPA (code: 004077), located approximately 4.4 km to the southwest of site, the Lower River Shannon SAC (002165) located approximately 1km to the southeast, and Woodcock Hill NHA (code: 002402), located approximately 1.1km west of the site (see Chapter 6 Biodiversity, Section 6.3.4 and accompanying NIS for full details of designated sites). The delivery of turbine components to the proposed development will require temporary works on sections of the public road network along the delivery route including temporary local road widening. As outlined in the Turbine Delivery Route (TDR) Assessment (Appendix 2C, Section 4.1), temporary road widening for the delivery of components will be required at the junction of the L3056 and R464 at Parteen. The location of designated sites of conservation importance relative to the temporary TDR works location is outlined and discussed in Section 4.6.5 of the NIS. The nearest designated area to the TDR temporary works is the Lower River Shannon SAC, which is located 46m from the location of the proposed temporary works.

7.1.2 Outline Proposed Development Description

Planning Permission is being sought for the construction of 12 wind turbines, permanent met mast, on-site electrical Substation and all ancillary works. The planning application (Redline) boundary for the proposed development is shown in Chapter 2 Description of the Proposed development, Figure 2-3.

The proposed development will include the following main components (refer to Chapter 2 Description of the Proposed development for details):

- 12 No. Wind Turbines (blade tip height up to 158m). Eleven of the turbines will have a hub height of 90m and a blade length of 68m and one turbine (T10) will have a hub height of 82m and a blade length of 68m.
- 12 No. Wind Turbine foundations and Hardstand areas.
- 1 No. Permanent Meteorological Mast (90m height) and foundation and associated hardstand areas.
- 1 No. electrical substation (110kV) including associated ancillary buildings, security fencing and all associated works.
- 2 No. Developed Site Entrances, one temporary entrance to facilitate construction traffic and one permanent entrance.
- New and upgraded internal site access tracks.
- Provision of an on-site Visitor cabin and parking.
- All associated underground electrical and communications cabling connecting the proposed turbines to the proposed onsite substation.
- Laying of approximately 1.5km of underground electricity cabling to facilitate the connection to the national grid from the proposed onsite substation to connect to an existing 110kV overhead line.
- Temporary works on sections of the public road network along the turbine delivery route (including hedge or tree cutting, relocation of powerlines/poles, lampposts, signage, and local road widening).
- 1 No. Temporary construction site compound and additional mobile welfare unit.

- 1 No. Borrow pit to be used as a source of stone material during construction.
- 3 No. spoil deposition areas (one at borrow pit location).
- Associated surface water management systems.
- Tree felling for wind farm infrastructure.

A 10-year planning permission and an operational period of no less than 35 years from the date of commissioning of the entire wind farm is being sought.

7.1.3 Purpose of the Chapter

The purpose of this chapter is to:

- Establish and evaluate the baseline ornithological environment as relevant to the proposed development;
- Identify, describe and assess any potentially significant ornithological effects associated with the proposed development;
- Set out the prevention and mitigation measures required to address any potentially significant ornithological effects and ensure compliance with relevant nature conservation legislation;
- Provide an assessment of the significance of any residual ornithological effects; and
- Identify any appropriate enhancement and / or post-construction monitoring requirements.

7.1.4 Competency of the Assessor

This Ornithology chapter has been prepared by Dr. Brian Madden of BioSphere Environmental Services (see Statement of Authority below) and is informed by survey data and relevant reports from various ecologists working with MWP and the Irish Ornithological Survey Group. The personnel involved in the design and the carrying out of the ornithological surveys are listed in Table 7-1 below, with details of their experience given in Appendix 7A.

Statement of Authority: Dr. Brian Madden BA. Mod. (Hons), PhD, MCIEEM Biosphere Environmental Services

Brian graduated in Natural Sciences from the University of Dublin in 1984 and earned a Ph.D. degree in 1990 from the National University of Ireland for his research on ecosystem processes in raised bogs. Since 1994, Brian has been the principal ecologist with BioSphere Environmental Services. Brian has carried out botanical surveys and habitat assessments for most terrestrial habitats which occur on the island of Ireland. He is an experienced ornithologist, with particular interests in birds of prey and wetland birds. He has published a range of peer-reviewed research papers.

Examples of proposed energy developments that Brian has been involved with include: Grousemount Wind Farm, Cos. Cork/Kerry, Oweninny Wind Farm Phases 1 & 2, Co. Mayo, Castlepook Wind Farm, Co. Cork, Letteragh Wind Farm, Co. Clare, Kiltumper Wind Farm Co. Clare, Eglish Wind Farm, Co Tyrone, Connemara 110kV Overhead Line Reinforcement Proposed development (40 km from Barna to Screeb Bay in Connemara).

Collision Risk Modelling for the proposed development has been undertaken by Mr. George Wilkinson, RSK Ireland Ltd. George Wilkinson is a Senior Ecologist who has over 5 years' experience working with protected habitats and

species, identifying and addressing ecological constraints. He has an MSc in Species Identification and Survey Skills from the University of Reading, and a BSc in Biology from the University of Bristol. He is also an associate member of Chartered Institute of Ecology and Environmental Management (CIEEM). George has acted as ornithology technical lead for a wide range of proposed developments servicing the transport, energy, commercial and residential sectors.

Mr. Nick Henson CEnv MCIEEM undertook the review of the Collision Risk Model. Nick has more than 17 years' experience of ecological work, including extensive experience with assessing potential ecological effects of wind farm projects.

Table 7-1: Personnel involved in Ornithological Surveys/Data Analysis for the Proposed development, 2019 - 2023

Team Role	Name and Qualifications
Managing and co-ordinating surveys (to September 2022)	Monica Kane (Proposed development Manager, MSc. BSc.) to December 2021 Ciara Barry-Hannon (Ecologist, BSc. Wildlife Biology) to July 2022 Sally Kelly (Environmental Scientist, MSc. BSc) from July 2022
Managing and co-ordinating surveys (October 2022 to SSeptember 2023) Field Surveyor	John Murphy (Ornithologist - Irish Ornithology Survey Group)
Field Surveyor	Stan Nugent (Ecologist, BSc)
Field Surveyor	Tom Ryan (Ornithologist, BSc. Wildlife Biology)
Field Surveyor	Marie Kearns (Ecologist, MSc. BSc.)
Field Surveyor	Joe Kelly (Ornithologist, BSc. Wildlife Biology)
Field Surveyor	Ciara Barry-Hannon (Ecologist, BSc.)
Field Surveyor	Ian McDermott (Ecologist, MSc. BSc.)
Field Surveyor	Austin Cooney (Ecologist, BSc.)
Field Surveyor	John Hehir (Ornithologist, BSc.)
Field Surveyor	John Deasy (Ornithologist, MSc. BSc.)
Field Surveyor	Gerry Murphy (Ornithologist)
Field Surveyor	Pádraig Cullinan (Ornithologist)
Field Surveyor	Tom Tarpey (Ornithologist)
Field Surveyor	Deirdre O'Brien (Ecologist, BSc.)

Team Role	Name and Qualifications
Field Surveyor	Úna Williams (Ecologist & Environmental Scientist, BSc. MSc.)
GIS Mapping & Data	Valerie Heffernan (Environmental Scientist, MSc. BSc.) Ashling Fenton (MSc. BSc.)
Collision Risk Modelling	George Wilkinson (MSc. BSc.) Nick Henson (CENV, MCIEEM)

7.1.5 Relevant Legislation and Published Guidance

The main pieces of legislation relevant to this chapter are as follows:

- The Wildlife Acts 1976 – 2021 as amended;
- The Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) as amended;
- The Birds Directive (Council Directive 2009/147/EC) as amended; and
- European Communities (Birds and Natural Habitats) Regulations 2011 – 2015 and the European Union (Birds and Natural Habitats) (Amendment) Regulations 2021.

In considering ornithological survey methods and assessment of impacts of the proposed development, regard was made to the following guidance and information documents:

- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022);
- European Commission (2017) Environmental Impact Assessment of Projects. Guidance on the preparation of the Environmental Impact Assessment Report. (Directive 2011/92/EU as amended by 2014/52/EU);
- NRA (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes;
- CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester;
- Balmer, D., Gillings, S., Caffrey, B., Swann, B., Downie, I. and Fuller, R. (2013). Bird Atlas 2007-11: The breeding and wintering birds of Britain & Ireland. BTO Books, Thetford;
- Gilbert, G., Stanbury, A. and Lewis, L. (2021). Birds of Conservation Concern in Ireland 4: 2020-2026. Irish Birds, Volume 43, 1-22;
- Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. and Thompson, D. (2013). Raptors: a field guide to survey and monitoring (3rd Edition). The Stationery Office, Edinburgh;
- Percival, S.M. (2003). Birds and Wind Farms in Ireland: A Review of Potential Issues and Impact Assessment. Sustainable Energy Ireland;
- Scottish Natural Heritage (2016a). Assessing Connectivity with Special Protection Areas (SPAs). Version 3. Scottish Natural Heritage; and
- Scottish Natural Heritage (2017). Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms. Version 2. Scottish Natural Heritage.

7.1.6 Zone of Influence and the Study Area

The study area is defined by the zone of influence (ZoI) of the proposed development with respect to the ornithological receptors that could potentially be affected.

Following the initial desk study (see **Appendix 7B**) and preliminary visits in and around the proposed development site, the scope and geographical extent of the required ornithological surveys were defined.

The ZoI in relation to direct impacts on bird species as a result of the proposed development will be confined to the area within the planning boundary of the proposed development, including the grid connection.

The ZoI of general construction activities (i.e. risk of spreading/introducing non-native invasive species, disturbance due to increased noise, vibration, human presence and lighting) is not likely to extend more than 500 metres from the proposed planning boundary but could be further for specific bird species, such as breeding hen harrier or wintering goose species.

The ZoI of potential impacts on surface water quality in the receiving environment, which provides habitats for wetland bird species, could extend downstream for up to 15 km (following UK guidance, Scott Wilson et al. 2006) but possibly more.

For bird activity surveys, the 500 m buffer around the proposed turbines provided data on selected target species for assessing avian collision risk. The 500 m buffer is included to account for error when recording bird flight lines within the planning boundary (SNH 2017). For ease of reference, all land within the 500 m buffer is referred to as the Study Area (**Figure 7-1**).

Surveys were also carried out to a distance of approximately 5 km from the Study Area for checking of suitable habitats, especially wetlands, which may support target species that have the potential to be impacted by the proposed development - this wider area of survey for birds is referred to as the Hinterland area. Suitable habitat for winter roosting and breeding by hen harrier was surveyed to a distance of approximately 2 km from the Redline boundary (SNH 2017).

7.2 Methodology

7.2.1 Desktop Study

A comprehensive desktop study was carried out to identify features of ornithological importance within the Study Area and surrounding region (see **Appendix 7B** for full details). The following principal information sources were examined:

- Online web-mapper of National Parks and Wildlife Service (NPWS) for data on sites designated for nature conservation (European & National) (see www.npws.ie/protected-sites);
- Ordnance Survey Ireland (OSI) aerial photography and 1:50,000 mapping, and other sources of online aerial imagery (to assess physical features and habitats which may potentially support important bird species);
- Review of 2007-2011 Bird Atlas (Balmer *et al*. 2013);
- Review of Birds of Conservation Concern in Ireland (BoCCI) 2020-2026 (Gilbert *et al*. 2021);
- Review of BirdWatch Ireland I-WeBS (Irish Wetland Bird Surveys) site information;

- General ornithological information available from BirdWatch Ireland (www.birdwatchireland.ie);
- Irish Bird Reports and the journal Irish Birds, published by BirdWatch Ireland; and
- Review of the 2015 National Survey of Breeding Hen Harrier in Ireland Report (Ruddock *et al*. 2016).

7.2.2 Consultation

As part of the study, consultation was invited with the following relevant ornithological parties:

- National Parks and Wildlife Services of the Department of Housing, Local Government and Heritage (response received 27th January 2022 – see **Appendix 1B** in **Volume III** of the **EIAR**);
- BirdWatch Ireland (no response received); and
- An Taisce (no response received).

7.2.3 Field Surveys

Initial reconnaissance walkovers were carried out at and around the Site for the proposed development to assist in determining the scope and extent of the surveys. Field surveys were undertaken from October 2019 to September 2023, inclusive. Surveys followed standard guidance (as listed in **Section 7.1.5**).

The field surveys comprised two main elements: vantage point (VP) surveys to gather flight data for target species, and targeted distribution and abundance surveys undertaken to gain an understanding of the bird species occurring both in the Study Area and the hinterland which may be subject to impacts from the proposed development.

7.2.3.1 Vantage Point Surveys

Vantage point (VP) surveys were undertaken in accordance with best practice guidance (SNH, 2017) in order to record bird flight activity throughout the site during the breeding season (i.e. April to September inclusive; 'B') and the non-breeding season (i.e. October to March inclusive; 'NB'), with emphasis on recording activity by target species. VP surveys were carried out between October 2019 and September 2023, i.e. four non-breeding seasons and four breeding seasons. The overall aim of these surveys was to record flight-line activity within a 500 m buffer to provide data on selected target species for assessing avian collision risk within the flight activity survey area. The flight activity survey area was taken to be that area encompassing the development area and extending out to a distance of approximately 500 m (referred to as the Study Area hereafter).

Three Vantage Point locations (VP1, VP2 & VP3) were selected for coverage of the proposed development site (**Table 7-2**).

Table 7-2: Vantage point locations at the proposed development site.

VP No.	Latitude, Longitude
1	52.713320, -8.640607
2	52.714537, -8.674022
3	52.726433, -8.691171

A summary of VP survey effort at each VP is provided in Table 7-2a.

Table 7-2a: Summary of Vantage Point survey effort

	Hours of Observation								
VP No.	NB 2019/20	B 2020	NB 2020/21	B 2021	NB 2021/22	B 2022	NB 2022/23	B 2023	Total
1	36	36	36	36	36	36	36	36	288
2	36	36	36	36	36	48	36	36	300
3	36	36	36	36	36	24	36	36	276

A total site coverage of 864 hours over the survey period October 2019 – September 2023 was undertaken. A viewshed analysis was carried out and the extent of coverage throughout the site from each VP is shown in Figure 7-1.

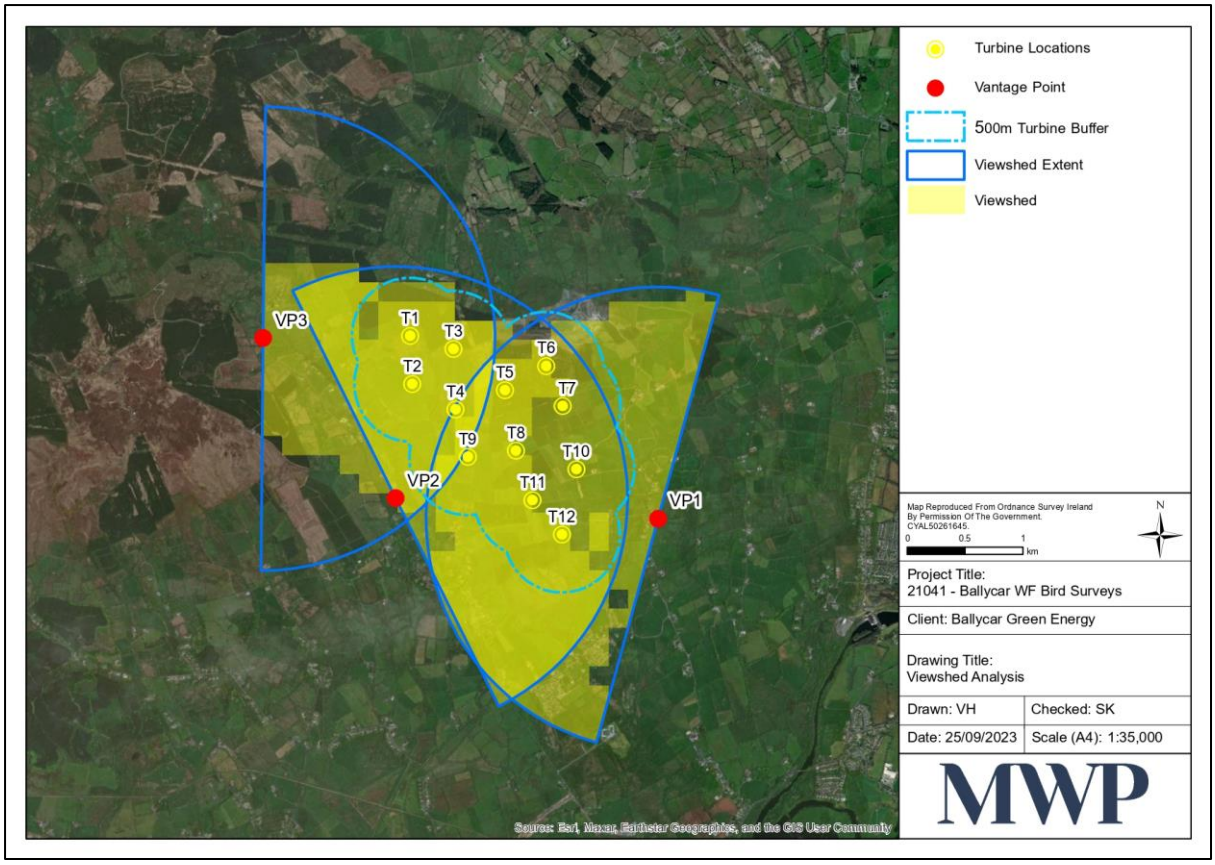


Figure 7-1: Viewsheds from each VP (1-3). Locations of turbines and the 500m (approx.) buffer zone is also shown.

The VPs selected to cover the site for the proposed wind farm are compliant with SNH (2017) guidelines, which stipulate that viewsheds from VPs should not extend more than 2 km and that the angle of view should also not be extended beyond an arc of 180 degrees.

During VP surveys the flight behaviour of target species was recorded. At the time of each species observation the following information was recorded:

- The time that the bird was detected;
- The flight duration(seconds) within various flight height categories (0-20m, 20-50m, 50-100m, 100-180m and >180m);
- Sex and age of the bird(s) (adult/juvenile), where possible to determine;
- Type of activity/behaviour such as hunting, flying, displaying etc.;
- Estimation of actual flight height;
- Habitat(s) where the bird was observed; and
- Weather conditions at time of sighting including wind speed, direction, degree of visibility.

Once an initial sighting was made, the species was observed until lost from view, with the flight line mapped on enlarged Discovery series maps.

During the VP surveys, all other non-target/secondary species were also recorded, where recording did not infringe on recording of target species flight data (see **Appendix 7E** for the period October 2019 to September 2022, and **Appendices 7I and 7J** for the period October 2022 to September 2023).

7.2.3.2 Distribution and Abundance Surveys

The distribution and abundance surveys comprised the following:

- Walkover transect survey;
- Wetland distribution survey;
- Hen harrier breeding survey;
- Hen Harrier winter roost survey;
- Woodcock and nightjar breeding survey;
- Wader breeding survey;
- Breeding peregrine survey;
- Hinterland survey.

Transect survey

A transect survey is a survey along a defined route within the study area. The overall aim of the transect surveys was to assess general bird distribution throughout the site and gather data on bird usage of the site. Transect surveys were completed for breeding birds in summers 2020, 2021, 2022 and 2023 and for wintering birds in winters 2019/20, 2020/21, 2021/22 and 2022/23 and were carried out as close as possible to the Common Bird Census (CBS) methodology within the study area. For summaries of the transect survey effort for the period October 2019 to September 2022, refer to **Appendix 7D**, for the period October 2022 to March 2023, refer to **Appendix 7I,** and for the period April to September 2023, refer to **Appendix 7J**.

Transects were selected in order to survey areas of suitable breeding/ foraging habitat, in areas where access was not an issue. In survey years where access was an issue, transects were confined to an existing farm access track through the west of the proposed development site where most of the site's principal habitats were present. Therefore, the transects undertaken across the study area during the period 2019 to 2023 are considered to be representative of the overall study area.

During each transect survey, the target species recorded included raptors, waders, gulls and other birds of conservation concern seen or heard, typically within 100m of the route, as well as all passerine species , although the topography of the landscape often allowed for the detection of birds at greater distances.

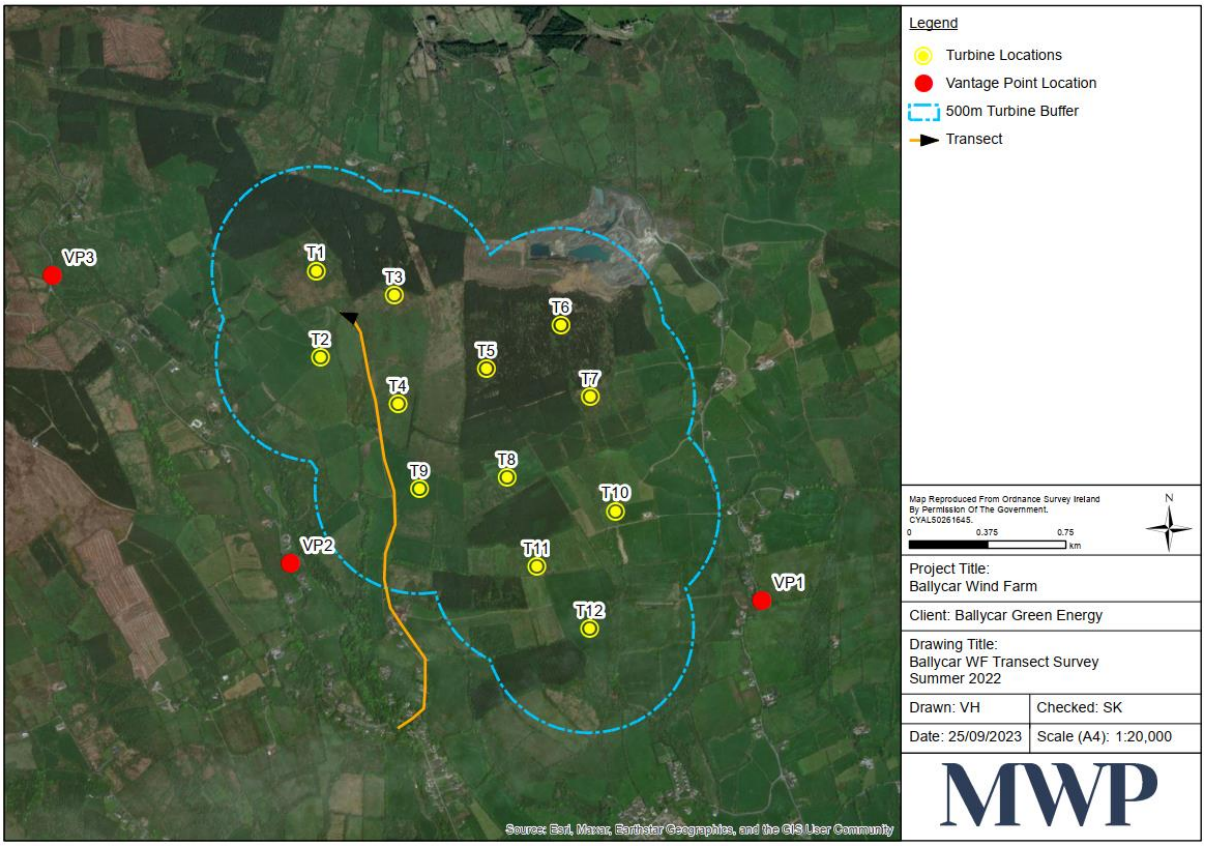


Figure 7-2: Transect survey route, 2019-2022

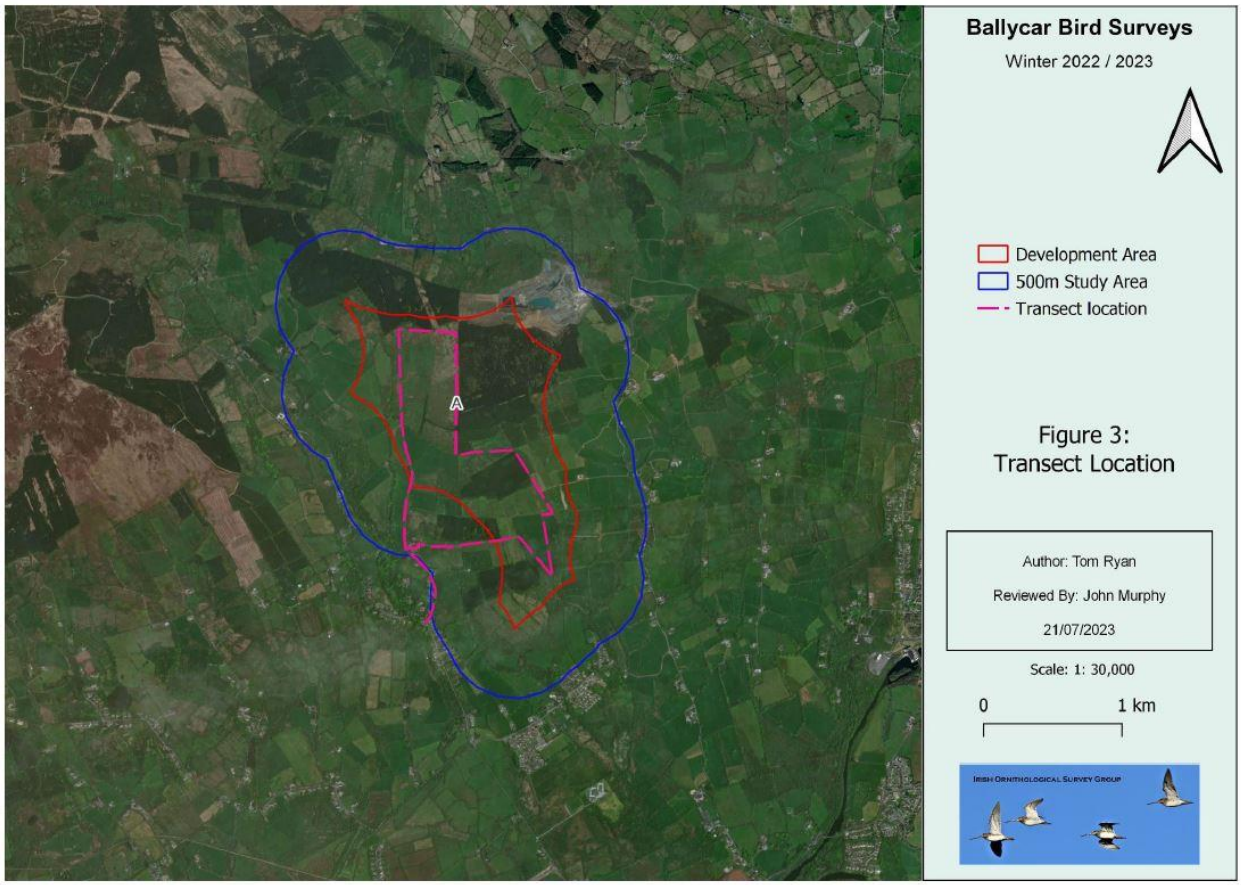


Figure 7-3: Transect survey route, 2022-2023

Waterbird distribution surveys

Waterbird distribution surveys were undertaken along four representative sections of the River Shannon Estuary to the south and southwest of the proposed development site from upstream of Thomas Island at the Shannon Banks to Bunlicky Lake and Coonagh Point (see **Figure 5** in **Appendix 7I**). The areas surveyed included suitable habitats for foraging and roosting purposes.

The surveys were carried out in winter 2019/2020 and winter 2022/2023 – for survey effort details and results, see **Appendix 7F** for winter 2019/20 and **Appendix 7I** for winter 2022/23. Survey methodology was based on the national Irish Wetland Bird Survey (I-WeBS) (BirdWatch Ireland / NPWS)[1] and is outlined in full **Appendix 7B**.

These surveys provide information on the distribution and abundance of waterbird species along the section of the River Shannon closest to the proposed development site.

Hen harrier breeding survey

Local knowledge of the general area indicated that the nearest known area of potential hen harrier activity to the study area is Woodcock Hill, located approximately 1.1 km west of the study area. Further known breeding activity occurs several kilometres to the north of the study area.

[1] Irish Wetland Bird Survey Training Resources - BirdWatch Ireland Accessed: 30th November 2023

Hen harrier Breeding Territory Surveys were carried out in 2022 and 2023. The focus of the surveys was to locate and monitor all potential hen harrier territories within and up to 2 km of the study area. The survey methodology had regard to Hardey et al. (2013), SNH (2017) and Ruddock et al. (2016). Table 7-3 outlines the hen harrier survey effort undertaken during the 2022 and 2023 breeding seasons.

Table 7-3: Hen Harrier 2022 and 2023 breeding season survey effort

Date	Period	Survey Objective
19th April, 2022 17th April, 2023	March to mid-April	To locate any nest sites and check for occupancy
19th May, 2022 12th May, 2023	Mid-April to late-May	To locate incubating females
14th & 15th June, 2022 16th June, 2023	Late-May to late-June	To check for young or for evidence of breeding
12th July & 3rd August, 2022 7th July, 2023	Late-June to late-August	To check for fledged young

The survey comprised a combination of transects, located within the surrounding 2 km hinterland area, to identify any potential breeding territories/nest-sites, and targeted VP watches overlooking these areas to monitor potential breeding activity (see Appendix 7F for summer 2022 survey effort, and Figure 3 in Appendix 7B for summer 2022 survey locations). During the targeted hen harrier breeding surveys, any other target species observed were also recorded.

Further hen harrier surveys focused on the Woodcock Hill area were undertaken in the 2023 breeding season (see Appendix 7J, Figure 4 for survey locations and details of survey effort). Monthly surveys were carried out from April to July inclusive following the method of Hardey *et al*. (2013).

Hen harrier winter roost survey

Hen Harrier Roost surveys were carried out over the winter season 2022-2023 at suitable roosting habitat within 2 km of the proposed development site boundary (SNH, 2017) (see Figure 4 in Appendix 7I for survey locations). Survey methodologies were also adapted from guidance by Hardey *et al*. (2013), Gilbert *et al*. (1999) and O'Donoghue (2019). Five surveys were carried out between 22nd November 2022 and 3rd March 2023 (survey effort details are presented in Appendix 7I).

Woodcock and nightjar breeding survey

Breeding season walkover surveys were undertaken at dusk on three dates in June 2022 to determine the presence of breeding woodcock (*Scolopax rusticola*) and nightjar (*Caprimulgus europaeus*) and record any

potential breeding activity. Surveys were undertaken on the 9th, 16th and 29th June 2022 between 21:30 and 23:30 hrs – refer to **Appendix 7F** for further survey details.

The surveys focussed on areas of potentially suitable habitat within the study area. The methodologies were broadly based on methods described in Bibby et al. (2000) and Gilbert et al. (1998). Surveyors slowly walked a transect route while recording any displaying and/or calling male birds. Any other target species observed or heard during surveys were recorded.

Surveys for woodcock were also carried out in April, May and June 2023, with focus in the northwest sector of the study area including the area for the proposed substation location (see **Figure 5** in **Appendix 7J**). Survey method followed Gilbert et al. (1998) and the British Trust for Ornithology (2013).

Breeding wader survey

Surveys for breeding waders were carried out in April, May and June 2023 within the 500 m study area (see **Appendix 7J** for survey details). These surveys focused on the most suitable habitats within the site for potential breeding, principally wet grassland, heath and bog. The survey method was adapted from the O'Brien and Smith methodology for censusing lowland breeding wader populations as described in Gilbert et al. (1998).

Breeding peregrine survey

Known suitable breeding sites and areas supporting suitable habitats were surveyed for the presence of peregrines showing breeding behaviour within a distance of at least 5 km of the proposed development site (see **Figure 18** in **Appendix 7J**). Visits were carried out between 5th April and 19th July 2023 (see **Appendix 7J).** The survey method followed Hardey *et al*. (2013).

Breeding raptor survey

Bird of prey species, other than hen harrier and peregrine as referred to above, were surveyed in suitable habitats within a distance of up to 2 km from the core study area and followed Hardey et al. (2013).

Hinterland survey

Hinterland surveys were undertaken within a 5km radius of the site boundary to determine the suitability of the surrounding habitats for target species with particular focus on birds of prey, and whether large assemblages of birds (e.g. wildfowl, waders) occurred regularly in the locality. Ssurveyors travelled roads and regularly stopped at locations with optimal views over potentially suitable habitats for birds of conservation importance, particularly waterbird species and birds of prey. However, all bird species of interest encountered around the proposed development area were recorded during the surveys. The purpose of the hinterland counts was to establish a better understanding of which bird species utilise the surrounding habitats and to gather data on whether species frequenting the region traverse the proposed development site.

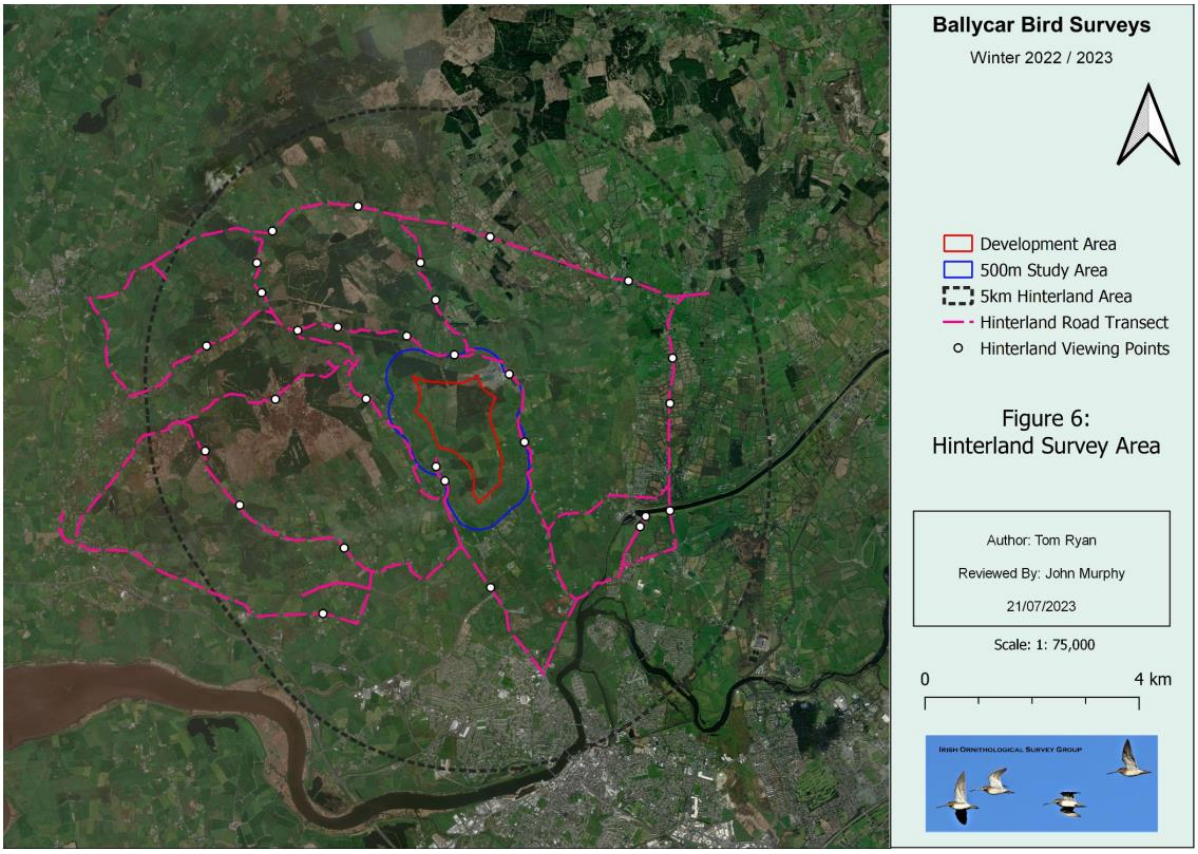


Figure 7-4: Route driven during the hinterland surveys within approximately 5km of the proposed development site

7.2.3.3 Survey Limitations

The surveys undertaken provide the information necessary to allow a complete, comprehensive and robust assessment of the potential impacts of the proposed development on avian receptors. The information provided in this EIAR chapter accurately and comprehensively describes the baseline environment; provides an accurate prediction of the likely effects of the proposed development; prescribes mitigation as necessary; and describes the predicted residual impacts. The specialist studies, analysis and reporting have been undertaken in accordance with the appropriate guidelines. No significant limitations in the scope, scale or context of the assessment have been identified.

7.2.4 Assessment Approach

The ecological evaluation and impact assessment approach used in this report is based on "Guidelines on the information to be contained in Environmental Impact Assessment Reports" (EPA, 2022) and "Guidelines for Ecological Impact Assessment in the UK and Ireland" (CIEEM, 2018).

7.2.4.1 Sensitivity of Receptors

In line with the recommendations of CIEEM guidelines, only ornithological receptors that are considered to be important, i.e. Valued Ornithological Receptors (VORs) and potentially affected by the proposed development were subject to detailed assessment. It is not necessary to carry out detailed assessment of receptors that are

sufficiently widespread, unthreatened and resilient to proposed development impacts and would remain viable and sustainable.

Ornithological receptors were considered within a defined geographical context and for this proposed development the following geographic frame of reference is used (following NRA Guidance, (NRA, 2009a)):

- International;
- National;
- County; and
- Local (higher value / lower value).

For designated sites, importance reflected the geographical context of the designation. For example, an SPA is considered internationally important while a Natural Heritage Area (NHA) is considered nationally important.

In assigning a level of value to a species, it is necessary to consider its distribution and status, including a consideration of trends based on available historical records. Reference has therefore been made to published lists and criteria where available. Examples of relevant lists and criteria include:

- Species of European conservation importance (as listed on Annex I of the Birds Directive); and
- Species Red-listed in Ireland under the relevant lists of Birds of Conservation Concern Ireland (BoCCI), e.g. Gilbert *et al*. 2021.

Where appropriate, the value of species populations has been determined using the standard '1% criterion' method (e.g. Crowe 2005). Using this, the presence of >1% of the international population of a species is considered internationally important; >1% of the national population is considered nationally important; etc.

7.2.4.2 Assessing Impacts and the Significance of Effects

The terms impact and effect are defined by CIEEM (2018) as:

- Impact – Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow (CIEEM, 2018); and
- Effect – Outcome to an ecological feature from an impact. For example, the effects on a dormouse population from loss of a hedgerow (CIEEM, 2018).

CIEEM (2018) guidelines state that when describing ecological impacts and effects, reference should be made to the following characteristics as required: positive or negative; extent; magnitude; duration; frequency and timing and reversibility.

Following the characterisation of impacts, an assessment of the ecological significance of their effects is made. The guidelines promote a transparent approach in which a beneficial or adverse effect is determined to be significant or not, in ecological terms, in relation to the integrity of the defined site or ecosystem(s) and/or the conservation status of habitats or species within a given geographical area, which relates to the level at which it has been valued. The decision about whether an effect is significant or not, is independent of the value of the ecological feature; the value of any feature that will be significantly affected is then used to determine the implications, in terms of legislation and / or policy (CIEEM, 2018).

Significance is a concept related to the weight that should be attached to effects when decisions are made. For the purpose of this assessment, 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features'. A significant effect is simply an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a proposed development. The EcIA guidelines (CIEEM, 2018) state that "*A significant effect does not necessarily equate to an effect so severe that consent for the proposed development should be refused planning permission. For example, many proposed developments with significant negative ecological effects can be lawfully permitted following EIA procedures as long as the mitigation hierarchy has been applied effectively as part of the decision-making process*". The assessment of significance is based on professional judgement.

7.2.4.3 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. Cumulative effects can occur where a proposed development results in individually insignificant impacts that, when considered in-combination with impacts of other proposed or permitted plans and proposed developments, can result in significant effects.

7.2.4.4 Avoidance, Mitigation, Compensation and Enhancement

When seeking mitigation or compensation solutions, efforts should be consistent with the geographical scale at which an effect is significant. For example, mitigation and compensation for effects on a species population significant at a county scale should ensure no net loss of the population at a county scale. The relative geographical scale at which the effect is significant will have a bearing on the required outcome which must be achieved.

Where potentially significant effects have been identified, the mitigation hierarchy has been applied, as recommended in the EPA (2022) and CIEEM (2022) Guidelines. The mitigation hierarchy sets out a sequential approach beginning with the avoidance of impacts where possible, the application of mitigation measures to minimise unavoidable impacts and then compensation for any remaining impacts. Once avoidance and mitigation measures have been applied, residual effects are then identified along with any necessary compensation measures, and incorporation of opportunities for enhancement.

It is important for the impact assessment to clearly differentiate between avoidance mitigation, compensation and enhancement and these terms are defined here as follows:

- Avoidance is used where an impact has been avoided, e.g. through changes in scheme design;
- Mitigation is used to refer to measures to reduce or remedy a specific negative impact *in situ*;
- Compensation describes measures taken to offset residual effects, i.e. where mitigation *in situ* is not possible; and
- Enhancement is improved management of ecological features or provision of new ecological features, resulting in a net benefit to biodiversity, which may be unrelated to a negative impact or is ‘over and above’ that required to mitigate/compensate for an impact.

7.3 Baseline Conditions

7.3.1 Desk review results

7.3.1.1 International Sites

An on-line search for Special Protection Areas (SPAs) within the area surrounding the proposed development was carried out to identify potential 'connectivity' between the site and SPAs, and to assess whether pathways exist through which the proposed development could impact on qualifying interest species. This was undertaken with reference to the SNH guidance document 'Assessing Connectivity with Special Protection Areas (SPAs)' (SNH, 2016a). SNH (2016a) recommends that typically the core foraging range should be used when determining whether there is connectivity between the proposal and qualifying interest species. Core foraging ranges for wind farm sensitive species can range from <5 km up to 20 km for some species of geese, namely greylag goose and pink-footed goose. The evaluation of potential for connectivity between qualifying interest species of SPAs and the proposed development site took account of the habitats that occur at the site of the proposed development, and their suitability with regard to individual species ecological requirements. On this basis, an area within a 15 km radius of the site was considered. This determined that there is one SPA within 15 km of the site (see Appendix 7B for details), namely:

- River Shannon and River Fergus Estuaries SPA (004077) – located 4.4 km southwest of proposed development site.

The evaluation of European sites is detailed in the Natura Impact Statement (NIS) which accompanies the application.

The desk-top review concluded that there are no sites designated as Wetlands of International Importance under the Ramsar Convention within 15 km of the site boundary.

The Important Bird and Biodiversity Areas (IBAs) Programme, overseen by Birdlife International, aims to identify, conserve and protect those areas throughout the world considered to be of the greatest significance to bird populations2. The desk-top review concluded that there is one IBA site within 15 km of the proposed development site boundary: 'Shannon and Fergus Estuaries', located approximately 4.4 km southwest of the site. The Shannon and Fergus Estuaries is of importance for wetland bird species.

7.3.1.2 Irish Wetland Bird Survey sites

The Irish Wetland Bird Survey (I-WeBS) monitors wetland bird populations in Ireland. There are two I-WeBS sites within 10 km of the proposed development site (see Table 7-4).

Table 7-4: I-WeBS sites within 10km of the proposed development

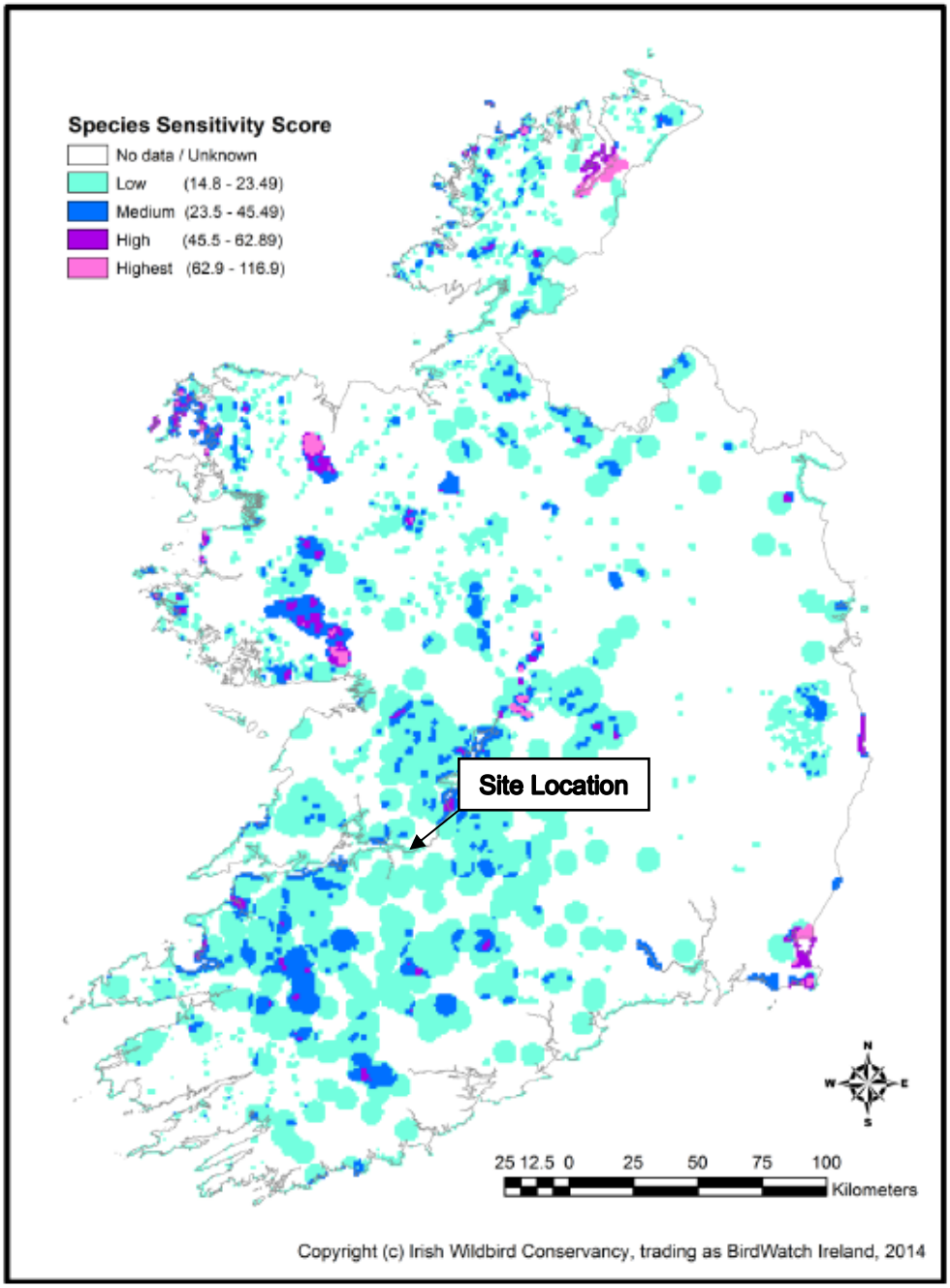
I-WeBS Site	Site code
Shannon & Fergus Estuary (Aerial) – located 4.4 km to south	0H410
River Shannon (Lower) - located 5.3 km to east	0H301

[2]http://www.birdlife.org/worldwide/programmes/important-bird-and-biodiversity-areas-ibas

7.3.1.3 BirdWatch Ireland Bird Sensitivity Tool

The Bird Sensitivity Mapping Tool for wind energy development provides a measured spatial indication of where protected birds are likely to be sensitive to wind energy developments (McGuinness et al. 2015).

A review of this mapping tool determined that the proposed development site lies within a zone of low bird sensitivity to wind energy development.



Source: for Wind Energy Developments and Associated Infrastructure in the Republic of Ireland Guidance Document February 2015

Figure 7-5: Bird Sensitivity for Wind Energy Development

7.3.1.4 NPWS Rare and Protected Species Database

A Sensitive Data Request regarding known records of sensitive or threatened bird species for the hectad R56 was submitted to NPWS in November 2021, with a follow-up request made in October 2022.

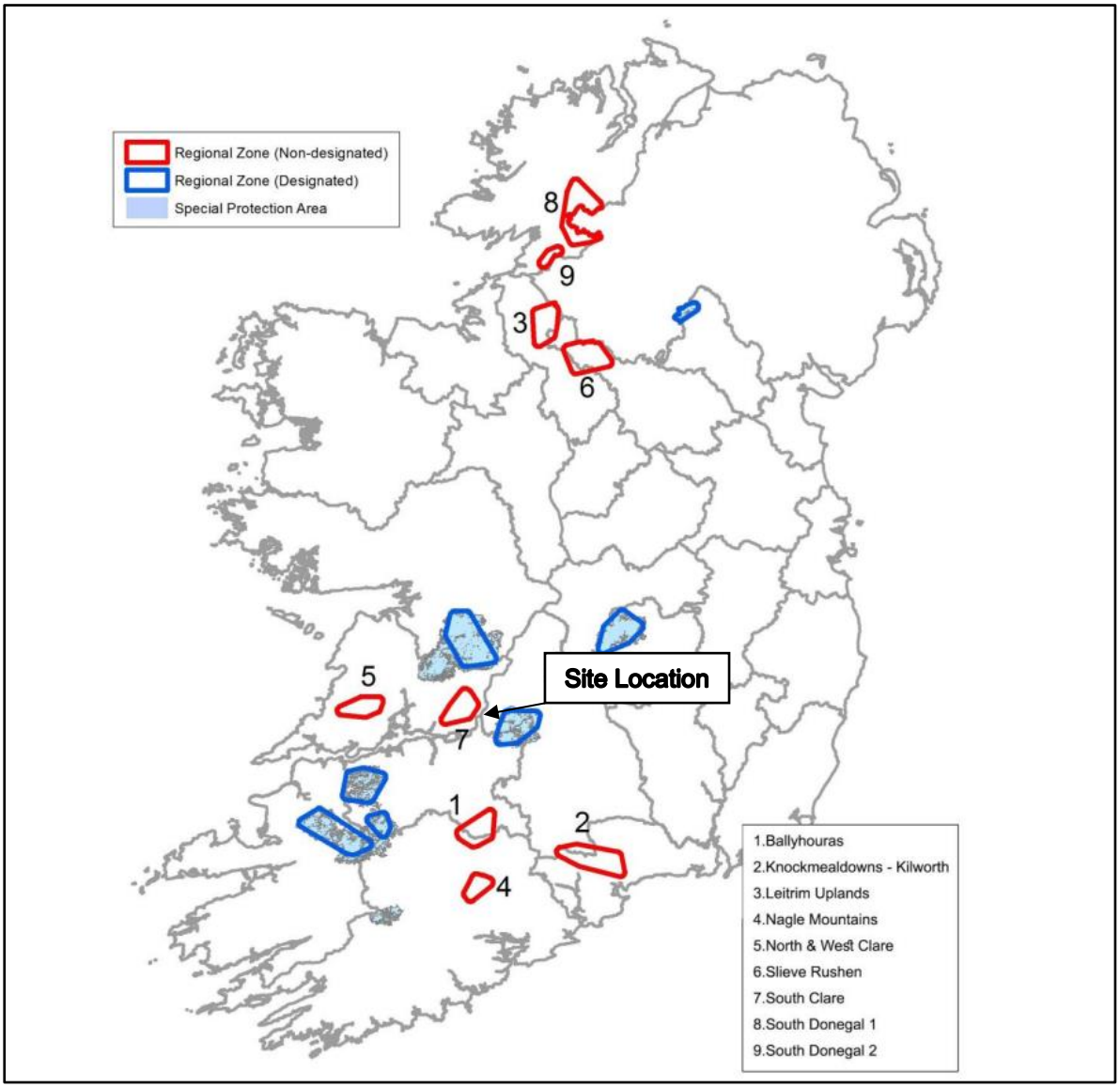
Information was received for one species, hen harrier. This confirmed that while there are no known traditional hen harrier territories within the proposed development site, one confirmed breeding site was located within a 0-3 km radius of the site in both 2010 and 2015.

The following information (Table 7-5) was provided as part of the NPWS Sensitive Data Request:

Table 7-5: Records of Hen Harriers sightings and breeding sites within 0-10km of the study area (information from NPWS)

Year	No. of Sightings	No. of Breeding Sites
2005	12	0
2010	0	1
2015	0	3
2020	0	1

NPWS also confirmed that a portion of the study area (approximately 20%) overlaps with one of nine non-designated but regionally important breeding areas for hen harrier in Ireland, as established from the 2015 National Hen Harrier Survey. This area was identified as the 'South Clare' non-designated Regional Zone for hen harrier and encompasses an area of over 14,000 hectares. Refer to Figure 7-6.



(Available at: Hen Harrier Conservation and the Forestry Sector in Ireland (irishriverproposed development.com).

Figure 7-6: The distribution of relatively important breeding populations of Hen Harriers (i.e. designated and non-designated regional zones

7.3.1.5 Identification of target species

Target species are typically those species which are afforded a higher level of legislative protection, or which are considered to be more sensitive to potential impacts from wind farm developments by virtue of their behaviour (SNH 2017).

The results of the comprehensive desk-top study, in conjunction with a site reconnaissance survey prior to the commencement of any surveys, were used to identify target bird species which were considered likely to occur in the study area. These target species formed the main focus of the bird surveys undertaken.

In conjunction with the findings of the desk-top study, which includes review of results for the relevant hectad (R56) from previous Bird Atlas projects (see **Appendix 7B**), the target species list was drawn from:

- Annex I of the Birds Directive as amended;

- Species protected under the Fourth Schedule of the Wildlife Acts 1976-2022 (buzzards, eagles, falcons, harriers, hawks, kites, osprey, owls);
- Red-listed birds of Conservation Concern (Gilbert *et al*. 2021);
- Special Conservation Interest (SCI) species of SPAs within a 15 km radius of the Site.

To ensure other species which may potentially be sensitive to wind farms were not missed during surveys, all other species of gull, wader, duck, diver, goose, swan, cormorant and heron were included as secondary species. It is generally considered that passerine species are not significantly impacted by wind farms (SNH, 2017); however, their presence was recorded to provide a complete picture of bird usage of the Site.

Table 7-6 lists the species which were identified as target species for the study area. The conservation status for each species is given (it is noted that all wild birds in Ireland are legally protected under the Wildlife Acts 1976-2021 as amended).

Table 7-6: Target species identified for the proposed development study area

Target Species	Conservation Status
Barn Owl (*Tyto alba*)	BoCCI Red-listed
Buzzard (*Buteo buteo*)	BoCCI Green-listed
Curlew (*Numenius arquata*)	BoCCI Red-listed/SCI
Golden Plover (*Pluvialis apricaria*)	Annex I EU Birds Directive/ BoCCI Red-listed/SCI
Hen Harrier (*Circus cyaneus*)	Annex I EU Birds Directive/ BoCCI Amber-listed
Kestrel (*Falco tinnunculus*)	BoCCI Red-listed
Kingfisher (*Alcedo atthis*)	Annex I EU Birds Directive/ BoCCI Amber-listed
Lapwing (*Vanellus vanellus*)	BoCCI Red-listed/SCI
Long-eared Owl (*Asio otus*)	BoCCI Green-listed
Merlin (*Falco columbarius*)	Annex I EU Birds Directive/ BoCCI Amber-listed
Nightjar (*Caprimulgus europaeus*)	Annex I EU Birds Directive/ BoCCI Red-listed
Peregrine Falcon (*Falco peregrinus*)	Annex I EU Birds Directive / BoCCI Green-listed
Red Grouse (*Lagopus lagopus*)	BoCCI Red-listed
Snipe (*Gallinago gallinago*)	BoCCI Red-listed
Sparrowhawk (*Accipiter nisus*)	BoCCI Green-listed

Whooper Swan (*Cygnus cygnus*)	Annex I EU Birds Directive/ BoCCI Amber-listed/SCI
Woodcock (*Scolopax rusticola*)	BoCCI Red-listed

7.3.2 Field Survey Results

7.3.2.1 Presentation of results

In the following sections, results from the various surveys which were carried out over the period from October 2019 to September 2023 are summarised. Full survey details and results are given in Appendices 7C to 7J.

There then follows an evaluation and discussion of the conservation importance for birds within the study area.

7.3.2.2 Flight activity surveys

Results from the vantage point surveys are tabulated for each species in Appendices 7C, 7H, 7I and 7J, with corresponding flight lines plotted in Appendices 7H, 7I and 7J.

Hen Harrier

There were four records of hen harrier during the vantage point surveys, as follows:

- 10/03/2020 – adult male flying/hunting to north-west of study site (outside of 500 m study area);
- 06/04/2020 – adult female flying through south-easterly sector of site in a southerly direction;
- 18/01/2022 – adult female flying through southern sector of site in a northerly direction;
- 20/01/2022 – adult female flying within north-west sector of site in a southeast direction.

Two of the records (10/03/2020 & 06/04/2020), involving male and female birds, were in the early part of the breeding season and may have been associated with a local breeding pair. The two winter records in January 2020 are likely to refer to the same individual and indicate that the study site is visited on occasions by wintering birds.

Sparrowhawk

Sparrowhawk was recorded in all the survey seasons other than winter 2019-2020. The records, which were of both male and female birds, involved birds flying, hunting, soaring and showing display behaviour within the study area. An observation of a bird carrying a prey item was made on 20th April 2022. All records were of single birds other than two together (male and female) on 21st January 2022 and two in the southeastern sector of the study area on 3rd July 2023.

The pattern of records indicate that sparrowhawk is resident in the local area, with the summer 2020 and 2022 records suggesting that a breeding territory was present within the westernmost part of the study area, while the summer 2023 records suggest breeding may have taken place in the southeastern sector of the study area.

Buzzard

Buzzard was a frequently recorded species within the study area during the vantage point surveys, with multiple observations in all the survey seasons.

The records involved birds flying, hunting, soaring/circling and showing interactive behaviour within the study area. While most of the records were of single birds, there were regular records of two together and several records of three (6th April 2020, 23rd September 2020, 11th July 2022, 8th September 2023), with one record of four birds together on 18th August 2020. Several perched birds were observed within the study area and on the 1st of June 2022 territorial calling was heard from a bird within a thicket in the western sector of site. A concentration of buzzard activity was also recorded outside of the study area to the northwest.

The pattern of flightline activity suggests that buzzard is resident in the local area with one or two breeding territories.

Peregrine

A juvenile bird was recorded on 8th September 2021 circling over the westernmost part of the study area. The species was recorded regularly over the study area in summer 2022, with records on five dates between 20th April and 13th July, including a pair hunting on 25th May. A single bird was recorded on 2nd November 2022. There were two records in summer 2023, involving single birds on 3rd May and on 3rd July.

The pattern of records reflects the occurrence of a known quarry breeding territory within the study area.

Kestrel

Kestrel was the most frequently recorded bird of prey species during the vantage point surveys, with multiple records in each season. Records were predominantly of single birds hunting and/or flying throughout the study area as well as in adjoining areas and especially to the northwest. Two birds together were recorded on six occasions, with soaring behaviour observed on several occasions. With one record involving a bird carrying a prey item (20th April 2022), a breeding territory is likely to exist within or in proximity to the study area.

Cormorant

A cormorant was recorded flying in a northwest direction along the westernmost sector of the study area on 10th March 2020. There were two records of birds flying over the site in summer 2023, involving single birds on 3rd May and 1st June.

Little egret

A little egret was recorded flying southwards just within the eastern boundary of the study area on 11th May 2020.

Grey heron

Grey heron was recorded in the study area on three dates, all involving single birds, as follows: one flying just to the northwest of the study area on 20th January 2022, one flying northwards along the western boundary of the study area on 30th May 2022, and one flying along the western boundary of the study area on 3rd July 2023.

Mallard

There were four sightings of mallard during the vantage point surveys - a pair was observed to the northwest of the study area on 31st March 2022, one was recorded along the western boundary of the study area on 20th April 2022, and two single birds on 3rd May 2023.

Snipe

Snipe was recorded on five dates during the vantage point surveys. Three of the records were of single birds in winter, while records of three on 20th April 2022 and two on 4th April 2023 (just outside the study area) were considered to have involved migratory birds.

It is noted that the vantage point survey method does not reliably sample snipe flight activity. SNH (2017) notes "*Snipe are very difficult to detect on standard VP watches and are unlikely to be meaningfully recorded*."

Woodcock

There was one woodcock flightline recorded to the northwest of the study area on 18th November 2019.

Whimbrel

There was one whimbrel flightline within the study area as follows: a party of seven birds flew northwards over the extreme eastern sector of the study area on 4th May 2021.

Black-headed Gull

There were two flightlines of black-headed gulls during the vantage point surveys. A party of 12 was observed flying to the east of the study area on 8th January 2021, while a single bird was recorded along the westernmost margin of the study area on 21st October 2021.

Herring Gull

There were two records of herring gull within the study area during the vantage point surveys, as follows: one flew through the southern part of the study area on 15th May 2020 and three birds flew across the central part of the study area on 2nd November 2022.

Lesser Black-backed Gull

There were records of lesser black-backed gull in each of the summer vantage point surveys. Most of the records were between one and three birds (11 records), with one record of five birds (14th June 2021), one of six birds (1st June 2023) and two records each of 12 birds (15th July 2020 & 2nd April 2021). The records were concentrated mostly along the western and southeastern boundaries of the study area (both within and outside of the boundary).

7.3.2.3 Transect surveys

Full results from the transect surveys are presented in **Appendix 7D, 7I** and **7J.** The surveys give an overview of the breeding and wintering species which are associated with the principal habitats in the vicinity of the transect route(s), namely improved agricultural grassland (GA1), semi-natural grassland (GS), hedgerows (WL1), woodland (WD4, WD & WN) and scrub (WS1).

Breeding birds

The dominance of grassland habitats and hedgerows along the route(s) corridor, along with nearby woodland, resulted in a range of passerine species which are widespread through the countryside. These include resident species such as woodpigeon, song thrush, blackbird, robin, wren, coal tit, blue tit, goldcrest, starling, house sparrow and chaffinch, as well as summer migrants such as blackcap, whitethroat, willow warbler and chiffchaff.

More localised species recorded included mistle thrush, stonechat, jay and linnet. Swallows were recorded feeding over the site and are likely to breed in local farm buildings.

Skylark was recorded only on two of the surveys (April 2021 & July 2023), probably reflecting the improved quality of the grassland habitat along much of the transect route(s). While meadow pipit was more widespread along the transects, numbers were still relatively low (peak of 16 on any one transect survey). The agricultural character to the site is further reflected by the regular presence of jackdaws and rooks.

The presence of crossbill and siskin (both associated with conifer woodland) in summer 2023 reflects the frequency of conifer plantation in the area.

Kestrel (Red-listed) was recorded in three of the four summers when surveys were undertaken.

Winter birds

The winter surveys recorded fewer bird species than in summer and, as in summer, most were widespread species of the Irish countryside.

Kestrel was recorded in each of the three surveys in winter 2020-2021, as well as one on 11th January 2023. Buzzard was recorded in three of the four winters, with sparrowhawk on one occasion (1st November 2022).

Snipe was surprisingly scarce during the transect surveys, with records on two dates only (January and March 2023).

As expected for an agricultural landscape, winter thrushes, fieldfare and redwing (Red-listed), were recorded regularly during three of the four winter surveys.

The Red-listed meadow pipit was recorded in three of the four winter surveys. There was one record of grey wagtail (Red-listed) in December 2020.

7.3.2.4 Winter waterbird surveys

Full results from the winter waterbird distribution surveys along the River Shannon for winters 2019-2020 and 2022-2023 are presented in Appendix 7F and Appendix 7I, respectively.

The species recorded were typical estuarine species which are associated with the Internationally Important Shannon and Fergus estuarine complex (see description of site and associated waterbirds in Crowe 2005). These include swans (both whooper and mute), duck species (teal, mallard, wigeon, etc), waders (oystercatcher, lapwing, redshank etc), gulls, as well as allied species such as little egret, cormorant, and kingfisher.

Of particular note is the regular population of whooper swan which frequents an area at Cooperhill on the southern side of the river. The flock, which peaked at 208 birds in February 2021, uses Cooperhill Lake as a roost site (approximately 6.5 km southwest of the proposed development site).

The waterbird species associated with the River Shannon system which were also recorded within the wind farm study area are listed in Table 7-7 (number of records and highest number recorded given for each species):

Table 7-7: Species recorded during the waterbird surveys and also recorded within the study area

Species associated with River Shannon system	Records within the study area
Little egret	1 record involving a single bird
Cormorant	3 records involving single birds
Mallard	4 records involving 1 and 2 birds
Grey heron	3 records involving single birds
Snipe	8 records involving up to 3 birds
Black-headed gull	3 records involving up to 12 birds
Herring gull	2 records involving up to 3 birds
Lesser black-backed gull	22 records involving up to 12 birds

The waterbird surveys show that the waterbird species which were recorded within the study area occur commonly within the Shannon estuarine system (separation distance between two locations of approximately 2.5 km). It is noted that none of the waterbird species which were recorded within the study area occurred there on a regular basis or in significant numbers and therefore it is considered that use of the site is very limited by these species.

7.3.2.5 Breeding hen harrier survey

There were no sightings of hen harrier within the areas surveyed between April and August 2022.

In the 2023 surveys, hen harrier activity was recorded in the survey area west of the site (approx. 3.8 km) as follows (see Appendix 7J, section 3.6):

- 4th May, 10.17 hrs: adult male observed flying over bog/young plantation.
- 4th May, 11.25 hrs: adult female observed on ground in area of young conifer and also seen flying.
- 16th June, 12.09 hrs: adult male observed flying over bog.

The presence of a pair in suitable habitat indicates that a breeding attempt was made in the 2023 season. However, the absence of any sightings over a five hour watch on 7th July would suggest that the attempt was not successful.

7.3.2.6 Winter hen harrier roost survey

There were no observations of hen harrier during any of the four roost surveys carried out at Woodcock Hill during winter 2022-2023.

7.3.2.7 Woodcock and nightjar breeding survey

There were no sightings of woodcock or nightjar during the 2022 surveys.

In the 2023 survey, a single woodcock was recorded roding in suitable breeding habitat on 19th June, approximately 1.3 km northwest of the study area (see **Appendix 7J**).

7.3.2.8 Wader breeding survey 2023

A single snipe was flushed from wet grassland in the eastern sector of the site in April 2023. As no further birds were recorded in this area during later visits, it is considered that this was a migratory bird (see **Appendix 7J**).

7.3.2.9 Breeding peregrine survey 2023

One of the potential peregrine breeding sites surveyed in summer 2023 was occupied, namely Ballycar Quarry. Birds were recorded on each survey date and three birds were ultimately fledged (see **Appendix 7J,** section 3.5).

7.3.2.10 Raptor survey 2023

The raptor surveys carried out in the vicinity of the study area produced the following (see **Appendix 7J**):

- Buzzard – 6 no. records, all of single birds.
- Kestrel – 2 no. records of single birds.
- Peregrine – 1 no. record of a single bird.
- Sparrowhawk – 2 no. records of single birds.

7.3.2.11 Hinterland surveys

Results from the two hinterland surveys carried out in winter 2022-2023 (03/10/22 & 16/02/23) are presented in **Table 3-5** of **Appendix 7I**. The following bird species of note were recorded:

- Buzzard – one at Clogherea, approximately 3.5 km northeast of study area;
- Kestrel - one at Woodcock Hill (c. 1 km west of study area) and one at Ballyfinneen North just outside of study area;
- Black-headed Gull – flock of c.80 at Ardnacrusha Bridge and flock of four at Parteen Bridge; and
- Lesser black-backed Gull – two at Parteen Bridge.

7.3.3 Evaluation of Status of Ornithological Receptors within Study Area

The following species, which were recorded within the study area during the various on-site surveys, are species of European conservation importance (as listed on Annex I of the Birds Directive as amended) and/or are species of national conservation importance (Red- or Amber-listed after Gilbert *et al*. 2021). Sparrowhawk and buzzard (both Green-listed) are included in the evaluation, as all bird of prey species are potentially sensitive to wind farm development. A summary of the conservation status of each species in the study area of the proposed wind farm

is indicated in Table 7-8. As already mentioned, for the purpose of discussion the 'Study Area' refers to a 500 m buffer from the proposed turbine locations.

Table 7-8: Conservation status of ornithological receptors in the Study Area

Species	Annex I	Red list	Amber list	Green list
Hen Harrier	Y		Y	
Sparrowhawk				Y
Buzzard				Y
Kestrel		Y		
Peregrine	Y			Y
Cormorant			Y	
Little Egret	Y			Y
Mallard			Y	
Snipe		Y		
Woodcock		Y		
Black-headed Gull			Y	
Herring Gull			Y	
Lesser Black-backed Gull			Y	
Swift		Y		
Goldcrest			Y	
Skylark			Y	
Sand Martin			Y	
House Martin			Y	
Swallow			Y	
Redwing		Y		
Willow Warbler			Y	
Starling			Y	
Grey Wagtail		Y		
Meadow Pipit		Y		
House Sparrow			Y	
Greenfinch			Y	
Linnet			Y	

Annex I Listed Species

Hen Harrier – Annex I; Amber list

There were four hen harrier flightlines recorded during the vantage point watches, including one just outside the 500 m study area. In addition, there was an incidental record of a male bird flying through the study area and continuing northwards on 2nd November 2022. As noted, two of the records (10/03/2020 & 06/04/2020), involving male and female birds, were in the early part of the breeding season, with the others in the winter period. While there were no records of hen harrier during the breeding survey carried out in the 2022 season, a pair was present in suitable breeding habitat to the west of the study area in early May 2023, with a male observed in mid June. From the above, it is considered that a breeding attempt was made at least in the 2023 season (and possibly in the 2020 season). NPWS had confirmed that one breeding site occurred within a 0-3 km radius of the study area in both 2010 and 2015, and also noted that part of the study area (c.20%) overlaps with a non-designated but regionally important breeding area for hen harrier (South Clare). The overlap is the northern portion of the study area which includes a limited area of heath and bog, as well as wet grassland. These on-site habitats occur in association with conifer plantation. Similar habitats continue to the northwest of the study area and then northwards towards the Knockaphunta and Seefin area and northeast towards the Slieve Bernagh upland area (c.10 km from the study area). In the 2015 national hen harrier survey (Ruddock *et al*. 2016), 5-7 pairs were recorded within the Slieve Bernagh to Keeper Hill population. The breeding habitat to the west of the study area, as well as the habitat within the northernmost sector of the study area, is therefore part of a large complex of habitat potentially suitable for breeding hen harrier.

While there were three hen harrier records within the study area during winter 2022/2023 (though two are likely to refer to the same individual), there was no evidence of a winter roost within a 2 km distance. Hen harriers travel widely in winter and the birds recorded are likely to be from the River Shannon corridor, which provides extensive suitable foraging and roosting habitat, including abundant swamp and scrub vegetation, for wintering hen harriers.

Peregrine – Annex I; Green list

While peregrine was not recorded in all the survey seasons, the pattern of records suggest that breeding took place in the vicinity of the study area possibly in 2021 and probably in 2022. Breeding was proved in the 2023 season at the quarry in the north-eastern sector of the study area, with three young fledged in mid July.

Little Egret – Annex I; Green list

There was one record of little egret within the study area in May 2020. As habitat within the study area and surrounding areas is not considered suitable for this species, it is likely that the record was of a passing bird associated with the Shannon system. Little egret was recorded on the Shannon during the waterbird surveys in winters 2019-2020 and 2022-2023.

At most, little egret is a rare visitor to the study area.

Red List Species

Kestrel – Red List

Kestrel was the most frequently encountered bird of prey within the study area, with birds regularly observed hunting within the site both in summer and winter. The species was also recorded in the focused raptor survey in 2023 and in the hinterland surveys.

From the various baseline surveys, it was established that there are up to three breeding territories in the area, one within the valley along the western boundary of the study area, one c. 1 km east of the eastern boundary of the study area, and one within the northernmost part of the study area. It is noted that it is unlikely that all three of these territories would be occupied in any one year.

Snipe – Red List

Snipe was recorded within the study area as a scarce winter visitor. In addition, records in April 2022 and April 2023 were considered to have involved migratory birds. Generally, apart possibly from the northwestern sector, the study area does not have suitable habitat for breeding snipe.

Snipe was also recorded along the River Shannon during the waterbird surveys in winters 2019-2020 and 2022-2023. High counts were made as follows: 155 on 12th January 2020 and 32 on 17th January 2023.

Snipe is a widespread species throughout Ireland in winter, with birds foraging across a variety of wetland and damp grassland habitats (Crowe 2005). Due to their highly elusive nature and largely nocturnal habit, populations are difficult to estimate. It is likely that the wet grassland fields within the study area may be used regularly by wintering snipe.

Woodcock – Red List

Woodcock was recorded within the study area largely as a scarce winter visitor. A single bird was recorded to the northwest of the study area on 18th November 2019 during a vantage point survey and nine birds were recorded on a transect survey on 5th February 2021. On the basis of the two records and taking into the account the difficulty of surveying for a species that is largely crepuscular, it is likely that woodcock is a winter visitor to the wider study area (which provides suitable habitat) in small numbers.

While there were no records of woodcock within the study area during the summer surveys, a breeding bird was recorded in suitable habitat to the northwest (c.1.3 km) of the study area in June 2023.

Swift – Red List

Swifts were recorded over the study area during vantage point watches in each of the summers 2020 to 2022. Numbers were relatively low, with peaks of six birds in August 2021 and eight birds in July 2023. The site does not have potential breeding sites*, i.e*. buildings, for swift.

Redwing – Red List

Redwing was recorded within the study area as a regular winter visitor. Numbers exceeded 100 birds in some months. The grassland fields and hedgerows within the study area provides suitable habitat for this species, as well as fieldfare.

Grey Wagtail – Red List

Grey wagtail was recorded within the study area in both summer and winter. The regular presence of the species indicates that breeding occurs on local watercourses. Most records were of one or two birds, though three were recorded in August 2020 and up to five in January 2021.

Meadow Pipit – Red List

Meadow pipit is resident within the study area, with breeding occurring in the wet grassland, heath and bog habitats.

Amber List Species

Cormorant – Amber List

Cormorant is a rare visitor within the study area, with only three records during the vantage point surveys (March 2020, May & June 2023).

The species was recorded regularly in the waterbird surveys in winters 2019-2020 and 2022-2023 along the River Shannon, with numbers in excess of 100 on several counts (peak of 459 on 19th February 2023. Cormorant also breeds along the Shannon.

Mallard – Amber List

Mallard is a rare visitor within the study area, with only four records during the vantage point surveys (March & April 2022, May 2023).

Mallard was recorded regularly in the waterbird surveys in winters 2019-2020 and 2022-2023 along the River Shannon, with numbers between 80 and 100 recorded on several surveys.

Black-headed Gull – Amber List

Black-headed gull is a rare winter visitor to the study area and its immediate surroundings, with two records (maximum 12 birds) during the vantage point surveys. The species was also recorded at Ardnacrusha Bridge (c.80 birds) and Parteen Bridge during the hinterland winter survey.

Black-headed gull was recorded regularly in the waterbird surveys in winters 2019-2020 and 2022-2023 along the River Shannon, with numbers between 726 and 1,662 on the 2022-2023 survey dates.

Lesser Black-backed Gull – Amber List

Lesser Black-backed Gull was recorded in the study area largely during summer but in relatively low numbers (up to 12 birds). There was a single incidental winter record of six birds on 3rd January 2023.

While the species was recorded regularly in the waterbird surveys in winters 2019-2020 and 2022-2023 along the River Shannon, numbers were relatively low in the main winter periods (maximum 18). A higher number of 150 was recorded on 1st November 2022 – these birds would have been late autumn birds on passage rather than local wintering birds.

From the pattern of records and local distribution of birds, it is considered that the study area does not provide suitable habitat for lesser black-backed gull.

Herring Gull – Amber List

Herring gull is a rare species within the study area, with only two records (15th May 2020 & 2nd November 2022) during the vantage point surveys.

While the species was recorded regularly in the waterbird surveys in winters 2019-2020 and 2022-2023 along the River Shannon, numbers were relatively low, with a maximum of 152 on 17th January 2023.

From the pattern of records and local distribution of birds, it is considered that the study area does not provide suitable habitat for herring gull.

Goldcrest – Amber List

Goldcrest was recorded regularly during both during the summer and winter surveys within the study area though in low numbers. The species is associated with woodland, scrub and hedgerows and was more prevalent in summer than in winter.

Skylark – Amber List

Skylark was a rare species during the surveys, with records of two birds during a transect survey in April 2021 and of three birds in July 2023. In addition, there were records in May 2020 (2 birds), April 2021 (2 birds) and July 2023 (8 birds). At most, one or two pairs may breed. Absent in winter.

Sand Martin – Amber List

Sand martin were recorded irregularly feeding over the study area in summers 2020 and 2021, with maximum count of 40 in September 2021. Expected to nest locally in sand quarries.

House Martin – Amber List

House martin were recorded feeding over the study area fairly regularly in each of the four summers 2020 to 2023, with a maximum count of 70 in September 2020. Expected to nest in buildings locally.

Swallow – Amber List

Swallow were recorded feeding over the study area regularly in summer, with a maximum count of 120 in September 2021. Expected to nest in local farm buildings.

Willow Warbler - Amber List

Willow warbler, a summer migrant, is a fairly widespread breeding species within the woodland and hedgerows within the study area.

Starling – Amber List

Starling were recorded within the study area in summer and may breed. High count of 120 in June 2023 included fledged young. Expected to be occasional in winter.

House Sparrow – Amber List

House sparrow is considered to be resident within the study area. Highest counts were 38 in August 2020, 35 in September 2021 and 62 in September 2023.

Greenfinch – Amber List

Greenfinch was a scarce species within the study area, with records irregularly both in winter and summer. Most records were of one or two birds, with a peak count of three in January 2020.

Linnet – Amber List

Recorded on a transect survey in May 2021 and on surveys during summer 2023 (up to 22 birds). It is likely that linnet breeds in marginal scrub areas along tracks within the study area.

Green List Species

Sparrowhawk – Green list (former Amber list species)

The frequency of records during vantage point surveys indicates that the study area, as well as surrounding areas, provides suitable foraging habitat for sparrowhawk throughout the year and that at least one breeding territory is likely to occur within the immediate vicinity of the study area (within 1 km distance).

Buzzard – Green List

Buzzard was a frequently recorded species within the study area during the various surveys, with multiple observations in all the survey seasons.

The records involved birds flying, hunting, soaring/circling and showing display interactive behaviour within the study area. While most of the records were of single birds, there were regular records of two together and several records of three, with one record of four birds together.

From the various baseline surveys, it was established that there are two breeding territories within the 500 m study area, one within the northwestern sector and one within eastern sector. A further known territory exists at Ardnacrusha.

It is concluded that buzzard is resident in the area and that much of the study area is within breeding territories of buzzards.

7.3.4 Summary of Conservation Value of Site for Birds

The study area, which comprises largely a mix of agricultural land and commercial forestry, is of relatively low importance for birds.

However, the northern sector of the site, which includes a limited area of bog and heath habitat as well as wet grassland, provides suitable foraging habitat for hen harrier and is within the range of a breeding territory for hen harrier (though during the breeding season there was only one record from within the study area). This area of the study area is within the South Clare non-designated regional zone for hen harrier.

The majority of suitable foraging habitat for hen harrier is located outside of the application boundary for the proposed development and, therefore, minimal habitat will be removed/altered to facilitate the development of the wind farm.

Hen harrier also had a presence in the study area during winter, though there were no roosts recorded within at least a 2 km distance of the site.

The site is within the territory of a quarry nesting pair of peregrine, with successful breeding taking place at least in the 2023 season. In Ireland, the trend of peregrine nesting in quarries was established in the 1980s and by the 2002 National Peregrine Survey the number of quarry nesting pairs accounted for 23.1% of the national total of occupied breeding territories (Madden et al. 2009). Both hen harrier and peregrine are Annex I listed species.

The study area is within breeding territories of kestrel (Red-listed), buzzard and probably sparrowhawk. All three species hunt regularly within the study area.

The study area supports breeding meadow pipit and (probably) grey wagtail, as well as wintering snipe, woodcock and redwing (all Red-listed species). Woodcock was recorded breeding to the northwest of the study area.

A range of Amber-listed species occur within the study area on a regular basis, including goldcrest, swallow, willow warbler, starling, house sparrow and linnet.

It is noted that the study area and the off site area along the TDR where temporary works will be required does not provide ex-situ habitat for the Special Conservation Interests of the nearby River Shannon and River Fergus Estuaries SPA (code 004077). Black-headed gull, an SCI, was recorded flying within, or close to, the study area on three occasions but not actually foraging within the study area.

On the basis of providing breeding and foraging habitat for several bird species of conservation importance, the study area is rated as of Local Importance (higher value) for birds.

7.4 Assessment of Potential Effects

7.4.1 The 'Do-Nothing' Impact

Without the proposed development proceeding, it is expected that the present main landuses, namely agriculture and afforestation, will continue, with future harvesting and replanting according to the forest cycle.

Overall, the value of the proposed development site for birds would be expected to remain fairly similar as at present. With harvesting and replanting of the forestry, a higher diversity of passerine species would be expected within the young open canopy forests, which in turn may attract foraging hen harriers on a more regular basis.

7.4.2 Impact on birds

For birds, the following predicted or potential impacts are considered:

- Loss of habitats;
- Potential disturbance to birds during construction;
- Nest damage or destruction during construction;
- Potential displacement of birds during operation;
- Potential effects from noise during operation;
- Potential barrier effect by presence of turbines;
- Predicted collision risk to birds;
- Potential effects on birds in hinterland;

- Potential effects on Special Conservation Interests of SPAs.

7.4.2.1 Loss of habitats

The permanent loss of habitat to facilitate the construction of the proposed development is approximately 32.65 ha, along with 849 m of hedgerow, 15 m of treeline and 158 m of stream and drainage ditches.

The majority of habitat loss is commercial conifer plantation (15.97ha). While some bird species of conservation importance such as goldcrest and willow warbler (both Amber-listed) but also hen harrier (latter mainly open canopy phase are associated with conifer plantation and especially the marginal areas), none are dependent on this (non-native) habitat for breeding and/or wintering requirements. All of the species would be expected to continue to utilise the remaining area of plantation within and outside the study area after the wind farm is constructed, with hen harrier likely to become more regular on site when mature stands are felled and replanted. Also, it is noted that conifer plantation is a widespread habitat in the local area and throughout County Clare. On the basis that a relatively small amount of conifer plantation is being lost, and that the bird species associated with this habitat will still retain a presence, the effect on birds due to the loss of conifer habitat to facilitate the proposed development is considered Not Significant.

Improved agricultural grassland is the other main habitat affected by the development, with the permanent loss of 7.27 ha. Intensively managed grassland is of low value for birds, though can attract flocks of starling in winter and gulls and crows when silage is being cut. As improved grassland is an abundant habitat throughout Ireland, the effect by the loss of a relatively small amount to facilitate the proposed development is considered Not Significant.

There will also be a loss of some dry-humid acid grassland (2.22 ha), dry-humid acid grassland in mosaic with improved grassland (1.83 ha) and wet grassland in mosaic with improved grassland (2.22 ha). These low intensively managed swards provide useful habitat for ground nesting species and notably meadow pipit and skylark, as well as foraging habitat for hen harrier, buzzard and kestrel. Wet grassland and, to a lesser extent, acid grassland are widespread habitats and will still occur within the study area and in surrounding areas. The effect on birds due to the loss of these grassland habitats to facilitate the proposed development is considered an Adverse effect of Slight Significance.

Small amounts of semi-natural woodland (c.0.05 ha), scrub (1.62 ha) and hedgerow/treeline (864 m) will be lost as a result of the proposed development. Due to the small amounts involved, it is not likely that the loss of woodland type habitats would have significant effects on any bird species which occurs on site and all such species will retain viable populations post-construction. The effect on birds due to the loss of these woodland habitats to facilitate the proposed development is considered an Adverse effect of Slight Significance.

7.4.2.2 Disturbance to birds during construction

The construction phase for the proposed development is anticipated to last 18 months. In this period, on-site activities, including tree felling, civil works and turbine erection works, may have potential to cause disturbance effects on birds in areas adjoining the works.

Scottish Natural Heritage (2016) write "*Different bird species have different tolerance levels to disturbance. Even within species, disturbance distance can vary according to time of year or geographical location. Some sensitive species may be disturbed by activity as much as 750 m away*." SNH had published "A review of disturbance distances in selected bird species" prepared by Ruddock and Whitfield (2007). This review included 26 'priority'

species and was based largely on expert opinion. The 2007 guidance note was replaced in 2022 by "Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species" (NatureScot Research Report 1283) prepared by Goodship and Furness (2022). The 2022 review included 65 bird species.

It is noted that passerine species, such as meadow pipit and skylark, are not perceived as being prone to disturbance by *wind* farm construction (SNH 2017) and indeed Pearce Higgins *et al*. (2012) found that densities of skylarks and stonechats increased on wind farms during construction.

During the baseline surveys carried out from 2019 to 2023, there was evidence for several of the identified target species (as listed in Table 7-9), which could be perceived as sensitive to construction disturbance, having breeding populations within the study area or its environs (see Section 7.3.3 above). These species are:

- Hen harrier;
- Sparrowhawk;
- Buzzard;
- Peregrine;
- Kestrel;
- Woodcock.

While some of these species notably peregrine had a breeding presence in the area during the baseline survey years (2019-2023), the status at the time of construction may have changed and would need to be established at the time by confirmatory pre-construction surveys (see Section 7.6.1). However, it is assumed that local populations will exist and the likely effect of disturbance on these species has been reviewed and is considered below.

It is noted that the winter baseline waterbird distribution surveys carried out in 2019-2020 and in 2022-2023 did not indicate that any of the target species which were selected mainly for potential wintering presence, namely golden plover, curlew and whooper swan, have any populations within a distance of 2 km or more from the proposed development site.

Hen harrier

Hen harrier is considered in the Goodship & Furness (2022) review of disturbance distances in birds and rated of 'medium sensitivity' to disturbance, with a buffer zone of 300-750 m suggested for both breeding birds and non-breeding birds. In the review of 'safe working distances' for forestry workers to sensitive bird species by Currie and Elliot (1997) a provisional safe working distance of 500-1,000 m for hen harrier is given.

While construction works at the site for the proposed development will take place in an area where hen harriers had been recorded in spring (2 records from vantage point watches in 2022), the 2022 and 2023 breeding surveys showed that the nearest location where breeding activity was recorded (in 2023 only) was at a distance of approximately 3 km west of the study area. The presence of a known breeding territory within a 3 km distance of the proposed development site was confirmed by information supplied by NPWS.

With suitable breeding habitat occurring as a near continuum to the west and northwest of the study area, there is potential that a breeding attempt could be made closer to the study area in future years (it is noted that within a hen harrier breeding territory, the actual nest location may change between years depending on local factors).

On this basis, it is considered that the construction of the wind farm would likely have a potential disturbance effect on breeding birds (if present) within a distance of possibly up to 1,000 m from the construction area – this is rated as an Adverse Significant Effect of Short-term duration.

During the baseline vantage point surveys, there were two winter records of hen harrier within the study area, plus a further incidental winter record. However, there were no winter roosts located within a distance of at least approximately 2 km of the site of the proposed development. For winter roosting birds, it is considered that the effect by disturbance from the construction of the wind farm is Not Significant (based on no evidence of winter roosts within a 2 km radius of site).

Sparrowhawk

Sparrowhawk was not considered in the Goodship & Furness (2022) review of disturbance distances in birds or in the review of 'safe working distances' for forestry workers to sensitive bird species by Currie and Elliot (1997). In the absence of such information, a buffer zone of 100-200 m is suggested for breeding birds (as for buzzard, a tree-nesting species, and kestrel, a tree and cliff/crag nesting species, in the NatureScot review).

At the site for the proposed development, construction works will take place in an area where sparrowhawk was sighted regularly during the breeding season and which has suitable habitat for breeding. It is considered that the construction of the proposed development would likely have a potential disturbance effect on breeding birds within a distance of possibly up to 200 m from the construction area – this is rated as an Adverse Significant Effect of Short-term duration.

It is considered unlikely that construction works would have effects on birds in the area of the site outside of the breeding season. The significance of the potential effect is rated as Imperceptible or Not significant.

Buzzard

Buzzard was considered in the Goodship & Furness (2022) review of disturbance distances in birds. The species is rated as of 'low/medium sensitivity' to disturbance, with a buffer zone of 100-200 m suggested for both breeding birds and non-breeding birds.

At the site for the proposed development, construction works will take place in areas that have supported tree nesting pair(s) of buzzard, as well as within areas suitable for hunting. It is considered that the construction of the wind farm would likely have a potential disturbance effect on breeding birds within a distance of possibly up to 200 m from the construction area. This is rated as an Adverse Significant Effect of Short-term duration.

It is considered unlikely that construction works would have significant adverse effects on birds in the area of the site outside of the breeding season – significance of potential effect rated as Slight.

Kestrel

Kestrel is considered in the Goodship & Furness (2022) review of disturbance distances in birds. The species is rated as of 'low/medium sensitivity' to disturbance, with a buffer zone of 100-200 m suggested for breeding birds and 50 m for non-breeding birds.

At the site for the proposed development, construction works will take place in areas that have supported tree nesting pair(s) of kestrel, as well as within areas suitable for hunting. It is considered that the construction of the wind farm would likely have a potential disturbance effect on breeding birds within a distance of possibly up to 200 m from the construction area. This is rated as an Adverse Significant Effect of Short-term duration.

It is considered unlikely that construction works would have significant effects on birds in the area of the site outside of the breeding season – significance of potential effect rated as Slight.

Peregrine

Peregrine is considered in the Goodship & Furness (2022) review of disturbance distances in birds. The species is rated as of 'medium sensitivity' to disturbance, with a buffer zone of 500-750 m suggested for breeding birds and up to 200 m for non-breeding birds. In the review of 'safe working distances' for forestry workers to sensitive bird species by Currie and Elliot (1997) gave a provisional safe working distance of 600-1,000 m for peregrine.

At the site for the proposed development, construction works will take place within a distance of approximately 400 m of a rock quarry which supports a breeding pair of peregrines. While peregrines nesting in active quarries will be habituated to a backgound level of disturbance, including noise, a precautionary approach is taken and it is considered that the construction of the wind farm, including tree-felling, may have a potential disturbance effect on breeding birds within a distance of at least 500 m from the construction area – this is rated as an Adverse Significant Effect of Short-term duration. Due to the high conservation status of peregrine, a pre-construction survey will be carried out and, as required, mitigation will be undertaken to reduce the significance of this potential effect on breeding birds.

It is considered unlikely that construction works would have significant effects on birds in the area of the site outside of the breeding season – significance of potential effect rated as Not significant.

Woodcock

Woodcock was recorded within the study area largely as a scarce winter visitor. Breeding was recorded to the northwest (c. 1 km) in the 2023 season and could possibly occur closer to the study area in future years as potentially suitable breeding habitat exists.

Woodcock was not considered in the Gooodship & Furness (2022) review of disturbance distances in birds.

It is considered that at the site for the proposed development, construction works would only disturb wintering birds should they take place very close to a roosting individual and then the bird would likely fly to another area of woodland away from the works. It is considered unlikely that construction works would have significant disturbance effects on wintering birds in the area of the site – significance of potential effect rated as Not significant.

Construction works including tree felling have the potential to cause disturbance to breeding birds should they take place close to a breeding territory. A distance of 100-200 m from the work zone is suggested as the disturbance distance – this is rated as an Adverse Significant Effect of Short-term duration.

7.4.2.3 Nest damage or destruction

Damage to, or destruction of, active nests during the construction phase, including tree felling on site or any tree/hedge trimming along the turbine delivery route (TDR), could contravene Section 22 of the Wildlife Acts 1976 to 2021 as amended.

This applies to all aspects of the proposed development, i.e. the Wind Farm Site, the Grid Connection Route and the Turbine Delivery Route.

The effect of loss of nests is rated as a potentially Significant Adverse Effect of Short-term Duration.

Mitigation will be implemented to ensure that loss of nests is avoided or minimised (see section 7.5.1.3).

7.4.2.4 Displacement of birds during operation

Displacement of birds from otherwise suitable habitat as a result of the presence of wind turbines has been reported as an impact of wind turbines (Drewitt & Langston 2006, de Lucas *et al*. 2007, Pearce-Higgins *et al*. 2009). The displacement occurs as a result of behavioural responses that prevent or decrease the use of an area for activities such as nesting, foraging or roosting. However, the results of studies on potential displacement have varied widely. In an overall review of the literature, Madders & Whitfield (2006) concluded that displacement effects of wind turbines on raptors are negligible for the most part. In a review of potential displacement effects on upland breeding bird densities at twelve wind farm sites in Britain, Pearce-Higgins *et al*. (2009) reported that seven of the twelve species studied exhibited significantly lower frequencies of occurrence close to the turbines. It is noted that passerine species, including species such as meadow pipit, are not perceived as being prone to displacement as a result of the presence of wind turbines (SNH 2017).

Consideration of potential for displacement is given for the following target species which were recorded within the study area:

Hen harrier

As part of the proposed development site provides foraging habitat for breeding hen harrier in the local area, birds from that territory are likely at times to forage within the proposed development area (as shown by records in 2020 breeding season).

In the review of upland raptors and wind farms, Madders and Whitfield (2006) tentatively rated foraging hen harriers as having a 'low-medium' sensitivity to displacement. They note that results at Argyll and Northern Ireland sites suggest that foraging may be minorly affected, but local displacement of nesting attempts may occur in the order of 200-300 m around turbines. In a study of the usage of the Derrybrien Wind Farm, Co. Galway by hen harriers, Madden & Porter (2007), reported birds both foraging and flying through the wind farm. Some birds were observed flying close to wind turbines (<50 m) and on one occasion within 10 m of the base. Pearce-Higgins *et al*. (2009) cited a predicted reduction in flight activity of 52.5% within 500 m of the turbine array for breeding birds.

Wilson *et al*. (2015) studied the movement of adult hen harriers at wind farm and control sites in Ireland using GPS tags and data collected during vantage point watches. The study aimed to determine whether habitat use by foraging hen harriers differed at wind farm and control sites. The study found that at wind farm sites, hen harriers favoured open habitats over afforested areas. Hen harriers at control sites foraged preferentially over peatland and young forest plantations, while those at wind farm sites foraged preferentially over natural and semi-natural open habitats (i.e. scrub, rough grassland) and to a lesser extent over peatland. While the authors noted that the

selection of the somewhat different foraging habitats between the wind farm and control sites is difficult to explain, the study demonstrated that wind farms were actively used for foraging purposes.

As part of the site of the proposed development is likely to be within the range of a breeding hen harrier territory and accepting that the evidence for avoidance of turbines by foraging birds is somewhat contradictory, it is expected that the species could show some signs of displacement around the turbines at the proposed development site. It is likely that any displacement effect would be highest in the early period of operation, with some degree of habituation occurring over time. Significance of potential effect is rated as Slight and of short- to medium-term duration.

Sparrowhawk

The baseline surveys showed that sparrowhawk is regular at the proposed development site, with breeding likely to occur in the local area.

There appears to be no data to show whether sparrowhawk is displaced from an area around turbines, though in the review of upland raptors and wind farms, for sharp-shinned hawk (Accipiter striatus) (same genus as sparrowhawk) Madders and Whitfield (2006) tentatively rated this North American hawk as having a 'low' sensitivity to displacement.

As sparrowhawk is a woodland species that nests in woodland and hunts largely along woodland margins and over scrub, it is expected that the species will not be displaced from suitable habitat in the vicinity of turbines at the proposed development site - significance of potential effect rated as Not significant.

Buzzard

The baseline surveys showed that buzzard is regular at the proposed development site, with breeding occurring within the study area.

In the review of upland raptors and wind farms, Madders and Whitfield (2006) tentatively rated foraging buzzards as having a 'low-medium' sensitivity to displacement. Pearce-Higgins et al. (2009) cited a predicted reduction in flight activity of 41.4% within 500 m of the turbine array for breeding birds.

As buzzard is a very regular species in the area of the proposed development, it is expected that the species could show some signs of displacement around the turbines at the proposed development site. It is likely that any displacement effect would be highest in the early period of operation, with some degree of habituation occurring over time. Significance of potential effect is rated as Slight and of short- to medium-term duration.

Peregrine

A peregrine quarry breeding site occurs within 400 m (approximately) of the location for Turbine T6 in the northeast sector of the wind farm.

Peregrine, however, have large territories, with Ratcliffe (1980) giving a range from 42 km2 (north-west England) to 192 km2 (north & west highlands). While peregrine was recorded flying over the site on a number of occasions,

for the local pair most of the hunting activity would likely be in the wider hinterland and especially along the Shannon corridor.

It is expected that the species will not be displaced from suitable habitat in the vicinity of turbines at the proposed development site - significance of potential effect rated as Not significant.

Kestrel

Kestrel was recorded regularly during the baseline surveys, with breeding and hunting occurring within the study area.

In the review of upland raptors and wind farms, Madders and Whitfield (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.

As kestrel is a very regular species in the area of the proposed development, it is expected that the species could show some signs of displacement around the turbines at the proposed development site. It is likely that any displacement effect would be highest in the early period of operation, with some degree of habituation occurring over time. Significance of potential effect is rated as Slight and of short- to medium-term duration.

7.4.2.5 Effects of noise on birds during operation

Many animal species rely on acoustic signals to communicate messages, which are critical to survival. However, noise from anthropogenic sources, such as traffic, industrial and commercial facilities, or wind farms, could impede the transmission of these signals. Birds in particular depend on acoustic signals and the masking effect of anthropogenic noise could have direct fitness consequences. Zwart et al. (2016) investigated whether wind turbine noise affects territory defence in the European robin. The study showed that robins increase low-frequency song elements in response to territorial intrusion under quiet conditions but that this response did not occur in the presence of wind turbine noise. Thus, anthropogenic noise may affect the ability to deter an intruder, leading to expenditure of extra time and energy and possibly reducing breeding success. Scholl and Nopp-Mayr (2021) undertook a major literature review of the impact of wind power plants on mammalian and avian wildlife species in shrub and woodlands. The study found that passerine density in areas near noise generating energy facilities, such as wind farms, is lower than density near noiseless energy facilities.

From these studies, it can be concluded that effects of noise from wind turbines may adversely affect behaviour of bird species, especially passerines, and ultimately breeding success, in a similar way as the effects of background noise from traffic, industry, urban areas etc.

At the proposed development site, there is already a background level of noise, including traffic, farming activities and quarrying. While the literature suggests that the behaviour of passerine species using habitats in proximity to turbines may be affected by noise from turbines, which could result in declines in the densities of species, the significance of this effect is likely to be, at most, Slight.

7.4.2.6 Potential barrier effect due to turbines

The potential impact of lines or groups of wind turbines creating a barrier effect to passing birds is mostly relevant to locations where migratory species pass regularly. Rees (2012) cites eight published studies of flight behaviour which reported changes in flightlines for swans or geese initially seen heading towards turbines, at distances

ranging from a few hundred metres to 5km (the larger distances were by birds on migration); 50-100% of individuals/ groups avoided entering the area between turbines, but in some cases the sample sizes were small.

The proposed development area has not been identified through the baseline surveys and desk review as being along a migration route for birds, such as wetland species (swans, geese etc.) or birds of prey, either on a seasonal basis (spring / autumn) or a daily basis (such as routes between feeding and roost sites). Furthermore, the proposed development is not in proximity to any other group of turbines (operational or permitted) so there cannot be a barrier effect in combination with other wind farm developments.

7.4.2.7 Collision

Collision risk posed to bird species is one of the main environmental concerns associated with wind energy developments (Drewitt & Langston 2006, Band et al. 2007, Drewitt & Langston 2008, Watson et al. 2018, Diffendorfer et al. 2021). However, bird species differ widely in their susceptibility to collision mortality. Essentially, birds are at risk of collision only when their flight path overlaps with the rotor blade sweep area of a turbine. It follows that birds whose flight heights coincide with the height of the turbine rotor sweep area are most at risk. It is generally considered that passerine species are less susceptible to collision with turbines than non-passerine species and especially waterfowl and raptor species (SNH 2017).

Collision Risk Modelling (CRM) is a method to estimate the number of birds likely to collide with turbines at the site. This method uses vantage point data to calculate the risk of collision. In this case, the vantage point data collected over the period 2019-2023 (four breeding seasons and four winter seasons) at the site were used.

Collision risk modelling is essentially a three-stage process:

1. Initial modelling uses field survey data on bird flight activity to assess the number of birds passing through the zone swept by the rotating turbine blades (i.e. the 'flight risk volume');
2. Modelling then estimates the probability of a bird being hit if it were to fly through an operational turbine, based on the estimated flight parameters of the specific bird species and the turbine parameters. This stage assumes birds take no action to avoid collisions with turbines (i.e. 'avoiding actions');
    - The outputs of Stages 1 and 2 are then multiplied together to provide an estimate of the number of collisions that would occur in the absence of avoiding actions. Assuming all collisions result in fatalities, this provides an estimate of the number of fatalities that would occur.
3. Finally modelling applies an avoidance rate to account for avoiding actions. This is based on the understanding that birds will often either avoid the wind farm entirely, fly above or below an operational turbine, or perform 'emergency' manoeuvres to avoid a moving turbine blade.
    - This provides an estimate of the number of fatalities that would occur, taking into account avoiding actions (again assuming all collisions result in fatalities).

Full details of the collision risk modelling method and results, as carried out by RSK, Ireland Ltd., are given in the Appendix 7K.

Based on sensitivity of the key ornithological receptors and their occurrences within the study area for the proposed development, five species were identified as requiring detailed collision risk modelling (see Table 7-9 below).

Whilst consideration was given to other target species, including cormorant, snipe, whimbrel and woodcock, on account of the level of activity recorded on site and/or the potential sensitivity of these species to collision impacts, collision risk modelling was not undertaken for these species.

Summary details of the key species recorded which may be sensitive to collision risk are given in Table 7-9.

Table 7-9: Summary of estimated number of collisions for key ornithological receptors over the lifetime of the proposed development.

Species	Estimated Collisions over the Lifetime of Wind Farm (35 yrs)	Estimated Collisions per Year	One Bird Collision every 'x' years
Hen Harrier	0.026 birds	0.0007	1,428 years
Sparrowhawk	0.265 birds	0.008	125 years
Buzzard	14.958 birds	0.427	2.34 years
Kestrel	10.935 birds	0.312	3.21 years
Peregrine	1.702 birds	0.049	20 years

For all species, the annual number of collisions predicted to occur is considerably less than one bird per year, with the rate for hen harrier and sparrowhawk particularly low. For these two species, the significance of collision risk effect is rated as Imperceptible.

Three of the species analysed, buzzard, kestrel and peregrine, have a collision risk of more than one bird over the entire lifetime of the proposed development. All of these species breed within the study area and are considered further.

Buzzard

For buzzard, the collision risk modelling has calculated a rate of 14.958 collisions over the lifetime of the Development or 0.427 casualties per year. While the size of the bird and its tendency to fly relatively low and within the potential collision risk zone makes buzzard prone to collision, the favourable conservation status of this species (Green-listed) limits the potential for ecologically significant effects to result. However, on a precautionary basis, the significance of collision risk is rated as a Long-term Slight Adverse effect.

Kestrel

For kestrel, the collision risk modelling has calculated a rate of 10.935 collisions over the lifetime of the Development or 0.312 casualties per year. While these rates are negligible in the context of the estimated national population of 13,500 birds (Lewis *et al.* 2019), any loss of a Red-list species is of some significance.

It is noted that kestrel, as well as lesser kestrel (*Falco naumanni*) and American kestrel (*Falco sparverius*), is a genus that is prone to collision (see for instance Barrios & Redrigues 2004, Hotker *et al*. 2006, Hotker 2008, Lucas *et al*. 2008, Marques *et al*. 2014, Diffendorfer *et al*. 2021). This is expected to be due to the hovering behaviour of the species. While birds are hunting and focusing on ground prey, they may be unaware of the turbine position or may suddenly change their position due to a gust of wind. The hovering height level is often within the rotor sweep of the turbines. Of eight casualties recorded at a wind farm in Cadiz Province, Spain, all were juveniles.

Taking into account the high conservation status (Red list) of the species and the known susceptibility of the genus to collision, the significance of collision risk is rated as a Long-term Slight Adverse effect.

Peregrine

For peregrine, the collision risk modelling has calculated a rate of 1.702 collisions over the lifetime of the Development or 0.049 casualties per year. Madden et al. (2009) had given a national population of 390 breeding territories based on the 2002 national peregrine census. The national population has since increased, with an estimate of 515 breeding pairs given in the latest NPWS Article 12 Reporting for period 2008-2012 (see npws.ie/news/birds-directive-article-12-report). Despite an increasing population, peregrine is a species of high conservation importance (Annex I) and any loss of a peregrine is of some significance.

On this basis, the significance of collision risk is rated as a Long-term Moderate Adverse effect.

7.4.2.8 Potential effects on birds in hinterland

The hinterland surveys were carried out on two dates in winter 2022-2023. These surveys, as well as the desk review and other off-site surveys such as breeding raptor and hen harrier winter roost surveys, did not identify any area of habitat(s) of particular importance for supporting concentrations of bird species of conservation importance. While species such as buzzard, kestrel, black-headed gull and lesser black-backed gull were observed within the hinterland area around the proposed development site, the presence of the proposed development would not be expected to have any effects on these or other species.

7.4.2.9 Potential effects on waterbirds associated with the River Shannon

The waterbird surveys were focused on the section of the River Shannon to the south of the proposed development site. The closest distance between the two locations, near Parteen, is just over 2 km.

While the surveys confirmed the presence of various bird species of conservation importance, and especially whooper swan, within the Shannon study area (see Section 7.3.6.2.5), the site for the proposed development does not have suitable habitats to support on a regular basis any of the bird species associated with the Shannon system. This is also true for the area of the proposed temporary works along the TDR (see Appendix 2C) which at its nearest point is located approximately 46m from the SAC and approximately 3.1km from the River Shannon and River Fergus Estuaries SPA boundary.

Also, the vantage point surveys did not record the movement of any waterbird species on a regular basis over the proposed development site. It can be concluded that the operation of the proposed development does not pose a significant risk of displacement or collision to any waterbird species associated with the Shannon system.

However, as the proposed development site drains to the River Shannon, there is potential for adverse effects on the habitats and food supplies of the waterbird species should contaminants enter the system as a result of the

construction, operation and/or decommissioning phases of the proposed development. In the absence of mitigation, this is potentially a Significant Adverse Effect of Short-term Duration. Appropriate mitigation measures to minimise any effects are discussed in Chapter 8 Water and in the NIS.

7.4.2.10 Potential effects on Special Protection Areas

The desk review identified one SPA within a 15 km distance of the proposed development site, as follows:

- River Shannon and River Fergus Estuaries SPA (004077) – located 4.4 km southwest of proposed development Site.

The potential for effects on the Special Conservation Interests (SCIs) of this SPA is considered in detail in the accompanying NIS. There follows an overview of the potential for impacts on the site:

- The proposed development site is separated from the SPA by a minimum distance of approximately 4.4. km (and approximately 3.1km from the proposed temporary works area along the TDR) and hence does not have potential for direct impacts, such as disturbance to birds or their habitats, or the SCIs of the SPA.
- The proposed development site does not provide suitable habitat to support on a regular basis any of the SCIs of the SPA.
- The vantage point surveys did not record on a regular basis the movement of any waterbird species associated with SPA over the proposed development site. Hence, the proposed development does not pose a significant risk of displacement or collision to any waterbird species associated with the SPA.

However, as the proposed development site drains to the River Shannon (and SPA), there is potential for adverse effects on the habitats and food supplies of waterbird species should contaminants enter the system as a result of the construction, operation and/or decommissioning phases of the wind farm proposed development, without appropriate mitigation measures being in place.

The principal potential construction phase effects of the proposed development relate to the release of suspended solids/nutrients, cementitious materials and hydrocarbons into the drainage network arising from all construction related site works including the site access track network, turbine foundations and associated turbine hardstands, electrical sub-station building, met mast, and works associated with the grid connection. There is also a risk of nutrient release as a result of the clear-fell of conifers required for the proposed development.

There is also potential for impacts on watercourses, and potentially the Special Conservation Interests of the SPA, during the operational phase of the proposed development. The risk of pollutants entering local watercourses during the operational phase could arise primarily through soil run-off from unvegetated surfaces and spillages of hydrocarbons.

For the decommissioning phase, anticipated impacts on local watercourse and ultimately the River Shannon and the SPA are similar in nature to those already referred to for the construction phase of the proposed development, i.e. release of hydrocarbons and suspended soils, but would be at a considerably lower scale.

The significance of a subsequent effect on the Special Conservation Interests of this designated site would vary depending on the type of pollutant, as well as the magnitude and duration of the event. As the conservation objectives of this European Site could potentially be affected adversely, measures are required to avoid or reduce harmful effects of the proposed development (i.e. mitigation measures as outlined in Chapter 8 Water and detailed in the NIS).

7.4.3 Decommissioning Phase Impacts

Decommissioning of the proposed development will result in the cessation of renewable energy generation at the end of the operational life of the proposed development with the removal of various infrastructural elements (see details in Chapter 2 Description of the Proposed Development).

From the perspective of ornithology, the anticipated potential impacts would be:

- disturbance to breeding birds which may be on site at the time;
- potential pollution of local waterways and ultimately the River Shannon system and associated SPA.

Disturbance of breeding birds

As with the construction phase works, the decommissioning works have potential to cause disturbance to breeding birds, including species such as hen harrier and kestrel.

Pre-decommissioning baseline surveys will be carried out for species identified as of conservation importance during the 2019-2023 baseline surveys, as well as for further species of importance which may be associated with the proposed development site at the time of the works. Relevant legislation relating to flora and fauna in force at the time will be strictly adhered to.

Mitigation measures described in the present report to avoid or minimise disturbance to protected fauna species will be implemented as necessary.

With the above approach followed, it is not likely that the decommissioning works will cause significant disturbance to bird species associated with the proposed development site.

Pollution of watercourses

While the decommissioning phase works will involve considerably less ground works than the construction phase, there is still potential for contaminants, and especially suspended solids and hydrocarbons, to enter local watercourses and ultimately the River Shannon where effects on bird species are possible. In the absence of mitigation, such impacts could result in Significant effects on various waterbird species and their habitats.

7.4.4 Cumulative Impacts

The principal other proposed developments and landuse activities which could potentially interact synergistically with the proposed development and result in significant cumulative effects on birds include the following (see Chapter 6, section 6.4.4 for full details of potential cumulative plans and projects in area):

- Wind farm developments and other energy related proposed developments;
- Commercial forestry;
- Agriculture;
- Quarrying.

Wind farm developments

Few wind energy developments or other energy related proposed developments, such as solar farms, have taken place or are planned in the area surrounding the proposed development site.

There are two existing single turbines, one located in Limerick Blow Moulding, Parteen, Co. Clare, approximately 3.2 km southeast of the proposed development site, and one located at Vistakon, 8.2 km southeast of the proposed development site. Other wind turbine developments identified within 25 km of the proposed Ballycar development, along with their respective operational status, are listed below:

- Castlewaller (permitted – not constructed; ABP planning ref.: ABP 304496) – located approximately 20 km to east of Ballycar; and
- Carrownagowan (permitted – under Judicial Review; ABP planning ref.: 317227) – located approximately 12 km to the northeast of Ballycar.

In addition, an 8-turbine wind farm at Fahy Beg, located approximately 8.5 km northeast of the proposed development site was submitted for planning in March 2023 (planning reference 23148). Planning was refused by Clare County Council. The developer has appealed the decision to An Bord Pleanála and a decision was due in October 2023. A decision has not yet been made at the time of publication of this EIAR.

With no other wind farm proposed developments within at least a 10 km radius of the Ballycar site (apart from the two single turbines), there is no plausible potential for significant cumulative effects on ornithological interests as a result of wind energy proposed developments.

The nearest proposed solar farms to the proposed development are listed as follows:

- Drummin Solar Farm – 70 hectares of 309,008 m^2 of solar photovoltaic panels, a 38 kV electrical substation and other ancillary works (Permitted by Clare County Council but not yet constructed); and
- Ballyglass Solar Farm – c. 265,000 m^2 of solar panels on ground mounted frames and other ancillary works (Permitted by Clare County Council, Appealed to An Bord Pleanála).

Drummin Solar farm is located approximately 2km east of the proposed development while Ballyglass is located approximately 4km east. The potential for cumulative effects are considered in the relevant chapters of this EIAR.

Commercial forestry

Forestry will continue as a main landuse within the proposed development site and is a widespread landuse in the wider area and especially to the north and northeast of the proposed development. With the tendency for forestry to be planted in moderately upland areas and often on peat-based soils, peatland and upland grassland habitats have been lost or degraded. This has likely had adverse effects on bird species such as hen harrier, merlin, red grouse, curlew and snipe. Forestry operations can also contribute to water pollution issues, including input of suspended solids and nutrients to the River Shannon system.

The design of the proposed development has avoided sensitive upland habitats and with compliance with mitigation in place, the proposed development will not result in pollutants entering the River Shannon system. Hence, it is considered that the proposed development will not contribute to a cumulative adverse effect when considered with the forestry on site and in surrounding areas.

Agriculture

Agriculture will continue as a main landuse within the proposed development site and is also a widespread activity in surrounding areas. Agricultural practices have potential to degrade natural and semi-natural habitats (through land 'improvement' schemes), which may be of importance for bird species, and may also contribute to the local water pollution which could ultimately affect the River Shannon system and the associated avifauna. However, it is assumed that the farming activities on-site and in the local area are carried out according to best practice advice from the Department of Agriculture, Food and the Marine.

The design of the proposed development has minimised effects on habitats associated with farming which are important for bird species, such as hedgerows, and with compliance with mitigation in place, the proposed development will not result in pollutants entering the River Shannon system. Hence, it is considered that the proposed development will not contribute to a cumulative adverse effect when considered with the agricultural activities on site and in surrounding areas.

Quarrying

An active quarry (O'Connell's Quarry) occurs immediately to the northeast of the proposed development site and is within the study area for ornithology. This provides suitable breeding habitat for important species such as peregrine. As there are no natural nesting sites (cliffs etc.) for peregrine in the immediate area, the presence of the quarry is considered a positive habitat feature (albeit of artificial origin and possibly not a permanent feature). It is possible that the quarry operations may expand in the future (subject to planning permission).

During the construction phase of the proposed development, blasting may be necessary at turbine foundations if rockhead is less than 3 m depth. There is potential for this (in absence to mitigation) to contribute to a cumulative noise impact when considered with noise emissions from quarry blasting. This disturbance could cause local disturbance to bird species, including peregrine, in the audible range of the blast. However, all blasting episodes at both the proposed development site and quarry would be carried out under strict and highly controlled conditions. Any blasting required for the proposed development will not take place at the same time as blasting in the quarry. Also, with the quarry already in existence for a considerable time, it is likely that bird species resident or wintering in the area, including peregrine, would be habituated to some extent to noise from occasional blasting.

While it is considered that the proposed development will potentially contribute to a cumulative adverse noise effect when considered with the quarrying activities which adjoin the site, the significance of the effect on birds is rated as slight and of brief duration.

7.5 Mitigation Measures

7.5.1 Construction Phase

7.5.1.1 Habitats

The present assessment has identified loss of semi-natural grassland and woodland/hedgerows habitats as an Adverse Effect of Slight Significance.

While habitat loss cannot be mitigated, the loss will be offset through a Biodiversity Enhancement Management Plan (BEMP). The BEMP is described in **Chapter 6 Biodiversity (Section 6.7)** and is presented in full in **Appendix 6E**.

Briefly, the BEMP will preserve and enhance parts of the proposed development site for Biodiversity through the following main measures:

- Creation of ponds/wetland habitat;
- Creation of invertebrate refugia;
- Retention and enhancement of existing boundary habitats; and
- Creation of linear wildflower meadow habitat.

The above will benefit bird species through the supply of breeding and foraging habitats during the lifetime of the proposed development. The success of the enhancement measures will be evaluated through a monitoring programme.

This plan will off-set the loss of habitats used by birds and as a result there will be no net loss for biodiversity. The implementation of the plan will result in net gain for biodiversity.

7.5.1.2 Mitigation to minimise disturbance to breeding species

The baseline surveys carried out in the period 2019 to 2023 recorded various target species breeding or possibly breeding within the study area and its environs and which could be affected through disturbance by the construction works (see Section 7.4.2.2).

Pre-construction breeding surveys for these species (see Section 7.8.5) will be carried to identify/confirm their distribution within the study area at the time of construction.

Best available evidence has been reviewed (Currie & Elliot 1997, NatureScot 2022, Scottish Natural Heritage 2016) and it is suggested that the following species could be disturbed by construction works, including tree felling, at the following distances:

- Hen harrier - 1,000 m;
- Sparrowhawk - 200 m;
- Buzzard - 200 m;
- Peregrine - 750 m;
- Kestrel - 200 m; and
- Woodcock – 200 m.

Should any of these species be recorded breeding within the given distances of the works area through confirmatory surveys before and/or during construction (see Section 7.6), a buffer zone (using above distances) will be established around the expected location of the nest (location identified as far as is possible without causing disturbance to the bird) and all works will be restricted within the zone until it can be demonstrated by the project ornithologist that the species has completed the breeding cycle in the identified area. Any restricted area that is required to be set up will be marked clearly using hazard tape fencing (or equivalent) and all site staff will be alerted through toolbox talks. The project ornithologist will monitor the area to ensure that the restriction is being adhered to.

The above mitigation, as needed, will apply from March to August (inclusive) and will ensure that the works will not have an adverse effect on the identified species of conservation importance.

7.5.1.3 Mitigation to avoid or minimise destruction of active bird's nests

A range of passerine bird species breed within the study area, including meadow pipit (Red-listed) and Amber-listed species such as skylark, goldcrest and willow warbler. In compliance with Section 22 of the Wildlife Acts 1976 to 2021 as amended, all vegetation required to be cleared, including tree felling, to facilitate the works will be done outside of the restricted period from 1st March to 30th August. Should it be necessary to remove vegetation during the breeding season, for instance where bramble and ephemeral plant species have become established on ground cleared earlier, this will be surveyed by an ornithologist up to 10 days before any clearance. Should an active nest be located, the area will be restricted from works by a distance where it is considered that the works would not cause disturbance or abandonment of the nest. Such distances, which will vary according to species and local topography, will be determined by the project ornithologist. The restriction will be maintained until it is established that any young birds present have fledged.

7.5.2 Operation Phase

7.5.2.1 Collision risk mitigation

The CRM carried out for the proposed development identified three species, buzzard, kestrel and peregrine, as having a collision risk of more than one bird over the lifetime of the proposed development. Each of these species breeds within the study area.

For buzzard and kestrel, the risk is likely to affect birds hunting through the site. Mitigation will be through discouragement of hunting birds from the area around the turbines. This can be achieved by the clearance of vegetation which attracts small mammals, birds and large insects (all prey items). This approach has proved highly effective at several wind farms in central-eastern Spain where the number of collisions with lesser kestrel decreased by 75% to 100% after the ground was superficially tilled to a distance of 80 m from the turbine base (Pescador et al. 2019).

For the proposed development, the area which will be cleared of vegetation to discourage bat activity around the turbines will suffice for birds as well. This will be a radius up to 95 m around each turbine (see Chapter 6 Biodiversity Section 6.5.21). This area will be kept as a short sward through regular mowing and trimming from March through to October. Scrub or rank grass will not be allowed to become established within any of these buffer zones.

For peregrine, the risk of collision is more likely associated with birds flying through the site when leaving or arriving at the breeding location rather than birds hunting around the turbines. As adult peregrines would normally be highly effective in avoiding man-made structures such as antennae, masts and turbines, the risk of collision is likely to be highest when inexperienced young birds are initially fledged and engaging in flight practice. As the young birds will often follow the adults in their initial practice flights, the turbines which pose the highest risk would be determined by the route used most regularly by the adults when exiting the breeding location.

Mitigation to minimise risk of collision will be by real time monitoring of the breeding location through the breeding season or for as long as the breeding attempt is in progress. It is noted that in some years the breeding site may not be occupied or breeding may be abandoned at any stage for various reasons, which is often inclement weather. In the early stage of the breeding cycle, focus will be on determining the routes taken by the adults when leaving the site (or arriving back at same). This may indicate the turbines which pose the highest potential risk of collision. Through June, emphasis will be on assessing the progress of the young and when the birds are

fledged (the average date of fledging in Britian/Ireland is 20th June). At this stage the birds are highly vocal and easily detected by an observer. From thence on, focus will be on the behaviour and movements of the young birds. For several weeks, the young will be fed by the parents whilst they practice hunting themselves. If there are two or more young, they will also engage in social activities and play 'hunting games' in the air. As the young grow stronger, they and the parents move increasingly further from the home cliff during the day but the family may return there at night to roost. With time, the young will gain full independence and will roost away from the natal cliff (in this case the quarry wall).

From the above, it is considered that there is at least a 4-week period when the young birds are at the highest risk of collision with the turbines. In this period, it may be preferable to curtail during daylight hours the turbine or turbines which are perceived (based on earlier observations) to pose the highest risk to fledgling collision. Alternatively, the approach might be to turn off the turbines immediately when the young birds are becoming active in the morning (which will vary between days based on weather) and leave them off until they settle down later (which could be for several hours). For this to work, the relevant turbines would need to be turned off (on instruction from the observer) within a very short space of time, i.e. less than 60-90 seconds, and would require a direct line of contact between the observer and the turbine control room.

As noted, the above mitigation would only be required in the years when the breeding territory is occupied and when young birds are reared successfully. As with most raptor species, breeding failure rate in peregrine can be quite high, as shown by a 47% failure of occupied territories in the 2002 national breeding survey (Madden et al. 2009).

7.5.3 Decommissioning Phase

As the Decommissioning works will involve works similar to those involved at construction stage (albeit at a lower intensity), these could result in similar effects on birds. Hence, the mitigation that will be undertaken for minimising disturbance to nesting birds during construction will also be applied during the decommissioning phase (taking into account changes in bird populations and distribution that may have occurred locally during the operational life of the proposed development).

7.5.4 Mitigation for waterbirds associated with River Shannon and SPA

As noted in Sections 7.4.2.8 and 7.4.2.9, without implementation of appropriate mitigation measures, there is potential for significant adverse effects on the habitats and food supplies of waterbird species within the River Shannon, including the SPA, should contaminants enter the system as a result of the construction, operation and/or decommissioning phases of the wind farm proposed development and temporary TDR works. Mitigation is therefore required to avoid or minimise this risk.

Mitigation measures proposed to maintain water quality in the drainage channels and watercourses which drain the site are detailed in Chapter 8 Water and referred to in the NIS. The implementation of mitigation through avoidance principles, pollution control measures, surface water drainage measures and other preventative measures have been incorporated into the proposed development design in order to minimise potential significant adverse effects on water quality at the site. A 50 m stream buffer zone has been implemented to EPA mapped watercourses at the proposed development site (apart from watercourse crossings and minor works) which will largely result in the avoidance of sensitive hydrological features. Direct discharges to surface waters of

de-watered loads will not be permitted under any circumstances. This in turn will avoid or reduce the potential for adverse effects on downstream estuarine habitats.

All of the mitigation measures described in **Chapter 8 Water** are contained in the **Construction and Environmental Management Plan** (**CEMP**) (appended to the **EIAR** in **Appendix 2A**). The **CEMP** provides a contractual commitment to mitigation and monitoring and reduces the risk of pollution whilst improving the sustainable management of resources. The environmental commitments of the proposed development will be managed through the CEMP and will be secured in contract documentation and arrangements for construction and later phases, such that there will be a robust mechanism in place for their implementation. The **CEMP** addresses the construction phase, and will be observed through to the commissioning, operation and final decommissioning phases.

It is noted that an ECoW with experience in overseeing wind farm construction proposed developments will be appointed by the Contractor for the duration of the construction phase to ensure that the CEMP is effectively implemented and that all planning conditions relating to ecology are complied with. An Environmental Manager will be appointed by the Developer to oversee the environmental management of the proposed development, advise on the environmental issues and ensure compliance by the Contractor.

With such mitigation in place and rigorously enforced, it can be concluded that there would not be any significant effects on the waterbirds associated with the River Shannon, and notably the Special Conservation Interests of the River Shannon and River Fergus Estuaries SPA, as a result of the proposed development.

7.6 Pre-Construction and Construction Phase Monitoring

7.6.1 Pre-construction bird survey

Pre-construction breeding surveys will take place within suitable habitat for the following species:

- Hen harrier;
- Sparrowhawk;
- Buzzard;
- Peregrine;
- Kestrel; and
- Woodcock.

The purpose of the surveys is to establish the breeding status of these species, which could be affected by disturbance during the construction phase. The surveys will take place within the distances from work areas presented in **Section 7.5.1.2**.

Survey will be carried out by a qualified and experienced ornithologist following standard methods. It is noted that the surveys will be in the period prior to any tree-felling/construction on site.

Following on from the surveys, guidance will be provided by the project ornithologist to the contractor on where restrictive buffer zones may be required during the bird nesting season. A project ornithologist will be on site for the duration of the construction phase and will ensure that all mitigation measures relating to ornithology described in this chapter are implemented.

In the case where a nest site is detected within the construction corridor or within 500m of the construction corridor the following actions will be implemented:

- The project ornithologist will immediately notify the NPWS (and where present the Clare County Council Ecologist);
- The location of the nest site will be cordoned off;
- All high impacts works including heavy construction works will be suspended within the required buffer distance of the nest site (buffer distance dependent on the species – see Section 7.5.1.2);
- The project ornithologist will continually monitor the nest until all young have fledged;
- Consultations will remain ongoing with NPWS (and Clare County Council) throughout the construction phase in such instances.

7.7 Post Construction Monitoring

7.7.1 Post Construction Bird Monitoring

Post-construction bird monitoring will take place to establish whether the construction and operation of the proposed development has had effects on the bird species associated with the site prior to construction (as shown by the baseline surveys in the 2019-2023 period). The monitoring programme will comprise the following:

Flight activity surveys

Flight activity surveys will be undertaken using the Vantage Point method (Scottish Natural Heritage 2017). The purpose of the surveys is to determine if the presence of the turbines is causing species such as kestrel and buzzard to avoid the site. This will use the same Vantage Points as used for the baseline EIAR surveys so that a valid comparison can be made between the two periods. The surveys will be undertaken monthly in Years 1, 2, 3, 5, 10 and 15 of the lifetime of the proposed development (in accordance with Scottish Natural Heritage Guidance 2009).

Transect survey within Site

A transect survey will be undertaken to monitor short-term and long-term effects on bird populations within the site. The transect location and the survey methodology will be the same as employed for the baseline EIAR surveys which will allow a comparison of data to be made for each monitoring year. Two surveys will be undertaken in each of the summer and winter seasons and will be in the same monitoring years as the vantage point surveys.

Collision searches

The objective of collision monitoring and corpse search is to establish whether bird fatalities are occurring as a result of collision with turbine blades. This also will provide data to determine the accuracy of the predictions from the Collision Risk Modelling carried out for the proposed development.

Carcass search was traditionally completed by human observers whose efficiency is influenced by several factors including carcass type, environmental conditions and observer competence. Numerous studies have been

conducted demonstrating that dogs have a superior ability to detect bird and bat carcasses than humans, particularly with small carcasses or in well vegetated areas (see for example Mathews, 2013). A trained dog under the control of a handler will be used.

A standard plot size will be selected at each turbine location where the search will occur. At the start of each survey, data recorded will include meteorological and ground cover information. The locations of any carcasses found will be recorded by GPS and will be photographed in-situ. The state of each carcass will be recorded on a corpse record card, using the following categories (after Johnson, 2003):

- Intact - a carcass that is completely intact, is not badly decomposed, and shows no sign of being fed upon by a predator or scavenger;
- Scavenged - an entire carcass which shows signs of being fed upon by a predator or scavenger, or a portion(s) of a carcass in one location such as wings, legs, skeletal remains or pieces of skin; and
- Feather Spot - ten or more feathers at one location indicating predation or scavenging. If only feathers are found, 10 or more total feathers or two or more primaries must be discovered to consider the observation a casualty.

Searcher efficiency and predation tests will be carried out at the commencement of the programme in order to calibrate the results to account for the search dog's ability to find bird corpses and to also account for scavenging of corpses by animals.

As the site is primarily of ornithological importance for breeding birds, it is proposed that the programme will be confined to the 6 month period March to August (inclusive).

The collision searches for birds can be combined with the bat carcass searches which will be carried out in the first three years of operation (post-construction surveys) and subsequently in years 5, 10, 15, 20, 25 and 30 in the spring to autumn periods, i.e. both bats and birds will be monitored in one programme. Consultations will remain ongoing with the NPWS and Clare County Council throughout the operational phase of the project via submission of annual reports for the first three years and subsequently every 5, 10, 15, 20, 25 and 30 years in line with bird monitoring programme.

7.8 Residual Effects of the Development

The effect of habitat loss on birds will be offset through a Biodiversity Enhancement Management Plan (BEMP). With the implementation of the plan, which will result in a net gain for biodiversity within the site, there will be no significant residual effect on birds as a result of habitat loss.

The potential disturbance effect from construction works on sensitive breeding species will be mitigated by the establishment of buffer zones through the breeding season around the expected location of the nest. The locations will be identified through confirmatory surveys before and/or during the construction phase. The sensitive avian receptors identified from baseline surveys are as follows:

- Hen Harrier;
- Sparrowhawk;
- Buzzard;
- Peregrine;

- Kestrel;
- Woodcock.

With this mitigation enforced during the breeding season, it is likely that there will be no significant residual effects on sensitive breeding species, including peregrine, as a result of potential disturbance from works during the construction and decommissioning phases.

All construction works associated with the proposed development have potential to impact directly on breeding passerine species, including meadow pipit. However, as surface clearance works will be carried out largely outside of the breeding season (in compliance with the Wildlife Acts), this impact will be avoided. Should removal of any vegetation be required during the breeding season, this will be subject to survey for presence of breeding birds by an experienced ornithologist to avoid likely disturbance to breeding birds.

The presence of the turbines is unlikely to cause a significant displacement effect for most bird species, though hen harrier, buzzard and kestrel are identified as species which may avoid the areas around the turbines. While habituation to the presence of the turbines is likely with time, the residual effect is rated as a Slight Significant short- to medium-term effect.

A significant collision risk with turbines has been identified for buzzard, kestrel and, especially, peregrine based on Collision Risk Modelling taking into account the respective conservation status of each species. For kestrel and buzzard, the avoidance of the immediate areas around turbines by vegetation management will be actively encouraged so as to minimise risk of collision. For peregrine, the risk will be reduced through mitigation involving curtailment of turbines posing highest risk during the period around fledging time – this programme will be supported by real-time monitoring post-construction surveys. With mitigation implemented, the residual risk of collision is likely to be reduced to the non-significant level.

The baseline surveys did not identify any regular migration routes or local movements of waterbird species or birds of prey through the proposed development site. The proposed development is not likely to have any residual effect on migrating species or local wetland bird populations.

The strict mitigation measures which will be enforced to maintain water quality in local drains and watercourses during the construction, operational and decommissioning phases of the proposed development (as described in detail in Chapter 8 Water and in the accompanying NIS) will ensure that there will be no significant residual effects (rated as Imperceptible) on local water quality.

As potential effects on the River Shannon and River Fergus Estuaries SPA as a result of the proposed development would only arise from contaminants carried within watercourses, i.e. Pathway from Source to Receptor, it follows that with mitigation implemented, there will be no likely significant effects on water quality or the Special Conservation Interests of this SPA.

For the likely significant effects assessed, application of the proposed mitigation measures in full will limit residual effects to low significance, negligible/not significant.

7.9 Conclusions

An assessment of effects on ornithology has been carried out for the proposed development based on a desk review and detailed survey information from 2019 to 2023.

The proposed development study area supports species of conservation importance, including breeding kestrel and quarry nesting peregrine (outside of the proposed development footprint). Habitats suitable for foraging by hen harrier are represented within part of the study area, which is within the South Clare non-designated regional zone for hen harrier. Buzzard and sparrowhawk regularly occur within the study area. Overall, the wind farm site is rated as Local Importance (higher value) for birds.

The principal ornithological effects as a result of the proposed development are as follows:

- Loss of various grassland and minimal loss of woodland habitats, which are used by bird species of conservation importance. The significance of this is rated as a Slight Adverse Effect of Permanent duration. With implementation of a Biodiversity and Enhancement Management Plan, the effect will be reduced to Not Significant;
- Likely construction related disturbance to breeding hen harrier, sparrowhawk, buzzard, kestrel, peregrine, and woodcock (depending on their local breeding status at time of construction), which is rated as a Significant Adverse Effect of Short-term duration. With mitigation by establishment of a buffer zone where works will be restricted during the breeding season, effect is avoided or reduced to Not Significant or, at most, Slight;
- Likely construction related disturbance to nests of passerine species, including Red-listed meadow pipit, which is rated as a Significant Adverse Effect of Short-term duration. With mitigation by clearance of vegetation outside of the breeding season, ongoing monitoring as required during the construction phase and compliance with avoidance measures, the effect will be avoided or reduced to Not Significant;
- During the operational phase of the proposed development, birds may show some avoidance of suitable habitat as a result of the presence of turbines. While the presence of the turbines is unlikely to cause a significant displacement effect for most bird species, foraging hen harrier, buzzard and kestrel are identified as species which may avoid the areas around the turbines. While habituation to the presence of the turbines is likely with time, the residual effect is rated as a Slight Significant short- to medium-term effect. It is noted that avoidance of the immediate areas around turbines will be actively encouraged by the management of vegetation so as to minimise risk of collision;
- A collision risk with turbines of greater than 1 bird for the lifetime of the project has been identified for buzzard, kestrel and peregrine based on Collision Risk Modelling. Taking into account the respective conservation status of the species, the effect is rated as a Slight Significant Adverse Effect for buzzard and kestrel and a Moderate Significant Adverse Effect for peregrine. With mitigation implemented, including real-time monitoring for peregrine, the risk effect will be avoided or reduced to Not Significant;
- The baseline surveys did not identify any regular migration routes or local movements of waterbird species or birds of prey through the wind farm site. The proposed development is not expected to have any residual effect on migrating species or local waterbird bird populations;
- With appropriate mitigation in place to prevent effects from pollutants on the quality of habitats within the River Shannon and River Fergus Estuaries SPA, significant adverse effects on water quality and the Special Conservation Interests of the SPA are not predicted (full details in accompanying NIS, the CEMP and Chapter 8 Water).

- The proposed development requires rigorous ornithological monitoring (in line with best practice guidance) at pre-construction, construction, operational and decommissioning phases. Compliance with monitoring and mitigation undertakings are likely to ensure that there is not likely to be any significant effect on birds from the proposed development alone or in combination with other developments.

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