

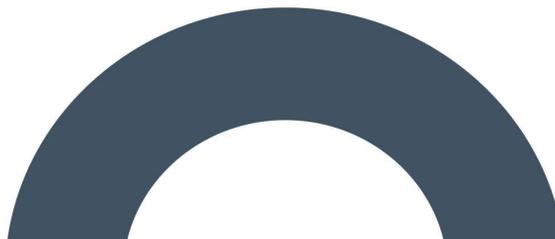
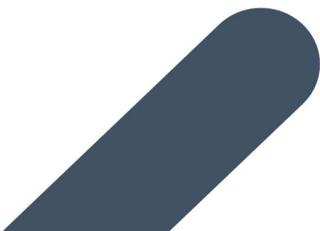
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Environmental Impact Assessment Report (EIAR)

Carrig Renewables Wind
Farm

Chapter 7 - Ornithology

Tipperary Planning Authority - Inspection Purposes Only!



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Table of Contents

7.	ORNITHOLOGY	7-1
7.1	Introduction.....	7-1
7.1.1	Description of the Proposed Development	7-2
7.1.2	Legislation, Guidance and Policy Context.....	7-2
7.1.3	Statement of Authority and Competence	7-4
7.2	Assessment Approach and Methodology	7-5
7.2.1	Desk Study.....	7-5
7.2.2	Consultation.....	7-5
7.2.3	Identification of Target Species and Key Ornithological Receptors.....	7-6
7.2.4	Field Surveys	7-7
7.2.5	Receptor Evaluation and Impact Assessment	7-24
7.2.6	Assessment Justification.....	7-27
7.3	Baseline Ornithological Conditions.....	7-29
7.3.1	Designated Sites within the Likely ZOI of the Development	7-29
7.3.2	Breeding and Wintering Bird Atlas Records.....	7-41
7.3.3	Bird Sensitivity Mapping Tool.....	7-42
7.3.4	Irish Wetland Bird Survey Records.....	7-43
7.3.5	Rare and Protected Species Dataset	7-43
7.3.6	Field Survey Results	7-44
7.4	Receptor Evaluation.....	7-63
7.4.1	Determination of Population Importance	7-63
7.4.2	Identification of Key Ornithological Receptors.....	7-75
7.4.3	Key Ornithological Receptor Sensitivity Determination	7-86
7.5	Potential Impacts.....	7-87
7.5.1	Do-Nothing Effect	7-87
7.5.2	Effects on Key Ornithological Receptors during Construction and Operation	7-88
7.5.3	Effects on Key Ornithological Receptors during Decommissioning.....	7-131
7.5.4	Effects on Designated Areas.....	7-132
7.5.5	Effect Associated with the Grid Connection and Turbine Delivery Route.....	7-132
7.6	Mitigation and Best Practice Measures.....	7-133
7.6.1	Sharing Ecological Data.....	7-133
7.6.2	Mitigation by Design.....	7-133
7.6.3	Mitigation During Construction, Operation and Decommissioning.....	7-133
7.7	Monitoring	7-135
7.7.1	Pre-Construction	7-135
7.7.2	Post-Construction.....	7-135
7.7.3	Decommissioning	7-135
7.8	Residual Effects.....	7-136
7.9	Cumulative Effects	7-137
7.9.1	Other Plans and Projects	7-137
7.9.2	Assessment of Cumulative Effects.....	7-141
7.10	Conclusion.....	7-155

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7. ORNITHOLOGY

7.1 Introduction

This chapter assesses the likely significant impacts of the Carrig Renewables Wind Farm (hereafter the “Proposed Development”) on avian receptors. Particular attention has been paid to bird species with national and international protection under the Irish Wildlife Acts 1976-2022 and the European Union (EU) Birds Directive (2009/147/EC). Where potential impacts on avian receptors are identified, mitigation is proposed and the residual effects are assessed. The cumulative effects of the Proposed Development and other plans and projects have also been assessed in this chapter.

This chapter is supported by Technical Appendices 7-1 to 7-4, which contain data from the surveys undertaken including full details of the survey times, weather conditions, and other relevant information together with the bird records themselves. Appendix 7-5 contains the Collision Risk Assessment (CRA) document which illustrates how the Collision Risk Modelling was undertaken for the Proposed Development. Appendix 7-6 contains the bird monitoring programme. Confidential Appendix 7-7 contains sensitive records of protected species breeding and roosting sites. The Wind Farm Site and survey radii are provided in Figures 7.1 – 7.7.

The chapter is structured as follows:

- The Introduction provides a description of the Proposed Development and the relevant legislation, guidance and policy context.
- The Assessment Approach and Methodology section is a comprehensive description of the ornithological surveys and impact assessment methodology used to inform a robust assessment of potential impacts of the Proposed Development on birds.
- The Baseline Ornithological Conditions section describes the existing bird population at the Proposed Development site.
- The Receptor Evaluation section identifies key ornithological receptors and determines their sensitivity.
- The Potential Impacts section details the impact assessment (including direct habitat loss, disturbance/displacement and collision risk). Impacts are described with regard to each phase of the Proposed Development: construction, operation and decommissioning.
- The Mitigation and Best Practice Measures section describes proposed mitigation and best practice measures to ameliorate the identified impacts.
- The Monitoring section outlines a schedule for monitoring birds during each phase of the Proposed Development if planning permission is granted: commencement and construction, operation and decommissioning.
- The Residual Effects section considers the implications of the proposed mitigation, best practice, enhancement measures and monitoring.
- Finally, the Cumulative Effects section fully assesses potential cumulative effects of the Proposed Development in combination with other projects.
- The Conclusion provides a summary statement on the overall significance of predicted effects on birds.

As detailed in Chapter 1, for the purposes of this EIAR, the various project components are described and assessed using the following references:

- Where the ‘Proposed Development’ is referred to, this relates to turbines, access roads, temporary construction compound, meteorological mast, junction accommodation works, peat and spoil management, tree felling, site drainage, 38kV onsite substation (and battery storage) and associated underground 38kV cabling connecting to the existing Dallow 110kV Substation. The Proposed Development is described in detail in Chapter 4 of this EIAR.

- “Wind Farm Site” refers to all infrastructure located within the EIAR Site Boundary with the exception of the grid connection route and turbine delivery route.
- “Turbine delivery route” refers to accommodation or widening along the turbine delivery route to facilitate the transportation of the turbines. See Chapter 4 of this EIAR for further details.
- “Grid connection route” refers to underground 38kV cabling connecting to the existing Dallow 110kV Substation in the townland of Clondallow, County Offaly. See Chapter 4 of this EIAR for further details.

The following other definitions are used in this chapter:

- The “Zone of Influence” (ZOI) for individual ornithological receptors refers to the area within which potential effects are anticipated. ZOIs differ depending on the sensitivities of particular species and were assigned in accordance with best available guidance (NatureScot, 2016 and McGuinness *et al.*, 2015), adopting a precautionary approach.
- “Key Ornithological Receptor” (KOR) is defined as a species occurring within the zone of influence of the Proposed Development upon which potential impacts are anticipated and assessed.

7.1.1 Description of the Proposed Development

A full description of the Proposed Development is provided in Chapter 4 of this EIAR. In brief, the applicant is seeking a 10-year planning permission for a project consisting of 7 no. turbines and the associated access roads, temporary construction compounds, meteorological mast, turbine delivery accommodation works, peat and spoil management, tree felling, site drainage, 38kV onsite substation and associated underground 38kV cabling connecting to the existing Dallow 110kV Substation. The turbines will be between 103.5m to 110.5mm at hub height, with 3 blades of a diameter ranging from 149m to 163m, giving an overall ground-to-blade tip height of between 179.5m and 185m and a lowest swept height ranging from 22m to 36m. The Proposed Development will have an operation life of 35 years from the date of commissioning.

7.1.2 Legislation, Guidance and Policy Context

This EIAR is prepared in accordance with the requirements of EU Environmental Impact Assessment Directive 2014/52/EU. The following key legislative provisions are applicable to habitats and fauna in Ireland:

- Irish Wildlife Acts 1976 to 2022. The original Act of 1976 (39/1976) was amended in 2000 (38/2000), 2010 (19/2010) and 2012 (29/2012), as well as in Part 3 of the Heritage Act 2018 (15/2018), Part 2 Chapter 3 of the Planning and Development, Heritage and Broadcasting (Amendment) Act 2021 (11/2021) and in the Flora (Protection) Order 2022 (235/2022).
- The Birds Directive (EU Directive 2009/147/EC on the conservation of wild birds)
- The European Communities (Birds and Natural Habitats) Regulations 2011, as amended (S.I. no. 477 of 2011). These regulations transpose the EU Birds Directive into Irish law. The regulations were amended in 2013 (290/2013 and 499/2013), 2015 (355/205) as well as Chapter 4 of the Planning, Heritage and Broadcasting (Amendment) Act 2021 (11/2021) and in 2021 (293/2021).
- The International Convention on Wetlands of International Importance (the Ramsar Convention), 1971. This convention protects 45 wetland sites of significant value for nature in Ireland.

In the absence of specific national ornithological survey and assessment guidance for Ireland, the following guidance documents published by NatureScot (formerly Scottish Natural Heritage [SNH]) have been followed to inform this assessment:

- NatureScot (2000). Wind farms and birds: calculating a theoretical collision risk assuming no avoidance action. Scottish Natural Heritage, Inverness, Scotland. Available at: <https://www.nature.scot/sites/default/files/2017-09/Guidance%20Note%20-%20Windfarms%20and%20birds%20-%20Calculating%20a%20theoretical%20collision%20risk%20assuming%20no%20avoiding%20action.pdf>
- NatureScot (2009). Monitoring the impact of onshore wind farms on birds. Scottish Natural Heritage, Inverness, Scotland. Available at: <https://www.nature.scot/sites/default/files/2017-09/Guidance%20Note%20-%20Monitoring%20the%20impact%20of%20onshore%20windfarms%20on%20birds.pdf>
- NatureScot (2016). Assessing connectivity with Special Protection Areas (SPAs). Scottish Natural Heritage, Inverness, Scotland. Available at: <https://www.nature.scot/sites/default/files/2018-08/Assessing%20connectivity%20with%20special%20protection%20areas.pdf>
- NatureScot (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage, Inverness, Scotland. Available at: <https://www.nature.scot/sites/default/files/2018-06/Guidance%20Note%20-%20Recommended%20bird%20survey%20methods%20to%20inform%20impact%20assessment%20of%20onshore%20windfarms.pdf>
- NatureScot (2018a) Avoidance rates for the onshore NatureScot wind farm collision risk model. Scottish Natural Heritage, Inverness, Scotland. Available at: <https://www.nature.scot/sites/default/files/2018-09/Wind%20farm%20impacts%20on%20birds%20-%20Use%20of%20Avoidance%20Rates%20in%20the%20SNH%20Wind%20Farm%20Collision%20Risk%20Model.pdf>
- NatureScot (2018b). Assessing the cumulative impacts of onshore wind farms on birds. Scottish Natural Heritage, Inverness, Scotland. Available at: <https://www.nature.scot/sites/default/files/2018-08/Guidance%20-%20Assessing%20the%20cumulative%20impacts%20of%20onshore%20wind%20farms%20on%20birds.pdf>
- NatureScot (2018c). Assessing significance of impacts from onshore wind farms outwith designated areas. Scottish Natural Heritage, Inverness, Scotland. Available at: <https://www.nature.scot/doc/guidance-assessing-significance-impacts-bird-populations-onshore-wind-farms-do-not-affect-protected>

The following Irish guidance documents were also consulted:

- Percival, S.M. (2003). Birds and wind farms in Ireland: A review of potential issues and impact assessment. Ecology Consulting, Durham, UK. Available at: https://tethys.pnnl.gov/sites/default/files/publications/Percival_2003.pdf
- McGuinness, D., Muldoon, C., Tierney, N., Cummins, S., Murray, A., Egan, S. and Crowe, O. (2015). Bird Sensitivity Mapping for Wind Energy Developments and Associated Infrastructure in the Republic of Ireland. Birdwatch Ireland, Wicklow, Ireland. Available at: https://birdwatchireland.ie/app/uploads/2019/09/BWI-Bird-Wind-Energy-devt-Sensitivity-Mapping-Guidance_document.pdf
- Gilbert, G., Stanbury, A. and Lewis, A. (2021). Birds of Conservation Concern in Ireland 4: 2020-2026. *Irish Birds*, 43:1-22. Available at: <https://birdwatchireland.ie/birds-of-conservation-concern-in-ireland/>

Furthermore, this assessment has been prepared with respect to the various planning policies and strategy guidance documents listed below and also those listed in Section 1.2 of Chapter 1 of this EIAR:

- European Commission (2002). Assessment of plans and projects significantly affecting Natura 2000 sites. Publications Office of the European Union, Luxembourg.
- European Commission (2020). Guidance document on wind energy developments and EU nature legislation. Publications Office of the European Union, Luxembourg.
- Planning and Development Acts 2000 (as amended).

- > NRA (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes. National Roads Authority, Ireland.
- > DoHPLG (2018). Guidelines for planning authorities and An Bord Pleanála on carrying out Environmental Impact Assessment. Department of Housing, Planning and Local Government, Government of Ireland, Dublin.
- > Tipperary County Development Plan 2022 – 2028
- > Offaly County Development Plan 2021-2027

7.1.3

Statement of Authority and Competence

This ornithology chapter has been prepared by Donnacha Woods (B.Sc., M.Sc.), Project Ornithologist of MKO and reviewed by Pdraig Cregg (B.Sc., M.Sc.), Principal Ornithologist. Both are suitably qualified ornithologists with experience in completing avifaunal assessments and competent experts for the purposes of the preparation of this EIAR. Donnacha Woods has over six years' of experience in ornithological assessments for the purposes of EIA across a range of sectors. Pdraig Cregg has over nine years' experience working in both the UK and Ireland in designing, executing and project managing ecological/ornithological assessments, and had worked on over 60 wind farm projects across the UK and Ireland.

The scope of works and survey methodology was devised by Pdraig Cregg and is fully compliant with recent NatureScot (formerly Scottish Natural Heritage) guidance. Field surveys were undertaken by Andre Robinson, Cathal Forkan, Jennifer Snook, Katie Grice, Nessa Lee, Patrick Manley, Peter Capsey, Tom Rea and Zuzana Erosova. Surveyors are suitably qualified competent experts for the purposes of the preparation of this EIAR.

7.2 Assessment Approach and Methodology

7.2.1 Desk Study

A comprehensive desk study was undertaken to search for any relevant information on species of conservation concern that may use the Wind Farm Site. The assessment included a thorough review of the available ornithological data including:

- Designated sites within the likely Zone of Influence (ZOI) of the Proposed Development.
- Bird atlases.
- Bird sensitivity mapping tool.
- Online web-mappers from the National Biodiversity Data Centre.
- Irish Wetland Bird Survey data.
- Review of specially requested records from the National Parks and Wildlife Service Rare and Protected Species Database.

7.2.2 Consultation

Consultation was undertaken with the relevant statutory and non-statutory organisations as part of the EIA scoping to inform the current assessment. Full details can be found in Chapter 2 of this EIA.

Table 7-1 Consultation responses Table 7-1 below provides a list of the organisations consulted with regard to ornithology during the scoping process and describes where any comments raised in the scoping responses received in relation to birds have been addressed in this Chapter.

Copies of all scoping responses are included in Appendix 2-1 of this EIA. The recommendations of the consultees have informed the EIA preparation process and the contents of this chapter; Chapter 2 outlined further where the comments raised in the scoping responses received have been addressed.

Table 7-1 Consultation responses

	Consultee	Response
01	An Taisce	Response received 08/05/2023 in the form of a generic email outlining that An Taisce are unable to respond to every query, and enclosed a link to some frequently asked questions. No correspondence relating to birds received.
02	BirdWatch Ireland	No response received
03	Department of Agriculture, Food and the Marine	Response received 28/09/2022 outlining tree felling requirements. No correspondence relating to birds received.
04	Department of the Environment, Climate and Communications	No response received
05	Development Applications Unit (NPWS/NMS)	Response received 09/05/2023. The key comments in relation to birds are presented below. These comments are addressed in Sections 7.3.1 and 7.5.2 of this chapter, and further in the Natura Impact Statement. <u>Whooper swan</u> “Whooper swan is known to feed on grasslands in the area and roost in wetlands closeby including on occasion NPWS owned lands adjoining the site. These birds may be

	Consultee	Response
		<p><i>associated with the Little Brosna Callows SPA or Middle Shannon Callows SPA and it will be required to consider whether this is ex-situ usage and whether the proposed development could adversely impact these European Sites. Flight lines between this area and the SPAs will require investigation and assessment.”</i></p> <p><u>Other wintering waterbirds</u></p> <p><i>“The wetland at the northern section of Kilcaren-Firville Bog SAC (known as the Sluggary) is extensively used by a wide range of wintering wildfowl many of which are qualifying interest species for both the Little Brosna Callows and Middle Shannon Callows SPAs, these include but are not limited to whooper swan, wigeon, teal, pintail, shoveler, golden plover, lapwing), Black-tailed Godwit and wintering curlew. The ecological impact assessment will need to consider potential impacts on this important wildfowl area. The Appropriate Assessment will need to establish whether there is movement between this and other potential ex-situ sites and the aforementioned SPAs and whether the proposed turbines could impact on movement between these sites.”</i></p> <p><u>Curlew</u></p> <p><i>“Curlew have been recorded in the vicinity of the proposed site during the breeding season. The potential impact of the development on this species and future management of the area to conserve them as a breeding species should be assessed.”</i></p>
06	Inland Fisheries Ireland	Response received on 23/09/2022 outlining recommended measures for the protection of aquatic resources and associated riparian habitat. No correspondence relating to birds received.
07	Irish Peatland Conservation Council	No response received
08	Irish Red Grouse Association	No response received
09	Irish Raptor Study Group	No response received
10	Irish Wildlife Trust	No response received
11	Waterways Ireland	Response received 26/09/2022 outlining that Proposed Development is not the zone of influence of Waterways Ireland waterways and the organisation will therefore not be commenting.

7.2.3

Identification of Target Species and Key Ornithological Receptors

Following a comprehensive desk study, initial site visits and consultation, a list of “target species” likely to occur in the ZOI of the Proposed Development was compiled. Bird surveys conducted within and

around the Wind Farm Site were then specifically designed to survey for these target species, in accordance with NatureScot (2017). The target species list was drawn from:

- Species listed on Annex I of the EU Birds Directive.
- Special Conservation Interests (SCI) of Special Protection Areas (SPA) within the zone of likely significant effects.
- Red listed Birds of Conservation Concern in Ireland (BoCCI).
- Raptors and species that are particularly sensitive to wind farm developments.

Following analysis of field survey data (described below), a precautionary screening approach was followed to identify KORs: the list of target species observed during surveys (see Appendix 7-1) was refined to KORs, excluding those for which pathways for a significant effect could not be identified.

7.2.4 Field Surveys

The survey work that was undertaken between September 2020 and March 2023 forms the core dataset for the assessment of impacts on ornithology. These field surveys were undertaken in compliance with NatureScot guidance (NatureScot, 2017). The data provided in this report is robust and allows clear, precise and definitive conclusions to be made in relation to the avian receptors identified within the Wind Farm Site and its surroundings.

7.2.4.1 Initial Site Assessment

Based on the results of the desk study, consultation and reconnaissance site visits undertaken in September 2020, the likely importance of the Wind Farm Site for bird species was ascertained. Based on the collated information available from the above preliminary assessment and adopting a precautionary approach, a site-specific survey scope for the ornithological survey was developed.

7.2.4.2 Survey Methodologies

Field surveys were undertaken during the survey period September 2020 – March 2023, consisting of 2 breeding seasons (April – September) and 3 non-breeding seasons (October – March).

In the absence of specific national bird survey guidelines, the ornithological surveys were designed and undertaken in full accordance with the guidance document '*Recommended bird survey methods to inform impact assessment of onshore wind farms*' (NatureScot, 2017). The various ornithological surveys undertaken at the Wind Farm Site and hinterland are described in detail below. Note: The Wind Farm Site has contracted from the extent of the site covered during surveys. Therefore the survey radii outlined below are a minimum distance, and the surveys generally covered an area greater than the required radius. The survey areas are shown in Figures 7-2 – 7-7.

7.2.4.2.1 Vantage Point Surveys

Vantage point (VP) surveys were undertaken in accordance with NatureScot (2017) to monitor flight activity within the Wind Farm Site and to a 500m radius of the proposed turbine positions. Surveys were conducted from 4 fixed point vantage points¹ with comprehensive coverage of the Wind Farm Site (Figure 7-1). The vantage point locations were selected by undertaking a viewshed analysis (described below) and confirmed by a reconnaissance visit and initial field surveys to ensure that the proposed turbine layout was entirely covered. As outlined above, the Wind Farm Site has contracted from the extent of the site covered during surveys. As such, the viewsheds of the vantage points VP1 &

¹ Due to access issues arising, the locations of VP1 and VP3 were moved in December 2022 (by which point over two years of data had been collected). These updated locations are labelled as VP1a and VP3a and were surveyed from December 2022 to March 2023. A viewshed analysis and reconnaissance visit was also completed for these VP locations.

VP1a no longer contain turbines. These vantage points are therefore not included in the collision risk analysis. However, data from these VP locations are presented in this chapter and has been included in the overall impact assessment.

Viewshed Analysis

Viewsheds were calculated using Resoft Wind Farm ZTV (Zone of Theoretical Visibility) software in combination with QGIS (Version 3.22) using a notional layer suspended at 22m, 30m and 36m, which is representative of the minimum heights considered for the Potential Collision Risk Area based on a turbine model congruent with the proposed turbine range dimensions. While the relevance of being able to view as much of the site to ground level is acknowledged, the NatureScot guidance (2017) emphasises the importance of visibility of the ‘collision risk volume’ when the data is to be used to estimate the risk of collision with turbines by birds. Therefore the viewshed analysis aims to identify the most suitable locations to site vantage points such that the airspace of the turbine rotor swept area is in view using the fewest possible number of vantage points.

The vantage point locations were tested for visibility coverage by creating a viewshed point 1.75m in height (to represent the height of observer) on a map using 10m contours terrain data. The relative height of any surrounding vegetation and its effects on visibility was recorded during a site visit and is also accounted for in the analysis. Using the ZTV software, a viewshed of 360° was produced calculating an area 22m from ground level up to a 2km radius. The resulting viewshed image was then cropped to 180° to give the viewshed. A 500m buffer was applied to the outer most turbines of the Proposed Development in line with NatureScot (2017). The visible viewsheds at 22m, 30m and 36m are presented in Figures 7-2-1 – 7-2-6.

Data Recording and Digitisation

Survey methodology followed NatureScot (2017). The surveyor collected data on bird observations and flight activity from the scanning arc of 180° to a 2km radius at the fixed vantage point locations for two 3 hour watches separated by a minimum 30 minute break (i.e. 6 hours total) per month. Surveys were conducted from September 2020 to March 2023 inclusive, and were scheduled to provide a minimum of 36 hours per winter or breeding season and spread over the full daylight period, including dawn and dusk watches, to coincide with the highest periods of bird activity.

Survey effort for vantage point watches is presented in Appendix 7-2, Table 1. This includes full details of dates, times, survey locations, survey duration and weather conditions for each survey. **Error! Reference source not found.**, below, shows a summary of the VP survey work undertaken.

Table 7-2 Vantage point survey watch duration

Survey Season and Number of Vantage Points (VPs)	Effort per Vantage Point (VP)
Winter Season 2020/2021 (4 VPs)	36 hours per VP
Breeding Season 2021 (4 VPs)	36 hours per VP
Winter Season 2021/2022 (4 VPs)	36 hours per VP
Breeding Season 2022 (4 VPs)	36 hours per VP
Winter Season 2022/2023 (4 VPs)	36 hours per VP ²

² VP1 (18 hours), VP1a (18 hours), VP2 (36 hours), VP3 (18 hours), VP3a (18 hours), VP4 (36 hours).

Flight activity of target species was mapped and recorded as per defined flight bands which were chosen in relation to the dimensions of potential turbine models for the site. Bands were split into 0-15m, 15-25m, 25-200m and >200m. All flight activity within a height bands 15-25m and 25-200m is considered to be within the Potential Collision Height (PCH) with regard to the turbine swept area, based on the largest proposed turbine range dimensions (i.e. 22m to 185m). See Appendix 7-5 for further detail. In addition, the presence of any non-target species was recorded to inform the evaluation of supporting habitat.

Each flight observation was assigned a unique identifier when mapped in the field and subsequently digitised using GIS software.

7.2.4.2.2 Breeding Walkover Surveys

Breeding walkover surveys were undertaken to determine the presence of bird species of high conservation concern and identify areas of possible, probable or confirmed breeding for bird species observed within the Wind Farm Site and 500m radius. The methodology was based on Brown and Shepherd (1993) and Calladine *et al.* (2009), combined with Common Bird Census methods (British Trust for Ornithology, 2021) for dense habitat. The survey area for these surveys was the Wind Farm Site and a 500m survey radius of the Wind Farm Site.

Transect routes were devised to ensure the required coverage of different habitat was achieved within the survey area. Transects were selected to ensure all areas of suitable breeding/ foraging habitat were approached to within 100m, where access allowed. Target species included waders, raptors, waterbirds, gulls and other birds of conservation concern. Along with target species, all additional non-target species observed were recorded to inform the evaluation of supporting habitat.

Breeding walkover surveys were carried out during daylight hours during the core breeding season months April to July (2021 and 2022), with the Wind Farm Site being visited two to three days per month on each occasion. The timing of visits followed the recommendations of Calladine *et al.* (2009). Following all survey visits, the field maps were analysed to determine the number and location of breeding territories. All non-breeding individuals and species encountered were also recorded.

The survey effort is presented in Appendix 7-2, including full details of dates, times and weather conditions for each survey. Figure 7-3 shows the survey area.

7.2.4.2.3 Breeding Raptor Surveys

Raptors include all harrier, falcon, buzzard, eagle, hawk, owl, kite and osprey species. Breeding raptor surveys were undertaken within the Wind Farm Site and to a 2km radius to identify occupied territories and monitor their breeding success near or within the Wind Farm Site. Survey methodology followed Hardey *et al.* (2013). Raptor surveys were undertaken to a 2km radius from the Wind Farm Site, in the form of short vantage point watches and walked transects. All raptor species observed were recorded and mapped and breeding status was assigned following British Trust for Ornithology (BTO) breeding status codes. Surveyors did not approach nest sites to avoid disturbance.

Each breeding raptor location was surveyed once per month during the core breeding season between April and July (2021 and 2022). Each round of surveys was undertaken over three days to survey the entirety of the survey area.

Survey effort is presented in Appendix 7-2, including full details of dates, times and weather conditions. Figure 7-4 shows the breeding raptor locations.

7.2.4.2.4 Breeding Woodcock Surveys

Breeding woodcock surveys were undertaken in accordance with Gilbert *et al.* (1998). Surveys were undertaken at the Wind Farm Site in May and June in 2021 and 2022. The survey area extended 500m beyond the Wind Farm Site boundary and was focused in areas of suitable habitat. Surveys commenced one hour before sunset and continued for one hour after sunset or until it was too dark to see, as per Gilbert *et al.* (1998). Transects were slowly walked through areas of suitable woodland habitat onsite and to a 500m radius of the Wind Farm Site. All observations of woodcock (as well as the areas covered) were mapped. The survey aimed to record the presence of roding (displaying) male woodcock and thereby establish the distribution and abundance of the species in the surveyed area. This survey method also allowed the observer to survey for owls, i.e. barn owls and long-eared owls.

Survey effort is presented in Appendix 7-2, including full details of dates, times and weather conditions. Figure 7-5 shows the transect routes.

7.2.4.2.5 Breeding Barn Owl Survey

Following an observation of a barn owl at an agricultural shed in February 2023 within 500m of the Wind Farm Site, dedicated breeding barn owl surveys were undertaken in April, May & June 2023. The survey aimed to confirm occupancy of this location. Survey methodology followed TII (2021). The surveyor conducted a watch overlooking the potential nest site from 30 mins before sunset until 1 hour after sunset, searching for barn owls provisioning young and listening for the sound of chicks. All such observations were recorded and mapped, and a breeding status was assigned following TII (2021). Survey effort is presented in Appendix 7-2, Table 5, including full details of dates, times and weather conditions. Confidential Appendix 7-7, Figure 7-7-4-2 shows the area surveyed.

7.2.4.2.6 Winter Walkover Surveys

Winter walkover surveys were undertaken to record the presence of bird species within the Wind Farm Site and to a 500m radius of the Wind Farm Site, including areas between vantage point locations. The methodology was adapted from the breeding walkover methodology outlined in Brown and Shepherd (1993) and Calladine *et al.* (2009), combined with Common Bird Census methods (British Trust for Ornithology, 2021). Transect routes were walked across different habitat complexes within the survey area where access allowed. All target species were recorded and mapped. In addition, the presence of any non-target species was recorded to inform the evaluation of supporting habitat.

Winter walkover surveys were conducted in daylight hours over four visits between October and March (i.e. four visits in winter 2020/2021, four visits in winter 2021/2022 and four visits in winter 2022/2023). Survey effort is presented in Appendix 7-2, including full details of dates, times and weather conditions for each survey. Figure 7-3 shows the survey area.

7.2.4.2.7 Waterbird Distribution Surveys

Waterbirds include: swans, geese and ducks; cormorant, shag, divers and grebes; auks and seabirds; gulls, terns and skuas; herons, egrets and crane; rails and crakes; waders; and kingfisher. Significant wetlands and waterbodies within a minimum 8km of the Wind Farm Site were surveyed for waterbirds during the 2020/2021, 2021/2022 and 2022/2023 winter and passage seasons (August to May inclusive) to provide information on their distribution in relation to the Wind Farm Site. The area surveyed exceeds the 500m for foraging waterbirds and 1km for roosting waterbirds requirements of NatureScot (2017) and follows the recommendations of NatureScot (2016) to account for the core foraging ranges of whooper swan (<5km) and Greenland white-fronted goose (5-8km) which are Annex I waterbirds listed as species of special conservation interest (SCI) of SPAs within 15km of the Wind Farm Site.

Survey methodology follows Gilbert *et al.* (1998) and the Irish Wetland Bird Survey (BirdWatch Ireland, 2021). Surveys were undertaken during daylight hours from suitable vantage points at wetlands and waterbodies. All target waterbird species were recorded and mapped. Survey effort, including details of survey duration and weather conditions, is presented in Appendix 7-2. Figure 7-6 shows the surveyed area.

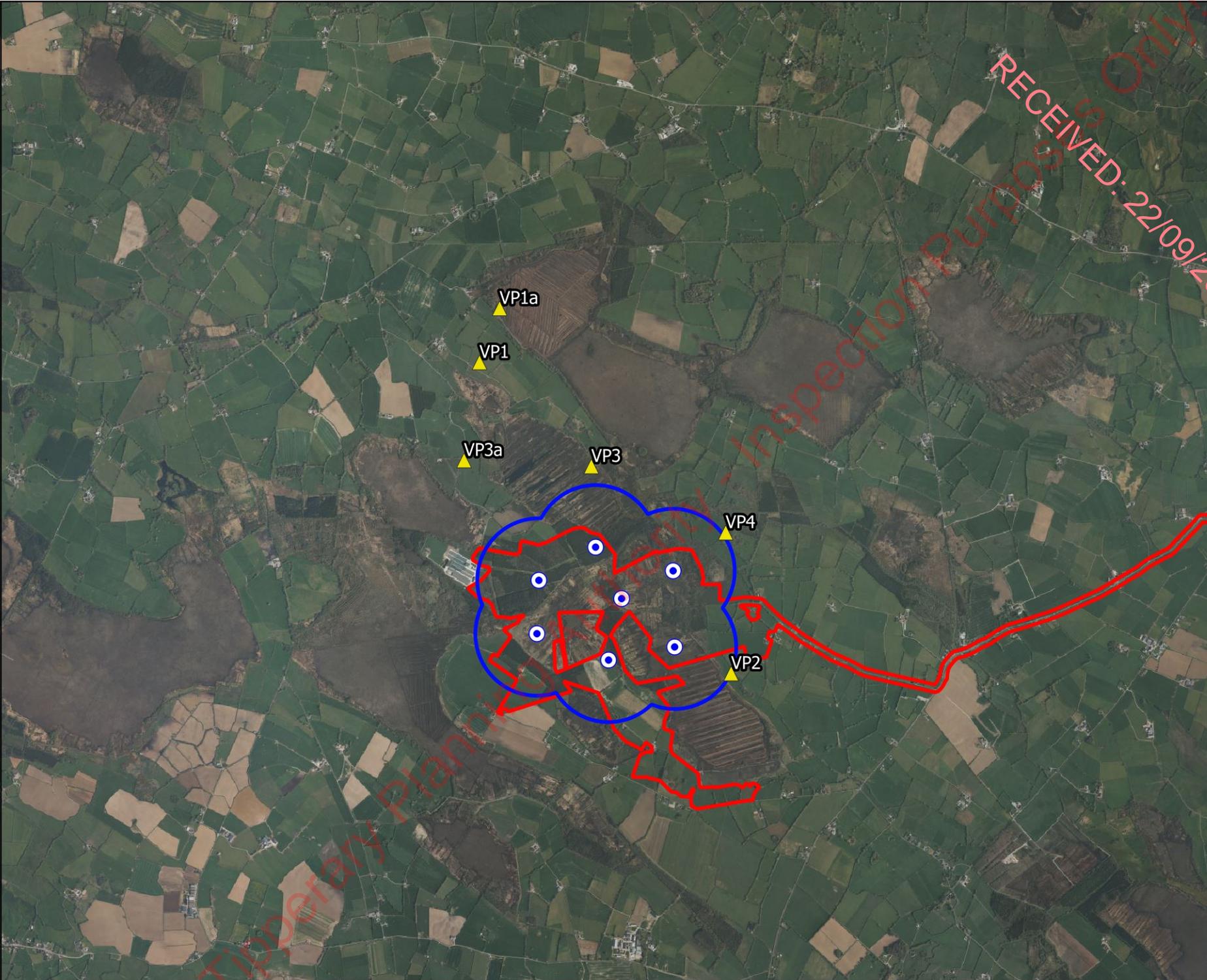
7.2.4.2.8 **Hen Harrier Roost Surveys**

Hen harrier roost surveys were undertaken within the Wind Farm Site and to a minimum 2km radius of the Wind Farm Site. These surveys aimed to identify active winter hen harrier roosts near or within the Wind Farm Site. Survey methodology followed Gilbert *et al.* (1998) and O'Donoghue (2019). Roost watches of 2-3 hours were conducted at five hen harrier vantage point locations from dusk until last visible light during which all hen harrier observations were recorded and mapped.

Each hen harrier vantage point was surveyed once per month during the winter season between October and March inclusive (in winter 2020/2021, 2021/2022 and 2022/2023). Survey effort is presented in Appendix 7-2, including full details of dates, times and weather conditions. Figure 7-7 shows the hen harrier vantage point locations.

7.2.4.2.9 **Multidisciplinary Walkover Survey**

The grid connection route was surveyed in June and July 2023 through a multidisciplinary walkover survey. The site was systematically walked, while the surveyor recorded a range of protected species, including birds. Further details on this survey are available in the Biodiversity Chapter (Chapter 6, Section 6.4.3 of this EIAR).



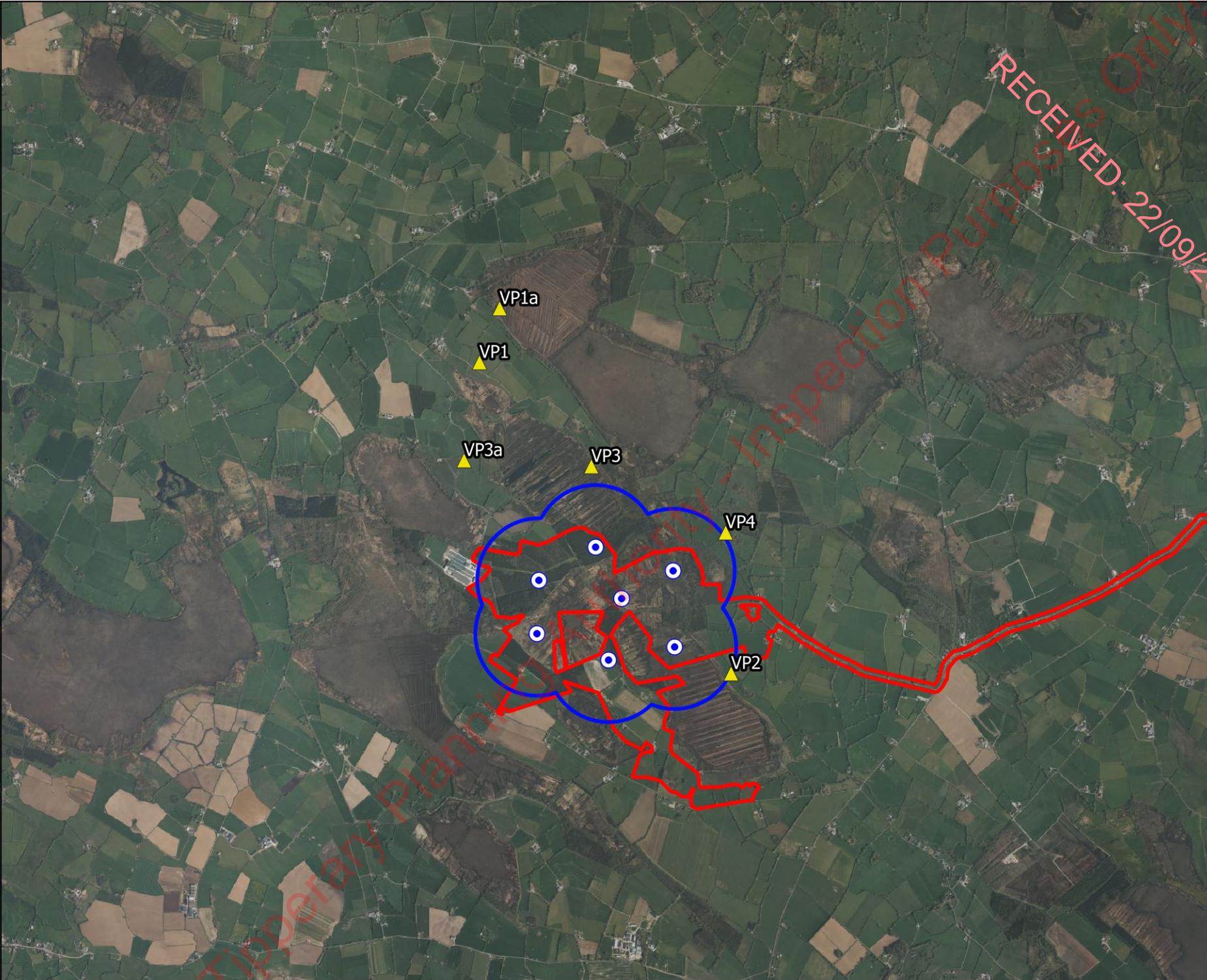
Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- ▲ Vantage Point Locations



Drawing Title	
Vantage Point Locations	
Project Title	
Carrig Renewables Wind Farm	
Drawn By	Checked By
D. Woods	P. Cregg
Project No	Drawing No
211016	Fig. 7-1
Scale	Date
1:40,000	22.08.2023
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Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- ▲ Vantage Point Locations

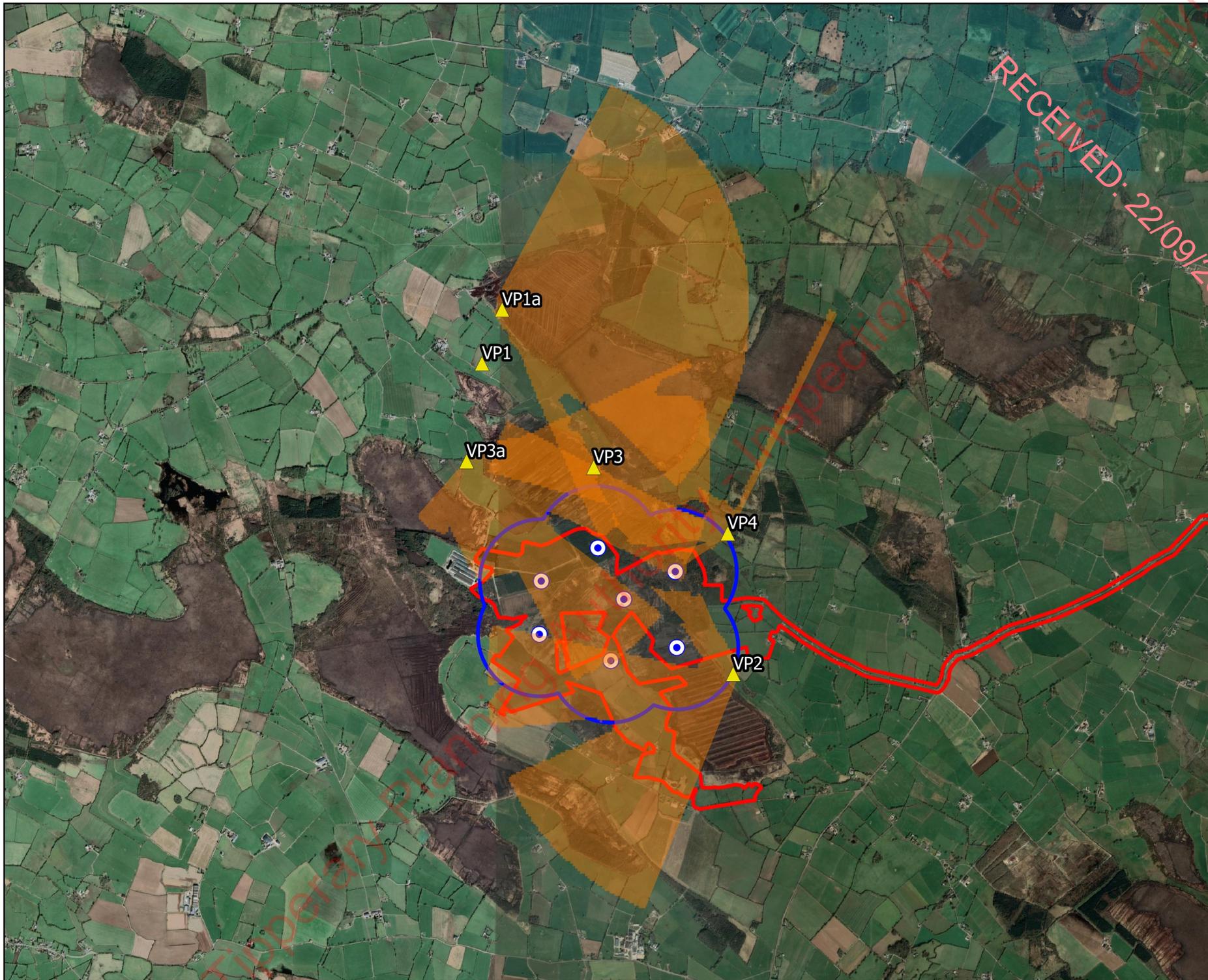
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Drawing Title	
Vantage Point Locations	
Project Title	
Carrig Renewables Wind Farm	
Drawn By	Checked By
D. Woods	P. Cregg
Project No	Drawing No
211016	Fig. 7-1
Scale	Date
1:40,000	22.08.2023
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Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- ▲ Vantage Point Locations
- Viewshed



Drawing Title:

**Viewshed Coverage at 22m
(VP1a, VP2, VP3a & VP4)**

Project Title:

Carrig Renewables Wind Farm

Drawn By:

D. Woods

Checked By:

P. Cregg

Project No.:

211016

Drawing No.:

Fig. 7-2-2

Scale:

1:40000

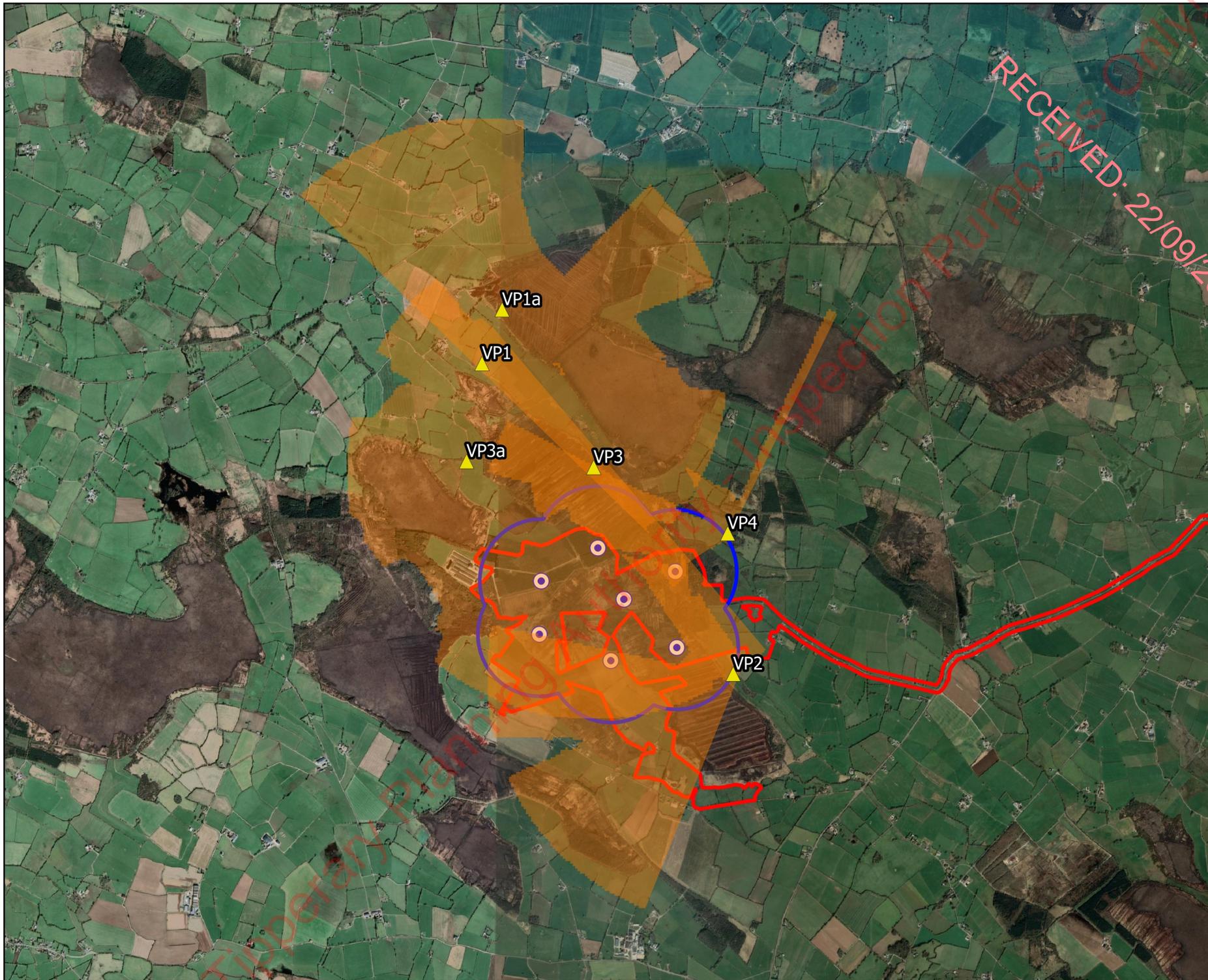
Date:

22.08.2023



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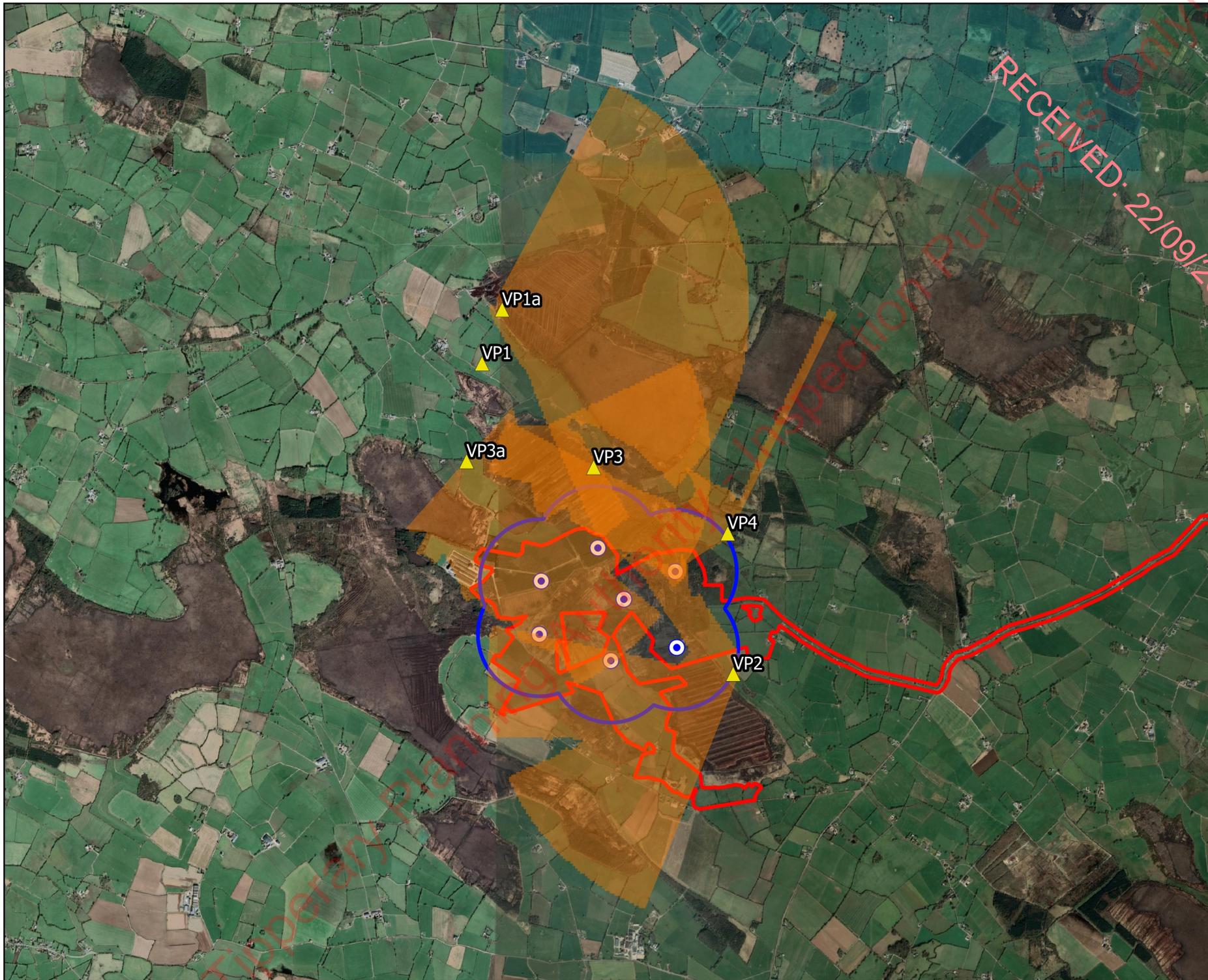
Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- ▲ Vantage Point Locations
- Viewshed



Drawing Title:	
Viewshed Coverage at 30m (VP1, VP2, VP3 & VP4)	
Project Title:	
Carrig Renewables Wind Farm	
Drawn By:	Checked By:
D. Woods	P. Cregg
Project No.:	Drawing No.:
211016	Fig. 7-2-3
Scale:	Date:
1:40000	22.08.2023
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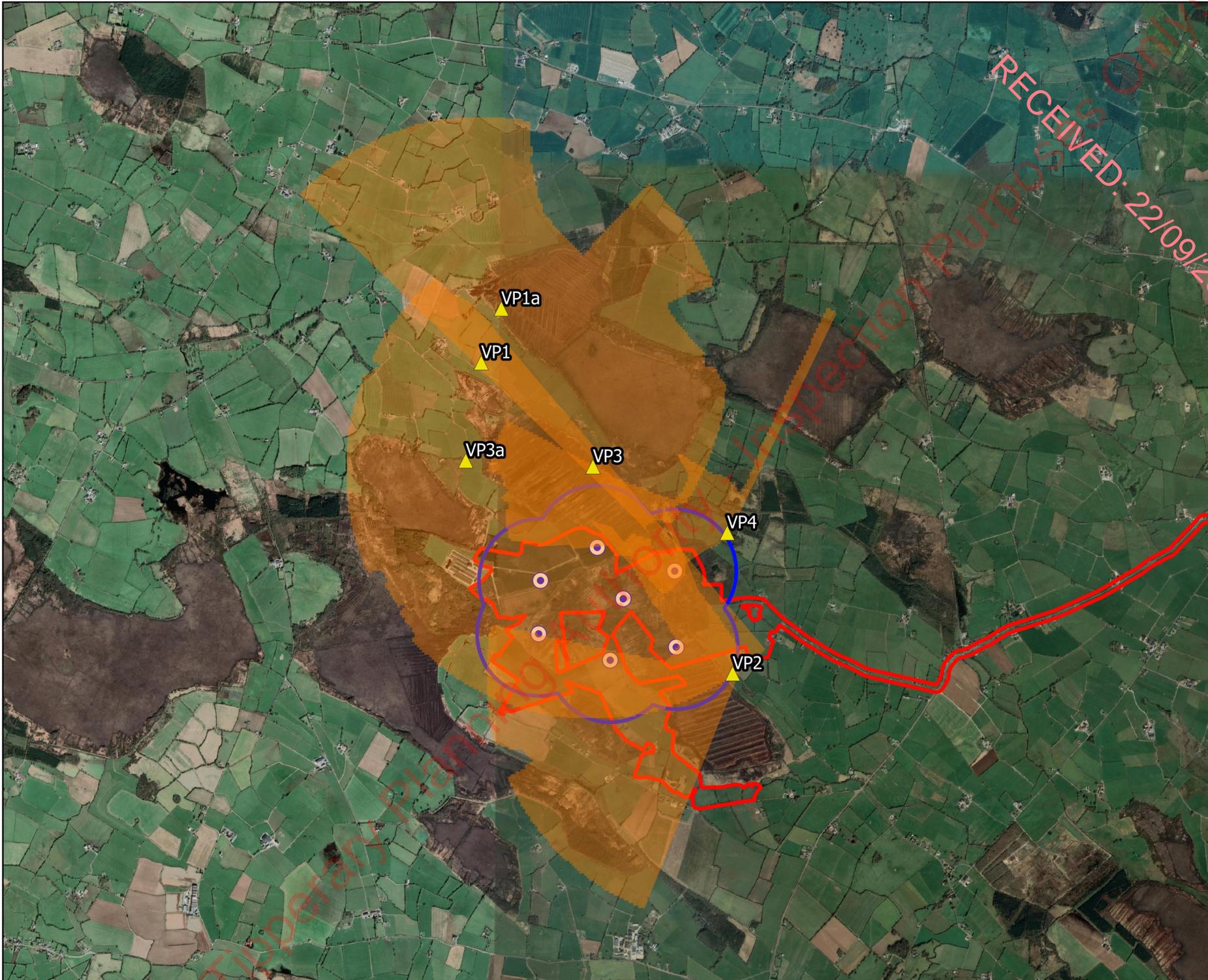
Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- ▲ Vantage Point Locations
- Viewshed



Drawing Title:	
Viewshed Coverage at 30m (VP1a, VP2, VP3a & VP4)	
Project Title:	
Carrig Renewables Wind Farm	
Drawn By:	Checked By:
D. Woods	P. Cregg
Project No.:	Drawing No.:
211016	Fig. 7-2-4
Scale:	Date:
1:40000	22.08.2023
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Map Legend

- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- ▲ Vantage Point Locations
- Viewshed

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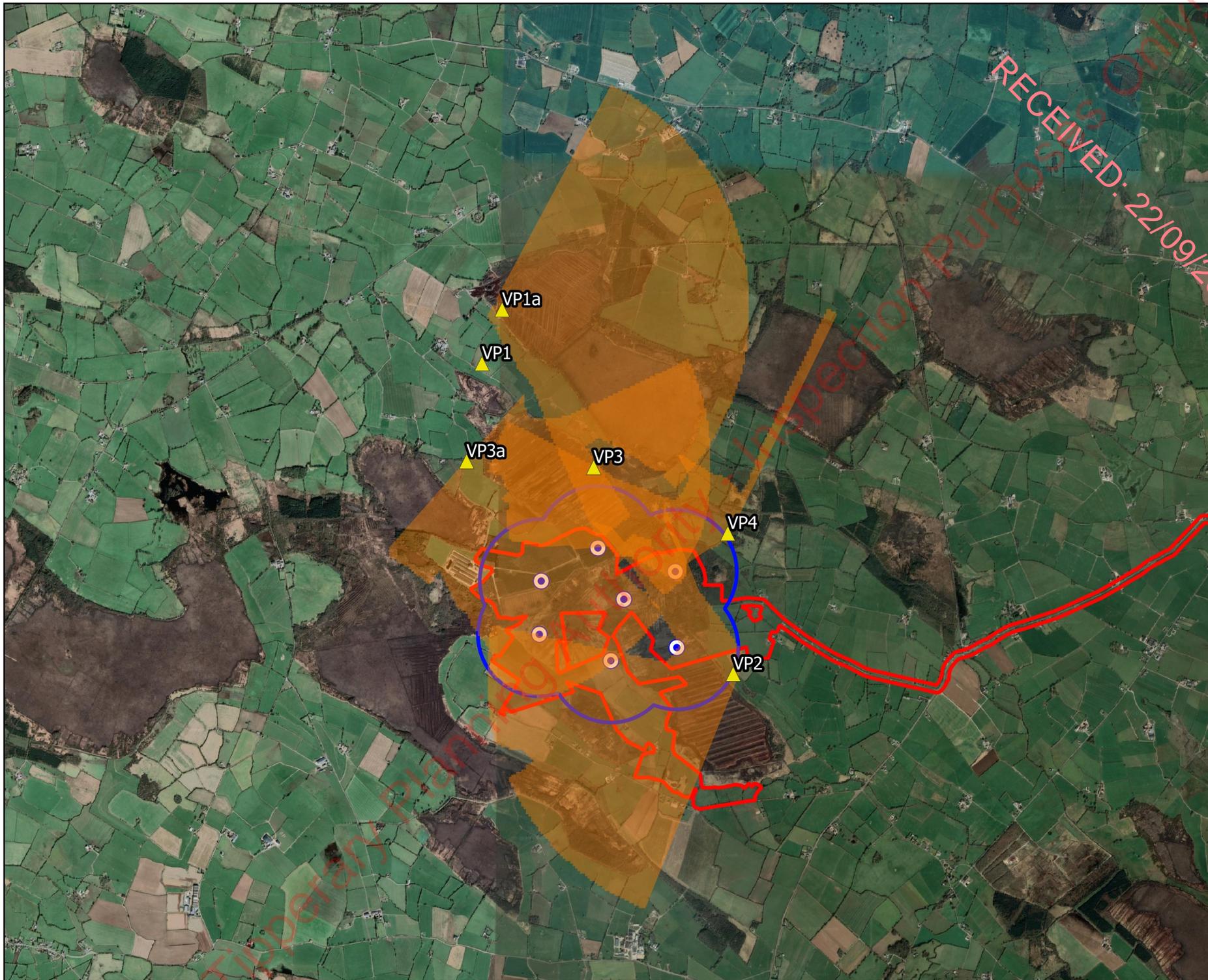
Drawing Title:
**Viewshed Coverage at 36m
(VP1, VP2, VP3 & VP4)**

Project Title:
Carrig Renewables Wind Farm

Drawn By D. Woods	Checked By P. Cregg
Project No. 211016	Drawing No. Fig. 7-2-5
Scale 1:40000	Date 22.08.2023

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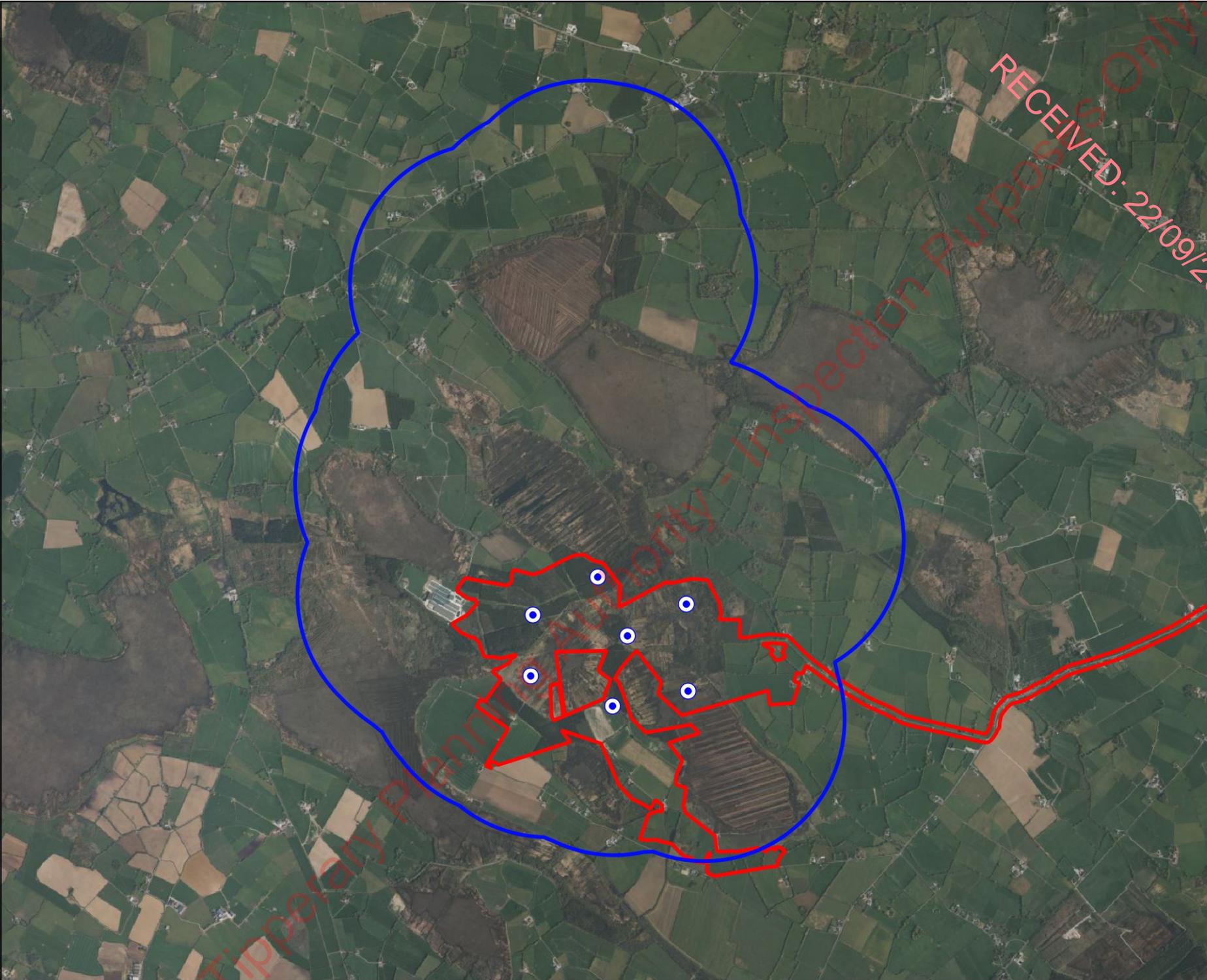
- EIA Site Boundary
- Turbine Layout
- 500m Radius of Turbines
- ▲ Vantage Point Locations
- Viewshed

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Drawing Title: Viewshed Coverage at 36m (VP1a, VP2, VP3a & VP4)	
Project Title: Carrig Renewables Wind Farm	
Drawn By: D. Woods	Checked By: P. Cregg
Project No.: 211016	Drawing No.: Fig. 7-2-6
Scale: 1:40000	Date: 22.08.2023
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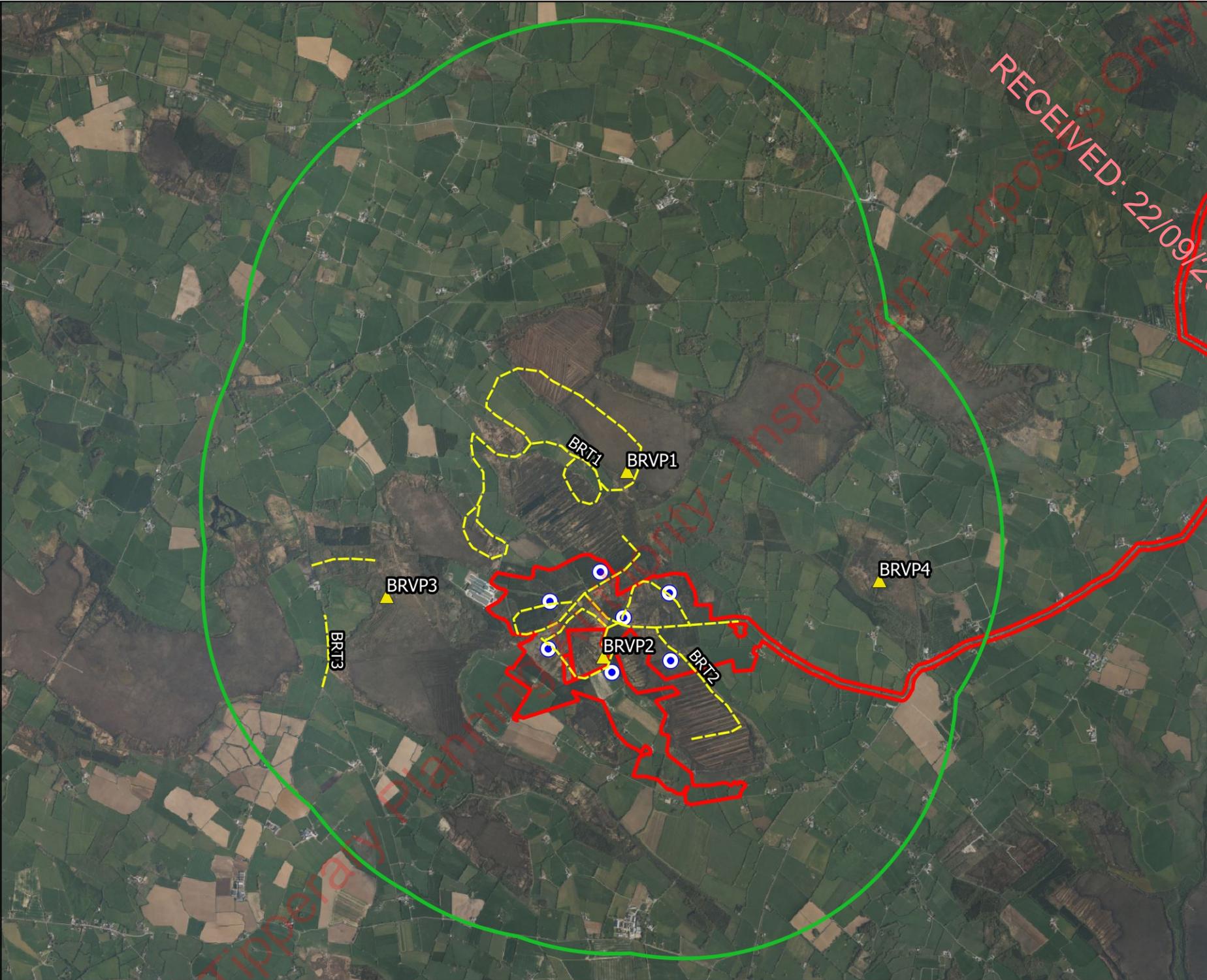
Map Legend

-  EIA Site Boundary
-  Turbine Layout
-  500m Survey Area



Drawing Title	
Walkover Survey	
Project Title	
Carrig Renewables Wind Farm	
Drawn By	Checked By
D. Woods	P. Cregg
Project No	Drawing No
211016	Fig. 7-3
Scale	Date
1:35,000	22.08.2023
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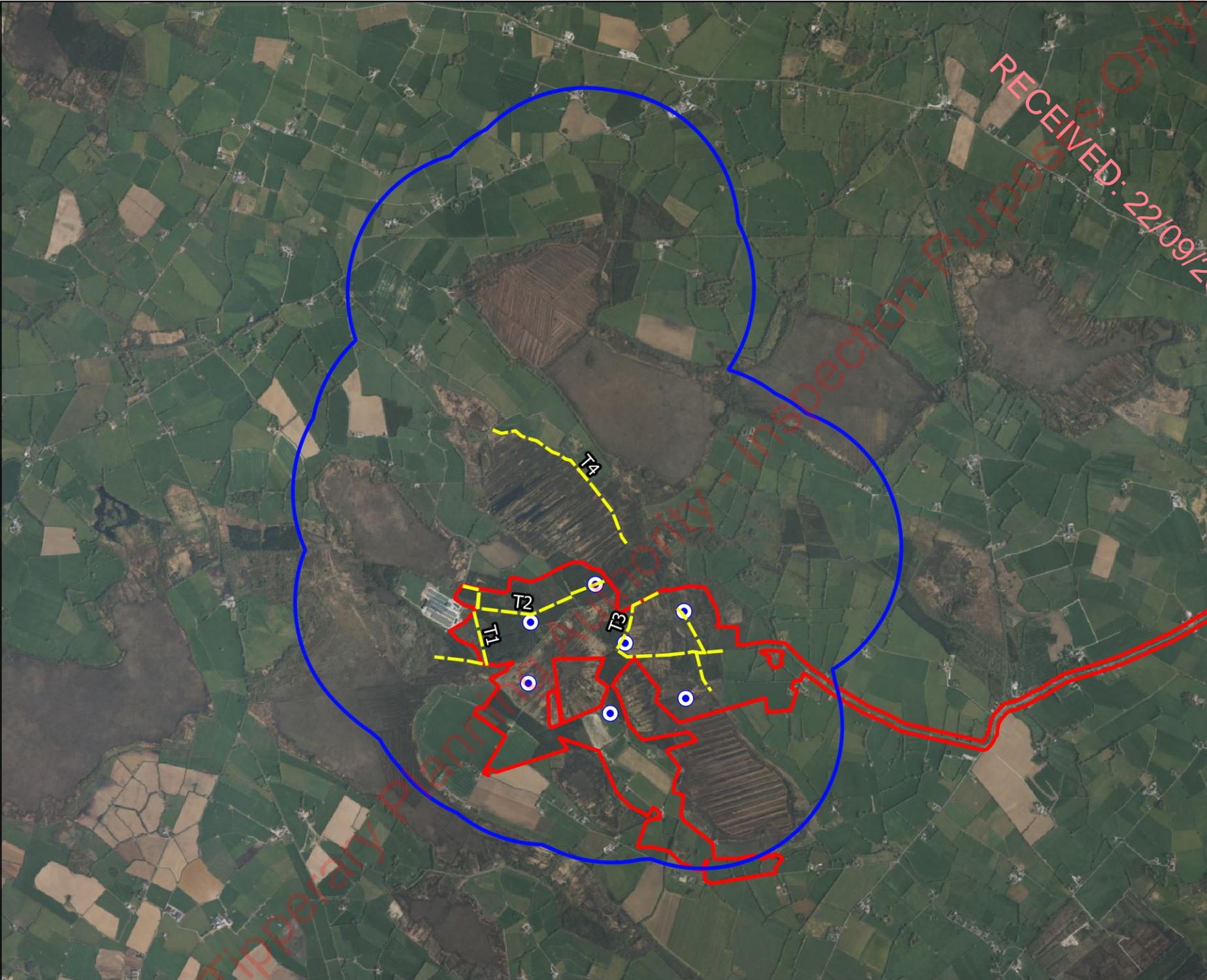
Map Legend

- EIA Site Boundary
- Turbine Layout
- 2km Survey Area
- ▲ BRVP Locations
- BR Transects



Drawing Title	
Breeding Raptor Survey	
Project Title	
Carrig Renewables Wind Farm	
Drawn By	Checked By
D. Woods	P. Cregg
Project No	Drawing No
211016	Fig. 7-4
Scale	Date
1:45,000	22.08.2023
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Map Legend

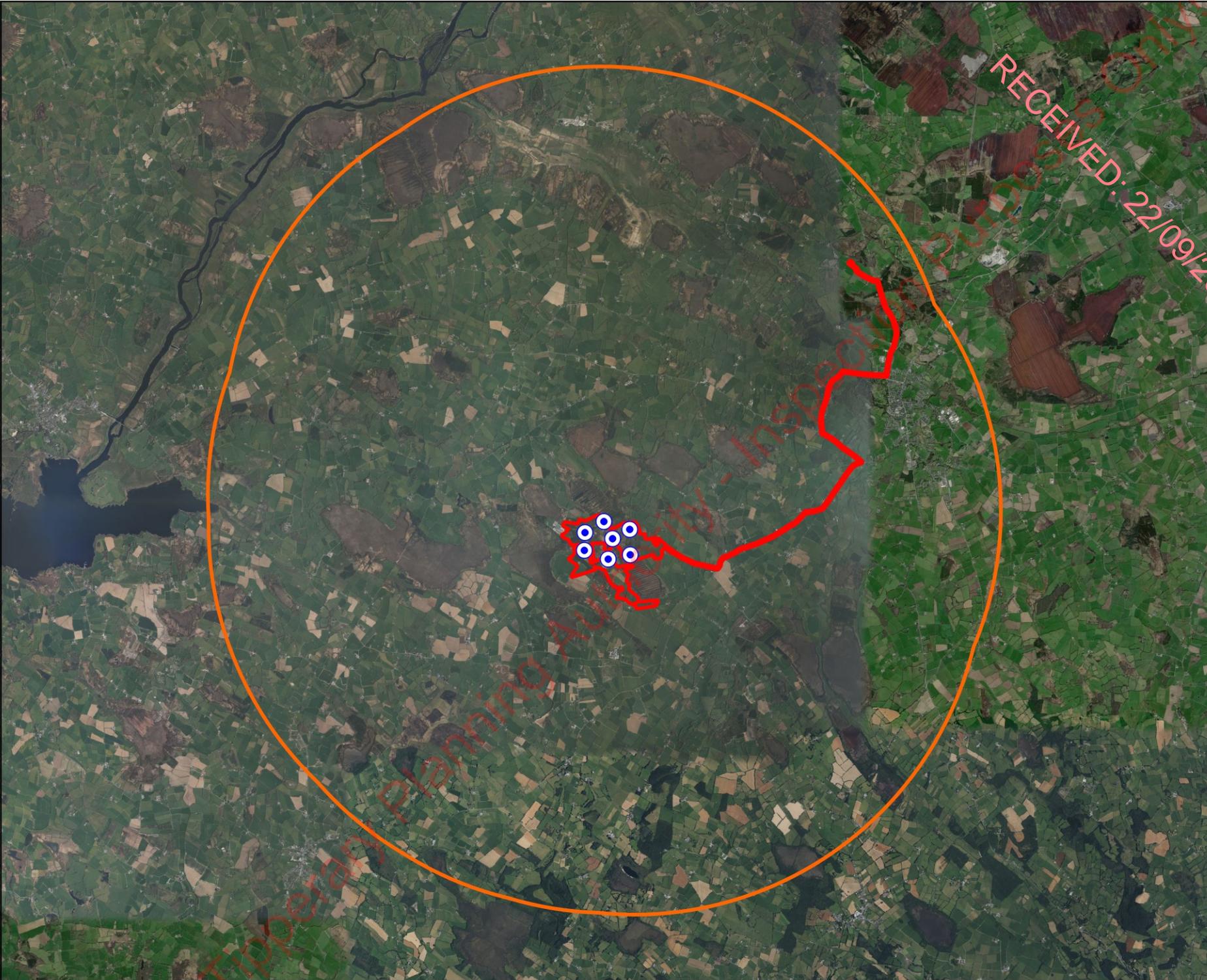
- EIA Site Boundary
- Turbine Layout
- 500m Survey Area
- Transects



Drawing Title Breeding Woodcock Survey	
Project Title Carrig Renewables Wind Farm	
Drawn By D. Woods	Checked By P. Cregg
Project No 211016	Drawing No Fig. 7-5
Scale 1:35,000	Date 22.08.2023

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Map Legend

-  EIA Site Boundary
-  Turbine Layout
-  8km Survey Area



Drawing Title
Waterbird Distribution Survey

Project Title
Carrig Renewables Wind Farm

Drawn By D. Woods	Checked By P. Cregg
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Project No 211016	Drawing No Fig. 7-6
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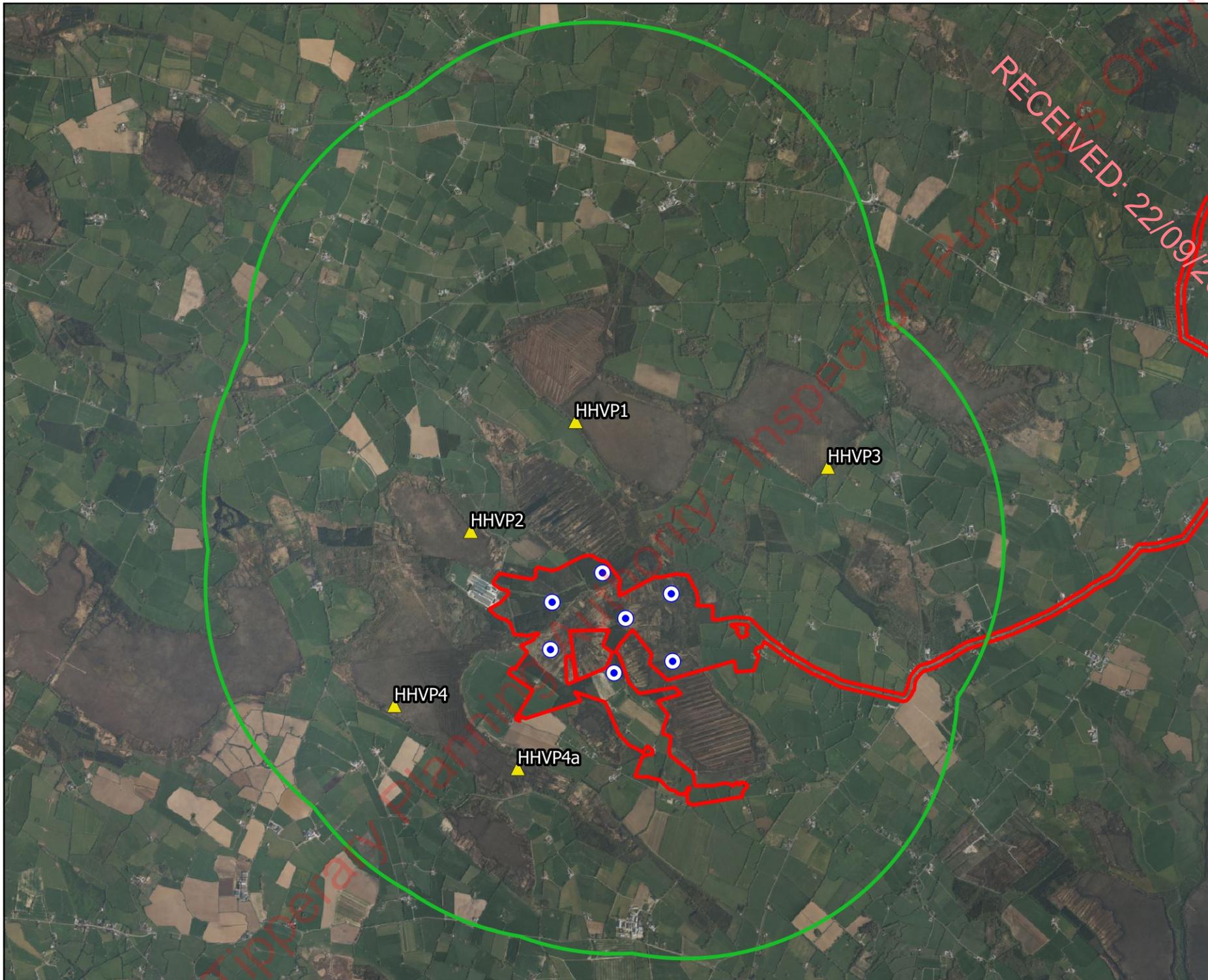
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Map Legend

- EIA Site Boundary
- Turbine Layout
- 2km Survey Area
- ▲ HHVP Locations



Drawing Title	
Hen Harrier Roost Survey	
Project Title	
Carrig Renewables Wind Farm	
Drawn By	Checked By
D. Woods	P. Cregg
Project No	Drawing No
211016	Fig. 7-7
Scale	Date
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7.2.5 Receptor Evaluation and Impact Assessment

7.2.5.1 Potential Impacts Associated with Proposed Development

Wind farms present three potential risks to birds (Drewitt and Langston 2006, 2008; *Band et al.*, 2007):

- **Direct habitat loss** due to wind farm infrastructure.
- **Disturbance/displacement** (sometimes called indirect habitat loss) if birds avoid the wind farm and its surrounding area due to construction works or turbine operation. Displacement may also include barrier effects in which birds are deterred from using normal routes to feeding or roosting grounds.
- Death through **collision** or interaction with turbine blades and other infrastructure.

For each of these three risks, the detailed knowledge of bird distribution and flight activity within and surrounding the Wind Farm Site has been used to predict potential impacts of the Proposed Development on birds. These impacts are also assessed cumulatively with other projects. The geographical framework and description of impacts are described below.

7.2.5.2 Geographical Framework

Guidance on Ecological Impact Assessment (CIEEM, 2019) recommends categories of ornithological value that relate to a geographical framework (e.g. international through to local). This chapter of the EIAR utilises the geographical framework described in ‘Guidelines for Assessment of Ecological Impact of National Road Schemes’ (NRA, 2009). The following geographic frame of reference should be used when determining the value of a bird population:

- International Importance
- National Importance
- County Importance
- Local Importance (Higher Value)
- Local Importance (Lower Value)

Locally Important (Lower Value) receptors are habitats and species that are widespread and of low ecological significance and important only in the local area. In contrast, Internationally Important sites are designated for conservation as part of the Natura 2000 Network (Special Area of Conservation or Special Protection Area) or provide the best examples of habitats or internationally important populations of protected flora and fauna.

7.2.5.3 Description of Impacts

The sensitivity, magnitude and significance of impacts on bird populations resulting from the Proposed Development was quantified according to two assessment criteria: Percival (2003) and the Environmental Protection Agency (EPA, 2022). The two assessment criteria have been used to independently characterise impacts to inform a robust assessment of potential impacts. EPA impact assessment criteria has been used for consistency between the Biodiversity and Ornithology chapters of this EIAR, while Percival (2003) has also been followed given its specific focus on birds.

Percival (2003) criteria

The Percival (2003) methodology quantifies the sensitivity of a given species to the development type, the magnitude of the effect and the significance of the potential impact. Table 7-3 (Sensitivity), Table 7-4 (Magnitude of effect) and

Table 7-5 (Determination of significance) outline the assessment criteria for each stage.

Table 7-3 Evaluation of sensitivity for birds (from Percival, 2003)

Sensitivity	Determining Factor
Very High	Species that form the cited interest of SPAs and other statutorily protected nature conservation areas. Cited means mentioned in the citation text for the site as a species for which the site is designated.
High	Species that contribute to the integrity of a SPA but which are not cited as a species for which the site is designated. Ecologically sensitive species including the following: divers, common scoter, hen harrier, golden eagle, red necked phalarope, roseate tern and chough. Species present in nationally important numbers (>1% of the Irish population)
Medium	Species listed on Annex 1 of the EU Birds Directive. Species present in regionally important numbers (>1% county population), Other species on BirdWatch Ireland’s Red List of Birds of Conservation Concern
Low	Any other species of conservation interest, including species on BirdWatch Ireland’s Amber List of Birds of Conservation Concern, not covered above.

Table 7-4 Determination of magnitude of effects (from Percival, 2003)

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

Table 7-5 Significance matrix combining magnitude and sensitivity to assess significance (from Percival, 2003)

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

EPA (2022) Criteria

EPA criteria use the following terms to describe the quality of the effect:

- **Positive** - a change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
- **Neutral** - no effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
- **Negative** - a change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).

The significance of the effect is quantified as:

- **Imperceptible** - an effect capable of measurement but without significant consequences.
- **Not Significant** - an effect which causes noticeable changes in the character of the environment but without significant consequences.
- **Slight** - an effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
- **Moderate** - an effect that alters the character of the environment that is consistent with existing and emerging baseline trends.
- **Significant** - an effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment.
- **Very Significant** - an effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
- **Profound** - an effect which obliterates sensitive characteristics.

The duration of effects can be:

- **Momentary** - effects lasting from seconds to minutes.
- **Brief** - effects lasting less than a day.
- **Temporary** - effects lasting less than a year.
- **Short-term** - effects lasting 1 to 7 years.
- **Medium term** - effects lasting 7 to 15 years.
- **Long term** - effects lasting 15 to 60 years.
- **Permanent** - effects lasting over 60 years.
- **Reversible** - effects that can be undone (e.g. through remediation or restoration).

The frequency of effects (i.e. how often the effect will occur) can be:

- **Once, rarely, occasionally, frequently or constantly**
- **Hourly, daily, weekly, monthly or annually**

The probability of the effect may be:

- **Likely** – the effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
- **Unlikely** – the effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

The effects may also be described in relation to their extent and context. Extent describes the population affected by an effect, while context relates the effect to the established baseline conditions.

7.2.5.4 Collision Risk Assessment

Collision risk is calculated using a mathematical model to predict the number of individual birds of a particular species that may be killed by collision with moving wind turbine rotor blades. The modelling method used in this collision risk calculation follows the Band Model (Band *et al.*, 2007), as recommended by NatureScot guidance. The Band Model first determines the number of bird transits through the air space swept by the rotor blades of the wind turbines. Then it calculates the collision risk for the birds. The product of the transits multiplied by the collision risk provides a collision rate. An avoidance factor is applied to this to account for birds actively avoiding turbines, providing a final “real world” annual collision rate for each species. See Appendix 7-5 for full details on the collision risk modelling method.

7.2.6 Assessment Justification

7.2.6.1 Survey Data

A comprehensive suite of bird surveys was undertaken within and around the Proposed Development site between September 2020 and March 2023. Results derived from a continuous 2.5 years of surveying at the Wind Farm Site and hinterland, undertaken in line with NatureScot guidance, are analysed to inform this assessment. As such, 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.

7.2.6.2 Mitigation

The development has been designed to specifically avoid, reduce and minimise impacts on all avian receptors. Where potential impacts on KORs are predicted, mitigation has been prescribed to avoid, reduce and remove such impacts. Proposed best practice design and mitigation measures are specifically set out and are realistic in terms of cost and practicality. They have been subject to detailed design and will effectively address the effects on the identified KORs. As such, the potential impacts of the Proposed Development have been considered and assessed to ensure that all impacts on KORs are adequately addressed and no significant residual effects are likely to remain following the implementation of mitigation measures and best practices (refer to Section 7.6 for further details).

7.2.6.3 Limitations

The information provided in this EIAR chapter accurately and comprehensively describes the baseline environment and provides an informed prediction of the likely impacts of the Proposed Development. It also prescribes mitigation as necessary and describes the predicted residual effects. Furthermore, the



specialist studies, analysis and reporting have been undertaken in accordance with the appropriate guidelines. Therefore, no significant limitations in the scope, scale or context of the assessment have been identified.

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7.3 Baseline Ornithological Conditions

7.3.1 Designated Sites within the Likely ZOI of the Development

A screening assessment and Natura Impact Statement (NIS) were prepared to provide the competent authority with the information necessary to complete an Appropriate Assessment for the Proposed Development in compliance with Article 6(3) of the EU Habitats Directive (92/43/EEC). According to EPA (2022) “A biodiversity section of an EIAR ... should not repeat the detailed assessment of potential effects on European sites contained in documentation prepared as part of the Appropriate Assessment process, but it should refer to the findings of that separate assessment”. Therefore, this section provides a summary of the key findings regarding SPAs and nationally designated sites. For a detailed assessment of any potential impacts on SPAs, refer to the Appropriate Assessment Screening Report and Natura Impact Statement which accompany this application.

Sites designated for nature conservation within the potential ZOI of the Proposed Development were identified using GIS software. The ZOI is derived utilising a precautionary approach. Initially, sites within a 15km radius of the proposed works are identified. Then designated sites located outside the 15km buffer zone are accounted for and assessed for pathways for impacts. In this case, no potential for direct or indirect impacts for species listed as SCIs of SPAs more than 15km from the Proposed Development was identified.

In addition (and in the absence of any specific European or Irish guidance), the guidance document ‘Assessing Connectivity with Special Protection Areas’ (NatureScot, 2016) was consulted. This document provides guidance on identifying of connectivity between the Proposed Development and SPAs. It considers the distances some species may travel beyond the boundary of their SPAs and outlines dispersal and foraging ranges. Potential effects on wetlands and supporting habitats associated with SPAs and potential indirect pathways in the form of surface water pollution are considered in the Appropriate Assessment and NIS and summarised below.

Six SPAs were located within 15km of the EIAR Site Boundary (including grid connection route). The SPAs are listed and summarised in Table 7-6.

Table 7-6 Designated sites in the Zone of Influence

Site Name	Distance from proposed works	Special Conservation Interests for which the site has been designated	Conservation Objectives	Zone of Influence Determination and Identification of Pathways for Effect
Special Protection Area				
River Little Brosna Callows SPA	6.1km from the Wind Farm Site 3km from EIAR site boundary including grid connection route.	<ul style="list-style-type: none"> ➤ Whooper Swan (<i>Cygnus cygnus</i>) [A038] ➤ Wigeon (<i>Anas penelope</i>) [A050] ➤ Teal (<i>Anas crecca</i>) [A052] ➤ Pintail (<i>Anas acuta</i>) [A054] ➤ Shoveler (<i>Anas clypeata</i>) [A056] ➤ Golden Plover (<i>Pluvialis pritaria</i>) [A140] ➤ Lapwing (<i>Vanellus vanellus</i>) [A142] ➤ Black-tailed Godwit (<i>Limosa limosa</i>) [A156] ➤ Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] ➤ Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395] ➤ Wetland and Waterbirds [A999] 	<p>This SPA has the First-Order Site-specific Conservation Objectives:</p> <p>To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA</p> <p>And:</p> <p>To maintain or restore the favourable conservation condition of the wetland habitat at River Little Brosna Callows SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.</p> <p>NPWS (2022) Conservation objectives for River Little Brosna Callows SPA [004086]. First Order Site-specific Conservation</p>	<p>There will be no direct effects as the project footprint is located entirely outside the designated site.</p> <p>During ornithological surveys undertaken between September 2020 and March 2023, the following SCI species were recorded within the Wind Farm Site and/or within 500m of the Wind Farm Site: whooper swan, teal, pintail, shoveler, golden plover, lapwing and black-headed gull. There were no records of black-tailed godwit or Greenland white-fronted goose within 1km of the Wind Farm Site. Therefore, there is no potential for adverse effect via disturbance, displacement or collision risk for these species.</p> <p>The distance between the SPA and the Wind Farm Site is greater than the core foraging ranges of whooper swan (<5km), pintail (1.3km) and shoveler (2-3km)) (NatureScot, 2016; Johnson <i>et al</i>, 2014) and no regular or patterned flight activity of these species was recorded during surveys³ such as would suggest</p>

³ A number of the vantage point survey locations were located between the Wind Farm Site and the SPA. Surveys were conducted monthly at these locations over 2.5 years, including overlapping with periods of dusk and dawn.



Site Name	Distance from proposed works	Special Conservation Interests for which the site has been designated	Conservation Objectives	Zone of Influence Determination and Identification of Pathways for Effect
Special Protection Area				
			<p>Objectives Version 1.0. Department of Housing, Local Government and Heritage.</p>	<p>connectivity between the Wind Farm Site and the SPA (see Section 7.3.7 for outline of field survey results and Section 7.5.2 for further assessment). Furthermore, in relation to whooper swan, a regularly used roost site was identified within 500m of the Wind Farm Site. Flock sizes recorded in the vicinity of the Wind Farm Site were broadly in-line with numbers observed at the roost site, and therefore the birds recorded in the vicinity of the Wind Farm Site are considered to be associated with this roost site, and not the SPA. Therefore, based on published core foraging ranges and recorded flight activity, there is no evidence to suggest connectivity between the SPA and the Wind Farm Site for whooper swan, pintail or shoveler. Therefore, there is no potential for adverse effect via ex-situ collision risk, disturbance or displacement on the SCI populations of whooper swan, pintail and shoveler associated with the SPA.</p> <p>The core foraging ranges of black-headed gull (11.4km) and teal (8.4km) are greater than the distance between the SPA and the Wind Farm Site (Johnson <i>et al.</i>, 2014; Thaxter <i>et al.</i>, 2017). There is no widely recognised foraging range for wintering golden plover or lapwing. As such, there is potential connectivity between the Wind</p>



Site Name	Distance from proposed works	Special Conservation Interests for which the site has been designated	Conservation Objectives	Zone of Influence Determination and Identification of Pathways for Effect
Special Protection Area				
				<p>Farm Site and the SCI species of teal, black-headed gull, golden plover and lapwing of the SPA and further assessment is required. A potential for direct adverse effect via collision risk and indirect adverse effects via ex-situ disturbance, displacement were identified and further assessment is required.</p> <p>The SPA is located approx. 18km downstream of the Proposed Development site, therefore there is a potential for deterioration in water quality to the SPA.</p> <p>A pathway for likely significant effect on this European Site was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Dovegrove Callows SPA	<p>6.7km from the Wind Farm Site</p> <p>160m from ELAR site boundary including grid</p>	<p>➤ Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395]</p>	<p>This SPA has the First-Order Site-specific Conservation Objective:</p> <p><i>To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA</i></p>	<p>There will be no direct effects as the project footprint is located entirely outside the designated site.</p> <p>There were no observations of Greenland white-fronted geese within 500m of the Wind Farm Site during ornithological surveys undertaken between September 2020 and March 2023. There is no connectivity between the SCI</p>



Site Name	Distance from proposed works	Special Conservation Interests for which the site has been designated	Conservation Objectives	Zone of Influence Determination and Identification of Pathways for Effect
Special Protection Area				
	connection route		<p>NPWS (2022) Conservation objectives for Dovegrove Callows SPA [004137]. First Order Sitespecific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.</p>	<p>species of the SPA and the Wind Farm Site. Consequently, the potential for direct and indirect impacts on populations of SCI species associated with the SPA can be discounted.</p> <p>Due to the short-term duration of the proposed grid connection route/cable installation works into the road in the vicinity of this SPA, which is at its closest point 160m from the boundary of the SPA, and due to the availability of foraging and roosting habitat within the boundary of the SPA, there is no potential for adverse effect as a result of disturbance of Greenland White-fronted Goose during construction of the grid connection route. The noise/disturbance levels from the cable installation in the existing road will be similar to that of existing levels of farm machinery disturbance and other farm activities within the agricultural lands of the SPA boundary and these works are not likely to cause adverse effects to the population of the SPA.</p> <p>Hydrological connectivity between the Proposed Development and the SPA was identified via the proposed grid connection route. Therefore, a potential for likely significant indirect effect via</p>

Site Name	Distance from proposed works	Special Conservation Interests for which the site has been designated	Conservation Objectives	Zone of Influence Determination and Identification of Pathways for Effect
Special Protection Area				
				deterioration of surface water quality was identified. A pathway for likely significant effect on this European Site was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.
Lough Derg (Shannon) SPA	7.9km from the Wind Farm Site and ELAR site boundary including grid connection route	<ul style="list-style-type: none"> ➤ Cormorant (<i>Phalacrocorax carbo</i>) [A017] ➤ Tufted Duck (<i>Aythya fuligula</i>) [A061] ➤ Goldeneye (<i>Bucephala clangula</i>) [A067] ➤ Common Tern (<i>Sterna hirundo</i>) [A193] ➤ Wetland and Waterbirds [A999] 	<p>This SPA has the First-Order Site-specific Conservation Objectives:</p> <p><i>To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA</i></p> <p>And:</p> <p><i>To maintain or restore the favourable conservation condition of the wetland habitat at Lough Derg (Shannon) SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.</i></p>	<p>There will be no direct effects as the project footprint is located entirely outside the designated site.</p> <p>Of the four SCI species of the SPA, only cormorant was recorded within the Wind Farm Site and/or within 500m of the Wind Farm Site during ornithological surveys undertaken between September 2020 and March 2023. The distance between the SPA and the Wind Farm Site is greater than the core foraging range of cormorant (Thaxter <i>et al.</i>, 2017). There is no connectivity between the SCI species of the SPA and the Wind Farm Site. Consequently, the potential for direct and indirect impacts on populations of SCI species associated with the SPA can be discounted.</p>

Site Name	Distance from proposed works	Special Conservation Interests for which the site has been designated	Conservation Objectives	Zone of Influence Determination and Identification of Pathways for Effect
Special Protection Area				
			<p>NPWS (2022) Conservation objectives for Lough Derg (Shannon) SPA [004058]. First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.</p>	<p>The SPA is located approx. 43km downstream of the Proposed Development site, therefore, taking a precautionary approach, there is a potential for deterioration in water quality to the SPA.</p> <p>A pathway for likely significant effect on this European Site was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
All Saints Bog SPA	<p>8.0km from the Wind Farm Site</p> <p>3.6km from EIAR site boundary including grid connection route.</p>	<p>➤ Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395]</p>	<p>This SPA has the First-Order Site-specific Conservation Objective:</p> <p><i>To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA</i></p> <p>NPWS (2022) Conservation objectives for All Saints Bog SPA [004103]. First Order Sitespecific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage</p>	<p>There will be no direct effects as the project footprint is located entirely outside the designated site.</p> <p>During bird surveys which were undertaken for the Proposed Development between September 2020 and March 2023, there were no observations of Greenland white-fronted geese within 500m of the Wind Farm Site. The closest record of Greenland White-fronted Geese observed during the surveys was 7.8km away from the Wind Farm Site. There is no connectivity between the SCI species of the SPA and the Wind Farm Site. Therefore, the potential for direct and indirect effects on the</p>

Site Name	Distance from proposed works	Special Conservation Interests for which the site has been designated	Conservation Objectives	Zone of Influence Determination and Identification of Pathways for Effect
Special Protection Area				
				<p>populations of Greenland White-fronted Goose associated with the SPA can be discounted.</p> <p>No complete impact source-pathway receptor chain was identified between the Proposed Development and this SPA.</p> <p>No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. The site is not within the Likely Zone of Impact and is not considered further in this assessment.</p>
Middle Shannon Callows SPA	<p>9.8km from the Wind Farm Site</p> <p>7.6km from EIAR site boundary including grid connection route.</p>	<ul style="list-style-type: none"> ➤ Whooper Swan (<i>Cygnus cygnus</i>) [A038] ➤ Wigeon (<i>Anas penelope</i>) [A050] ➤ Corncrake (<i>Crex crex</i>) [A122] ➤ Golden Plover (<i>Pluvialis apricaria</i>) [A140] ➤ Lapwing (<i>Vanellus vanellus</i>) [A142] ➤ Black-tailed Godwit (<i>Limosa limosa</i>) [A156] 	Detailed conservation objectives for this site, (Version 1, November 2022 ⁴), were reviewed as part of the assessment and are available at www.npws.ie	<p>There will be no direct effects as the project footprint is located entirely outside the designated site.</p> <p>During ornithological surveys undertaken between September 2020 and March 2023, the following SCI species were recorded within the wind farm site and/or within 500m of the wind farm site: whooper swan, golden plover, lapwing and black-headed gull.</p>

⁴ https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004096.pdf



Site Name	Distance from proposed works	Special Conservation Interests for which the site has been designated	Conservation Objectives	Zone of Influence Determination and Identification of Pathways for Effect
Special Protection Area				
		<ul style="list-style-type: none"> ➤ Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] ➤ Wetland and Waterbirds [A999] 		<p>The distance between the SPA and the Wind Farm Site is greater than the core foraging range of whooper swan (<5km) (NatureScot, 2016), and no regular or patterned flight activity of this species was recorded during surveys⁵ such as would suggest connectivity between the Wind Farm Site and the SPA (see Section 7.3.7 for outline of field survey results and Section 7.5.2 for further assessment). Furthermore, in relation to whooper swan, a regularly used roost site was identified within 500m of the Wind Farm Site. Flock sizes recorded in the vicinity of the Wind Farm Site were broadly in-line with numbers observed at the roost site, and therefore the birds recorded in the vicinity of the Wind Farm Site are considered to be associated with this roost site, and not the SPA. Therefore, based on published core foraging ranges and recorded flight activity, there is no evidence to suggest connectivity between the SPA and the Wind Farm Site for whooper swan.</p>

⁵ A number of the vantage point survey locations were located between the Wind Farm Site and the SPA. Surveys were conducted monthly at these locations over 2.5 years, including overlapping with periods of dusk and dawn.

Site Name	Distance from proposed works	Special Conservation Interests for which the site has been designated	Conservation Objectives	Zone of Influence Determination and Identification of Pathways for Effect
Special Protection Area				
				<p>The core foraging ranges of black-headed gull (11.4km) is greater than the distance between the SPA and the Wind Farm Site (Thaxter <i>et al.</i>, 2017). There is no widely recognised foraging range for wintering golden plover or lapwing. As such, there is potential connectivity between the proposed development and the SCI species of black-headed gull, golden plover and lapwing of the SPA. The potential for significant effects on the SCI species in the form of disturbance, displacement and collision risk cannot be excluded and further assessment is required.</p> <p>The SPA is located approx. 28km downstream of the Proposed Development site, therefore there is a potential for deterioration in water quality to the SPA.</p> <p>A pathway for likely significant effect on this European Site was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Slieve Bloom Mountains SPA	17.8km from the Wind Farm Site	Hen Harrier (<i>Circus cyaneus</i>) [A082]	Detailed conservation objectives for this site, (Version 1,	There will be no direct effects as the project footprint is located entirely outside the designated site.



Site Name	Distance from proposed works	Special Conservation Interests for which the site has been designated	Conservation Objectives	Zone of Influence Determination and Identification of Pathways for Effect
Special Protection Area				
	12.7km from ELAR site boundary including grid connection route.		September 2022 ⁶), were reviewed as part of the assessment and are available at www.npws.ie	<p>The Wind Farm Site is located 17.8km from the SPA. The Wind Farm Site is outside the core foraging distance of hen harrier (Core range of 2km, with maximum range of 10km) as per Scottish Natural Heritage Guidelines (SNH, 2016). According to the Site-specific Conservation Objectives for this SPA, the core area used by breeding pairs is within 5km of nest sites. Therefore, it is highly unlikely that there is a potential for significant effect to breeding pairs.</p> <p>During the bird surveys which were undertaken for the Proposed Development between September 2020 and March 2023, hen harrier was only recorded within the wind farm site on one occasion over the three winters of bird surveys, comprising a single bird hunting. The Wind Farm Site is therefore not an important foraging habitat for hen harrier and there is no potential for construction works to result in ecologically significant habitat loss for hen harrier. The land lost to the development footprint is small (i.e. 6.02ha/2.5% of the Wind</p>

⁶ https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004160.pdf



Site Name	Distance from proposed works	Special Conservation Interests for which the site has been designated	Conservation Objectives	Zone of Influence Determination and Identification of Pathways for Effect
Special Protection Area				
				<p>Farm Site) relative to the total area within the Wind Farm Site.</p> <p>No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. The site is not within the Likely Zone of Impact and is not considered further in this assessment.</p>

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7.3.2

Breeding and Wintering Bird Atlas Records

“Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland’ (Balmer *et al.*, 2013) is the most recent comprehensive work on wintering and breeding birds in Ireland.

Previous bird atlases have been the primary source of information on the distribution and abundance of British and Irish birds prior to Bird Atlas 2007–11. The three previously published atlases were:

- Sharrock, J.T.R. (1976) The atlas of breeding birds in Britain and Ireland.
- Lack, P.C. (1986) The atlas of wintering birds in Britain and Ireland.
- Gibbons, D.W., Reid, J.B. & Chapman, R.A. (1993) The new atlas of breeding birds in Britain and Ireland: 1988-1991.

The Wind Farm Site lies within hectads M90 and N00. Table 7-7 and Table 7-8 present a list of species of conservation interest recorded from the relevant hectads, with regard to breeding and wintering respectively.

Table 7-7 Breeding Bird Atlas Data (Hectads M90 & N00).

Species Name	Breeding Atlas 1968-1972		Breeding Atlas 1988-1991		Breeding Atlas 2007-2011		Conservation Status
	M90	N00	M90	N00	M90	N00	
Barn Owl	probable	confirmed	-	breeding	confirmed	confirmed	RL
Corncrake	probable	confirmed	seen	seen	-	-	BD
Curlew	confirmed	confirmed	seen	seen	possible	-	RL
Grey Partridge	-	confirmed	-	-	-	-	RL
Grey Wagtail	confirmed	confirmed	breeding	breeding	possible	confirmed	RL
Hen Harrier	-	probable	-	-	-	-	BD
Kestrel	probable	confirmed	seen	breeding	confirmed	confirmed	RL
Kingfisher	-	confirmed	-	breeding	probable	probable	BD
Lapwing	confirmed	confirmed	-	seen	confirmed	confirmed	RL
Little Egret	-	-	-	-	possible	-	BD
Meadow Pipit	confirmed	confirmed	breeding	breeding	confirmed	confirmed	RL
Merlin	-	possible	-	-	possible	-	BD
Nightjar	-	probable	-	-	-	-	RL
Red Grouse	probable	confirmed	-	-	-	-	RL
Redshank	confirmed	-	-	breeding	confirmed	confirmed	RL
Shoveler	-	-	-	-	probable	-	RL
Snipe	probable	confirmed	breeding	breeding	probable	possible	RL
Stock Dove	possible	confirmed	-	seen	-	probable	RL
Spotted Crake	-	-	-	-	possible	-	BD
Swift	confirmed	confirmed	breeding	seen	probable	confirmed	RL
Woodcock	probable	confirmed	-	seen	-	probable	RL
Yellowhammer	confirmed	confirmed	breeding	seen	probable	probable	RL

Seen = recorded; Poss = possible breeding; Prob = probable breeding; Conf = confirmed breeding; - = not-recorded; Bred = Breeding Record. Conservation Status: BD = Annex I of the Birds Directive, RL = BoCCI Red Listed.

Table 7-8 Wintering Bird Atlas Data (Hectds M90 & N00).

Species Name	Wintering Atlas 1981-1984		Wintering Atlas 2007-2011		Conservation Status
	M90	N00	M90	N00	
Barn Owl	-	present	-	present	RL
Bewick's Swan	present	present	-	-	BD
Black-tailed Godwit	-	-	-	present	BD
Curlew	present	present	present	present	RL
Dunlin	present	present	present	present	BD
Golden Plover	present	present	present	present	BD
Greenland White-fronted Goose	present	present	present	present	BD
Grey Wagtail	present	present	present	present	RL
Hen Harrier	present	present	present	-	BD
Kestrel	present	present	present	present	RL
Kingfisher	-	present	present	present	BD
Lapwing	present	present	present	present	RL
Little Egret	-	-	present	present	BD
Meadow Pipit	present	present	present	present	RL
Merlin	-	-	present	present	BD
Peregrine Falcon	present	present	present	present	BD
Pochard	present	present	present	present	RL
Red Grouse	present	-	present	-	RL
Redshank	present	present	-	-	RL
Redwing	present	present	present	present	RL
Ruff	-	-	present	present	BD
Scaup	-	-	present	-	RL
Shoveler	present	present	present	present	RL
Snipe	present	present	present	present	RL
Stock Dove	present	-	-	present	RL
Whooper Swan	present	present	present	present	BD
Woodcock	present	present	present	present	RL
Yellowhammer	present	present	present	present	RL

Pres = present in hectad; - = not recorded. Conservation Status: BD = Annex I of the Birds Directive, RL = BoCCI Red Listed

7.3.3

Bird Sensitivity Mapping Tool

A Bird Sensitivity Mapping Tool for wind energy development was developed by BirdWatch Ireland to provide a measured spatial indication of where protected birds are likely to be sensitive to wind energy developments. The tool can be accessed via the National Biodiversity Data Centre Website

(www.biodiversityireland.ie) and is accompanied by a guidance document (McGuinness *et al.*, 2015).

The criteria for estimating a zone of sensitivity (i.e. 'low', 'medium', 'high' and 'highest') is based on a review of the behavioural, ecological and distributional data available for each species.

The Wind Farm Site is not located within an area identified as sensitive to birds (i.e. there is no data available). The Wind Farm Site boundary is 6.3km south of the nearest area of high sensitivity, which encompasses the Little Brosna Callows.

7.3.4 Irish Wetland Bird Survey Records

The Irish Wetland Bird Survey (IWeBS), coordinated by BirdWatch Ireland, monitors wintering waterbird populations at their wetland sites across Ireland. IWeBS site locations are available at <https://birdwatchireland.ie/our-work/>.

The Wind Farm Site is not covered by an I-WeBS site and the nearest site is located approximately 5.9km north of the Wind Farm Site at the Little Brosna Callows. Data from I-WeBS sites in County Tipperary have been used to estimate county populations of wintering waterbirds identified as KORs⁷. Datasets for the following sites were sourced from www.birdwatchireland.ie and reviewed:

- > Cabragh Wetlands
- > Drangan Bog
- > Gortdrum
- > Little Brosna Callows⁸
- > Lough Derg (Shannon)
- > Lough Eorna
- > Lyonstown Stud Farm
- > Marfield Lake
- > Pat Reddan's Lake
- > River Suir Middle
- > River Suir Upper
- > Rockwell Cottage Lake

7.3.5 Rare and Protected Species Dataset

An information request was sent to NPWS requesting records from the Rare and Protected Species Database. The following most recent records were obtained from the NPWS on the 9th May 2023:

Peregrine Falcon

Two occupied peregrine nest sites were recorded in hectad R99 during the 2017 National Peregrine Survey. The Wind Farm Site lies outside of hectad R99.

Curlew

The following curlew nest locations or estimated centres of territory have been recorded:

- > Hectad R99: Two records in 2016
- > Hectad M90: One record in 2021, two records in 2019 and one record in 2018
- > Hectad S09: One record in 2016

The Wind Farm Site lies outside of hectads R99 and S09, and is partially within hectad M90.

⁷ The limitations of using this data to estimate a county population is acknowledged, e.g. as all the counts in a given year were not undertaken on the same day typically there is the potential for under or over estimates, however this is the best available information.

⁸ This Proposed Development lies partly within both Co. Tipperary and Co. Offaly. Count data from this site has therefore been divided in two for inclusion in the Co. Tipperary population of relevant waterbirds.

7.3.6 Field Survey Results

The target species recorded within the potential ZOI of the Wind Farm Site during field surveys are listed in

Table 7-9, along with a summary of breeding and roosting status. The following sections describe the records of each target species under the individual survey headings.

Table 7-9 Target species recorded in the Potential ZOI of the Proposed Development

Species	Overall breeding status	Overall wintering status
Golden Plover (Annex I; SCI of River Little Brosna Callows SPA & Middle Shannon Callows SPA)	Non-breeding. There was no evidence of breeding at the site during surveys.	No regularly used roosts identified
Hen Harrier (Annex I)	Non-breeding. There was no evidence of breeding at the site during surveys.	No regularly used roosts identified There were four irregularly used roost sites identified, situated 300m, 340m, 1.2km and 2.0km from the Wind Farm Site.
Kingfisher (Annex I)	Non-breeding. There was no evidence of breeding at the site during surveys.	No regularly used roosts identified
Little Egret (Annex I)	Non-breeding. There was no evidence of breeding at the site during surveys.	No regularly used roosts identified
Merlin (Annex I)	Confirmed Breeding. There was one breeding territory identified approximately 1.3km from the Wind Farm Site. There was no evidence of breeding within the Wind Farm Site.	No regularly used roosts identified There was one irregularly used roost sites identified, situated approximately 750m from the Wind Farm Site.
Peregrine Falcon (Annex I)	Non-breeding. There was no evidence of breeding at the site during surveys.	No regularly used roosts identified
Red Kite (Annex I)	Non-breeding. There was no evidence of breeding at the site during surveys.	No regularly used roosts identified
White-tailed Eagle (Annex I)	Non-breeding. There was no evidence of breeding at the site during surveys.	No regularly used roosts identified

Species	Overall breeding status	Overall wintering status
Whooper Swan (Annex I; SCI of River Little Brosna Callows SPA & Middle Shannon Callows SPA)	Does not breed in Ireland	Regular roost site identified approximately 400m from Wind Farm Site and 600m from the nearest proposed infrastructure.
Lapwing (SCI of River Little Brosna Callows SPA & Middle Shannon Callows SPA; Red Listed)	Non-breeding. There was no evidence of breeding at the site during surveys.	No regularly used roosts identified
Shoveler (SCI of River Little Brosna Callows SPA; Red Listed)	Non-breeding. There was no evidence of breeding at the site during surveys.	No regularly used roosts identified
Black-headed Gull (SCI of River Little Brosna Callows SPA & Middle Shannon Callows SPA)	Non-breeding. There was no evidence of breeding at the site during surveys.	No regularly used roosts identified
Cormorant (SCI Lough Derg (Shannon) SPA)	Non-breeding. There was no evidence of breeding at the site during surveys.	No regularly used roosts identified
Pintail (SCI Middle Shannon Callows SPA)	Non-breeding. There was no evidence of breeding at the site during surveys.	No regularly used roosts identified
Teal (SCI Middle Shannon Callows SPA)	Non-breeding. There was no evidence of breeding at the site during surveys.	No regularly used roosts identified
Barn Owl (Red Listed)	Confirmed Breeding. There was one breeding territory identified approximately 75m from the Wind Farm Site and approximately 350m from the nearest proposed infrastructure.	Resident. Roosting also noted at probable nest site.
Curlew (Red Listed)	Probable Breeding. There was one probable breeding territory identified approximately 750m from the Wind Farm Site.	No regularly used roosts identified

Species	Overall breeding status	Overall wintering status
Kestrel (Red Listed)	Confirmed Breeding. Up to three breeding territories identified within 2km of Wind Farm Site.	No regularly used roosts identified
Snipe (Red Listed)	Probable Breeding. Drumming recorded in suitable habitat within Wind Farm Site.	No regularly used roosts identified
Woodcock (Red Listed)	Probable Breeding. Roding males recorded in suitable habitat within Wind Farm Site.	No regularly used roosts identified
Buzzard (Raptor)	Confirmed Breeding. Up to three breeding territories identified within 2km of Wind Farm Site.	No regularly used roosts identified
Long-eared Owl (Raptor)	Non-breeding. There was no evidence of breeding at the site during surveys.	No regularly used roosts identified
Sparrowhawk (Raptor)	Confirmed Breeding. Up to two breeding territories identified within 2km of Wind Farm Site.	No regularly used roosts identified

The target species listed below were only recorded during waterbird distribution surveys, greater than 1km from, and up to 10km from, the Wind Farm Site. The vast majority of these records were from the Little Brosna Callows, which was encompassed by the survey area. These species were not observed within a minimum 1km of the Wind Farm Site and, therefore, there is no potential for impact from the Proposed Development. The list is ordered in accordance with conservation significance: Annex I species, SCIs of designated sites, Red listed species and raptors, and the closest record to the Wind Farm Site is given:

- > Barnacle Goose - (closest record 9.7km distant)
- > Bewick's Swan - (closest record 1.8km distant)
- > Brent Goose - (closest record 1.4km distant)
- > Dunlin - (closest record 6.6km distant)
- > Great White Egret - (closest record 6.6km distant)
- > Greenland White-fronted Goose - (closest record 7.8km distant)
- > Marsh Harrier - (closest record 8.1km distant)
- > Mediterranean Gull - (closest record 3.1km distant)
- > Ruff - (closest record 8.3km distant)
- > Black-tailed Godwit - (closest record 2.5km distant)
- > Goldeneye - (closest record 6.5km distant)
- > Tufted Duck - (closest record 1.3km distant)
- > Wigeon - (closest record 1.6km distant)
- > Pochard - (closest record 6.6km distant)
- > Redshank - (closest record 7.6km distant)

A list of all bird species recorded during surveys is provided in Appendix 7-1. Appendix 7-3 presents results summary tables including:

- > Summary of vantage point survey records
- > Summary of winter walkover survey records

- Summary of breeding walkover survey records
- Summary of waterbird distribution survey records
- Summary of hen harrier roost survey records
- Summary of breeding raptor survey records
- Summary of breeding woodcock survey records
- Summary of non-target species recorded

Sensitive data relating to breeding and roosting sites are provided in Confidential Appendix 7-7.

Golden Plover

Golden plover were observed in the winter and passage⁹ seasons. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Survey

Golden plover were recorded on 35 occasions during vantage point surveys, within the months of September to April. All observations comprised birds travelling and/or circling, with flock sizes ranging between 2 - 500 birds. Of these observations, 10 were within the Wind Farm Site and/or within 500m of the Wind Farm Site, with a max flock size of 350 birds.

Winter Walkover Survey

Golden plover were recorded on 2 occasions during winter walkover surveys, in January and February 2021. These observations comprised a flocks of 18 and 101 birds roosting in agricultural grassland, both located approximately 2.2km north of the Wind Farm Site.

Waterbird Distribution Survey

Golden plover were recorded on 110 occasions during waterbird distribution surveys across the months of September to March. These observations ranged from between 1.6km – 10.6km distant from the Wind Farm Site, with the majority of observations recorded within the Little Brosna Callows. Observations comprised birds in flight, foraging and roosting with flock sizes of between 2 – 8,000 birds recorded.

Incidental Records

There were 15 incidental records of golden plover, comprising 12 from hen harrier roost surveys, 2 from vantage point surveys and 1 from a breeding raptor survey in April. All observations were of birds in flight, travelling and circling with flock sizes of between 1 – 320 birds recorded. Of these observations, 7 were within the Wind Farm Site and/or within 500m of the Wind Farm Site (max flock of 100 birds).

7.3.6.2 Hen Harrier

Hen harrier was recorded during the winter season. Raw survey data and maps are provided in Appendix 7-4. Sensitive data and mapping relating to recorded roosting locations are contained in Confidential Appendix 7-7.

⁹ Passage season refers to the period when birds are on migration or movement between breeding and wintering areas, typically in the months of August, September, March and April.

Vantage Point Survey

Hen harrier were recorded on six occasions during vantage point surveys, within the months of November, January and March. These observations comprised single birds (ringtail and males) travelling and hunting. Of these observations, one was within the Wind Farm Site and four were within 500m of the Wind Farm Site.

Winter Walkover Survey

Hen harrier were recorded on two occasions during winter walkover surveys, both on the same day in October 2020. These observations both comprised a ringtail hunting and were located 500m and 900m north of the Wind Farm Site.

Hen Harrier Roost Survey

There were nine observations of hen harrier during the hen harrier roost surveys. Of these observations, six were of birds going to/leaving a roost:

- During a dawn survey in October 2020, there were observations of three birds total leaving a roost approximately 300m south-west of the Wind Farm Site (approx. 1km from the nearest proposed turbine). There were no further observations of hen harrier roosting at this location in subsequent survey visits.
- There was one observation of a ringtail bird being mobbed by a hooded crow and shortly after going to ground, approximately 45 minutes after sunset, located approximately 1.2km west of the Wind Farm Site. This observation was in December 2022 and there were no further observations of hen harrier roosting at this location.
- There was a single observation of a ringtail bird coming into roost at a location approximately 2km north of the Wind Farm Site (approx. 2.3km from the nearest proposed turbine). This observation was in February 2021 and there were no further observations of hen harrier roosting at this location.
- There were two separate observations of a male going to roost in an area between approximately 340m - 510m north-west of the Wind Farm Site (approx. 900m from the nearest proposed turbine at closest point). This is the only location where roosting was observed on more than one occasion. The two observations were in October 2020 and March 2022. There were no further observations of hen harrier roosting at this location.

The remaining three observations were of birds hunting or travelling.

Incidental Records

There was 11 incidental record of hen harrier during the waterbird distribution surveys, up to 8km from the Wind Farm Site. All observations were of individuals hunting or commuting.

7.3.6.3 Kingfisher

Kingfisher was recorded during the breeding season. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Survey

Kingfisher were recorded on 2 occasions during vantage point surveys, both on the same day in September 2022. Both observations were of individuals in flight over small pools approximately 300m north of the Wind Farm Site.

Incidental Records

There were four incidental records of kingfisher. These was one observation during a breeding raptor survey in May 2022 of an individual in flight and perching at the edge of a ditch, located approximately 2km north of the Wind Farm Study Area. The remaining three observations were of individuals perching, diving and feeding at Ashton Callows during Waterbird Distribution Surveys in April and May 2022, located approximately 10km north of the Wind Farm Site.

7.3.6.4 Little Egret

Little egret was recorded during the breeding season. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Survey

There was one observation of little egret from vantage point surveys, comprising an individual travelling approximately 800m north of the Wind Farm Site in April 2021.

Waterbird Distribution Survey

Little egret were recorded on 67 occasions during waterbird distribution surveys across the months of September to May. These observations ranged from approximately 2km – 10km distant from the Wind Farm Site, with the majority of observations recorded within the River Little Brosna Callows. Observations comprised birds in flight, foraging, loafing and roosting with flock sizes of between 1 – 34 birds recorded.

7.3.6.5 Merlin

Merlin was recorded during the breeding and winter seasons. Raw survey data and maps are provided in Appendix 7-4. Sensitive data and mapping relating to recorded breeding and roosting locations are contained in Confidential Appendix 7-7.

Vantage Point Survey

Merlin were recorded on 12 occasions during vantage point surveys, within the months of January, February, June, July August and November. These observations comprised single birds (both male and female) travelling, soaring and hunting. Of these observations, two were within the Wind Farm Site and three were within 500m of the Wind Farm Site.

Breeding Walkover Survey

Merlin were recorded on 9 occasions during breeding walkover surveys during the month April - July. During the 2021 breeding season there were two observations of a female at a nest site, approximately 1.3km from the Wind Farm Site. There was one observation of a merlin attacking a buzzard near the nest site during the 2022 breeding season. Additionally, there was one observation of a merlin mobbing a kestrel within the Wind Farm Site. The remaining observations were of birds hunting, commuting or perched.

Breeding Raptor Survey

Merlin were recorded on 26 occasions during breeding raptor surveys. All observations were of birds in the general vicinity of the recorded nest site location. The observations comprised individual sightings of male and female birds, in addition, to the pair together, birds were recorded travelling hunting,

perching, visiting nest site and mobbing. The observations ranged from approximately 800m – 1.5km from the Wind Farm Site.

Furthermore, an additional merlin breeding survey (consisting of a six-hour vantage point watch over the area) was conducted at the location where a bird was observed mobbing a kestrel during breeding walkover survey, mentioned above, and no merlin were observed during this survey indicated that there was no breeding territory at this location.

Winter Walkover Survey

Merlin were recorded on three occasions during winter walkover surveys. These observations comprised a single bird and two birds together hunting approximately 1.2km from of the Wind Farm Site in October 2020; and an individual hunting approximately 1.3km from of the Wind Farm Site in February 2021.

Incidental Records

There were 11 incidental records of merlin, comprising 10 from hen harrier roost surveys and 1 from a waterbird distribution survey. Of these observation, only one was within 500m of the Wind Farm Site. There were four incidental records of note:

- A merlin pair were recorded copulating approximately 1.4km from the Wind Farm Site in February 2021.
- There were two observations of individuals (male and female) in the vicinity of the identified nest site in March 2023.
- Additionally, a bird was observed hunting starlings and then dropping to ground at a location approximately 750m from the Wind Farm Site in January 2023. This observation was close to sunset and it is presumed this birds was going to roost. This area was covered by hen harrier roost surveys, and there were no additional observations of merlin roosting at this location over the three winter seasons.

All other observations comprised individual birds travelling, hunting and perching.

Breeding Summary

In summary, Merlin bred approximately 1.3km from the Wind Farm Site during the 2021 breeding season. In 2022, merlin attempted to breed at the 2021 nest location but failed early in the season due to being displaced by hooded crows. A second breeding attempt was not recorded within the Wind Farm Site or within 500m of the Wind Farm Site. A male and female were seen together in the vicinity of the nest location in March 2023, indicating potential breeding for 2023 breeding season. Note: April 2023 breeding season observations indicate continued occupancy of this breeding location.

7.3.6.6 Peregrine

Peregrine was recorded during the winter season and in the early/late breeding season. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Surveys

Peregrine were recorded on 18 occasions during vantage point surveys, within the months of October – April and one observation in August. These observations predominantly comprised birds travelling, soaring, perching and hunting. The majority of observations were of individual adult birds, with one observation of two birds soaring together in March (1.6km north of Wind Farm Site) and one

observation of a juvenile bird in October (within Wind Farm Site). Of the 18 total observations, five were within the Wind Farm Site and four were within 500m of the Wind Farm Site.

Winter Walkover Survey

There was one observation of peregrine during winter walkover surveys. This comprised a juvenile bird observed travelling over the Wind Farm Site in March 2022.

Incidental Records

There were 9 incidental records of peregrine, comprising 7 from waterbird distribution surveys and 2 from hen harrier roost surveys. The observations ranged from 1.5km – 10km distant from the Wind Farm Site and comprised individuals travelling, perching and hunting.

7.3.6.7 Red Kite

Red kite was recorded during the winter season. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Surveys

There was one observation of red kite during vantage point surveys. This comprised an individual travelling approximately 1.5km north of the Wind Farm Site in March 2023.

7.3.6.8 White-tailed Eagle

White-tailed eagle was recorded during the winter season and in the early/late breeding season. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Surveys

There was one observation of white-tailed eagle during vantage point surveys. This comprised an individual soaring approximately 900m north of the Wind Farm Site in August 2022.

Breeding Raptor Survey

There was one observation of white-tailed eagle during breeding raptor surveys. This comprised an individual soaring approximately 1km east of the Wind Farm Site in April 2022.

Incidental Records

There were 8 incidental records of white-tailed eagle during waterbird distribution surveys. Seven of these observations were in the vicinity of the Little Brosna Callows, approximately 9km from the Wind Farm Site. Additionally there was an observation of an individual in flight approximately 4km north of the Wind Farm Site. All observations were of individuals travelling, hunting or perching.

7.3.6.9 Whooper Swan

Whooper swan was recorded during the winter and passage seasons. Raw survey data and maps are provided in Appendix 7-4. Sensitive data and mapping relating to recorded roosting locations are contained in Confidential Appendix 7-7.

Vantage Point Survey

Whooper swan were recorded on 42 occasions during vantage point surveys across the months of October – March. Of these observations, 15 were within, or partially within the Wind Farm Site; 10 were within, or partially within, 500m of the Wind Farm Site; and the remaining 17 observations were beyond 500m from the Wind Farm Site.

There were four observations of birds going to/from a roost site, approximately 400m from the Wind Farm Site, and a further five observations of birds calling from or seen at the roost site. Flight activity was random over the Wind Farm Site, with no distinct commuting route to or from the roost identified. The maximum flock size of birds at the roost site was 26. All roosting observations were recorded during the 2021/22 winter season. All other observations during these surveys were of birds commuting over the Wind Farm Site, with flocks ranging from an individual to 34 birds.

Winter Walkover Survey

There were two observations of whooper swan during the winter walkover surveys. There was one observation of four birds commuting over the Wind Farm Site and one observation of 84 birds feeding, approximately 2km west of the Wind Farm Site.

Waterbird Distribution Survey

Whooper swan were recorded on 208 occasions during waterbird distribution surveys across the months of October to May. Five of these observations were within 500m of the Wind Farm Site, the remaining observations ranged from between 1.5km – 10.5km distant from the Wind Farm Site. Observations comprised birds commuting, foraging and roosting with flock sizes ranging from an individual to 226 birds.

Incidental Records

There were 26 incidental records of whooper swan, from hen harrier roost surveys and vantage point surveys (calls heard from behind VP locations). Of the observations, none were within the Wind Farm Site and six observations were within, or partially within, 500m of the Wind Farm Site.

Six observations related to the roost site identified 400m from the Wind Farm Site, with up to 27 birds being observed. Additionally, there was an observation of 8 birds leaving a different roosting site approximately 2.4km from the Wind Farm Site. The remaining observations comprised birds commuting and heard calling.

7.3.6.10 Lapwing

Lapwing was recorded during the winter, passage and breeding seasons. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Survey

Lapwing were recorded on 12 occasions during vantage point surveys, within the months of October – March, with one observation in June. All observations comprised birds travelling or circling, with flock sizes ranging from an individual up to 200 birds. Of the observations, two were partially within the Wind Farm Site and two observations were within 500m of the Wind Farm Site. The remaining observations were beyond 500m from the Wind Farm Site.

Winter Walkover Survey

There were four observations of lapwing during winter walkover surveys. All observations were of birds commuting, with flock sizes of between 10 and 62 birds. One observation was partially within the Wind Farm Site, the remaining observations were beyond 500m from the Wind Farm Site.

Waterbird Distribution Survey

Lapwing were recorded on 217 occasions during waterbird distribution surveys across the months of August to May. Two of these observations were within 500m of the Wind Farm Site, both of birds in flight, with the remaining observations ranged from between 1.5km – 10.5km distant from the Wind Farm Site. Observations comprised birds commuting, foraging and roosting with flock sizes ranging from an individual to 3,000 birds, with the majority of records from the Little Brosna Callows.

7.3.6.11 Shoveler

Shoveler was recorded during the winter and passage seasons. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

Shoveler were recorded on 113 occasions during waterbird distribution surveys across the months of October to April. There was one observation of shoveler within 500m of the Wind Farm Site, comprising 28 birds foraging on agricultural grassland 100m north of the Wind Farm Site in February 2022. All remaining observations were beyond 500m of the Wind Farm Site, ranging from between 2.2km – 10.5km distant. Observations comprised birds foraging and roosting with flock sizes ranging from an individual up to 342 birds, with the majority of records from the Little Brosna Callows.

7.3.6.12 Black-headed Gull

Black-headed Gull was recorded during the breeding, winter and passage seasons. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Surveys

Black-headed gull were recorded on 19 occasions during vantage point surveys, across the months January – March and May – July. Of these observations, 6 were within, or partially within, the Wind Farm Site, and 3 were partially within 500m of the Wind Farm Site. All observations were of birds travelling, with flock sizes ranging from an individual up to 100 birds.

Winter Walkover Survey

There was one observation of black-headed gull during winter walkover surveys, comprising a flock of 40 birds travelling approximately 1.3km west of the Wind Farm Site in February 2021.

Waterbird Distribution Survey

Black-headed gull were recorded on 128 occasions during waterbird distribution surveys across the months of October to May. None of the observations were within 500m of the Wind Farm Site. Observations comprised birds travelling, foraging, roosting and perching with flock sizes ranging from an individual up to 400 birds. Observations ranged from between 1.5km – 10km from the Wind Farm site.

Incidental Records

There was one incidental record of black-headed gull, comprising a single bird travelling within the Wind Farm Site during a breeding raptor survey in May 2022.

7.3.6.13 Cormorant

Cormorant was recorded during the breeding and winter seasons. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Survey

Cormorant were recorded on 22 occasions during vantage point surveys, within the months October - January and April & August. Of all the observations, 5 were partially within the Wind Farm Site, and 1 was partially within 500m of the Wind Farm Site. All remaining observations were beyond 500m from the Wind Farm Site.

All observations were of birds travelling, with flock sizes ranging from 1 - 2 birds. Fourteen of the 22 observations related to cormorant travelling along the Little Brosna River, over 4km from the Wind Farm Site.

Breeding Walkover Survey

There was one observation of cormorant during breeding walkover surveys, comprising a single bird travelling over the Wind Farm Site in July 2021.

Winter Walkover Survey

There was one observation of cormorant during winter walkover surveys, comprising a single bird travelling approximately 250m north of the Wind Farm Site in February 2021.

Waterbird Distribution Survey

Cormorant were recorded on 48 occasions during waterbird distribution surveys across the months of September to May. None of the observations were within 500m of the Wind Farm Site. All observations were within the Little Brosna Callows area and comprised birds travelling, foraging, roosting and perching with flock sizes ranging from an individual up to 5 birds.

Incidental Records

There were three incidental records of cormorant. Two observations were of single birds travelling over the Wind Farm Site during a breeding raptor survey in May and June, and one observation of a single bird travelling partially within 500m of the Wind Farm Site during a hen harrier roost survey in December.

7.3.6.14 Pintail

Pintail was recorded during the winter and passage seasons. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Survey

There was one observation of pintail during vantage point surveys, comprising three birds travelling partially within 500m of the Wind Farm Site in February 2021.

Waterbird Distribution Survey

Pintail were recorded on 119 occasions during waterbird distribution surveys across the months of October to March, and August. There was one observation within 500m of the Wind Farm Site, comprising a flock of four birds feeding on agricultural grassland approximately 150m north of the Wind Farm Site. All other observations were beyond 500m from the Wind Farm Site and comprised birds travelling, foraging, and roosting with flock sizes ranging from an individual up to 325 birds. Observations ranged from between 2km – 10.5km from the Wind Farm site, with most observations from the Little Brosna Callows.

7.3.6.15 Teal

Teal was recorded during the winter and passage seasons. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Survey

There was one observation of teal during vantage point surveys, comprising two birds heard calling approximately 400m north of the Wind Farm Site in December.

Winter Walkover Survey

There were four observations of teal during winter walkover surveys. One observation was within the Wind Farm Site, comprising two birds being flushed from bog. The remaining three observations comprised birds foraging/swimming, approximately 400m to 2km from the Wind Farm Site.

Waterbird Distribution Survey

Teal were recorded on 181 occasions during waterbird distribution surveys across the months April to August. There were seven observations within 500m of the Wind Farm Site, comprising flocks 1-40 birds feeding on agricultural grassland approximately 100-400m north of the Wind Farm Site. All other observations were beyond 500m from the Wind Farm Site and comprised birds travelling, foraging, and roosting with flock sizes ranging from an individual up to 2,000 birds. These observations ranged from between 1.3km – 10.5km from the Wind Farm site, with most observations from the Little Brosna Callows.

Incidental Records

There was one incidental records of teal, comprising a flock of 60 birds foraging on a pond approximately 100m east of the Wind Farm Site in December.

7.3.6.16 Barn Owl

Barn owl was recorded during the breeding and winter seasons. Raw survey data and maps are provided in Appendix 7-4. Sensitive data and mapping relating to recorded roosting/breeding locations are contained in Confidential Appendix 7-7.

Incidental Records

There were three incidental records of barn owl. One observation comprised a bird flying overhead and perching briefly on a branch, before flying off again during a breeding woodcock survey in June 2022. There was an observation of a bird being flushed from a roost in an agricultural shed during a bat survey in February 2023, situated approximately 75m from the Wind Farm Site (approximately 400m from the nearest proposed turbine location).

A third observation comprised a pellet found during a waterbird distribution survey in the area of Little Brosna Callows, approximately 8km from the Wind Farm Site.

Breeding Barn Owl Survey

Following the incidental observation of a barn owl within an agricultural shed in February 2023 (see above), breeding barn owl surveys were undertaken in April, May & June 2023. A single bird was observed leaving and entering the shed during the April and May visits. June 2023 observations included a pair exiting the above shed, therefore confirming occupancy of this territory in 2023 breeding season.

7.3.6.17 Curlew

Curlew was recorded during the breeding, passage and winter seasons. Raw survey data and maps are provided in Appendix 7-4. Sensitive data and mapping relating to potential breeding locations are contained in Confidential Appendix 7-7.

Vantage Point Survey

Curlew were recorded on 8 occasions during vantage point surveys, within the months February, March, July and October. Of all the observations, none were within the Wind Farm Site, and 6 were within, or partially within, 500m of the Wind Farm Site. The majority of observations were of birds travelling, with numbers ranging from an individual up to 17 birds. There was one observation of a single bird landing in a flooded part of the bog approximately 400m from the Wind Farm Site in July 2022.

There were an additional 7 auditory observations of curlew during vantage point surveys. These ranged from approximately 200m – 1.2km from the Wind Farm Site, with three in December 2021 and the remaining four observations in April – July 2022.

Breeding Walkover Survey

Curlew were recorded on 5 occasions during breeding walkover surveys during the months of April, June & July, all in 2022. None of the observations were within the Wind Farm Site. There were three separate observations of between 1-3 curlew during a walkover survey in July 2022. These comprised birds in flight and calling, and one observation of a single bird landing, all at an area of bog approximately 750m – 1.5km from the Wind Farm Site. A curlew was also head calling at a separate location approximately 700m from the Wind Farm Site, also in July 2022. The remaining observation comprised a single bird travelling and calling partially within 500m of the Wind Farm Site in April 2022.

Waterbird Distribution Survey

Curlew were recorded on 71 occasions during waterbird distribution surveys across the months of October to May. None of the observations were within 500m of the Wind Farm Site. There were two observations within 500m of the Wind Farm Site, comprising flocks of 2 and 10 birds foraging on

agricultural land. The remaining observations comprised birds travelling, foraging, roosting and calling with flock sizes ranging from an individual up to 34 birds.

Incidental Records

There were 16 incidental records of curlew, all from breeding raptor and breeding woodcock surveys, apart from one observation during a hen harrier roost survey. There were 7 observations of curlew in the same area of bog out as outlined above under breeding walkover surveys. These comprised the following:

- **2021:** Three observations from a breeding raptor survey in June 2021 of individual curlew in flight, calling, landing and taking off from bog. There was an additional observation during a woodcock survey later in June 2021 of a single bird travelling to land in bog and calling.
- **2022:** Three observations from a breeding raptor survey in June 2022. One observations was of a curlew alarm calling and travelling to land on bog in an area where four hooded crows had been present moments before. The other two observations were of a bird heard calling, and a pair calling and landing in two different spots on bog.

The remaining incidental curlew observations comprised birds heard calling but not seen on 8 occasions. Two of these observations were estimated to be within 500m of the Wind Farm Site. A single bird was observed travelling within the Wind Farm Site on one occasion in June 2022.

Breeding Summary

In summary, it is likely that curlew attempted to breed at an area of bog approximately 750m – 1.5km from the Wind Farm Site (closest approximately 900m from nearest proposed turbine) in both 2021 and 2022 breeding seasons. No chicks or fledged young were observed in either season, and hooded crows were recorded at this area of bog followed by alarm calling by curlew in 2022 breeding season. It is considered likely that the nesting attempt failed due to predation in both seasons.

7.3.6.18 Kestrel

Kestrel was recorded during the breeding and winter seasons. Raw survey data and maps are provided in Appendix 7-4. Sensitive data and mapping relating to recorded breeding locations are contained in Confidential Appendix 7-7.

Vantage Point Survey

Kestrel were recorded on 289 occasions during vantage point surveys, across all months of the year. All observations were of birds travelling, hunting or perching/landing, with sightings of 1 up to 4 birds. Most observations were of birds hunting or commuting. There were four observations relating to breeding behaviour. There was one observation of a bird mobbing and another of a bird displaying in 2021 and one observation of a bird mobbing during the 2022 breeding season. This indicates probable breeding at this location, approximately 1.6km from the Wind Farm Site, in the 2021 and 2022 breeding seasons.

Breeding Walkover Survey

Kestrel were recorded on 16 occasions during breeding walkover surveys. Most observations were of individuals hunting or commuting. There was one observation of a pair copulating at the probable breeding location mentioned above, approximately 1.6km from the Wind Farm Site, in April 2021. Additionally, there was an observation of a female mobbing another bird at a separate location in July 2021. This indicates another probable breeding territory at this location, approximately 800m from the Wind Farm Site.

Breeding Raptor Survey

Kestrel were recorded on 61 occasions during breeding raptor surveys. Most observations were of birds commuting or hunting. There were six observations of breeding behaviour.

- A female was observed on a nest in both April and May 2021 at the breeding location mentioned above, approximately 1.6km from the Wind Farm Site, therefore confirming this territory.
- A pair was observed in a display flight over an area of woodland approximately 2.1km from the Wind Farm Site in May 2022. This was in the general area of the confirmed nest site location from 2021 above. A pair was observed fighting with jackdaws near this location in April 2022. This indicates probable breeding at this general area again in 2022.
- A male was observed displaying over woodland at a separate location in April 2021, approximately 1.1km from the Wind Farm Site, indicating a probable territory at this location.
- A female was observed with a fledgling in July 2022. This indicates probable breeding in this general area approximately 900m from Wind Farm Site, although, as the fledgling was developed enough to travel, the nest site location can only be broadly estimated.

Winter Walkover Survey

Kestrel were recorded on 20 occasions during winter walkover surveys. Most observations comprised single birds travelling or hunting. Of the 20 observations, only two were within the Wind Farm Site.

Incidental Records

There were 70 incidental records of kestrel. Most observations comprised single birds travelling or hunting. There was only one observation partly within the Wind Farm Site.

Breeding Summary

In summary, the following territories were identified during the two breeding seasons:

- **2021** – One confirmed and one probable territory (1.6km and 1.1km from Wind Farm Site respectively).
- **2022** – Two probable breeding territories (900m and 1.6km from Wind Farm Site).

7.3.6.19 Snipe

Snipe was recorded during the breeding and winter seasons. Raw survey data and maps are provided in Appendix 7-4. Sensitive data and mapping relating to recorded breeding locations are contained in Confidential Appendix 7-7.

Vantage Point Survey

Snipe were recorded on 62 occasions during vantage point surveys, 39 of which were flights and 23 were auditory records. There were 35 observations relating to breeding activity, seven during the 2021 breeding season and 28 during the 2022 breeding season. There were three breeding areas identified in 2021 and two in 2022. These breeding areas have a minimum of one breeding pair each.

Breeding Walkover Survey

Snipe were recorded on 19 occasions during breeding walkover surveys, eight of which were within the Wind Farm Site and a further eight within 500m of the Wind Farm Site. Thirteen observations related to breeding activity, with the remaining observations being of birds flushed by the observer. There was

one observation of a displaying bird during the 2021 breeding season. The remaining observations of breeding activity were of birds displaying or singing during the 2022 breeding season. There was one breeding area identified in 2021 and five during the 2022 breeding season. These breeding areas have a minimum of one breeding pair each.

Winter Walkover Survey

Snipe were recorded on 20 occasions during winter walkover surveys. The majority of these observations were of birds being flushed by the observer. Four observations were within the Wind Farm Site. Flock numbers ranged from an individual up to 5 birds.

Waterbird Distribution Survey

Snipe were recorded on 17 occasions during waterbird distribution surveys across the months of October to February, and May. There were five observations within 500m of the Wind Farm Site, comprising 1-2 birds in flight/flushed by the observer, and one observation of 12 birds. The remaining observations were up to 10km from the Wind Farm Site, with the most notable being a flock of 80 birds at Ashton Callows during a period of heavy freeze in December 2022.

Incidental Records

There were 49 incidental records of snipe. Twelve of these observations related to breeding activity, during breeding raptor and breeding woodcock surveys. There was only one breeding observation during the 2021 breeding season, with the remaining eleven observations during the 2022 breeding season.

Breeding Summary

In summary, the following areas were identified during the two breeding seasons:

- **2021** – Four breeding areas within Wind Farm Site;
- **2022** – Two breeding areas within Wind Farm Site and two outside of Wind Farm Site (50m and 1.2km from Wind Farm Site).

7.3.6.20 Woodcock

Woodcock was recorded during the breeding and winter seasons. Raw survey data and maps are provided in Appendix 7-4. Sensitive data and mapping relating to recorded breeding locations are contained in Confidential Appendix 7-7.

Vantage Point Survey

There was one observation of woodcock during vantage point surveys, comprising an individual travelling within 500m of the Wind Farm Site in March.

Breeding Walkover Survey

There was one observation of woodcock during the breeding walkover surveys of a bird flushed by the observer within 500m of the Wind Farm Site.

Breeding Woodcock Survey

During the dedicated breeding woodcock surveys, there were 37 observations during the 2021 surveys and 36 observations during the 2022 surveys. During the 2021 breeding season, there were 35 observations of displaying woodcock, identifying three breeding areas for woodcock. During the 2022 breeding season, there were 24 observations of displaying woodcock, identifying four breeding areas for woodcock. These breeding areas have a minimum of one breeding pair each.

Waterbird Distribution Survey

There was one observation of woodcock during waterbird distribution surveys, comprising a single bird in flight approximately 1.5km from the Wind Farm Site.

Incidental Records

There were five incidental records of woodcock during hen harrier roost surveys, between month of November – January. All observations were of 1-2 birds travelling.

7.3.6.21 Buzzard

Buzzard was recorded during the breeding and winter seasons. Raw survey data and maps are provided in Appendix 7-4. Sensitive data and mapping relating to recorded breeding locations is contained in Confidential Appendix 7-7.

Vantage Point Survey

Buzzard were recorded on 354 occasions during vantage point surveys across all months of the year, 334 of which were flights and 20 were other records. The majority of observations were of birds travelling, hunting or soaring. There were five observations of displaying birds, all during the 2022 breeding season. There were two probable breeding territories identified during the 2022 breeding season, approximately 150m and 800m from the Wind Farm Site.

Breeding Walkover Survey

There were 48 observations of buzzard during breeding walkover surveys. Most observations were of birds travelling, hunting or soaring. There were three observations of birds displaying during the 2022 breeding season. These observations related to two probable breeding territories, one within the Wind Farm Site, and another approximately 800m from the Wind Farm Site.

Breeding Raptor Survey

Buzzard were recorded on 61 occasions during breeding raptor surveys. Most observations were of birds commuting or hunting. There were four observations of breeding behaviour during these surveys, all of which were during the 2021 breeding season. Three observations related to a confirmed breeding territory within the Wind Farm Site (birds seen displaying, then carrying prey into woodland). A fourth observation related to probable territory approximately 800m from the Wind Farm Site (in area of probable territory during 2022 breeding season).

Winter Walkover Survey

Buzzard were recorded on 38 occasions during winter walkover surveys. Most observations comprised single birds travelling, hunting or soaring. There was one observation of a pair displaying in March 2022, which is related to one of the breeding territories identified above.

Incidental Records

There were 64 incidental records of buzzard during other survey types. Most observations were of birds travelling, hunting or soaring. There were two observations relating to breeding behaviour, both of which were displaying birds. One observation related to a previously identified territory, mentioned above (approx. 150m from Wind Farm Site), and the second related to a probable breeding territory approximately 7.8km north of the Wind Farm Site.

Breeding Summary

In summary, the following territories were identified during the two breeding seasons:

- **2021** – One confirmed and one probable territory (within Wind Farm Site and 1.8km from Wind Farm Site respectively).
- **2022** – Three probable breeding territories (within Wind Farm Site, 150m and 1.8km from Wind Farm Site respectively). Additionally, there was one probable breeding territory identified approximately 7.8km from the Wind Farm Site during a waterbird distribution survey.

7.3.6.22 Long-eared Owl

Long-eared owl was recorded during the winter season. Raw survey data and maps are provided in Appendix 7-4.

Incidental Records

There was one incidental record of long-eared owl, during a hen harrier roost survey in December 2021. The observation comprised a bird hunting approximately 1.1km from the Wind Farm Site.

7.3.6.23 Sparrowhawk

Sparrowhawk was recorded during the breeding and winter seasons. Raw survey data and maps are provided in Appendix 7-4. Sensitive data and mapping relating to recorded breeding locations is contained in Confidential Appendix 7-7.

Vantage Point Survey

Sparrowhawk were recorded on 42 occasions during vantage point surveys, across all months of the year. The majority of observations were of birds travelling, hunting or soaring. There was one observation of a displaying bird in January 2023, indicating a breeding territory for the 2023 breeding season.

Breeding Walkover Survey

There were 17 observations during walkover surveys, most of which were birds commuting, soaring or hunting. There were three observations relating to breeding behaviour during the 2021 breeding season, there were two auditory records of agitated birds calling from a woodland, indicating probable breeding territory, and one observation of a bird carrying prey to a nest confirming a breeding territory, both within the Wind Farm Site.

Breeding Raptor Survey

There were 19 observations of sparrowhawk during the breeding raptor surveys. All observations were of individuals travelling, hunting, soaring or calling. There were two observations of birds calling within woodland at location of confirmed breeding territory within Wind Farm Site outlined above.

Incidental Records

There were 15 incidental records of sparrowhawk during other survey types. Most observations were of birds travelling or hunting. There were three observations of displaying birds – two in January 2023 and one in March 2023, all in the same general area approximately 200m – 1km from the Wind Farm Site, indicating a potential breeding territory for 2023 breeding season.

Breeding Summary

In summary, the following territories were identified during the two breeding seasons:

- > **2021** – One confirmed and one probable territory, both within Wind Farm Site.
- > **2022** – No confirmed or probable territories identified within the Wind Farm Site or 2km survey area.

7.3.6.24 Red-Listed Passerines

The BoCCI Red listed species grey wagtail, meadow pipit, redwing, swift and yellowhammer were recorded during the surveys between September 2020 and March 2023. Grey wagtail were observed on 13 occasions, with only individual birds being recorded. Meadow pipit were observed on 387 occasions, with up to 22 birds being recorded. Redwing were observed on 64 occasions, with up to 300 birds being recorded. Swift were observed on 18 occasions, with up to 19 birds being recorded. Yellowhammer were observed on 60 occasions, with up to six birds being recorded.

7.4 Receptor Evaluation

7.4.1 Determination of Population Importance

A determination of population importance for birds within the likely ZOI is provided below, following the criteria described in Section 7.2.5. Estimates of national population sizes were obtained from the most recent species-specific national survey, or national surveys by Burke *et al.* (2018), Lewis *et al.* (2019a), Crowe *et al.* (2014) and Lewis *et al.* (2019b), or Ireland's Article 12 Reporting 2013-2018 (EU, 2022), depending on what literature was relevant. Estimates for mean county population sizes were obtained from species-specific surveys, a review of I-WeBS sites within Co. Tipperary¹⁰, or derived from national estimates, according to what literature was available.

Following NRA (2009), a population of National Importance is a regularly occurring population that exceeds 1% of the national population. Similarly, a population of County Importance is a regularly occurring population that exceeds 1% of the county population. Locally Important (Higher Value) populations are resident or regularly occurring species of conservation concern of importance at the local level, while Locally Important (Lower Value) populations are resident or regularly occurring species of some local importance.

7.4.1.1 Golden Plover

Wintering

The estimated national wintering population of golden plover in Ireland is 80,707 for the Republic of Ireland (ROI) (Burke *et al.* 2018). 1% of the ROI National wintering population of golden plover is 807 birds. As per NRA 2009, a regularly occurring population of 807 golden plover is required for classification as Nationally Important. The maximum number of birds recorded within 500m of the Wind Farm Site from the winter seasons surveyed was 350 birds. A regularly occurring Nationally Important population was not therefore observed at the Wind Farm Site.

To estimate the county population, a review of all County Tipperary I-WeBS sites was conducted. It should be noted that the population estimate based on I-WeBS figures alone is likely to be an underestimate of the county population¹¹. This is due to the foraging ecology of wintering golden plover that will utilise agricultural grasslands and other terrestrial habitats not typically surveyed during I-WeBS counts, as this is a survey of wetland habitats. To account (partly) for the birds that occur in terrestrial habitats that would not have been counted by I-WeBS surveyors, the golden plover that occur at terrestrial locations outside of any I-WeBS sites within the 8km survey radius of the Waterbird Distribution Survey were added to the county population estimate.

Below are the mean count values recorded for I-WeBS sites over the most recent 5-season period, i.e. for the period 2016/17 – 2020/21 (note that sites with a mean of zero birds were excluded from this list) and the mean peak count from the 8km survey radius of the Waterbird Distribution Surveys for the three winter seasons (2020/21 – 2022/23):

- > Cabragh Wetlands (mean = 17)
- > Gortdrum (mean = 85)
- > Lough Derg (Shannon) (mean = 2)
- > Little Brosna Callows (mean = 2,555)

¹⁰ Please note that these figures are estimates based on the best available information and should be interpreted with a degree of caution.

¹¹ As per Burke *et al.* (2018) in relation to the golden plover count, "these estimates must be treated as conservative on the basis that they are widely disturbed in a variety of wetland and non-wetland habitats that are under-sampled during I-WeBS."

➤ Terrestrial habitats¹² (mean = 1,106)

Based on the above, the mean wintering population¹³ from Tipperary sites is 3,765 birds. However, as previously stated this likely remains an underestimate. Therefore, a regularly occurring population of 37 or more birds (>1% of the county population, as per NRA (2009)) is required to be classified as County Importance.

Flocks of 37 birds or more (County Importance) were recorded on 7 occasions within the Wind Farm Site, and a further 4 occasions within 500m of the Wind Farm Site. The population recorded within 500m of Wind Farm Site was therefore assigned **County Importance** on the basis of a resident/regularly occurring wintering population assessed to be important on a county level.

Breeding

This species was only observed on 7 occasions during the breeding season from all surveys, with no observations within 500m of the Wind Farm Site. These observations were in April and September and consisted of flocks of between six and 130 birds. These observations are believed to be birds on passage given the breeding range of the species¹⁴, flock size, time of year and no further observations during the breeding season months of May to August inclusive.

The Wind Farm Site is of **No Ecological Importance** to this species during the breeding season.

7.4.1.2 Hen Harrier

Wintering

As per NPWS Article 12 Reporting (2013-2018), the estimated national wintering population of hen harrier in Ireland is 311-435 therefore 1% of the ROI National wintering population is 3-4 birds. A regularly occurring wintering population of 3-4 hen harrier is required for classification as Nationally/Internationally Importance.

There are no published figures for the County Tipperary population of hen harrier. Taking a precautionary approach, a regularly occurring population of just one bird is required for classification of County Importance.

Hen harrier were only observed on two occasions within the Wind Farm Site, both of individuals hunting/travelling. There were a further eight observations within 500m of the Wind Farm Site. There were no observations of roosting hen harrier within the Wind Farm Site. Four recorded roost locations were identified outside the Wind Farm Site, however none were found to be in regular use. Roosting at three of these locations was each only recorded on one occasion over the three winters of surveying, and on two occasions at the remaining location approximately 900m from the nearest infrastructure.

Given that there was a regularly occurring winter population of at least one bird at the Wind Farm Site / within 500m of the Wind Farm Site, the Wind Farm Site has been assigned **County Importance** for wintering hen harrier.

¹² From terrestrial areas within the 8km survey radius of the Waterbird Distribution Surveys outside of any I-WeBS sites. Flocks in flight not included in counts.

¹³ Please note that these figures are estimates based on the best available information and should be interpreted with a degree of caution.

¹⁴ The breeding range is largely restricted to western and northern coastal counties.

Breeding

There were no observations of hen harrier during the breeding season despite undertaking a comprehensive suite of surveys over two and a half years. The Wind Farm Site is of **No Ecological Importance** to this species during the breeding season.

7.4.1.3 Kingfisher

There were no observations of kingfisher within the Wind Farm Site despite undertaking a comprehensive suite of surveys over two and a half years. There were two observations approximately 300m from the Wind Farm Site, both on the same day in September 2022. All remaining observations were from greater than 2km from the Wind Farm Site.

The Wind Farm Site is of **No Ecological Importance** to this species, given that there were no observations of this species within the Wind Farm Site.

7.4.1.4 Little Egret

There were no observations of little egret within the Wind Farm Site despite undertaking a comprehensive suite of surveys over two and a half years. The closest observation comprised an individual bird over 800m from the Wind Farm Site. All remaining observations were greater than 2km from the Wind Farm Site.

The Wind Farm Site is of **No Ecological Importance** to this species, given that there were no observations of this species within the Wind Farm Site.

7.4.1.5 Merlin

As per the latest NPWS Article 12 reporting document, the estimated population of merlin is between 400-800 individuals. Therefore, a regularly occurring population of 4-8 birds is required to be of national importance. There are no published figures for County Tipperary population of merlin. Taking a precautionary approach a regularly occurring population of a single bird is required for classification of County Importance.

A confirmed merlin nest site was recorded approximately 1.3km from the Wind Farm Site. The majority of merlin sightings were associated with this general area. Merlin were recorded within the Wind Farm Site on three occasions, with a further three observations within 500m of the Wind Farm Site. All observations were of individuals.

A merlin was observed likely going to roost at a location approximately 750m from the Wind Farm Site. Roosting at this location was only recorded on one occasion over the three winters of surveying.

Given that, there were several observations of merlin hunting at the Wind Farm Site / within 500m of the Wind Farm Site, and given the presence of a nest site in the wider area, the Wind Farm Site has been assigned **County Importance** for merlin.

7.4.1.6 Peregrine Falcon

As per the latest NPWS Article 12 reporting document, the estimated population of peregrine is 425 pairs. Therefore, as per NRA 2009, a regularly occurring population of four pairs of peregrine is required for classification as Nationally Important. There are no published figures for the County Tipperary population of peregrine. Assuming an even distribution of peregrine across the 26 counties of the Republic of Ireland, the population of peregrine in Co. Tipperary is roughly estimated to be 32 birds (national population divided by 26 counties). Taking a precautionary approach and using the

above as a guide; a regularly occurring population of a single bird is required for classification of County Importance.

Peregrine was observed on 10 occasions within 500m of the Wind Farm Site. The majority of these observations were of birds commuting or hunting and were during the winter months (October - March). No breeding evidence for this species was recorded.

Taking a precautionary approach, given that there were several observations of peregrine hunting at the Wind Farm Site / within 500m of the Wind Farm Site, the Wind Farm Site has been assigned **County Importance** for peregrine.

7.4.1.7 Red Kite

There were no observations of red kite within the Wind Farm Site. The only record of this species was an observation of a bird travelling approximately 1.5km from the Wind Farm Site in March.

The Wind Farm Site is of **No Ecological Importance** to this species, given that there were no observations of this species within the Wind Farm Site and given the known resident population of this species in Ireland is largely confined to counties Wicklow and Down.

7.4.1.8 White-tailed Eagle

There were no observations of red kite within the Wind Farm Site. The closest record of this species was an observation of a bird travelling approximately 900m from the Wind Farm Site.

The Wind Farm Site is of **No Ecological Importance** to this species, given that there were no observations of this species within the Wind Farm Site.

7.4.1.9 Whooper Swan

Wintering

As per the latest national wintering estimates provided in Burke et al (2021), the national wintering population of whooper swan in the Republic of Ireland is 14,467. Using these latest Whooper Swan Census figures, 1% of the National population of whooper swan is 145. Therefore, as per NRA 2009, a regularly occurring population of 145 Whooper Swans is required for classification as Nationally Important.

The Swan Census 2020 (Burke et. al., 2021) was consulted regarding the population data for whooper swan in Co. Tipperary. Based on the 2020 Swan Census data, in January 2020 the County Tipperary population was 441 individuals. Therefore a regularly occurring population of 4 or more birds is required to be classified as County Importance.

There were no flocks of national importance recorded at the Wind Farm. A whooper swan roosting site was identified approximately 400m from the Wind Farm Site, with a maximum count of 27 birds recorded (County importance). All other observations within the Wind Farm Site comprised birds in flight, with a maximum flock of 34 recorded.

The flocks recorded within 500m of Wind Farm Site were assigned **County Importance**.

Breeding

Whooper swan are a wintering species in Ireland. The Wind Farm Site is of **No Ecological Importance** for this species during the breeding season.

7.4.1.10 Lapwing

Wintering

The estimated national wintering population of lapwing in Ireland is 69,823 for the Republic of Ireland (ROI) (Burke et al. 2018). 1% of the ROI National wintering population of lapwing is 698 birds. As per NRA 2009, a regularly occurring population of 698 lapwing is required for classification as Nationally Important. The maximum number of birds recorded within 500m of the Wind Farm Site from the winter seasons surveyed was 200 birds. Nationally important flocks of lapwing were not observed on, or within 500m of, the Wind Farm Site.

To estimate the county population, a review of all County Tipperary I-WeBS sites was conducted. It should be noted that, the population estimate based on I-WeBS figures below is likely to be an underestimate of the county population¹⁵. Similar to golden plover, wintering lapwing will utilise agricultural grasslands and other habitats not typically surveyed during I-WeBS counts. To account (partly) for the birds that occur in terrestrial habitats that would not have been counted by I-WeBS surveyors, the lapwing that occur at terrestrial locations outside of any I-WeBS sites within the 8km survey radius of the Waterbird Distribution Survey were added to the county population estimate.

Below are the mean count values recorded for I-WeBS sites over the most recent 5-season period, i.e. for the period 2016/17 – 2020/21 (note that sites with a mean of zero birds were excluded from this list) and the mean peak count from the 8km survey radius of the Waterbird Distribution Surveys for the three winter seasons (2020/21 – 2022/23):

- > Cabragh Wetlands (mean = 192)
- > Drangan Bog (mean = 5)
- > Gortdrum (mean = 2)
- > Little Brosna Callows (mean = 1,629)
- > Lough Derg (Shannon) (mean = 71)
- > Lough Eorna (mean = 45)
- > Pat Reddan's Lake (mean = 110)
- > River Suir Middle (mean = 60)
- > River Suir Upper (mean = 62)

- > Terrestrial habitats¹⁶ (mean = 451)

Based on the above, the mean wintering population¹⁷ from Tipperary sites is 2,627 birds. However, as previously stated this likely remains an underestimate. Therefore, a regularly occurring population of 21 or more birds (>1% of the county population, as per NRA (2009)) is required to be classified as County Importance.

Lapwing were recorded within 500m of the Wind Farm Site on six occasions during the winter months. All observations were of birds travelling with no observations of birds utilising habitats within the Wind Farm Site or surrounding area. Flocks of 21 birds or more (County Importance) were observed within 500m of the Wind Farm Site on four occasions during the winter period. Taking a precautionary approach, the population recorded within 500m of the Wind Farm Site was assigned **County Importance**.

¹⁵ A relatively large proportion of Lapwing are known to spend winter away from coastal wetlands, often in non-wetland habitats such as agricultural land. Therefore, this species is considered poorly monitored by wetland waterbird monitoring methods and assigning accurate national estimates of wintering populations is difficult (Delaney et al., 2009).

¹⁶ From terrestrial areas within the 8km survey radius of the Waterbird Distribution Surveys outside of any I-WeBS sites. Flocks in flight not included in counts.

¹⁷ Please note that these figures are estimates based on the best available information and should be interpreted with a degree of caution.

Breeding

There were no observations of lapwing within the Wind Farm Site during the breeding season despite undertaking a comprehensive suite of surveys over two and a half years. The only record of lapwing during the breeding season from all surveys comprised a single bird travelling approximately 200m from the Wind Farm Site in June. No breeding evidence for this species was recorded.

The Wind Farm Site is of **No Ecological Importance** to this species during the breeding season.

7.4.1.11 Shoveler

There were no observations of shoveler within the Wind Farm Site. There was one record of shoveler within 500m of the Wind Farm Site, comprising a flocks 28 birds foraging on agricultural grassland. All remaining observations were greater than 2km from the Wind Farm Site, the majority from the Little Brosna Callows.

The Wind Farm Site is of **No Ecological Importance** to this species, given that there were no observations of this species within the Wind Farm Site.

7.4.1.12 Black-headed Gull

Wintering

As per NPWS Article 12 Reporting, the national population of wintering black-headed gull is estimated at 48,821. As per NRA 2009, a regularly occurring population of 488 black-headed gull is required for classification as Nationally Important. The maximum number of birds recorded within 500m of the Wind Farm Site from the winter seasons surveyed was 24 birds. Nationally important flocks of black-headed gull were not observed on, or within 500m of, the Wind Farm Site.

To estimate the county population, a review of all County Tipperary I-WeBS sites was conducted. It should be noted that, the population estimate based on I-WeBS figures below is likely to be an underestimate of the county population¹⁸. Similar to golden plover and lapwing outlined above, wintering black-headed gull will utilise agricultural grasslands and other habitats not typically surveyed during I-WeBS counts. To account (partly) for the birds that occur in terrestrial habitats that would not have been counted by I-WeBS surveyors, the black-headed gull that occur at terrestrial locations outside of any I-WeBS sites within the 8km survey radius of the Waterbird Distribution Survey were added to the county population estimate.

Below are the mean count values recorded for I-WeBS sites over the most recent 5-season period, i.e. for the period 2016/17 – 2020/21 (note that sites with a mean of zero birds were excluded from this list) and the mean peak count from the 8km survey radius of the Waterbird Distribution Surveys for the three winter seasons (2020/21 – 2022/23):

- > Cabragh Wetlands (mean = 22)
- > Drangan Bog (mean = 4)
- > Little Brosna Callows (mean = 50)
- > Lough Derg (Shannon) (mean = 103)
- > Lough Eorna (mean = 162)

¹⁸ The counting of gulls is optional under I-WeBS survey methodology, and gulls often occur outside of wetland areas which are not covered by this survey. Furthermore, NPWS Article 12 reporting states the following concerning black-headed gull: “this species along with other gull species that overwinter in Ireland is currently only poorly covered by the Irish Wetland Bird Survey (I-WeBS) programme. This [Article 12] reported population size...is an underestimate of the true population size”. Black-headed gull population numbers outlined are therefore highly likely to be a considerable underestimate of the actual wintering national population and county population.

- > Marfield Lake (mean = 21)
- > Pat Reddan's Lake (mean = 96)
- > River Suir Middle (mean = 29)
- > River Suir Upper (mean = 2)

- > Terrestrial habitats¹⁹ (mean = 467)

Based on the above, the mean wintering population²⁰ from Tipperary sites is 956 birds. However, as previously stated this likely remains an underestimate. Therefore, a regularly occurring population of 9 or more birds (>1% of the county population, as per NRA (2009)) is required to be classified as County Importance.

Black-headed gull were recorded within 500m of the Wind Farm Site on only three occasions during the winter months, with flock sizes of 7-24 birds (County importance). All observations were of birds travelling with no observations of birds utilising habitats within the Wind Farm Site or surrounding area. Taking a precautionary approach, the population recorded within 500m of the Wind Farm Site was assigned **County Importance**.

Breeding

The population of breeding black-headed gull in Ireland is estimated at approximately 7,810 pairs (Cummins *et al.*, 2019), based on census results for the period 2013-2018. The census was completed with respect to the number of occupied nests (i.e. breeding pairs). Taking a highly conservative approach it has been assumed that the number of birds was double the number of occupied nests, although it is likely that there were also non-breeding or juvenile birds in the area which were not accounted for in the census. Therefore, a regularly occurring breeding season population of 156 birds is required for classification as Nationally Important.

There are no published figures for the County Tipperary breeding population of black-headed gull. However, the Article 12 reporting provides an overview of breeding locations and approximate numbers (Cummins *et al.*, 2019). There is one breeding colony partly within Co. Tipperary, at Lough Derg, which is shown as having between 501 – 1,000 breeding pairs. Taking the median of this range (i.e. 750 pairs), and assuming that the number of birds is double the number of occupied nests, the population of breeding black-headed gull in Co. Tipperary is estimated to be 1,500 birds. Therefore, a regularly occurring population of 15 birds is required for classification of County Importance.

Black-headed gull were recorded within 500m of the Wind Farm Site on seven occasions during the breeding season. There were no observations of flocks of County importance, with flock sizes of 1-4 birds recorded. No breeding evidence for this species was recorded. All observations were of birds travelling with no observations of birds utilising habitats within the Wind Farm Site or surrounding area. The flocks recorded at within 500m of Wind Farm Site were therefore assigned **Local Importance (Higher value)**.

7.4.1.13 Cormorant

Wintering

As per NPWS Article 12 Reporting, the national population of wintering cormorant is estimated at 7,967. As per NRA 2009, a regularly occurring population of 79 cormorant is required for classification as Nationally Important. The maximum number of birds recorded within 500m of the Wind Farm Site

¹⁹ From terrestrial areas within the 8km survey radius of the Waterbird Distribution Surveys outside of any I-WeBS sites. Flocks in flight not included in counts.

²⁰ Please note that these figures are estimates based on the best available information and should be interpreted with a degree of caution.

from the winter seasons surveyed was two birds. Nationally important flocks of cormorant were not observed on, or within 500m of, the Wind Farm Site.

To estimate the county population, a review of all County Tipperary I-WeBS sites was conducted. The following mean count values have been recorded for I-WeBS sites over the most recent 5-season period, i.e. for the period 2016/17 – 2020/21 (note that sites with a mean of zero birds were excluded from this list):

- > Cabragh Wetlands (mean = 1)
- > Gortdrum (mean = 7)
- > Little Brosna Callows (mean = 2)
- > Lough Derg (Shannon) (mean = 71)
- > Marfield Lake (mean = 1)
- > River Suir Middle (mean = 17)

Based on the above, the mean wintering population²¹ from Tipperary sites is 99 birds. Therefore, a regularly occurring population of 1 or more birds (>1% of the county population, as per NRA (2009)) is required to be classified as County Importance.

Cormorant were recorded within 500m of the Wind Farm Site on five occasions during the winter months. All observations were of birds travelling with no observations of birds utilising habitats within the Wind Farm Site or surrounding area. Most observations were of single birds, with a max of two birds. The flocks recorded at the Wind Farm Site were therefore assigned **Local Importance (Higher value)**.

Breeding

The population of breeding cormorant in Ireland is estimated at approximately 4,688 pairs (Cummins *et al.*, 2019), based on census results for the period 2015-2018. The census was completed with respect to the number of occupied nests (i.e. breeding pairs). Taking a highly conservative approach it has been assumed that the number of birds was double the number of occupied nests, although it is likely that there were also non-breeding or juvenile birds in the area which were not accounted for in the census. Therefore, a regularly occurring breeding season population of 93 birds is required for classification as Nationally Important.

There are no published figures for the County Tipperary breeding population of cormorant. However, the Article 12 reporting provides an overview of breeding locations and approximate numbers (Cummins *et al.*, 2019). The majority of breeding colonies are at coastal locations. There is one breeding colony partly within Co. Tipperary, at Lough Derg, which is shown as having between 101 – 500 breeding pairs. Taking the median of this range (i.e. 300 pairs), and assuming that the number of birds is double the number of occupied nests, the population of breeding cormorant in Co. Tipperary is estimated to be 600 birds. Therefore, a regularly occurring population of 6 birds is required for classification of County Importance.

Cormorant were recorded within 500m of the Wind Farm Site on six occasions during the breeding season. All observations were of birds travelling with no observations of birds utilising habitats within the Wind Farm Site or surrounding area. As such, there is no regularly occurring population within 500m of the Wind Farm Site. Most observations were of single birds, with a max of two birds. There were no observations of flocks of County importance. No breeding evidence for this species was recorded. The flocks recorded within 500m of the Wind Farm Site were therefore assigned **Local Importance (Higher value)**.

²¹ Please note that these figures are estimates based on the best available information but should be interpreted with a degree of caution.

7.4.1.14 **Pintail**

There were no observations of shoveler within the Wind Farm Site. There were two observations within 500m of the Wind Farm Site, comprising a flock of four birds feeding on agricultural grassland and three birds recorded travelling. All remaining observations were greater than 2km from the Wind Farm Site, the majority from the Little Brosna Callows.

The Wind Farm Site is of **No Ecological Importance** to this species, given that there were no observations of this species within the Wind Farm Site.

7.4.1.15 **Teal****Wintering**

As per NPWS Article 12 Reporting, the national population of wintering teal is estimated at 27,644. As per NRA 2009, a regularly occurring population of 270 teal is required for classification as Nationally Important. The maximum number of birds recorded within 500m of the Wind Farm Site from the winter seasons surveyed was 60 birds. Nationally important flocks of teal were not observed on, or within 500m of, the Wind Farm Site.

To estimate the county population, a review of all County Tipperary I-WeBS sites was conducted. The following mean count values have been recorded for I-WeBS sites over the most recent 5-season period, i.e. for the period 2016/17 – 2020/21 (note that sites with a mean of zero birds were excluded from this list):

- > Cabragh Wetlands (mean = 233)
- > Drangan Bog (mean = 18)
- > Gortdrum (mean = 1)
- > Little Brosna Callows (mean = 949)
- > Lough Derg (Shannon) (mean = 9)
- > Lough Eorna (mean = 53)
- > Lyonstown Stud Farm (mean = 16)
- > Marfield Lake (mean = 90)
- > Pat Reddan's Lake (mean = 86)
- > River Suir Middle (mean = 67)
- > River Suir Upper (mean = 6)
- > Rockwell Cottage Lake (mean = 17)

Based on the above, the mean wintering population²² from Tipperary sites is 1,545 birds. Therefore, a regularly occurring population of 15 or more birds (>1% of the county population, as per NRA (2009)) is required to be classified as County Importance.

Teal were recorded within 500m of the Wind Farm Site on 12 occasions during the winter months, with most records of birds foraging. Flocks of 15 birds or more (County Importance) were observed within 500m of the Wind Farm Site on two occasions during the winter period. Taking a precautionary approach, the population recorded within 500m of the Wind Farm Site was assigned **County Importance**.

²² Please note that these figures are estimates based on the best available information but should be interpreted with a degree of caution.

Breeding

There were no observations of teal within 500m of the Wind Farm Site during the breeding season. The only breeding season observations of this species were from April and August from Little Brosna Callows, over 5km from the Wind Farm Site.

The Wind Farm Site is of **No Ecological Importance** to this species during the breeding season.

7.4.1.16 Barn Owl

As per the latest NPWS Article 12 reporting document, the estimated population of barn owl is between 562 and 702 pairs. Therefore, as per NRA 2009, a regularly occurring population of five pairs of barn owl is required for classification as Nationally Important.

There are no published figures for the County Tipperary population of barn owl. Taking a precautionary approach, a regularly occurring population of just one pair is required for the classification of County Important.

A breeding barn owl territory was identified approximately 75m from the Wind Farm Site. The population within 500m of the Wind Farm Site was therefore assigned **County Importance**.

7.4.1.17 Curlew

Breeding

The most recent estimated breeding population of curlew in the Republic of Ireland is between 105 and 119 pairs (Colhoun *et al.*, 2022). Therefore, as per NRA 2009, a regularly occurring population of one pair of curlew is considered as Nationally Important. Interpretation of the distribution map of breeding curlew territories gives an estimated population for Co. Tipperary of 5-8 pairs (Colhoun *et al.*, 2022).

A probable curlew breeding attempt was identified approximately 750m – 1.5km from the Wind Farm Site during breeding season surveys. There was only one observation of curlew within the Wind Farm Site during the 2.5 years of surveying, comprising an individual travelling in July. There were no observations of curlew utilising habitats within the Wind Farm Site. There were a further six observations of curlew within 500m of the Wind Farm Site during the breeding season. These comprised single birds heard calling, a bird foraging on the ground and a flock of 17 birds travelling. All further curlew observations were greater than 500m from the Wind Farm Site and largely related to the identified probable breeding territory.

Taking a precautionary approach, given the presence of a probable breeding pair within 750m - 1.5km from the Wind Farm Site, the population recorded was assigned **National Importance**.

Wintering

There were no observations of curlew within the Wind Farm Site during the winter season. There were six observations within 500m of the Wind Farm Site. The majority of these observations comprised single birds travelling. There was one observation of 10 birds foraging on agricultural grassland. All remaining observations were greater than 2km from the Wind Farm Site, the majority from the Little Brosna Callows.

The Wind Farm Site is of **No Ecological Importance** to this species, given that there were no observations of this species within the Wind Farm Site.

7.4.1.18 Kestrel

As reported (2008-2012) under Article 12 of the Birds Directive (Directive 2009/147/EC), the national breeding population estimates of kestrel in the Republic of Ireland is 13,500 birds. Using these latest figures, 1% of the National population of kestrel is 135 birds. Therefore, as per NRA 2009, a regularly occurring population of 135 birds is required for classification as Nationally Important.

There are no published figures for the County Tipperary population of kestrel. Assuming an even distribution of kestrel across the 26 counties of the Republic of Ireland²³, the population of kestrel in County Tipperary is estimated to be 519 birds (national population divided by 26 counties). Therefore, a regularly occurring population of five birds is required for classification of County Importance.

There were no breeding territories identified within the Wind Farm Site or within 500m of the Wind Farm Site. There was a maximum of three probable/confirmed breeding territories per year (2021–2022) identified in the surrounding area the closest of which was 900m from the Wind Farm Site. This indicates a resident population of six adult birds during the breeding season in the wider area. Kestrel were regularly recorded hunting within the Wind Farm Site, and it can therefore be assumed birds from these territories utilise the Wind Farm Site as hunting grounds. This population would be bolstered by fledglings at the end of the breeding season, which will remain present in the area until the start of the next breeding season, when birds become territorial again. Given that kestrel have brood sizes of four to five chicks, and a survival rate of 30% in their first year²⁴, it is likely that there would be a population of approximately six adults and five juvenile birds by the end of each winter season. The population recorded at the Wind Farm Site was therefore assigned **County Importance** on the basis of a resident/regularly occurring wintering population assessed to be important on a county level.

7.4.1.19 Snipe

As reported (2013-2018) under Article 12 of the Birds Directive (Directive 2009/147/EC), the national breeding population estimates of snipe in the Republic of Ireland is 4,275 breeding pairs. Using these latest figures, 1% of the National population of snipe is 43 pairs. Therefore, as per NRA 2009, a regularly occurring population of 43 pairs is required for classification as Nationally Important.

There are no published figures for the County Tipperary populations of snipe. Assuming an even distribution of snipe²⁵ across the 26 counties of the Republic of Ireland, the County population of snipe is estimated to be 164 pairs (national population divided by 26 counties). Therefore, a regularly occurring population of 1 pair is required for the classification of County Importance.

Given that there were up of four breeding territories identified per breeding season (2021-2022), each of which is assumed to comprise a minimum of one breeding pair, the population recorded within 500m of the Wind Farm Site was assigned **County Importance**.

7.4.1.20 Woodcock

Woodcock is BoCCI Red Listed during the breeding season in Ireland. There are no national estimates of the breeding population of woodcock in Ireland. There were between three to four breeding territories identified at, or within 500m of, the Wind Farm Site between 2021 and 2022. Taking a precautionary approach (given the species' unfavourable conservation status) the population recorded within 500m of the Wind Farm Site was assigned **County Importance**.

²³ While acknowledging the unfavourable conservation status of this species with an identified population decline, this remains a species with a widespread distribution in Ireland (BoCCI, 2020-2026).

²⁴ <https://app.bto.org/birdfacts/results/bob3040.htm>

²⁵ While acknowledging the unfavourable conservation status of this species with an identified population decline, this remains a species with a widespread distribution in Ireland (BoCCI, 2020-2026).

7.4.1.21 Buzzard

Buzzard is not listed on Annex I of the Birds Directive. The species is Green listed in Ireland (BoCCI). The population recorded across the seasons was assigned **Local Importance (Higher Value)** on the basis of a resident/regularly occurring population assessed to be important at the local level.

7.4.1.22 Long-eared Owl

Long-eared Owl is not listed on Annex I of the Birds Directive. The species is Green listed in Ireland (BoCCI). There were no observations of long-eared owl within the Wind Farm Site or within 500m of the Wind Farm Site. The only observation was greater than 1km distance from the Wind Farm Site. The Wind Farm Site is of **No Ecological Importance** to this species, given that there were no observations of this species within the Wind Farm Site.

7.4.1.23 Sparrowhawk

Sparrowhawk is not listed on Annex I of the Birds Directive. The species is Green listed in Ireland (BoCCI). The population recorded was assigned **Local Importance (Higher Value)** on the basis of a resident/regularly occurring population assessed to be important at the local level.

7.4.1.24 Passerines (Red Listed)

Grey wagtail, meadow pipit, redwing, swift and yellowhammer are red listed in Ireland. Populations recorded at the Wind Farm Site were deemed to be of no greater than **Local Importance (Lower Value)**.

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7.4.2 Identification of Key Ornithological Receptors

Table 7-10 outlines the rationale for including or excluding each target species recorded during field surveys as a KOR. The conservation status, population importance evaluation following NRA (2009) and a detailed explanation for inclusion/exclusion as a KOR is provided. The sensitivity of species included as KORs are then evaluated in the following section.

Table 7-10 Receptor evaluation and selection criteria rationale

Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
Golden Plover	Annex I, EU Birds Directive; BoCCI Red List (Breeding & Wintering Populations), Irish Wildlife Act & SCI of River Little Brosna Callows SPA & Middle Shannon Callows SPA	Wintering County Importance	There were no records of this species utilising habitats within the Wind Farm Site. All observations comprised birds in flight travelling or circling. As such, there is limited potential for impacts relating to habitat loss within the Wind Farm Site. Birds were regularly recorded in flight within the Wind Farm Site. The potential for displacement exists. An assessment of displacement effects is required. This species was recorded flying over the Wind Farm Site within the potential collision risk zone. A collision risk assessment is required.	Yes
		Breeding No population of ecological significance recorded	Golden plover was recorded infrequently and in low numbers during the breeding season, with no observations within the Wind Farm Site. The potential for direct habitat loss, disturbance/displacement and collision risk are limited and there is no evidence to suggest that the Wind Farm Site is of significance to this species. Please refer to Section 7.4.1 for further detailed discussion. No pathways for significant effects were identified.	No
Hen Harrier	Annex I, EU Birds Directive;	Wintering	Hen harrier were occasionally observed hunting within the Wind Farm Site. An assessment of direct habitat loss is required.	Yes



Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
	BoCCI Amber List & Irish Wildlife Act.	County Importance	<p>Birds were occasionally recorded within the Wind Farm Site. Four recorded roost locations were identified outside the Wind Farm Site, however none were found to be in regular use. Roosting at three of these locations was each only recorded on one occasion over the three winters of surveying, and on two occasions at the remaining location approximately 900m from the nearest infrastructure. Two of these locations were within 500m of the Wind Farm Site. The potential for displacement exists. An assessment of displacement effects is required.</p> <p>This species was recorded flying over the Wind Farm Site within the potential collision risk zone. A collision risk assessment is required.</p>	
		<p>Breeding</p> <p>No population of ecological significance recorded</p>	<p>There were no observations of hen harrier during the breeding season. The potential for direct habitat loss, disturbance/displacement and collision risk are limited and there is no evidence to suggest that the Wind Farm Site is of significance to this species during the breeding season. Please refer to Section 7.4.1 for further detailed discussion.</p> <p>No pathways for significant effects were identified.</p>	No
Kingfisher	Annex I, EU Birds Directive; SCI of the River Boyne and River Blackwater SPA; BoCCI Amber List & Irish Wildlife Act.	<p>All Seasons</p> <p>No population of ecological significance recorded</p>	<p>Kingfisher was recorded infrequently with no observations within the Wind Farm Site. The potential for direct habitat loss, disturbance/displacement and collision risk are limited and there is no evidence to suggest that the Wind Farm Site is of significance to this species. Please refer to Section 7.4.1 for further detailed discussion.</p> <p>No pathways for significant effects were identified.</p>	No



Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
Little Egret	Annex I, EU Birds Directive & Irish Wildlife Act.	All Seasons No population of ecological significance recorded	Little egret was recorded infrequently and in low numbers, with no observations within the Wind Farm Site. The potential for direct habitat loss, disturbance/displacement and collision risk are limited and there is no evidence to suggest that the Wind Farm Site is of significance to this species. Please refer to Section 7.4.1 for further detailed discussion. No pathways for significant effects were identified.	No
Merlin	Annex I, EU Birds Directive; BoCCI Amber List & Irish Wildlife Act	All Seasons County importance	Merlin were occasionally observed hunting within the Wind Farm Site. An assessment of direct habitat loss is required. Birds were occasionally recorded within the Wind Farm Site, A confirmed nest site was identified approximately 1.7km from the Wind Farm Site. The disturbance distance for merlin is up to 500m (Ruddock and Whitfield, 2007; Goodship & Furness, 2022). Following the consideration of the project constraints no infrastructure has been sited within this 500m buffer zone. Therefore, the separation distance between the nest site and the Wind Farm Site is such that no impact is anticipated. However, given that merlin was observed hunting within the Wind Farm Site, the potential for displacement exists. An assessment of displacement effects is required. This species was not recorded flying over the Wind Farm Site within the potential collision risk zone. A collision risk assessment is not required.	Yes
Peregrine	Annex I, EU Birds Directive & Irish Wildlife Act.	All Seasons County importance	This species was recorded foraging within the Wind Farm Site. The potential for direct habitat loss cannot be excluded. An assessment of direct habitat loss is required. Birds were recorded within the Wind Farm Site. Taking a precautionary approach, the potential for displacement exists.	Yes

Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
			This species was recorded flying over the Wind Farm Site within the potential collision risk zone. A collision risk assessment is required.	
Red Kite	Annex I, EU Birds Directive & Irish Wildlife Act.	All Seasons No population of ecological significance recorded	Red kite was recorded infrequently (once), with no observations within the Wind Farm Site. The potential for direct habitat loss, disturbance/displacement and collision risk are limited and there is no evidence to suggest that the Wind Farm Site is of significance to this species. Please refer to Section 7.4.1 for further detailed discussion. No pathways for significant effects were identified.	No
White-tailed Eagle	Annex I, EU Birds Directive & Irish Wildlife Act.	All Seasons No population of ecological significance recorded	White-tailed eagle was recorded infrequently, with no observations within the Wind Farm Site. The potential for direct habitat loss, disturbance/displacement and collision risk are limited and there is no evidence to suggest that the Wind Farm Site is of significance to this species. Please refer to Section 7.4.1 for further detailed discussion. No pathways for significant effects were identified.	No
Whooper Swan	Annex I, EU Birds Directive; BoCCI Amber List, Irish Wildlife Act & SCI of River Little Brosna Callows SPA & Middle Shannon Callows SPA	Wintering County Importance	There were no records of this species utilising habitats within the Wind Farm Site. All observations of whooper swan within the Wind Farm Site comprised birds in flight travelling. As such, there is no potential for impacts relating to habitat loss within the Wind Farm Site. Birds were recorded in flight over the Wind Farm Site and utilising habitats within 500m of the Wind Farm Site. A roost site was identified approximately 400m from the Wind Farm Site (approximately 620m from nearest proposed turbine location). A buffer of 300m from wind infrastructure is recommended around whooper swan foraging/roosting sites (McGuinness <i>et al.</i> , 2015). Following the consideration of the project constraints, no infrastructure has been sited within this 300m buffer zone. Therefore, the separation distance between the roost site and the Wind Farm Site is such that no impact is anticipated.	Yes



Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
			<p>However, given that whooper swan were recorded in flight over the Wind Farm Site and utilising habitats within 300m of the Wind Farm Site, the potential for displacement exists. An assessment of displacement effects is required.</p> <p>This species was recorded flying over the Wind Farm Site within the potential collision risk zone. A collision risk assessment is required.</p>	
Lapwing	BoCCI Red Listed (Breeding & Wintering Populations) & Irish Wildlife Act & SCI of River Little Brosna Callows SPA & Middle Shannon Callows SPA	<p>Wintering</p> <p>County Importance</p>	<p>There were no records of this species utilising habitats within the Wind Farm Site. All observations comprised birds in flight travelling or circling. As such, there is no potential for impacts relating to habitat loss within the Wind Farm Site.</p> <p>Birds were occasionally recorded in flight within 500m of the Wind Farm Site. The potential for displacement exists. An assessment of displacement effects is required.</p> <p>This species was recorded flying over the Wind Farm Site within the potential collision risk zone. A collision risk assessment is required.</p>	Yes
		<p>Breeding</p> <p>No population of ecological significance recorded</p>	<p>Lapwing was recorded infrequently (once) and in low numbers (single bird travelling) during the breeding season, with no observations within the Wind Farm Site. The potential for direct habitat loss, disturbance/displacement and collision risk are limited and there is no evidence to suggest that the Wind Farm Site is of significance to this species. Please refer to Section 7.4.1 for further detailed discussion.</p> <p>No pathways for significant effects were identified.</p>	No
Shoveler	SCI of River Little Brosna Callows SPA	<p>All Seasons</p> <p>No population of ecological significance recorded</p>	<p>Shoveler was recorded infrequently and in low numbers, with no observations within the Wind Farm Site. The potential for direct habitat loss, disturbance/displacement and collision risk are limited and there is no evidence to suggest that the Wind Farm Site is of significance to this species. Please refer to Section 7.4.1 for further detailed discussion.</p>	No



Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
			No pathways for significant effects were identified.	
Black-headed Gull	SCI of River Little Brosna Callows SPA & Middle Shannon Callows SPA	Wintering County Importance	<p>There were no records of this species utilising habitats within the Wind Farm Site. All observations comprised birds in flight travelling or circling. As such, there is no potential for impacts relating to habitat loss within the Wind Farm Site.</p> <p>Birds were occasionally recorded in flight within 500m of the Wind Farm Site. The potential for displacement exists. An assessment of displacement effects is required.</p> <p>This species was recorded flying over the Wind Farm Site within the potential collision risk zone. A collision risk assessment is required.</p>	Yes
		Breeding Local Importance (Higher value)	<p>There were no records of this species utilising habitats within the Wind Farm Site. All observations comprised birds in flight travelling or circling. As such, there is no potential for impacts relating to habitat loss within the Wind Farm Site.</p> <p>Birds were occasionally recorded in flight within 500m of the Wind Farm Site. The potential for displacement exists. An assessment of displacement effects is required.</p> <p>This species was recorded flying over the Wind Farm Site within the potential collision risk zone. A collision risk assessment is required.</p>	Yes
Cormorant	SCI of Lough Derg (Shannon) SPA	Wintering Local Importance (Higher value)	<p>There were no records of this species utilising habitats within the Wind Farm Site. All observations comprised birds in flight travelling or circling. As such, there is limited potential for impacts relating to habitat loss within the Wind Farm Site.</p> <p>Birds were occasionally recorded in flight within the Wind Farm Site. The potential for displacement exists. An assessment of displacement effects is required.</p>	Yes



Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
			This species was recorded flying over the Wind Farm Site within the potential collision risk zone. A collision risk assessment is required.	
		<p>Breeding</p> <p>Local Importance (Higher value)</p>	<p>There were no records of this species utilising habitats within the Wind Farm Site. All observations comprised birds in flight travelling or circling. As such, there is limited potential for impacts relating to habitat loss within the Wind Farm Site.</p> <p>Birds were occasionally recorded in flight within the Wind Farm Site. The potential for displacement exists. An assessment of displacement effects is required.</p> <p>This species was recorded flying over the Wind Farm Site within the potential collision risk zone. A collision risk assessment is required.</p>	Yes
Pintail	SCI of River Little Brosna Callows SPA	<p>Wintering</p> <p>No population of ecological significance recorded</p>	<p>Pintail was recorded infrequently and in low numbers, with no observations within the Wind Farm Site. The potential for direct habitat loss, disturbance/displacement and collision risk are limited and there is no evidence to suggest that the Wind Farm Site is of significance to this species. Please refer to Section 7.4.1 for further detailed discussion.</p> <p>No pathways for significant effects were identified.</p>	No
Teal	SCI of River Little Brosna Callows SPA	<p>Wintering</p> <p>County importance</p>	<p>This species was recorded utilising habitats within the Wind Farm Site. The potential for direct habitat loss cannot be excluded. An assessment of direct habitat loss is required.</p> <p>Birds were occasionally recorded within the Wind Farm Site and recorded foraging within 500m of the Wind Farm Site. Taking a precautionary approach, the potential for displacement exists.</p> <p>This species was not recorded flying over the Wind Farm Site within the potential collision risk zone. A collision risk assessment is not required.</p>	Yes

Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
		<p><u>Breeding</u></p> <p>No population of ecological significance recorded</p>	<p>Teal were not recorded within 500m of the Wind Farm Site during the breeding season. The potential for direct habitat loss, disturbance/displacement and collision risk are limited and there is no evidence to suggest that the Wind Farm Site is of significance to this species during the breeding season. Please refer to Section 7.4.1 for further detailed discussion.</p> <p>No pathways for significant effects were identified.</p>	No
Barn Owl	BoCCI Red Listed & Irish Wildlife Act.	<p><u>All Seasons</u></p> <p>County Importance</p>	<p>Barn were not recorded within the Wind Farm Site. However, as this is a nocturnal species, activity was likely under recorded during surveys. The potential for direct habitat loss therefore cannot be excluded. An assessment of direct habitat loss is required.</p> <p>A barn owl breeding territory was recorded approximately 75m from the Wind Farm Site. The potential for displacement exists. An assessment of displacement effects is required.</p> <p>Barn owl were not recorded flying over the Wind Farm Site within the potential collision risk zone. A collision risk assessment is not required.</p>	Yes
Curlw	BoCCI Red Listed (Breeding & Wintering Populations) & Irish Wildlife Act.	<p><u>Breeding</u></p> <p>National Importance</p>	<p>There were no records of this species utilising habitats within the Wind Farm Site. The only observation within the Wind Farm Site comprised a single bird travelling. As such, there is limited potential for impacts relating to direct habitat loss within the Wind Farm Site.</p> <p>Birds were occasionally recorded within 500m of the Wind Farm Site, in addition to a probable breeding territory approximately 750m – 1.5km from the Wind Farm Site (approximately 900m from nearest proposed turbine location). A buffer of 800m from wind infrastructure is recommended around curlew breeding sites (<i>Pearce-Higgins 2009</i>, McGuinness <i>et al</i>, 2015). Following the consideration of the project constraints no infrastructure has been sited within this 800m buffer zone. Therefore, the separation distance between the probable breeding territory and the Wind Farm Site is such that no impact is anticipated. However, given that curlew were occasionally observed within 500m of the</p>	Yes



Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
			<p>Wind Farm Site during the breeding season, the potential for displacement exists. An assessment of displacement effects is required.</p> <p>This species was not recorded flying over the Wind Farm Site within the potential collision risk zone during the breeding season. A collision risk assessment is not required.</p>	
		<p>Wintering</p> <p>No population of ecological significance recorded</p>	<p>Curlew was recorded infrequently and in low numbers during the winter season, with no observations within the Wind Farm Site. The potential for direct habitat loss, disturbance/displacement and collision risk are limited and there is no evidence to suggest that the Wind Farm Site is of significance to this species during the winter. Please refer to Section 7.4.1 for further detailed discussion.</p> <p>No pathways for significant effects were identified.</p>	No
Kestrel	BoCCI Red Listed (Breeding Populations) & Irish Wildlife Act.	<p>All Seasons</p> <p>County Importance</p>	<p>There were no kestrel territories identified within the Wind Farm Site. However, up to two territories were observed within the surrounding 2km of the Wind Farm Site and kestrel were regularly recorded hunting within the Wind Farm Site. The potential for habitat loss cannot be excluded. An assessment of direct habitat loss is required.</p> <p>This species was regularly recorded within the Wind Farm Site. An assessment of displacement effect is required.</p> <p>This species was recorded flying over the Wind Farm Site within the potential collision risk zone. A collision risk assessment is required.</p>	Yes
Snipe	BoCCI Red Listed (Breeding & Wintering Populations) &	<p>All Seasons</p> <p>County Importance</p>	<p>There were up to three breeding territories identified on, or within 500m of, the Wind Farm Site between the 2021 and 2022 breeding seasons. An assessment of direct habitat loss is required.</p>	Yes



Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
	Irish Wildlife Act.		<p>This species was recorded within the Wind Farm Site. An assessment of displacement effect is required.</p> <p>This species was recorded flying over the Wind Farm Site within the potential collision risk zone. A collision risk assessment is required.</p>	
Woodcock	BoCCI Red Listed (Breeding Populations)	<p>Breeding</p> <p>County Importance</p>	<p>There were up to four breeding territories identified on, or within 500m of, the Wind Farm Site between the 2021 and 2022 breeding seasons. An assessment of direct habitat loss is required.</p> <p>This species was recorded within the Wind Farm Site. An assessment of displacement effect is required.</p> <p>This species was not recorded flying over the Wind Farm Site within the potential collision risk zone. A collision risk assessment therefore not required.</p>	Yes
Buzzard	BoCCI Green List & Irish Wildlife Act.	<p>All Seasons</p> <p>Local Importance (Higher Value)</p>	<p>There were up to two territories identified on, or within 500m of, the Wind Farm Site between the 2021 and 2022 breeding seasons. The potential for habitat loss cannot be excluded. An assessment of direct habitat loss is required.</p> <p>This species was regularly recorded hunting within the Wind Farm Site. An assessment of displacement effect is required.</p> <p>This species was regularly recorded flying over the Wind Farm Site within the potential collision risk zone. A collision risk assessment is required.</p>	Yes
Long-eared Owl	BoCCI Green List & Irish Wildlife Act.	<p>All Seasons</p>	<p>Long-eared owl was not recorded within 500m of the Wind Farm Site. The potential for direct habitat loss, disturbance/displacement and collision risk are limited and there is no</p>	No



Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
		No population of ecological significance recorded	evidence to suggest that the Wind Farm Site is of significance to this species. Please refer to Section 7.4.1 for further detailed discussion. No pathways for significant effects were identified.	
Sparrowhawk	BoCCI Amber List & Irish Wildlife Act.	<u>All Seasons</u> Local Importance (Higher Value)	There were up to two territories identified within the Wind Farm Site between the 2021 and 2022 breeding seasons. The potential for habitat loss cannot be excluded. An assessment of direct habitat loss is required. This species was recorded hunting within the Wind Farm Site. An assessment of displacement effect is required. This species was recorded flying over the Wind Farm Site within the potential collision risk zone. A collision risk assessment is required.	Yes
Passerines (Red Listed)	BoCCI Red List & Irish Wildlife Act.	<u>All Seasons</u> Local Importance (Lower Value)	As per NatureScot guidance, it is generally considered that passerine bird species are not significantly impacted by wind farms due to their ecology. As such, the potential for direct habitat loss, disturbance/displacement and collision risk are limited and there is no evidence to suggest that the development will significantly impact this species.	No

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7.4.3 Key Ornithological Receptor Sensitivity Determination

Criteria developed by Percival (2003) for assessing bird sensitivity within the Wind Farm Site is presented in Table 7-3 (Section 7.2.5). The sensitivity of the KORs, as per Percival (2003), are listed below, including the rationale for their respective sensitivity classification.

Very High Sensitivity KORs include:

- > Black-headed gull [wintering] (SCI of River Little Brosna Callows SPA & Middle Shannon Callows SPA)
- > Cormorant [breeding] (SCI of Lough Derg (Shannon) SPA)
- > Golden Plover [wintering] (SCI of River Little Brosna Callows SPA & Middle Shannon Callows SPA)
- > Lapwing [wintering] (SCI of River Little Brosna Callows SPA & Middle Shannon Callows SPA)
- > Teal [wintering] (SCI of River Little Brosna Callows SPA)

High Sensitivity KORs include:

- > Hen Harrier (ecologically sensitive species)

Medium Sensitivity KORs include:

- > Whooper swan (Annex I; EU Birds Directive)
- > Merlin (Annex I; EU Birds Directive)
- > Peregrine (Annex I; EU Birds Directive)
- > Barn Owl (BoCCI Red Listed)
- > Curlew (BoCCI Red Listed)
- > Kestrel (BoCCI Red Listed)
- > Snipe (BoCCI Red Listed)
- > Woodcock (BoCCI Red Listed)

The remaining KORs identified were classified as Low Sensitivity:

- > Black-headed gull [breeding]
- > Cormorant [wintering]
- > Buzzard
- > Sparrowhawk

7.5 Potential Impacts

All elements of the Proposed Development have been considered in assessing impacts on KORs. This section is structured as follows:

- > Assessment of ‘Do nothing’ Effect
- > Assessment of impacts in relation to KORs during construction and operation
- > Assessment of impacts in relation to KORs during decommissioning
- > Assessment of impacts associated with the grid connection route
- > Assessment of impacts on designated areas

7.5.1 Do-Nothing Effect

If the proposed development for which this EIAR has been prepared was not to proceed, the site would continue to be managed under the various current management practices. The site is characterised by formerly milled cutover bog, degraded former raised bog, scrub, improved agricultural grassland utilised for livestock grazing and some commercial forestry plantations. It is assumed that the character of the bird community, including the KORs identified, will remain much as it is described in the baseline ornithological conditions.



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7.5.2 Effects on Key Ornithological Receptors during Construction and Operation

The tables in the following sections describe potential effects on KORs that may occur during the construction and operation of the wind farm. The magnitude and significance of these effects are then defined according to Percival (2003) and EPA (2022) criteria.

7.5.2.1 Golden Plover (Wintering)

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>As outlined in Section 7.4.2, there were no records of golden plover utilising habitats within the Wind Farm Site over the 2.5 years of surveying. All observations within 500m of the Wind Farm Site comprised birds in flight travelling or circling. As such, there is no potential for impacts relating to direct habitat loss within the Wind Farm Site.</p> <p>No significant effects are predicted.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and <i>Negligible</i> impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect
Disturbance	<p>Disturbance studies for wintering golden plover are limited. Goodship & Furness (2022) recommends a 200-500m buffer during the non-breeding season, although this is largely derived from studies relating to disturbance from pedestrians.</p> <p>Golden plover was not recorded utilising habitats within the Wind Farm Site for roosting or foraging. The closest recorded roosting or foraging of this species to the Wind Farm Site during waterbird distribution surveys was 1.6km distant. This is sufficiently distant that no impacts from construction works are anticipated. Furthermore, the availability of similar suitable habitats in the surroundings (i.e. agricultural grassland, cutover bog) limits the potential for significant disturbance effects.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and <i>Negligible</i> impact corresponds to a Low effect significance.</p>	Short-term Slight Negative Effect

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Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
	Significant effects are not predicted.		
Operational Phase			
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect
Displacement and Barrier Effect	<p>This species was not recorded utilising habitats within the Wind Farm Site for roosting or foraging. All records of this species within 500m of the proposed turbine layout comprised birds commuting. No regularly used flight path or corridor was identified. The closest recorded roosting or foraging of this species to the Wind Farm Site during waterbird distribution surveys was 1.6km distant. This is sufficiently distant that no displacement effects are anticipated. Furthermore, the availability of similar suitable habitats in the surroundings (i.e. agricultural grassland, cutover bog) limits the potential for significant displacement effects.</p> <p>Significant displacement effects are not anticipated.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and <i>Negligible</i> impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect
Collision Risk	<p>This species was recorded flying the potential collision risk zone during vantage point surveys. A “Random” collision risk analysis has been undertaken (full details provided in Appendix 7-6).</p> <p>A key factor in calculating the predicted rate of collisions for a given species is the application of an avoidance rate. The avoidance rate accounts for the ability of a bird to take evasive action to avoid a collision with a turbine. Where species-specific avoidance rates are available these rates are usually very high, e.g. all swan species have been shown to avoid colliding with operating turbines 99.8% of the time. Until recently a species-specific avoidance rate has not been available for golden plover. A review of golden plover collision avoidance from four UK wind farms has been undertaken and is outlined in Appendix 7-5. The output of this new research was a golden plover</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and <i>Negligible</i> impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect



Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
	<p>avoidance rate of 99.6 to 99.8%. This avoidance rate was used in the collision risk analysis.</p> <p>The collision risk has been calculated at a rate of 2.345 collisions per year. Annual mortality of adult golden plover has been calculated at 27% per annum (Sandercock, 2003). If 2.345 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the local population (i.e. 3,765 birds (please see Section 7.4.1 for further details)) by 0.23%. The predicted collision risk is therefore of negligible magnitude as per Percival criteria (2003).</p> <p>No significant effects are predicted.</p>		

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7.5.2.2 **Hen Harrier (Wintering)**

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>Hen harrier was only recorded within the Wind Farm Site on one occasion over the three winters of bird surveys, comprising a single bird hunting. The Wind Farm Site is therefore not an important foraging habitat for hen harrier and the potential for construction works to result in ecologically significant habitat loss for hen harrier is limited. The land lost to the development footprint is small (i.e. 6.02ha/2.5% of the Wind Farm Site) relative to the total area within the Wind Farm Site. Furthermore, there is an abundance of more suitable habitat in the wider surroundings of the Wind Farm Site, i.e. areas of intact raised bog, scrubland and rough grassland.</p> <p>No confirmed roosting sites were recorded within the Wind Farm Site. There is therefore no potential for impacts on roosting sites in relation to habitat loss within the Wind Farm Site.</p> <p>No significant effects are predicted.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of a <i>High</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect
Disturbance	<p>As previously discussed, foraging or commuting hen harrier were infrequently recorded within the Wind Farm Site (only on one occasion over three winters).</p> <p>Hen harrier were recorded going to roost at four separate locations in the surrounding 2km of the Wind Farm Site – situated approximately 300m, 340m, 1.2km and 2km from the Wind Farm Site boundary (and 800m, 770m, 1.5km and 2.2km from the nearest proposed infrastructure respectively). Three of these locations only had one record of birds going to roost over three winters of repeated monthly bird surveys. There were two separate observations of a bird going to roost at the location 340m from the Wind Farm Site, however, these were from two different winters: winter 2020/21 and winter 2021/2022. It</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of a <i>High</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance.</p>	Short-term Slight Negative Effect



Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
	<p>is therefore concluded that these are not roosts that are regularly used by this species.</p> <p>A disturbance buffer zone of between 300-750m from construction works is recommended for roosting hen harrier (Goodship & Furness, 2022). As outlined above, there is no infrastructure or construction works within 750m of any of the four recorded roost locations.</p> <p>Therefore, based on the survey data, there is little potential for significant disturbance effects given that hen harrier were not dependent on the habitats located in close proximity to development infrastructure for foraging, and recorded roost locations are beyond the zone for potential disturbance effects.</p> <p>Significant effects are not predicted.</p>		
Operational Phase			
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect
Displacement and Barrier Effect	<p>Hen harrier have been recorded to be subject to displacement impacts within a 500m radius of turbines (Pearce-Higgins et al., 2009). Foraging/commuting hen harrier were infrequently recorded within the Wind Farm Site and were only recorded within 500m of the proposed turbine layout on four occasions over three winters of bird surveys. The four recorded roosting locations are all located greater than 500m from the proposed turbine layout (900m, 1km, 1.2km and 2km respectively), and are therefore beyond any potential for displacement effects.</p> <p>Significant effects are not predicted given the infrequency of observations within 500m of the proposed turbine layout.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of a <i>High</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect



Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Collision Risk	<p>This species was recorded flying the potential collision risk zone during vantage point surveys. A “Random” collision risk analysis has been undertaken (full details provided in Appendix 7-6).</p> <p>The collision risk has been calculated at a rate of 0.005 collisions per year, or one bird every 204 years. The predicted collision risk is insignificant over the 35-year life-time of the proposed wind farm.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>High</i> sensitivity species and <i>Negligible</i> Impact corresponds to a Very Low effect significance</p>	<p>Long-term Imperceptible Negative Effect</p>

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7.5.2.3 **Merlin (All Seasons)**

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>Merlin was only recorded within the Wind Farm Site on two occasions over the 2.5 years of bird surveys. The Wind Farm Site is therefore not an important foraging habitat for merlin and the potential for construction works to result in ecologically significant habitat loss for merlin is limited. The land lost to the development footprint is small (i.e. 6.02ha/2.5% of the Wind Farm Site) relative to the total area within the Wind Farm Site. Furthermore, there is an abundance of more suitable hunting habitat in the wider surroundings of the Wind Farm Site, i.e. areas of intact raised bog, scrubland and rough grassland.</p> <p>No confirmed breeding or roosting sites were recorded within the Wind Farm Site. There is therefore no potential for impacts on breeding or roosting sites in relation to habitat loss within the Wind Farm Site.</p> <p>No significant effects are predicted.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance.</p>	<p>Long-term Slight Negative Effect</p>
Disturbance	<p>As previously discussed, foraging or commuting merlin were infrequently recorded within the Wind Farm Site (only on two occasions over 2.5 years). A confirmed merlin nest site was identified approximately 1.7km from the Wind Farm Site. In addition, There was one observation of a merlin leaving a roost site approximately 750m from the Wind Farm Site. This roost site was not recorded to be active on the repeat visits to this location subsequently, or on monthly visits during the previous two winters. It is therefore concluded that this is not a regularly used roost.</p> <p>A disturbance buffer zone of between 300-500m from construction works is recommended for breeding merlin, and <200m for roosting merlin (Goodship & Furness, 2022). By design, following the consideration of the project constraints, both the confirmed nest site and the recorded roosting location are</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance.</p>	<p>Short-term Slight Negative Effect</p>

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Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
	<p>beyond these distances from the Wind Farm Site and nearest proposed infrastructure.</p> <p>Therefore, based on the survey data, there is little potential for significant disturbance effects given that merlin were not dependent on the habitats located in close proximity to development infrastructure for foraging, and the recorded nest site and roost location are beyond the zone for potential disturbance effects. Significant effects are not predicted.</p>		
Operational Phase			
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect
Displacement and Barrier Effect	<p>Foraging/commuting merlin were infrequently recorded within the Wind Farm Site and were only recorded within 500m of the proposed turbine layout on five occasions over 2.5 years of surveying. Both the confirmed nest site and the recorded roosting location are situated over 1km from the nearest proposed turbines (1.3km and 1.2km respectively).</p> <p>Given the large separation distance involved between these locations and the proposed turbines, and that survey data shows the Wind Farm Site is not regularly used by this species, significant displacement effects are therefore not predicted.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect
Collision Risk	This species was not recorded flying at potential collision height during the extensive vantage point survey work undertaken at the Wind Farm Site. Collision related mortality is not likely to significantly impact this species.	No Effect	No Effect



7.5.2.4 Peregrine (All Seasons)

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>Peregrine was recorded within the Wind Farm Site on six occasions over the 2.5 years of bird surveys, with an additional four observations within 500m of the Wind Farm Site. Observations comprised birds hunting and travelling. All observations were during the winter season and no evidence of breeding activity was recorded. This species is unlikely to be dependent on the onsite habitats, given the wide-ranging nature of the species and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/ grassland/ coniferous plantation).</p> <p>Significant effects are not predicted.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance</p>	Long-term Slight Negative Effect
Disturbance	<p>Peregrine were infrequently recorded within 500m of the proposed turbine layout, with eight observations over the 2.5 years of surveying. There was no evidence of breeding activity recorded. Disturbance during construction is unlikely to discourage flight activity or foraging in the vicinity of the Wind Farm Site, particularly given peregrine has been documented to become accustomed to various sources of human disturbance (Ruddock et. al 2007).</p> <p>Significant disturbance effects are not anticipated.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance</p>	Short-term Slight Negative Effect
Operational Phase			
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect
Displacement and Barrier Effect	There was no evidence of breeding recorded. In total, this species was recorded on eight occasions within 500m of the proposed turbine layout between September 2020 and March 2023. The availability of alternative suitable habitat in the surroundings limits the potential for significant displacement effects.	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i></p>	Long-term Slight Negative Effect



Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
	Significant displacement effects are not predicted given the infrequency of observations within 500m of the proposed turbine layout and the abundance of alternative foraging habitat in the surroundings.	Impact corresponds to a Low effect significance	
Collision Risk	<p>This species was recorded flying the potential collision risk zone during vantage point surveys. A “Random” collision risk analysis has been undertaken (full details provided in Appendix 7-6).</p> <p>The collision risk has been calculated at a rate of 0.152 collisions per year. Annual mortality of adult peregrine has been calculated at 19% per annum (Craig <i>et al.</i>, 2004). If 0.152 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the county population (i.e. 32 birds (please see Section 7.4.1 for further details)) by 2.5%. The predicted collision risk is therefore of low magnitude as per Percival criteria (2003).</p> <p>No significant effects are predicted.</p>	<p>The magnitude of the effect is assessed as Low.</p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance</p>	Long-term Slight Negative Effect

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7.5.2.5 Whooper Swan (Wintering)

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>As outlined in Section 7.4.2, there were no records of whooper swan utilising habitats within the Wind Farm Site over the 2.5 years of surveying. All observations within the Wind Farm Site comprised birds in flight travelling. As such, there is no potential for impacts relating to direct habitat loss within the Wind Farm Site.</p> <p>No significant effects are predicted.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Negligible</i> impact corresponds to a Very Low effect significance.</p>	Long-term Imperceptible Negative Effect
Disturbance	<p>Whooper swan was recorded flying over the Wind Farm Site on 16 occasions over the 2.5 years of bird surveys, with an additional 16 observations within 500m of the Wind Farm Site. There were no records of whooper swan utilising habitats within the Wind Farm Site.</p> <p>A roost site was identified approximately 400m from the Wind Farm Site (approximately 600m from the nearest construction works). The maximum flock size of birds at the roost site was 26. All roosting observations were recorded during the 2021/22 winter season.</p> <p>A disturbance buffer zone of between 200-600m from construction works is recommended for whooper swan (Goodship & Furness, 2022). By design, following the consideration of the project constraints, the identified roost site is located beyond the most conservative limit of this buffer zone from nearest proposed infrastructure and proposed construction works (600m).</p> <p>Therefore, based on the survey data, there is little potential for significant disturbance effects given that whooper swan were not dependent on the habitats located in close proximity to development infrastructure for</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance</p>	Short-term Slight Negative Effect

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Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
	foraging/roosting, and the recorded roost site is beyond the zone for potential disturbance effects. Significant effects are not predicted.		
Operational Phase			
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect
Displacement and Barrier Effect	<p>There were no records of whooper swan utilising habitats within the Wind Farm Site. All records of this species within the Wind Farm Site comprised birds commuting. There were 16 observations of whooper swan within 500m of the proposed turbine layout. Flight activity was random over the Wind Farm Site, with no distinct commuting route to or from the roost identified.</p> <p>Whooper swan has been shown to be susceptible to displacement from habitats up to 300m from wind energy installations (McGuinness <i>et al.</i>, 2015 & Percival, 2003). The recorded roosting location is located approximately 620m from the nearest proposed turbine location, and is therefore beyond any potential for displacement effects.</p> <p>Significant effects are not predicted.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance</p>	Long-term Slight Negative Effect
Collision Risk	<p>This species was recorded flying the potential collision risk zone during vantage point surveys. A “Random” collision risk analysis has been undertaken (full details provided in Appendix 7-6).</p> <p>The collision risk has been calculated at a rate of 0.326 collisions per year. Annual mortality of adult whooper swan has been calculated 20% per annum (Brazil, 2003). If 0.326 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the county population (i.e. 441 birds (please see Section 7.4.1 for further details)) by 0.37%. The predicted collision risk is therefore negligible as per Percival criteria (2003).</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Negligible</i> impact corresponds to a Very Low effect significance.</p>	Long-term Imperceptible Negative Effect



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7.5.2.6 Lapwing (Wintering)

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>As outlined in Section 7.4.2, there were no records of lapwing utilising habitats within the Wind Farm Site over the 2.5 years of surveying. All observations within the Wind Farm Site comprised birds in flight travelling. As such, there is no potential for impacts relating to direct habitat loss within the Wind Farm Site.</p> <p>No significant effects are predicted.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and <i>Negligible</i> impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect
Disturbance	<p>Lapwing was not recorded utilising habitats within the Wind Farm Site for roosting or foraging. All records of this species within 500m of the Wind Farm Site comprised birds commuting, and these flights are unlikely to be impacted by construction works. The closest recorded roosting or foraging of this species to the Wind Farm Site during waterbird distribution surveys was 1.5km distant. This is sufficiently distant that no impacts from construction works are anticipated. Furthermore, the availability of similar suitable habitats in the surroundings (i.e. agricultural grassland, cutover bog) limits the potential for significant disturbance effects.</p> <p>Significant disturbance effects are not anticipated.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and <i>Negligible</i> impact corresponds to a Low effect significance.</p>	Short-term Slight Negative Effect
Operational Phase			
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect
Displacement and Barrier Effect	<p>This species was not recorded utilising habitats within the Wind Farm Site for roosting or foraging. All records of this species within 500m of the proposed turbine layout comprised birds commuting. No regularly used flight path or corridor was identified. The closest recorded roosting or foraging of this species to the Wind Farm Site during waterbird distribution surveys was 1.5km</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and</p>	Long-term Slight Negative Effect



Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
	<p>distant. This is sufficiently distant that no displacement effects are anticipated. Furthermore, the availability of similar suitable habitats in the surroundings (i.e. agricultural grassland, cutover bog) limits the potential for significant displacement effects.</p> <p>Significant displacement effects are not anticipated.</p>	<p><i>Negligible</i> impact corresponds to a Low effect significance.</p>	
Collision Risk	<p>This species was recorded flying the potential collision risk zone during vantage point surveys. A “Random” collision risk analysis has been undertaken (full details provided in Appendix 7-6).</p> <p>The collision risk has been calculated at a rate of 2.941 collisions per year. Annual mortality of adult lapwing has been calculated 29.5% per annum (Peach <i>et al</i>, 1994). If 2.941 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the county population (i.e. 2,627 birds (please see Section 7.4.1 for further details)) by 0.38%. The predicted collision risk is therefore negligible as per Percival criteria (2003).</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and <i>Negligible</i> impact corresponds to a Low effect significance.</p>	<p>Long-term Slight Negative Effect</p>

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7.5.2.7 Black-headed Gull (Wintering)

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>As outlined in Section 7.4.2, there were no records of black-headed gull utilising habitats within the Wind Farm Site over the three winters of surveying. All observations within the Wind Farm Site comprised birds in flight travelling. As such, there is no potential for impacts relating to direct habitat loss within the Wind Farm Site.</p> <p>No significant effects are predicted.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and <i>Negligible</i> impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect
Disturbance	<p>Black-headed gull was not recorded utilising habitats within the Wind Farm Site for roosting or foraging during the winter. All records of this species within 500m of the Wind Farm Site comprised birds commuting, and these flights are unlikely to be impacted by construction works. The closest recorded roosting or foraging of this species to the Wind Farm Site during waterbird distribution surveys was 1.5km distant. This is sufficiently distant that no impacts from construction works are anticipated. Furthermore, the availability of similar suitable habitats in the surroundings (i.e. agricultural grassland) limits the potential for significant disturbance effects.</p> <p>Significant disturbance effects are not anticipated.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and <i>Negligible</i> impact corresponds to a Low effect significance.</p>	Short-term Slight Negative Effect
Operational Phase			
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect
Displacement and Barrier Effect	<p>This species was not recorded utilising habitats within the Wind Farm Site for roosting or foraging during the winter. All records of this species within 500m of the proposed turbine layout comprised birds commuting. No pattern of direction was observed from these flights and no regular commuting over the site was recorded. The closest recorded roosting or foraging of this species to</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and</p>	Long-term Slight Negative Effect

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Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
	<p>the Wind Farm Site during waterbird distribution surveys was 1.5km distant. This is sufficiently distant that no displacement effects are anticipated. Furthermore, the availability of similar suitable habitats in the surroundings (i.e. agricultural grassland, cutover bog) limits the potential for significant displacement effects.</p> <p>Significant displacement effects are not anticipated.</p>	<p><i>Negligible</i> impact corresponds to a Low effect significance.</p>	
Collision Risk	<p>This species was recorded flying the potential collision risk zone during vantage point surveys. A “Random” collision risk analysis has been undertaken (full details provided in Appendix 7-6).</p> <p>The collision risk has been calculated at a rate of 1.296 collisions per year. Annual mortality of adult black-headed gull has been calculated 10% per annum (Prévot-Julliard <i>et al.</i>, 1998). If 1.296 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the county population (i.e. 956 birds (please see Section 7.4.1 for further details)) by 1.36%. However, as discussed in Section 7.4.1, the county population number utilised for this mortality calculation is highly likely to be a considerable under-estimate of the actual wintering county population. The county population was calculated partly using data from surveys of terrestrial habitat within an 8km radius of the Wind Farm Site. The population figure from this area was over 450 birds. The addition of birds from all remaining terrestrial habitats within Co. Tipperary outside of this 8km radius, which have not been included in calculation, would give a much larger county population figure and reduce the calculated increase in mortality below 1%. As such, the predicted collision risk is therefore considered to be of negligible magnitude as per Percival criteria (2003).</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and <i>Negligible</i> impact corresponds to a Low effect significance.</p>	<p>Long-term Slight Negative Effect</p>

7.5.2.8 **Black-headed Gull (Breeding)**

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>As outlined in Section 7.4.2, there were no records of black-headed gull utilising habitats within the Wind Farm Site over the two breeding seasons of surveying. All observations within the Wind Farm Site comprised birds in flight travelling. As such, there is no potential for impacts relating to direct habitat loss within the Wind Farm Site.</p> <p>No significant effects are predicted.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Low</i> sensitivity species and <i>Negligible</i> impact corresponds to a Very Low effect significance.</p>	Long-term Imperceptible Negative Effect
Disturbance	<p>Black-headed gull was not recorded utilising habitats within the Wind Farm Site for roosting or foraging during the breeding season and there was no evidence of breeding recorded.</p> <p>All records of this species within 500m of the Wind Farm Site comprised birds commuting, and these flights are unlikely to be impacted by construction works. Furthermore, the availability of similar suitable habitats in the surroundings (i.e. agricultural grassland) limits the potential for significant disturbance effects.</p> <p>Significant disturbance effects are not anticipated.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Low</i> sensitivity species and <i>Negligible</i> impact corresponds to a Very Low effect significance.</p>	Short-term Imperceptible Negative Effect
Operational Phase			
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect
Displacement and Barrier Effect	Black-headed gull was not recorded utilising habitats within the Wind Farm Site for roosting or foraging during the breeding season and there was no evidence of breeding recorded.	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Low</i> sensitivity species and <i>Negligible</i></p>	Long-term Imperceptible Negative Effect

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
	<p>All records of this species within 500m of the proposed turbine layout comprised birds commuting. No pattern of direction was observed from these flights and no regular commuting over the site was recorded. Furthermore, the availability of similar suitable habitats in the surroundings (i.e. agricultural grassland, cutover bog) limits the potential for significant displacement effects.</p> <p>Significant displacement effects are not anticipated.</p>	<p>impact corresponds to a Very Low effect significance.</p>	
Collision Risk	<p>This species was recorded flying the potential collision risk zone during vantage point surveys. A “Random” collision risk analysis has been undertaken (full details provided in Appendix 7-6).</p> <p>The collision risk has been calculated at a rate of 0.194 collisions per year. Annual mortality of adult black-headed gull has been calculated 10% per annum (Prévoit-Julliard <i>et al.</i>, 1998). If 0.0194 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the county population (i.e. 1,500 birds (please see Section 7.4.1 for further details)) by 0.13%. The predicted collision risk is therefore negligible as per Percival criteria (2003).</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Low</i> sensitivity species and <i>Negligible</i> impact corresponds to a Very Low effect significance.</p>	<p>Long-term Imperceptible Negative Effect</p>



7.5.2.9 **Cormorant (Wintering)**

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>As outlined in Section 7.4.2, there were no records of cormorant utilising habitats within the Wind Farm Site over the three winter seasons of surveying. All observations within the Wind Farm Site comprised birds in flight travelling. As such, there is no potential for impacts relating to direct habitat loss within the Wind Farm Site.</p> <p>No significant effects are predicted.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Low</i> sensitivity species and <i>Negligible</i> impact corresponds to a Very Low effect significance.</p>	Long-term Imperceptible Negative Effect
Disturbance	<p>Cormorant was not recorded utilising habitats within the Wind Farm Site for roosting or foraging during the winter season.</p> <p>All records of this species within 500m of the Wind Farm Site comprised birds commuting, and these flights are unlikely to be impacted by construction works. There are no substantial lakes or rivers within the Wind Farm Site and therefore no suitable habitat for cormorant.</p> <p>Significant disturbance effects are not anticipated.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Low</i> sensitivity species and <i>Negligible</i> impact corresponds to a Very Low effect significance.</p>	Short-term Imperceptible Negative Effect
Operational Phase			
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect
Displacement and Barrier Effect	<p>Cormorant was not recorded utilising habitats within the Wind Farm Site for roosting or foraging during the winter season.</p> <p>All records of this species within 500m of the proposed turbine layout comprised birds commuting. No pattern of direction was observed from these flights and no regular commuting over the site was recorded. There are no</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Low</i> sensitivity species and <i>Negligible</i> impact corresponds to a Very Low effect significance.</p>	Long-term Imperceptible Negative Effect



Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
	<p>substantial lakes or rivers within the Wind Farm Site and therefore no suitable habitat for cormorant.</p> <p>Significant displacement effects are not anticipated.</p>		
Collision Risk	<p>This species was recorded flying the potential collision risk zone during vantage point surveys. A “Random” collision risk analysis has been undertaken (full details provided in Appendix 7-6).</p> <p>The collision risk has been calculated at a rate of 0.015 collisions per year, or one bird every 66 years. The predicted collision risk is insignificant over the 35-year life-time of the proposed wind farm.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Low</i> sensitivity species and <i>Negligible</i> impact corresponds to a Very Low effect significance.</p>	<p>Long-term Imperceptible Negative Effect</p>

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7.5.2.10 Cormorant (Breeding)

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>As outlined in Section 7.4.2, there were no records of cormorant utilising habitats within the Wind Farm Site over the two breeding seasons of surveying. All observations within the Wind Farm Site comprised birds in flight travelling. As such, there is no potential for impacts relating to direct habitat loss within the Wind Farm Site.</p> <p>No significant effects are predicted.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and <i>Negligible</i> impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect
Disturbance	<p>Cormorant was not recorded utilising habitats within the Wind Farm Site for roosting or foraging during the breeding season and there was no evidence of breeding recorded.</p> <p>All records of this species within 500m of the Wind Farm Site comprised birds commuting, and these flights are unlikely to be impacted by construction works. There are no substantial lakes or rivers within the Wind Farm Site and therefore no suitable habitat for cormorant.</p> <p>Significant disturbance effects are not anticipated.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and <i>Negligible</i> impact corresponds to a Low effect significance.</p>	Short-term Slight Negative Effect
Operational Phase			
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect
Displacement and Barrier Effect	<p>Cormorant was not recorded utilising habitats within the Wind Farm Site for roosting or foraging during the breeding season and there was no evidence of breeding recorded.</p> <p>All records of this species within 500m of the proposed turbine layout comprised birds commuting. No pattern of direction was observed from these</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and</p>	Long-term Slight Negative Effect



Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
	<p>flights and no regular commuting over the site was recorded. There are no substantial lakes or rivers within the Wind Farm Site and therefore no suitable habitat for cormorant.</p> <p>Significant displacement effects are not anticipated.</p>	<p><i>Negligible</i> impact corresponds to a Low effect significance.</p>	
Collision Risk	<p>This species was recorded flying the potential collision risk zone during vantage point surveys. A “Random” collision risk analysis has been undertaken (full details provided in Appendix 7-6).</p> <p>The collision risk has been calculated at a rate of 0.078 collisions per year. Annual mortality of adult cormorant has been calculated 12% per annum (Frederiksen & Bregnballe, 2000). If 0.078 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the county population (i.e. 600 birds (please see Section 7.4.1 for further details)) by 0.11%. The predicted collision risk is therefore negligible as per Percival criteria (2003).</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and <i>Negligible</i> impact corresponds to a Low effect significance.</p>	<p>Long-term Slight Negative Effect</p>

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7.5.2.11 Teal (Wintering)

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>Teal was only recorded within the Wind Farm Site on one occasion over the three winters of bird surveys, comprising two birds flushed from a bog. The Wind Farm Site is therefore not an important foraging or roosting habitat for teal and the potential for construction works to result in ecologically significant habitat loss for teal is limited. The land lost to the development footprint is small (i.e. 6.02ha/2.5% of the Wind Farm Site) relative to the total area within the Wind Farm Site. Furthermore, suitable habitat is abundant in the wider surroundings of the Wind Farm Site, i.e. agricultural grassland, cutover bogs and pools.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and <i>Negligible</i> impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect
Disturbance	<p>Teal was only recorded within the Wind Farm Site on one occasion over the three winters of bird surveys, comprising two birds flushed from a bog. There were an additional eight observations within 500m of the Wind Farm Site, as summarised below.</p> <p>There was one observation of a flock of 60 birds on a pond to the east of the Wind Farm Site (over 200m from nearest proposed infrastructure). There were no further observations at this location over the three winters of surveying. The only other area birds were recorded was agricultural fields north of the Wind Farm Site. There were six records of teal foraging at these fields (between 300m – 780m from the nearest proposed infrastructure). Four of these observations comprised flocks of 1-4 birds, with one observation of 14 birds and one observation of 40 birds.</p> <p>There is no recommended disturbance buffer zone for teal, however a distance of between 100m – 200m is broadly recommended for other <i>Anas</i> duck species in the non-breeding season (Goodship & Furness, 2022). The areas recorded utilised by teal are situated greater than 200m from the nearest</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and <i>Negligible</i> impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect



Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
	<p>proposed construction works, and birds utilising these habitat are therefore unlikely to be impacted by construction activity due to the significant separation distance.</p> <p>Significant disturbance effects are therefore not anticipated.</p>		
Operational Phase			
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect
Displacement and Barrier Effect	<p>Teal was only recorded within the Wind Farm Site on one occasion over the three winters of bird surveys, comprising two birds flushed from a bog. There were an additional six observations within 500m of the proposed turbine layout. These comprised a flock of 60 birds on a pond to the east of the Wind Farm Site and five records of teal foraging at field north of the Wind Farm Site with flocks ranging from 1-40 birds (as outlined above).</p> <p>This is a very low rate of occurrence and demonstrates a lack of dependence of teal on the habitats of the Wind Farm Site. In addition, results from waterbird distribution surveys show that the significant areas for this species in the local context are outside of the Wind Farm Site (e.g. flocks of more than 1,000 birds regularly recorded at Little Brosna Callows).</p> <p>Significant displacement effects are not anticipated.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Very High</i> sensitivity species and <i>Negligible</i> impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect
Collision Risk	This species was not recorded flying at potential collision height during the extensive vantage point survey work undertaken at the Wind Farm Site. Collision related mortality is not likely to significantly impact this species.	No Effect	No Effect

7.5.2.12 Barn Owl (All Seasons)

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>A breeding site was identified (off-site) approximately 70m from the Wind Farm Site. Barn owl was only observed on one occasion within the Wind Farm Site comprising a bird travelling, however given the nocturnal nature of this species, it is likely to be under recorded during surveys.</p> <p>The land lost to the development footprint is small (i.e. 6.02ha/2.5% of the Wind Farm Site) relative to the total area within the Wind Farm Site. Furthermore, A significant proportion of the Wind Farm Site comprises formerly milled cutover bog and conifer forestry, these habitats are sub-optimal for foraging barn owl. Suitable habitats are abundant (agricultural grassland, intact bog, scrubland) in the wider surroundings of the Wind Farm Site.</p> <p>Significant effects on foraging barn owl are not predicted.</p>	<p>The magnitude of the effect is assessed as <i>Low</i></p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance</p>	Long-term Slight Negative Effect
Disturbance	<p>A breeding site was identified approximately 400m from the nearest proposed turbine. As per Ruddock & Whitfield (2007), barn owl have a limit of disturbance at 50-100m, with many nest sites not being disturbed until a human was within 10m during the study. However, the Forestry Commission of Scotland (2006)²⁶ recommends a 250m disturbance buffer around a known nest site where operations should be limited.</p> <p>The nearest proposed infrastructure (a new road) is approximately 350m from the nest site. The area between the nest site and the Wind Farm Site within this 250m buffer comprises mature forestry, which is of little to no ecological value for barn owl and the potential for birds to utilise this area is limited. The better</p>	<p>The magnitude of the effect is assessed as <i>Low</i></p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance</p>	Short-term Slight Negative Effect

²⁶ <https://forestry.gov.scot/images/corporate/pdf/Guidancenote32Birddisturbance.pdf>

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
	<p>foraging habitat (e.g. agricultural grassland, intact raised bog, scrubland) is located off-site and away from the Wind Farm Site. The forestry should also provide a level of visual screening from construction works.</p> <p>The nest site is situated beyond the recommended 250m construction disturbance buffer zone, and there is sub-optimal habitat for barn owl within this zone. As such, no significant disturbance effects area anticipated.</p>		
Operational Phase			
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect
Displacement and Barrier Effect	<p>A breeding site was identified approximately 400m from the nearest proposed turbine.</p> <p>There is no published research on displacement/avoidance buffers for barn owl around operational wind infrastructure. The area between the nest site and the Wind Farm Site comprises mature forestry, which is of little to no ecological value for barn owl and the potential for birds to utilise this area is limited. The better foraging habitat (e.g. agricultural grassland, intact raised bog, scrubland) is located off-site and away from the Wind Farm Site. The forestry should also provide a level of visual screening from operational turbines.</p> <p>Additionally, as previously detailed, a significant proportion of the Wind Farm Site comprises formerly milled cutover bog and conifer forestry, these habitats are sub-optimal for foraging barn owl. Suitable habitat is abundant (agricultural grassland, intact bog, scrubland) in the wider surroundings of the Wind Farm Site.</p> <p>Significant effects are not predicted.</p>	<p>The magnitude of the effect is assessed as <i>Low</i></p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance</p>	Long-term Slight Negative Effect



Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Collision Risk	This species was not recorded flying at potential collision height during the extensive vantage point survey work undertaken at the Wind Farm Site. Collision related mortality is not likely to significantly impact this species, particularly given this species flies at low elevation when foraging (Barn Owl Trust, 2021 ²⁷).	No Effect	No Effect

²⁷ <https://www.barnowltrust.org.uk/hazards-solutions/barn-owls-wind-turbines/>



7.5.2.13 **Curlew (Breeding)**

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>As outlined in Section 7.4.2, there were no records of curlew utilising habitats within the Wind Farm Site over the 2.5 years of surveying. All observations within the Wind Farm Site comprised birds in flight travelling. As such, there is no potential for impacts relating to direct habitat loss within the Wind Farm Site.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Negligible</i> impact corresponds to a Very Low effect significance.</p>	<p>Long-term Not Significant Negative Effect</p>
Disturbance	<p>There were six observations of curlew within 500m of the Wind Farm Site during the breeding season. These comprised single birds heard calling, a bird foraging on the ground and a flock of 17 birds travelling. A probable breeding territory was recorded approximately 750m – 1.5km from the Wind Farm Site (approximately 900m from nearest proposed turbine location).</p> <p>Given the separation distance between the breeding territory and the nearest proposed infrastructure (i.e. 900m), there is limited to no potential for disturbance to birds at this location as a result of construction works. The intervening land between the probable territory location and the Wind Farm Site comprises areas of mature forestry, treelines and scrubland which further screen the Wind Farm Site from this area.</p> <p>Therefore, based on the survey data, there is little potential for significant disturbance effects given that curlew were not dependent on the habitats located in close proximity to development infrastructure for foraging, and the recorded nest site is beyond the zone for potential disturbance effects. Significant effects are not predicted.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance</p>	<p>Short-term Slight Negative Effect</p>
Operational Phase			



Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect
Displacement and Barrier Effect	<p>There were four observations of curlew within 500m of the proposed turbine layout during the breeding season. A probable breeding territory was recorded approximately 750m – 1.5km from the Wind Farm Site (approximately 900m from nearest proposed turbine location).</p> <p>A buffer of 800m from wind infrastructure is recommended around curlew breeding sites (McGuinness <i>et al.</i>, 2015). The probable nesting location is located over 900m from the nearest proposed turbine location, and is therefore beyond any potential for displacement effects.</p> <p>Significant effects are not predicted.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance</p>	Long-term Slight Negative Effect
Collision Risk	This species was not recorded flying at potential collision height during the extensive vantage point survey work undertaken at the Wind Farm Site. Collision related mortality is not likely to significantly impact this species.	No Effect	No Effect



7.5.2.14 **Kestrel (All Seasons)**

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>There were no kestrel breeding territories recorded within the Wind Farm Site. There were up to two breeding territories identified in each breeding season during surveys. These were situated between 900m - 1.6km from the Wind Farm Site. There will be minimal loss of suitable breeding habitat, given the extent of suitable woodland habitat greater than 500m from the proposed turbine layout.</p> <p>Kestrel were regularly recorded foraging within the Wind Farm Site. Direct loss of foraging habitat relative to its availability onsite, will be minimal. The land lost to the development footprint is small (i.e. 6.02ha/2.5% of Wind Farm Site) relative to the total area within the Wind Farm Site.</p> <p>Substantial areas of undisturbed suitable breeding and foraging habitat will remain both within the Wind Farm Site and the wider surroundings post-construction.</p> <p>Significant impacts are not predicted.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect
Disturbance	<p>As outlined above, there were up to two breeding territories identified, situated between 900m - 1.6km from the Wind Farm Site.</p> <p>A disturbance buffer zone of between 100-200m from construction works is recommended for kestrel during the breeding season, and <50m during non-breeding season (Goodship & Furness, 2022). The identified breeding territories are significantly beyond these distances from the Wind Farm Site and any construction works.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance.</p>	Short-term Slight Negative Effect



Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
	<p>While kestrel were recorded foraging within the Wind Farm Site, the site does not contain habitats that are unique to the local area. A significant amount of foraging activity was also recorded in areas distant from the Wind Farm Site during surveys. Therefore, were disturbance to occur it would not result in the loss of a scarce resource for the local kestrel population.</p> <p>Significant impacts are not predicted.</p>		
Operational Phase			
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect
Displacement and Barrier Effect	<p>Raptor studies have generally found only low levels of turbine avoidance (Hötker et al. 2006; Madders & Whitfield 2006), with some species, such as kestrels, known to continue foraging activity close to turbines (Pearce Higgins et.al 2009). Moreover, significant effects are not anticipated, given that extensive areas of suitable foraging habitat exist and will remain in the wider area. Onsite habitats are not considered unique to the Wind Farm Site.</p> <p>Significant displacement effects are not predicted.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Medium</i> Impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect
Collision Risk	<p>This species was recorded flying the potential collision risk zone during vantage point surveys. A “Random” collision risk analysis has been undertaken (full details provided in Appendix 7-6).</p> <p>The collision risk has been calculated at a rate of 1.848 collisions per year. Annual mortality of adult kestrel has been calculated 31% per annum (Village, 1990). If 1.848 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the county population (i.e. 519 birds (please see Section 7.4.1 for further details)) by 1.15%. The predicted collision risk is therefore low as per Percival (2003).</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Low</i> impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect



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7.5.2.15 Snipe (All Seasons)

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>Snipe were regularly recorded during surveys, with observations of drumming or calling snipe during the breeding season frequently recorded. There were up to four breeding territories identified within the Wind Farm Site between the 2021 and 2022 breeding seasons. One of these recorded territories overlaps with a proposed turbine location, and one partly with the proposed substation location.</p> <p>However, the loss of breeding habitat will be minimal as the infrastructure is confined to a narrow corridor (i.e., 6.02ha/2.5% of Wind Farm Site). Significant areas of suitable nesting and foraging habitat will continue to remain post construction and suitable habitat is abundant in the surrounding area.</p> <p>Significant habitat loss effects are not predicted.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect
Disturbance	<p>There were up to four breeding territories identified within the 500m of the Wind Farm Site between the 2021 and 2022 breeding seasons.</p> <p>Disturbance associated with construction works will result in a measurable reduction in the breeding density of snipe onsite/around the margins of the Wind Farm Site. However, substantial areas of undisturbed suitable breeding and foraging habitat will remain both within the Wind Farm Site and the wider surroundings post-construction.</p> <p>Significant disturbance effects are not predicted.</p>	<p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Medium</i> Impact corresponds to a Low effect significance.</p>	Short-term Slight Negative Effect
Operational Phase			
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect



Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Displacement and Barrier Effect	<p>Pearce-Higgins et. al (2009), found that breeding snipe showed significant avoidance of turbines extending to a distance of 400m, with breeding density reduced by up to 50% within this area (Pearce-Higgins et. al 2009). There is also evidence of avoidance of access tracks. Disturbance displacement associated with operational turbines will result in a measurable reduction in the breeding density of snipe onsite/around the margins of the Wind Farm Site.</p> <p>However, substantial areas of undisturbed suitable breeding and foraging habitat will remain both within the Wind Farm Site and the wider surroundings post-construction.</p> <p>Significant displacement is not predicted.</p>	<p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Medium</i> Impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect
Collision Risk	<p>This species was recorded flying the potential collision risk zone during vantage point surveys. A “Random” collision risk analysis has been undertaken (full details provided in Appendix 7-6).</p> <p>The collision risk has been calculated at a rate of 0.166 collisions per year, or one bird every 8 years. Annual mortality of adult snipe has been calculated 37.5% per annum (Spence, 1988). If 0.166 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the county population (i.e. 328 birds (please see Section 7.4.1 for further details)) by 0.13%. The predicted collision risk is therefore of negligible as per Percival (2003).</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Negligible</i> impact corresponds to a Very Low effect significance.</p>	Long-term Not Significant Negative Effect



7.5.2.16 **Woodcock (Breeding)**

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>This species was regularly recorded during the breeding seasons at the Wind Farm Site. Numerous roding male woodcock were recorded. These observations indicate that woodcock bred within the Wind Farm Site. There were up to three breeding territories identified within the Wind Farm Site. Sections of the site are dominated by scrub, immature birch woodland and commercial forestry which provide suitable breeding habitat for woodcock. Some of these areas with identified breeding territories overlap with the development footprint. However, direct loss of breeding habitat relative to its availability onsite, will be minimal. The land lost to the development footprint is small (i.e. 6.02ha/2.5% of Wind Farm Site) relative to the total area within the Wind Farm Site. In addition, any potential impact will not result in the loss of a scarce resource given these habitats are not unique to the Wind Farm Site nor rare locally and extensive areas of suitable foraging and nesting habitat will remain post construction. Considering the above, no significant habitat loss is predicted.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tablature of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance.</p>	Long-term Slight Negative Effect
Disturbance	<p>There were up to four breeding territories identified within 500m of the Wind Farm Site.</p> <p>Sections of the site are dominated by scrub, immature birch woodland and commercial forestry which provide suitable breeding habitat for woodcock. Some of these areas with identified breeding territories overlap with the development footprint and therefore construction works.</p> <p>The construction of the Wind Farm Site will result in a measurable reduction in the breeding habitat onsite/around the margins of the Wind Farm Site. However, construction works will be within a small footprint relative to the total area within the Wind Farm Site. In addition, any potential impact will not</p>	<p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tablature of <i>Medium</i> sensitivity species and <i>Medium</i> Impact corresponds to a Low effect significance.</p>	Short-term Slight Negative Effect



Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
	result in the loss of a scarce resource given these habitats are not unique to the Wind Farm Site nor rare locally and extensive areas of suitable foraging and nesting habitat will remain post construction. Considering the above, no significant habitat loss is predicted.		
Operational Phase			
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect
Displacement and Barrier Effect	There is no published research on displacement/avoidance buffers for woodcock around operational wind infrastructure. The breeding habitats on-site (i.e. scrub, immature birch woodland and commercial forestry) are not unique to the Wind Farm Site nor rare locally and extensive areas of suitable foraging and nesting habitat exists beyond 500m from the proposed turbine layout. Considering the above, no significant displacement effects are predicted.	The magnitude of the effect is assessed as <i>Medium</i> . The cross tabulation of <i>Medium</i> sensitivity species and <i>Medium</i> Impact corresponds to a Low effect significance.	Long-term Slight Negative Effect
Collision Risk	This species was not recorded flying at potential collision height during the extensive vantage point survey work undertaken at the Wind Farm Site. Collision related mortality is not likely to significantly impact this species.	No Effect	No Effect



7.5.2.17 **Buzzard (All Seasons)**

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>There was one buzzard breeding territory identified within the Wind Farm Site in each breeding season surveyed. One of these locations overlaps with a proposed turbine location.</p> <p>This species was frequently recorded within the Wind Farm Site during the breeding and winter seasons. The construction of the wind farms site will not result in the loss of a significant amount of foraging habitat given the development footprint is small (i.e., 6.02ha/2.5% of Wind Farm Site) relative to the total area within the Wind Farm Site. In addition, the majority of suitable nesting habitat (e.g. mature forestry and treelines) are located outside the development footprint and there will be no significant reduction in these habitats.</p> <p>Significant impacts are not predicted.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Low</i> Impact corresponds to a Very Low effect significance.</p>	Long-term Slight Negative Effect
Disturbance	<p>On-site areas and to a 500m radius of the Wind Farm Site has hosted between one to two breeding pairs of buzzard between 2021 and 2022 (see Confidential Appendix). In addition, this species was regularly recorded within the Wind Farm Site during the breeding and wintering season. The disturbance associated with construction works will result in a measurable reduction in the breeding density of buzzard onsite and a reduction in the amount of available foraging habitat around the margins of the Wind Farm Site. However, these lands (e.g., cutover bog, scrub and adjacent woodland and farmland) are not considered unique to the Wind Farm Site or rare in the wider surroundings. Significant displacement effects are not predicted at the county, national or international scale.</p>	<p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Medium</i> Impact corresponds to a Very Low effect significance.</p>	Short-term Slight Negative Effect
Operational Phase			



Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect
Displacement and Barrier Effect	<p>This species was frequently recorded within the Wind Farm Site during the breeding and winter seasons. There were one to two breeding territories identified within 500m of the proposed turbine layout.</p> <p>Pearce-Higgins (2009) describes that buzzard has been found to show significant turbine avoidance extending to at least 500m. There were one to two breeding territories identified within 500m of the proposed turbine layout. Extensive areas of suitable foraging and breeding habitat exist and will remain in the wider area (i.e. outside 500m from the proposed turbine layout).</p> <p>Additionally, buzzard were regularly recorded within 500m of the proposed turbine layout. There will be a measurable reduction in the frequency of commuting and foraging buzzard within 500m of the proposed turbine layout. However, onsite habitats are not considered unique to the Wind Farm Site and suitable habitat is abundant for this species greater than 500m from the proposed turbine layout within the Wind Farm Site and its surroundings.</p> <p>Significant displacement effects are not predicted at the county, national or international scale.</p>	<p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Medium</i> Impact corresponds to a Very Low effect significance.</p>	Long-term Slight Negative Effect
Collision Risk	<p>This species was recorded flying the potential collision risk zone during vantage point surveys. A “Random” collision risk analysis has been undertaken (full details provided in Appendix 7-6).</p> <p>The collision risk has been calculated at a rate of 1.491 collisions per year. The favourable conservation status of this species (Green-listed BoCCI) limits the potential for ecologically significant effects to result. The loss of 1.491 birds per</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Low</i> Impact corresponds to a Very Low effect significance.</p>	Long-term Slight Negative Effect



Potential effects during the construction and operational phases of the Proposed Development	Significance (Percival, 2003)	Significance (EPA, 2022)
	year from the local population of a Green-listed (BoCCI) species is considered of low significance.	

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7.5.2.18 Sparrowhawk (All Seasons)

Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Construction Phase			
Direct Habitat Loss	<p>This species was frequently recorded within the Wind Farm Site during the breeding and winter seasons. The construction of the Wind Farms Site will not result in the loss of a significant amount of foraging habitat given the development footprint is small (i.e., 6.02ha/2.5% of the Wind Farm Site) relative to the total area within the Wind Farm Site.</p> <p>There were two probable/confirmed breeding territories identified within or partially within the Wind Farm Site in 2021 (see Confidential Appendix). These two probable territories do not overlap with any proposed turbine locations. There is potential for the loss of nesting habitat within the Wind Farm Site. However, these lands (e.g. cutover bog and scrub) are not considered unique to the Wind Farm Site or rare in the wider surroundings.</p> <p>Significant population level effects are not predicted at the county, national or international scale.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Medium</i> Impact corresponds to a Very Low effect significance.</p>	<p>Long-term Slight Negative Effect</p>
Disturbance	<p>Breeding sparrowhawk were recorded within the Wind Farm Site. Construction activity adjacent to the nest sites within the Wind Farm Site could potentially cause disturbance of breeding and foraging sparrowhawk. The disturbance associated with construction works will result in a measurable reduction in the breeding density of sparrowhawk and a reduction in the amount of available foraging habitat within the Wind Farm Site. However, these lands (e.g., cutover bog and scrub) are not considered unique to the Wind Farm Site or rare in the wider surroundings.</p> <p>Significant population level disturbance effects are not predicted at the county, national or international scale.</p>	<p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Medium</i> Impact corresponds to a Very Low effect significance.</p>	<p>Short-term Slight Negative Effect</p>
Operational Phase			

Tipperary Planning Authority



Potential effects during the construction and operational phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Direct Habitat Loss	Direct effects are not anticipated as no additional infrastructure is proposed.	No Effect	No Effect
Displacement and Barrier Effect	<p>As previously discussed, the Wind Farm Site hosts breeding and foraging sparrowhawk. Displacement from turbines is not reported for sparrowhawk, however, it is assumed for the purposes of the assessment that sparrowhawk show avoidance to a distance of 500m from turbines as with other raptors (Pearce-Higgins et al., 2009).</p> <p>There were two territories identified within 500m of the proposed turbine layout. The disturbance associated with operational turbines will result in a measurable reduction in the breeding density of sparrowhawk and a reduction in the amount of available foraging habitat within the Wind Farm Site. Notwithstanding this, extensive areas of suitable foraging habitat exist and will remain in the wider area (i.e. outside 500m from the proposed turbine layout). Moreover, onsite habitats are not considered unique to the Wind Farm Site with significant areas of similar habitats available in surrounding bogs.</p> <p>Significant population level displacement effects are not predicted at the county, national or international scale.</p>	<p>The magnitude of the effect is assessed as <i>Medium</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Medium</i> Impact corresponds to a Very Low effect significance.</p>	Long-term Slight Negative Effect
Collision Risk	<p>This species was recorded flying the potential collision risk zone during vantage point surveys. A “Random” collision risk analysis has been undertaken (full details provided in Appendix 7-6).</p> <p>The collision risk has been calculated at a rate of 0.036 collisions per year, or one bird every 27 years. The favourable conservation status of this species (Green-listed BoCCI) limits the potential for ecologically significant effects to result. The loss of 0.036 birds per year from the local population of a Green-listed (BoCCI) species is considered of low significance.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of <i>Low</i> sensitivity species and <i>Negligible</i> Impact corresponds to a Very Low effect significance.</p>	Long-term Imperceptible Negative Effect



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7.5.3 Effects on Key Ornithological Receptors during Decommissioning

Potential effects on KORs that may occur during the decommissioning of the wind farm are described below. The magnitude and significance of these effects are then defined according to Percival (2003) and EPA (2022).

Potential impacts during the decommissioning phase of the Proposed Development		Significance (Percival 2003)	Significance (EPA 2022)
Direct Habitat Loss	Direct or indirect effects are not anticipated.	No Effect	No Effect
Disturbance	As above for the construction phase for each species in Section 7.5.2.	As above for the construction phase for each species in Section 7.5.2.	As above for the construction phase for each species in Section 7.5.2.

7.5.4 Effects on Designated Areas

Where the potential for any adverse effect on any European Site has been identified, the pathway by which any such effect may occur has been robustly blocked through the use of avoidance, appropriate design and mitigation measures as set out within the Natura Impact Statement and its appendices. The measures ensure that the construction and operation of the Proposed Development does not adversely affect the integrity of European sites.

Therefore, it can be objectively concluded that the Proposed Development, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site.

7.5.5 Effect Associated with the Grid Connection and Turbine Delivery Route

The proposed grid connection cable route will commence from the proposed onsite substation and will run along existing roads to the existing 110 kV Dallow substation near Birr, Co. Offaly. Required works are minor and are all located within the existing road corridor (full details in Chapter 4 of this EIAR). The proposed turbine delivery route will require accommodation works at 3 no. locations to facilitate the delivery abnormal loads. (full details in Chapter 4 of this EIAR). Upon completion of the turbine delivery phase, the turbine delivery accommodation works locations will revert to their existing condition.

The majority of habitats along both the grid connection and turbine delivery route are of low ecological value (i.e. existing roads/tracks, agricultural land) and do not have the potential to support species of conservation interest in the area. On a precautionary basis, it is assumed that some temporary disturbance may occur during construction works. However, given the extent of suitable habitat in the wider area; significant displacement effects are not predicted. The turbine delivery route does not have the potential to result in any significant habitat loss or displacement of any KOR species. No significant effects are predicted.

As per Percival (2003) the magnitude of the effect on KOR is assessed as **Negligible**. The cross tabulation of a **Very High** sensitivity species (e.g. black-headed gull, cormorant, lapwing and teal - the highest sensitivity species identified as a KOR at this site) and **Negligible** impact corresponds to a **Low Effect Significance**. The significance of the potential impact is classed as a **Short-term Slight Negative** effect following EPA criteria (2022). As no further works are proposed following construction, no significant effects are predicted during the operational phase.

7.6 Mitigation and Best Practice Measures

This section describes the measures that are in place to mitigate negative effects associated with the Proposed Development on avian receptors. Effects on avian receptors have been addressed in two ways:

- > Design of the Proposed Development.
- > Management of the development phases.

7.6.1 Sharing Ecological Data

As a measure to support conservation research and policy, it is proposed to submit the pre-planning survey data and information to the National Biodiversity Data Centre (NBDC) on relevant ecological records, for example, information on the location of breeding territories and nest sites of bird species of conservation concern. The submission of the data will follow relevant standards and will be provided in the preferred NBDC excel template. This measure will be fulfilled within the first year of the construction phase in the event of a successful application.

7.6.2 Mitigation by Design

The project design has followed the basic principles outlined below to avoid the potential for significant effects on avian receptors:

- > Sensitive areas recorded during surveys were taken into account in the design of the Proposed Development. Infrastructure has been placed such as to avoid these areas and to be beyond recommended buffer zones in relation to disturbance (Goodship & Furness, 2022) and displacement effects (McGuinness *et al.*, 2015; Pearce-Higgins *et al.*, 2009), as outlined below:
 - No infrastructure placed within 750m of any recorded hen harrier roost location;
 - No infrastructure placed within 1km of the identified merlin nest site;
 - No infrastructure placed within 600m of the identified whooper swan roost site; and
 - No infrastructure placed within 800m of the identified probable curlew breeding territory.
- > Hard standing areas have been designed to the minimum size necessary to accommodate the turbine model that is selected.
- > The proposed grid connection routes have been selected to utilise built infrastructure for the majority of its length (i.e. cables to be laid within public roads). Cables will be laid underground to avoid effects on roadside hedgerows and disturbance to nesting birds.

7.6.3 Mitigation During Construction, Operation and Decommissioning

The following section describes the mitigation and best practice measures to be implemented during each phase of the Proposed Development.

7.6.3.1 Construction Phase

A Construction and Environmental Management Plan (CEMP) has been prepared and will be in place prior to the start of the construction phase. The CEMP is included as Appendix 4-3 of this EIA and details pertinent to birds are summarised below. Note that these measures are proposed as industry best practices rather than to mitigate any identified significant effect and will be updated as required to address any conditions of a permission or findings of any pre-construction survey results.

- Works will commence outside the bird nesting season (1st of March to 31st of August inclusive). Any requirement for construction works to run into the subsequent breeding season following commencement will be informed by pre-construction bird surveys.
- The removal of woody vegetation will be undertaken in full compliance with Section 40 of the Wildlife Act 1976 – 2022. Refer to the BMEP for replanting of hedgerows (Appendix 6-3).
- During the construction phase, noise limits, noise control measures, hours of operation (i.e. dusk and dawn is high faunal activity time) and selection of plant items will be considered in relation to disturbance of birds. All plant and equipment for use will comply with the European Communities (Noise Emission By Equipment For Use Outdoors) Regulations, 2001, as amended (SI 632/2001). Plant machinery will also be turned off when not in use.
- Silt fences will be installed as an additional water protection measure around existing watercourses.
- An Environmental Clerk of Works and Project Ecologist will be appointed. Duties will include:
 - Organise the undertaking of a pre-construction walkover bird survey to ensure that significant effects on birds will be avoided.
 - Inform and educate on-site personnel of the ornithological and ecological sensitivities within the Wind Farm Site.
 - Oversee management of ornithological issues during the construction period and advise on ornithological issues as they arise.
 - Provide guidance to contractors to ensure legal compliance with respect to protected species onsite.
 - Liaise with officers of consenting authorities and other relevant bodies with regular updates in relation to construction progress as necessary.
- If winter roosting or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and no works shall be undertaken within a species-specific disturbance buffer in line with industry best practice (e.g. Goodship and Furness, 2022). No works shall be permitted within the buffer until it can be demonstrated that the roost/nest is no longer occupied.

7.6.3.2 Operational Phase

No significant operational phase impacts requiring mitigation were identified.

7.6.3.3 Decommissioning Phase

During the decommissioning phase, disturbance limitation measures will be as per the construction phase described in Section 7.6.3.1.

7.7 Monitoring

The following monitoring measures are proposed as industry best practice rather than in response to any identified impacts associated with the Proposed Development.

7.7.1 Pre-Construction

Pre-construction surveys will be undertaken prior to the initiation of works at the wind farm. The survey will include a thorough walkover survey to a 500m radius of the Proposed Development footprint and all works areas, where access allows. If winter roosting or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter or breeding season of the construction phase. If it is found to be active during the construction phase, no works shall be undertaken within a disturbance buffer in line with industry best practice (e.g. Forestry Commission Scotland, 2006; Ruddock and Whitfield, 2007; Goodship and Furness, 2022). No works shall be permitted within the buffer until it can be demonstrated that the roost/nest is no longer occupied.

7.7.2 Post-Construction

A detailed post-construction Bird Monitoring Programme has been prepared for the operational phase of the proposed development (please refer to Appendix 7-6 for further details). The programme of works will monitor parameters associated with collision, displacement/barrier effects and habituation during the lifetime of the project. Surveys will be scheduled to coincide with Years 1, 2, 3, 5, 10 and 15 of the lifetime of the wind farm. Monitoring measures are broadly based on guidelines issued by NatureScot (2009, 2017). The following individual components are proposed:

- Vantage point surveys to monitor flight activity in the vicinity of the turbines;
- Breeding walkover surveys to monitor breeding bird activity at the Wind Farm Site;
- Breeding barn owl surveys to monitor the identified barn owl nest;
- Whooper swan roost surveys to monitor the identified whooper swan roost location;
- Collision monitoring, including carcass searches with trained dogs to monitor bird fatalities due to collision. These will include searcher efficiency and scavenger removal trails as a best practice measure.

7.7.3 Decommissioning

Decommissioning monitoring surveys will be undertaken prior to works associated with decommissioning at the wind farm. The survey will include a thorough walkover survey to a 500m radius of the Proposed Development footprint and all works areas, where access allows. If winter roosting or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter or breeding season of the decommissioning phase. If it is found to be active during the decommissioning phase, no works shall be undertaken within a disturbance buffer (Forestry Commission Scotland, 2006; Ruddock and Whitfield, 2007; Goodship and Furness, 2022) in line with industry best practice. No works shall be permitted within the buffer until it can be demonstrated that the roost/nest is no longer occupied.

Residual Effects

The following species were identified as KORs and were subject to detailed impact assessment:

- > Golden Plover (wintering)
- > Hen Harrier (wintering)
- > Merlin (all seasons)
- > Peregrine (all seasons)
- > Whooper Swan (wintering)
- > Lapwing (all seasons)
- > Black-headed Gull (all seasons)
- > Cormorant (all seasons)
- > Teal (wintering)
- > Barn Owl (all seasons)
- > Curlew (breeding)
- > Kestrel (all seasons)
- > Snipe (all seasons)
- > Woodcock (breeding)
- > Buzzard (all seasons)
- > Sparrowhawk (all seasons)

Following the measures described in Section 7.6, no effect significance greater than **Low**, as per Percival (2003) criteria, was identified for any KOR. No effect significance greater than **Slight**, as per EPA (2022) criteria, was identified for any KOR. Taking into consideration the effect significance levels identified and the proposed best practice and mitigation, significant residual effects on the KORs with regard to direct habitat loss, disturbance/displacement or collision mortality are not anticipated.

7.9 Cumulative Effects

As per NatureScot guidance “Assessing the Cumulative Impacts of onshore Wind Energy Developments” (NatureScot, 2012), cumulative effects arising from two or more developments may be:

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

This section first identifies other plans and projects in the vicinity of the Wind Farm Site and then assesses the potential for additive, antagonistic or synergistic impacts to occur.

7.9.1 Other Plans and Projects

Assessment material was compiled for relevant developments within the vicinity of the Wind Farm Site. The material was gathered through a search of relevant online Planning Registers, reviews of relevant EIS/EIAR documents, planning application details and planning drawings. It served to identify past and future plans and projects, their activities and their environmental impacts. These are then considered for in-combination or cumulative effects with the Proposed Development. All plans and projects reviewed are outlined below.

7.9.1.1 Plans Considered in the Cumulative Impact Assessment

The following plans were considered in the cumulative impact assessment:

- Tipperary County Development Plan 2022-2028
- Offaly County Development Plan 2021-2027
- Regional Planning Guidelines for the Midland Region 2010-2022
- National Biodiversity Action Plan 2017-2021

7.9.1.2 Projects Considered in the Cumulative Impact Assessment

NatureScot guidance (NatureScot, 2012; 2018) was consulted while undertaking the cumulative assessment. NatureScot (2012; 2018) emphasises that its priority is to ‘maintain the conservation status of the species population at the national level.’ However, it is acknowledged that consideration should also be allowed for impacts at the regional level ‘where regional impacts have national implications (for example where a specific region holds the majority of the national population)’. A 25km radius of the Proposed Development was considered an appropriate regional scale given the foraging range of the key ornithological receptors identified within the Proposed Development area.

To conduct the cumulative impact assessment, as detailed in Chapter 2 of this EIAR, relevant online planning registers, relevant EIAR (or historical EIS) documents, planning application details and planning drawings in the vicinity of the Proposed Development site were reviewed to identify past and future projects, their activities and their environmental impacts. The findings of this review are outlined in the following sections.

7.9.1.2.2 Forestry and Agricultural Practices

The wider surroundings of the Proposed Development primarily consist of land managed for agriculture in the form of livestock grazing and commercial conifer plantations, both of low ecological value. The forestry works (felling/planting) associated with the forestry in the wider surroundings of the Proposed Development will be subject to relevant licencing and guidance from the Forestry Service.

These land-uses have been taken into account in this cumulative assessment.

7.9.1.2.3 Other Developments

The review of the County Council’s planning registers identified relevant general development planning applications in the vicinity of the Proposed Development. Most of these relate to the provision and/or alteration of one-off rural housing and agriculture-related structures, as described in Chapter 2 of the EIA. Owing to the scale and nature of these developments, significant cumulative impacts are not anticipated.

7.9.1.2.4 Other Wind Farm Developments

Wind farm projects within 25km of the Proposed Development are provided in Table 7-11, including details of their planning status. A total of 41 existing turbines and 21 permitted turbines were identified for consideration. The environmental impacts of each permitted or existing wind farm are outlined in detail in this section. The cumulative impact assessments for each KOR species are provided in the following section (Section 7.9.2).

Table 7-11 Wind energy applications within 25km of the Wind Farm Site.

County	Wind Farm	Planning Status	Number of Turbines	Separation Distance (turbine to turbine)
Tipperary	Carrig	Operational	3	c.3.8km
	Skehanagh	Operational	5	c.4.7km
	Monaincha	Operational	15	c.23km
	Ballinlough-Ikerrin	Operational	3	c.25km
Offaly	Meewuan	Operational	4	c.12km
	Derrinlough	Permitted – under construction	21	c.15km
	Cloghan	Operational	9	c.16km
	Leabeg	Operational	2	c.24km

Carrig

The potential for the Proposed Development to result in significant cumulative or in-combination effects when assessed alongside the Proposed Development was considered. The planning file²⁸ was reviewed on the Tipperary County Council Planning Register and no information regarding potential effects on birds was available. However, given the location of the wind farm, the nature of the habitats onsite (as reviewed on publicly available aerial photography) and the lack of significant residual impacts on bird species associated with the Proposed Development when considered on its own, significant cumulative or in-combination effects on KORs with regard to displacement or collision mortality are not anticipated.

²⁸ <https://www.eplanning.ie/TipperaryCC/AppFileRefDetails/5123496/0>

Skehanagh

The potential for the Proposed Development to result in significant cumulative or in-combination effects when assessed alongside Skehanagh Wind Farm, was considered. The planning file²⁹ was reviewed on the Tipperary County Council Planning Register and no information regarding potential effects on birds was available. However, given the location of the wind farm, the nature of the habitats onsite (as reviewed on publicly available aerial photography) and the lack of significant residual impacts on bird species associated with the Proposed Development when considered on its own, significant cumulative or in-combination effects on KORs with regard to displacement or collision mortality are not anticipated.

Meewuan

The potential for the Proposed Development to result in significant cumulative or in-combination effects when assessed alongside Meewuan Wind Farm was considered. The EIA³⁰ for Meewuan Wind Farm was consulted. Meewuan Wind Farm shared the following key ornithological receptors with the Proposed Development: whooper swan, golden plover, snipe, kestrel, woodcock and buzzard. This EIA assessed collision risk and displacement for the operational phase of this development. The collision risk was assessed to be of low significance for whooper swan, woodcock, kestrel and buzzard and of very low significance for golden plover and snipe. Disturbance/displacement and barrier effect were assessed to be of low significance for whooper swan and golden plover, and of very low significance for woodcock, kestrel and buzzard.

The cumulative assessment for the Meewuan Wind Farm assessed the in-combination collision risk and the in-combination barrier effect of the Wind Farm when wind farms within 15km were taken into consideration. It was concluded that given the distances of these wind farms from the Meewuan Wind Farm, the high avoidance rate of KORs, and the low numbers of turbines involved (i.e. four), any in-combination collision risk on KORs was assessed as negligible. The in-combination barrier effect was assessed as low.

Based on this information, as well as the location of Meewuan Wind Farm, the nature of the habitats onsite (as reviewed on publicly available aerial photography) and the lack of significant residual impacts on bird species associated with the Proposed Development when considered on its own, significant cumulative or in-combination effects on KORs with regard to direct habitat loss, displacement or collision mortality are not anticipated.

Derrinlough

The potential for the Proposed Development to result in significant cumulative or in-combination effects when assessed alongside Derrinlough Wind Farm was considered. The EIA³¹ for Derrinlough Wind Farm was consulted. Derrinlough Wind Farm shared the following key ornithological receptors with the Proposed Development: whooper swan, golden plover, hen harrier, merlin, peregrine, lapwing, black-headed gull, woodcock, curlew, buzzard, sparrowhawk, kestrel, snipe and teal. This EIA assessed collision risk and displacement for the operational phase of this development. The collision risk was assessed to be of low significance for lapwing (wintering), black-headed gull (breeding); of negligible significance for whooper swan, golden plover, hen harrier, peregrine, curlew, sparrowhawk, kestrel and snipe; and no effect for merlin, woodcock, buzzard and teal. Disturbance/displacement and barrier effect were assessed to be of low significance for whooper swan, golden plover, hen harrier, peregrine, lapwing, black-headed gull, woodcock and curlew; and of very low significance for merlin, buzzard, sparrowhawk, kestrel, snipe and teal.

²⁹ <https://www.eplanning.ie/TipperaryCC/AppFileRefDetails/5123495/0>

³⁰ <https://www.eplanning.ie/OifalyCC/AppFileRefDetails/1544/0>

³¹ <https://www.derrinloughwindfarmplanning.ie/Environmental.htm>

The cumulative assessment for the Derrinlough Wind Farm assessed the in-combination collision risk and the in-combination barrier effect of the Wind Farm when other wind farms were taken into consideration. It was concluded that, given barrier effects are typically more likely to impact large flocks of migrating waterbirds than other species groups, and that no migratory routes were identified during any surveys undertaken, significant cumulative barrier effects were not anticipated.

Based on this information, as well as the location of Derrinlough Wind Farm, the nature of the habitats onsite (as reviewed on publicly available aerial photography) and the lack of significant residual impacts on bird species associated with the Proposed Development when considered on its own, significant cumulative or in-combination effects on KORs with regard to direct habitat loss, displacement or collision mortality are not anticipated.

Cloghan

The potential for the Proposed Development to result in significant cumulative or in-combination effects when assessed alongside Cloghan Wind Farm was considered. The EIAR³² for Cloghan Wind Farm was consulted. The EIAR does not identify key ornithological receptors, however birds recorded at or near the site included whooper swan, lapwing, snipe and golden plover. This EIAR assessed collision risk and displacement for the operational phase of this development. A collision risk model was only conducted for Greenland white-fronted goose (not a KOR of the Proposed Development). Collision risk was assessed as low for other species based on limited observations at the potential collision height. Similarly, disturbance/displacement and barrier effect were assessed to be not significant due to the lack of important bird populations or scarce resource habitats occurring at the site.

Monaincha

The potential for the Proposed Development to result in significant cumulative or in-combination effects when assessed alongside Monaincha Wind Farm was considered. The EIAR³³ for Monaincha Wind Farm was consulted. Monaincha Wind Farm shared the following key ornithological receptors with the Proposed Development: merlin, golden plover and peregrine. This EIAR assessed collision risk and displacement for the operational phase of this development. The collision risk was assessed to be low given the lack of suitable habitat at the site for species typically at risk of collision, e.g. large wintering waterbirds and raptor species. Similarly, disturbance/displacement and barrier effect were assessed to be low given the abundance of suitable habitat for identified species in the surrounding area.

Leabeg

The potential for the Proposed Development to result in significant cumulative or in-combination effects when assessed alongside Leabeg Wind Farm was considered. The EIAR³⁴ for Leabeg Wind Farm was consulted. The EIAR does not identify key ornithological receptors, but includes the following species in the impact assessment which are KORs of the Proposed Development: whooper swan, golden plover and hen harrier. This EIAR assessed collision risk and displacement for the operational phase of this development. The collision risk was assessed to be of low significance for all species. Similarly, disturbance/displacement and barrier effect were assessed to be of low significance.

Ballinlough-Ikerrin

The potential for the Proposed Development to result in significant cumulative or in-combination effects when assessed alongside the Proposed Development was considered. The planning file³⁵ was reviewed

³² <https://www.eplanning.ie/OffalyCC/AppFileRefDetails/14188/0>

³³ <https://www.eplanning.ie/TipperaryCC/AppFileRefDetails/11510203/0>

³⁴ <https://www.eplanning.ie/OffalyCC/AppFileRefDetails/10130/0>

³⁵ <https://www.eplanning.ie/TipperaryCC/AppFileRefDetails/5124325/0>

on the Tipperary County Council Planning Register and no information regarding potential effects on birds was available. However, given the location of the wind farm, the nature of the habitats onsite (as reviewed on publicly available aerial photography) and the lack of significant residual impacts on bird species associated with the Proposed Development when considered on its own, significant cumulative or in-combination effects on KORs with regard to displacement or collision mortality are not anticipated.

7.9.2 Assessment of Cumulative Effects

There were 16 KORs identified at the Proposed Development: golden plover, hen harrier, merlin, peregrine, whooper swan, lapwing, black-headed gull, cormorant, teal, barn owl, curlew, kestrel, snipe, woodcock, buzzard and sparrowhawk. A key consideration in the assessment of the potential for cumulative impacts to result in significant effects on KORs is proximity. There were only two wind farms within 5km of the Proposed Development (Carrig and Skehanagh). Both these wind farms consist of a low number of older turbines (Vestas V52/850 – 52m rotor diameter) All remaining wind farms were within 12-25km from the Wind Farm Site.

Following NatureScot (2012) guidance, the cumulative impact assessment has been carried out at the scale of the importance rating of the receptor: National Importance (curlew); County Importance (golden plover, hen harrier, merlin, peregrine, whooper swan, lapwing, black-headed gull [wintering], teal, barn owl, kestrel, snipe, woodcock); and Local Importance Higher Value (black-headed gull [breeding], cormorant, buzzard and sparrowhawk). For the purposes of this cumulative assessment, the local scale is considered to be a 5km radius of the Wind Farm Site. A 25km radius has been used to approximate the county scale³⁶. The assessment of cumulative effects on KORs is provided in Table 7-12 below. In particular, cumulative habitat loss and displacement associated with the proposed development is assessed.

³⁶ Rationale: as bird movements are not influenced by county boundaries, it was necessary to choose a reasonable approximation of the area of a county. A 25km radius of the wind farm is a reasonable approximation of the county scale for the assessment.

Table 7-12 Assessment of cumulative effects on KORs

KOR	Evaluation of Cumulative Impacts	Determination
<p>Golden Plover (County Importance)</p>	<p>Golden plover were recorded travelling over the Wind Farm Site and there were no records of birds utilising habitats within the Wind Farm Site. The impacts of habitat loss, disturbance, displacement and barrier effects as a result of the Proposed Development are classed as of low significance. No significant effects of collision risk are anticipated at the county, national or international level.</p> <p>The potential for developments at a county scale (within 25km) to result in significant cumulative or in combination effects when assessed alongside the Proposed Development were considered. Carrig, Skehanagh, Leabeg and Ballinlough-Ikerrin Wind Farms are located within agricultural grassland habitat. Meewuan Wind Farm is located within commercial forestry and agricultural grassland habitats. Monaincha, Cloghan and the permitted Derrinlough Wind Farms are located within a mix of commercial forestry, scrub/immature woodland and cutover bog habitats. The agricultural grassland and cutover bog habitat are suitable for foraging and roosting golden plover. However, given the separation distance and that these habitats (cutover bogs and farmland), are not considered to be a scarce resource within 25km of the Wind Farm Site, significant cumulative impacts are not anticipated.</p> <p>The collision risk for golden plover from the 7 operational and one permitted wind farm was assessed to be of low to negligible significance. There are only two wind farms within 5km of the Wind Farm Site. These comprise low numbers of older, smaller turbines. Cumulative impacts in relation to collision risk are not anticipated.</p> <p>No significant impacts on this species were identified for any of the other wind farms within 5km. Furthermore, no significant effects were reported for any of the wind farm located within a 25km radius (county scale) of the Wind Farm Site.</p> <p>Taking into consideration the above reported effects and the predicted effects with the Proposed Development (including that this species was not observed utilising habitats within the Wind Farm Site), no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.</p>	<p>Significant cumulative impacts are not predicted to occur at the county, national or international scale.</p>



KOR	Evaluation of Cumulative Impacts	Determination
<p>Hen Harrier (County Importance)</p>	<p>Foraging hen harrier was infrequently recorded within the Wind Farm Site. The impacts of habitat loss, disturbance, displacement and barrier effects as a result of the Proposed Development are classed as of low significance. No significant effects of collision risk are anticipated at the county, national or international level.</p> <p>The potential for developments at a county scale (25km) to result in significant cumulative or in combination effects when assessed alongside the Proposed Development were considered. Hen harrier have been recorded to be subject to displacement impacts within a 500m radius of turbines (Pearce-Higgins et al., 2009). The amount of foraging habitat that will be (potentially) subject to disturbance displacement impacts is insignificant relative to the abundance of suitable habitat (i.e. areas of intact raised bog, young conifer plantations, scrubland, low intensity agricultural grassland etc.) in the wider surroundings.</p> <p>No significant impacts on this species were identified for any of the other wind farms within 5km. Furthermore, no significant effects were reported for any of the wind farm located within a 25km radius (county scale) of the Wind Farm Site.</p> <p>Taking into consideration the above reported effects and the predicted effects with the Proposed Development, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.</p>	<p>Significant cumulative impacts are not predicted to occur at the county scale.</p>
<p>Merlin (County Importance)</p>	<p>Foraging merlin was infrequently recorded within the Wind Farm Site. The impacts of habitat loss, disturbance, displacement and barrier effects as a result of the Proposed Development are classed as of low significance. No significant effects of collision risk are anticipated at the county, national or international level.</p> <p>The potential for developments at a county scale (25km) to result in significant cumulative or in combination effects when assessed alongside the Proposed Development were considered. Merlin was identified as a KOR (where information is available) for Derrinlough and Monaincha Wind Farms. Disturbance/displacement and collision risk were assessed to be of no effect to low significance for these wind farms. The habitats within the total eight identified wind farms within 25km of the Wind Farm Site</p>	<p>Significant cumulative impacts are not predicted to occur at the county, national or international scale.</p>



KOR	Evaluation of Cumulative Impacts	Determination
	<p>comprise agricultural grassland, commercial forestry, cutover bog and scrubland/immature woodland. Some of these habitats offer some foraging potential for merlin. However, given the separation distance and that these habitats are not considered to be a scarce resource within 25km of the Wind Farm Site, significant cumulative impacts are not anticipated.</p> <p>No significant impacts on this species were identified for any of the other wind farms within 5km. Furthermore, no significant effects were reported for any of the wind farm located within a 25km radius (county scale) of the Wind Farm Site.</p> <p>Taking into consideration the above reported effects and the predicted effects with the Proposed Development, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.</p>	
<p>Peregrine (County Importance)</p>	<p>Foraging peregrine was infrequently recorded within the Wind Farm Site. The impacts of habitat loss, disturbance, displacement and barrier effects as a result of the Proposed Development are classed as of low significance. No significant effects of collision risk are anticipated at the county, national or international level.</p> <p>The potential for developments at a county scale (25km) to result in significant cumulative or in combination effects when assessed alongside the Proposed Development were considered. Peregrine was identified as a KOR (where information is available) for Derrinlough and Monaincha Wind Farms. Disturbance/displacement and collision risk were assessed to be of negligible to low significance for these wind farms. The habitats within the total eight identified wind farms within 25km of the Wind Farm Site comprise agricultural grassland, commercial forestry, cutover bog and scrubland/immature woodland. Some of these habitats offer some foraging potential for peregrine. However, given the separation distance and that these habitats are not considered to be a scarce resource within 25km of the Wind Farm Site, significant cumulative impacts are not anticipated.</p> <p>No significant impacts on this species were identified for any of the other wind farms within 5km. Furthermore, no significant effects were reported for any of the wind farm located within a 25km radius (county scale) of the Wind Farm Site.</p>	<p>Significant cumulative impacts are not predicted to occur at the county, national or international scale.</p>



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KOR	Evaluation of Cumulative Impacts	Determination
	<p>Taking into consideration the above reported effects and the predicted effects with the Proposed Development, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.</p>	
<p>Whooper Swan (County Importance)</p>	<p>Whooper swan were recorded travelling over the Wind Farm Site, but there were no observations of birds utilising habitats within the Wind Farm Site. The impacts of habitat loss, disturbance, displacement and barrier effects as a result of the Proposed Development are classed as no greater than low significance. No significant effects of collision risk are anticipated at the county, national or international level.</p> <p>The potential for developments at a county scale (25km) to result in significant cumulative or in combination effects when assessed alongside the Proposed Development were considered. Whooper swan was identified as a KOR (where information available) for Meewuan, Cloghan, Leabeg and Derrinlough Wind Farms. Disturbance/displacement and collision risk were assessed to be of negligible to low significance for these wind farms. The habitats within the total eight identified wind farms within 25km of the Wind Farm Site comprise agricultural grassland, commercial forestry, cutover bog and scrubland/immature woodland. The agricultural grassland and cutover bog habitat are suitable for foraging and roosting whooper swan. However, given the separation distance and that these habitats are not considered to be a scarce resource within 25km of the Wind Farm Site, significant cumulative impacts are not anticipated.</p> <p>No significant impacts on this species were identified for any of the other wind farms within 5km. Furthermore, no significant effects were reported for any of the wind farm located within a 25km radius (county scale) of the Wind Farm Site.</p> <p>Taking into consideration the above reported effects and the predicted effects with the Proposed Development (including that this species was not observed utilising habitats within the Wind Farm Site), no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.</p>	<p>Significant cumulative impacts are not predicted to occur at the county, national or international scale.</p>

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KOR	Evaluation of Cumulative Impacts	Determination
<p>Lapwing (County Importance)</p>	<p>Lapwing were recorded travelling over the Wind Farm Site, but there were no observations of birds utilising habitats within the Wind Farm Site. The impacts of habitat loss, disturbance, displacement and barrier effects as a result of the Proposed Development are classed as of low significance. No significant effects of collision risk are anticipated at the county, national or international level.</p> <p>The potential for developments at a county scale (25km) to result in significant cumulative or in combination effects when assessed alongside the Proposed Development were considered. Lapwing was identified as a KOR (where information available) for Cloghan and Derrinlough Wind Farms. Disturbance/displacement and collision risk were assessed to be of low significance for these wind farms. The habitats within the total eight identified wind farms within 25km of the Wind Farm Site comprise agricultural grassland, commercial forestry, cutover bog and scrubland/immature woodland. The agricultural grassland and cutover bog habitat are suitable for foraging and roosting lapwing. However, given the separation distance, and that these habitats are not considered to be a scarce resource within 25km of the Wind Farm Site, significant cumulative impacts are not anticipated.</p> <p>No significant impacts on this species were identified for any of the other wind farms within 5km. Furthermore, no significant effects were reported for any of the wind farm located within a 25km radius (county scale) of the Wind Farm Site.</p> <p>Taking into consideration the above reported effects and the predicted effects with the Proposed Development, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.</p>	<p>Significant cumulative impacts are not predicted to occur at the county, national or international scale.</p>
<p>Black-headed Gul (County Importance)</p>	<p>Black-headed gull were recorded travelling over the Wind Farm Site, but there were no observations of birds utilising habitats within the Wind Farm Site. The impacts of habitat loss, disturbance, displacement and barrier effects as a result of the Proposed Development are classed as of low significance. No significant effects of collision risk are anticipated at the county, national or international level.</p> <p>The potential for developments at a county scale (25km) to result in significant cumulative or in combination effects when assessed alongside the Proposed Development were considered. Black-headed gull was identified as a KOR (where information available) for Derrinlough Wind Farms. Disturbance/displacement and collision risk were assessed to be of low significance for this wind farm.</p>	<p>Significant cumulative impacts are not predicted to occur at the county, national or international scale.</p>



KOR	Evaluation of Cumulative Impacts	Determination
	<p>The habitats within the total eight identified wind farms within 25km of the Wind Farm Site comprise agricultural grassland, commercial forestry, cutover bog and scrubland/immature woodland. The agricultural grassland habitat is suitable for foraging black-headed gull. However, given the separation distance, and that these habitats are not considered to be a scarce resource within 25km of the Wind Farm Site, significant cumulative impacts are not anticipated.</p> <p>No significant impacts on this species were identified for any of the other wind farms within 5km. Furthermore, no significant effects were reported for any of the wind farm located within a 25km radius (county scale) of the Wind Farm Site.</p> <p>Taking into consideration the above reported effects and the predicted effects with the Proposed Development, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.</p>	
<p>Cormorant (Local Importance)</p>	<p>Cormorant were recorded travelling over the Wind Farm Site, but there were no observations of birds utilising habitats within the Wind Farm Site. The impacts of habitat loss, disturbance, displacement and barrier effects and collision risk as a result of the Proposed Development are classed as of no greater than low significance.</p> <p>The potential for developments at a county scale (25km) to result in significant cumulative or in combination effects when assessed alongside the Proposed Development were considered. Cormorant was not identified as a KOR (where information is available) for any of the wind farms within 25km of the Wind Farm Site. The habitats within these eight wind farms comprise agricultural grassland, commercial forestry, cutover bog and scrubland/immature woodland. These are no suitable habitats for cormorant. Given the separation distance, and that these habitats are not considered to be a scarce resource within 25km of the Wind Farm Site, significant cumulative impacts are not anticipated.</p> <p>No significant impacts on this species were identified for any of the other wind farms within 5km. Furthermore, no significant effects were reported for any of the wind farm located within a 25km radius (county scale) of the Wind Farm Site.</p>	<p>Significant cumulative impacts are not predicted to occur at the county, national or international scale.</p>



KOR	Evaluation of Cumulative Impacts	Determination
	<p>Taking into consideration the above reported effects and the predicted effects with the Proposed Development, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.</p>	
<p>Teal (County Importance)</p>	<p>Teal were recorded foraging in lands within 500m of the Wind Farm Site, but there were limited observations of birds utilising habitats within the Wind Farm Site. The impacts of habitat loss, disturbance, displacement and barrier effects as a result of the Proposed Development are classed as of low significance. No significant effects of collision risk are anticipated at the county, national or international level.</p> <p>The potential for developments at a county scale (25km) to result in significant cumulative or in combination effects when assessed alongside the Proposed Development were considered. Teal was identified as a KOR (where information available) for Derrinlough Wind Farms.</p> <p>Disturbance/displacement and collision risk were assessed to be of very low and negligible significance for this wind farm. The habitats within the total eight identified wind farms within 25km of the Wind Farm Site comprise agricultural grassland, commercial forestry, cutover bog and scrubland/immature woodland. The agricultural grassland habitat when flooded is suitable for foraging teal. However, given the separation distance, and that these habitats are not considered to be a scarce resource within 25km of the Wind Farm Site, significant cumulative impacts are not anticipated.</p> <p>No significant impacts on this species were identified for any of the other wind farms within 5km. Furthermore, no significant effects were reported for any of the wind farm located within a 25km radius (county scale) of the Wind Farm Site.</p> <p>Taking into consideration the above reported effects and the predicted effects with the Proposed Development, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.</p>	<p>Significant cumulative impacts are not predicted to occur at the county, national or international scale.</p>
<p>Barn Owl (County Importance)</p>	<p>A probable barn owl breeding territory was identified within 500m of the Wind Farm Site. The impacts of habitat loss, disturbance, displacement and barrier effects as a result of the Proposed Development are</p>	<p>Significant cumulative impacts are not predicted to occur at the county, national or international scale.</p>



KOR	Evaluation of Cumulative Impacts	Determination
	<p>classed as of low significance. No significant effects of collision risk are anticipated at the county, national or international level.</p> <p>The potential for developments at a county scale (25km) to result in significant cumulative or in combination effects when assessed alongside the Proposed Development were considered. Barn owl was not identified as a KOR for any wind farm within 25km of the Wind Farm Site (where information available). The habitats within the total eight identified wind farms within 25km of the Wind Farm Site comprise agricultural grassland, commercial forestry, cutover bog and scrubland/immature woodland. Some of these habitats offer some foraging potential for barn owl (e.g. rough grassland within the agricultural grassland). However, given the separation distance and that these habitats are not considered to be a scarce resource within 25km of the Wind Farm Site, significant cumulative impacts are not anticipated.</p> <p>No significant impacts on this species were identified for any of the other wind farms within 5km. Furthermore, no significant effects were reported for any of the wind farm located within a 25km radius (county scale) of the Wind Farm Site.</p> <p>Taking into consideration the above reported effects and the predicted effects with the Proposed Development, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.</p>	
<p>Curlew (National Importance)</p>	<p>Curlew were infrequently recorded travelling over the Wind Farm Site, but there were no observations of birds utilising habitats within the Wind Farm Site. A probable breeding territory was identified within 1km of the Wind Farm Site. The impacts of habitat loss, disturbance, displacement and barrier effects as a result of the Proposed Development are classed as of very low to low significance. No significant effects of collision risk are anticipated at the county, national or international level.</p> <p>The potential for developments at a county scale (25km) to result in significant cumulative or in combination effects when assessed alongside the Proposed Development were considered. Breeding curlew was not identified as a KOR for any wind farm within 25km of the Wind Farm Site (where information available). The habitats within the total eight identified wind farms within 25km of the Wind Farm Site comprise agricultural grassland, commercial forestry, cutover bog and scrubland/immature</p>	<p>Significant cumulative impacts are not predicted to occur at the county, national or international scale.</p>



KOR	Evaluation of Cumulative Impacts	Determination
	<p>woodland. Commercial forestry and scrubland/immature woodland are not suitable breeding habitats for curlew. Some flooded areas of cutover bog could provide some foraging habitat. However, given the separation distance and that these habitats are not considered to be a scarce resource within 25km of the Wind Farm Site, significant cumulative impacts are not anticipated.</p> <p>No significant impacts on this species were identified for any of the other wind farms within 5km. Furthermore, no significant effects were reported for any of the wind farm located within a 25km radius (county scale) of the Wind Farm Site.</p> <p>Taking into consideration the above reported effects and the predicted effects with the Proposed Development, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.</p>	
<p>Kestrel (County Importance)</p>	<p>Kestrel was recorded hunting within the Wind Farm Site. The impacts of habitat loss, disturbance, displacement and barrier effects as a result of the Proposed Development are classed as of low significance. No significant effects of collision risk are anticipated at the county, national or international level.</p> <p>The potential for developments at a county scale (25km) to result in significant cumulative or in combination effects when assessed alongside the Proposed Development were considered. Kestrel was identified as a KOR (where information available) for Meewuan and Derrinlough Wind Farms. Disturbance/displacement and collision risk were assessed to be of low to negligible significance for these wind farms. The habitats within the total eight identified wind farms within 25km of the Wind Farm Site comprise agricultural grassland, commercial forestry, cutover bog and scrubland/immature woodland. Some of these habitats offer some foraging and breeding potential for kestrel. However, given the separation distance and that these habitats are not considered to be a scarce resource within 25km of the Wind Farm Site, significant cumulative impacts are not anticipated.</p> <p>No significant impacts on this species were identified for any of the other wind farms within 5km. Furthermore, no significant effects were reported for any of the wind farm located within a 25km radius (county scale) of the Wind Farm Site.</p>	<p>Significant cumulative impacts are not predicted to occur at the county, national or international scale.</p>



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KOR	Evaluation of Cumulative Impacts	Determination
	<p>Taking into consideration the above reported effects and the predicted effects with the Proposed Development, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.</p>	
<p>Snipe (County Importance)</p>	<p>Snipe were recorded within the Wind Farm Site, including probable breeding territories. The impacts of habitat loss, disturbance, displacement and barrier effects as a result of the Proposed Development are classed as of low significance. No significant effects of collision risk are anticipated at the county, national or international level.</p> <p>The potential for developments at a county scale (25km) to result in significant cumulative or in combination effects when assessed alongside the Proposed Development were considered. Woodcock was identified as a KOR (where information available) for Meewuan and Derrinlough Wind Farms. Disturbance/displacement and collision risk were assessed to be of low to very low significance for these wind farms. The habitats within the total eight identified wind farms within 25km of the Wind Farm Site comprise agricultural grassland, commercial forestry, cutover bog and scrubland/immature woodland. Areas of bog and wet grassland offer suitable breeding habitat for snipe, and cutover bog and agricultural land can provide foraging habitat. However, given the separation distance and that these habitats are not considered to be a scarce resource within 25km of the Wind Farm Site, significant cumulative impacts are not anticipated.</p> <p>No significant impacts on this species were identified for any of the other wind farms within 5km. Furthermore, no significant effects were reported for any of the wind farm located within a 25km radius (county scale) of the Wind Farm Site.</p> <p>Taking into consideration the above reported effects and the predicted effects with the Proposed Development, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.</p>	<p>Significant cumulative impacts are not predicted to occur at the county, national or international scale.</p>
<p>Woodcock (County Importance)</p>	<p>Woodcock were recorded within the Wind Farm Site, including probable breeding territories. The impacts of habitat loss, disturbance, displacement and barrier effects as a result of the Proposed</p>	<p>Significant cumulative impacts are not predicted to occur at the county, national or international scale.</p>

Tipperary Planning Authority



KOR	Evaluation of Cumulative Impacts	Determination
	<p>Development are classed as of low significance. No significant effects of collision risk are anticipated at the county, national or international level.</p> <p>The potential for developments at a county scale (25km) to result in significant cumulative or in combination effects when assessed alongside the Proposed Development were considered. Woodcock was identified as a KOR (where information available) for Meewuan and Derrinlough Wind Farms. Disturbance/displacement and collision risk were assessed to be of low significance to no effect for these wind farms. The habitats within the total eight identified wind farms within 25km of the Wind Farm Site comprise agricultural grassland, commercial forestry, cutover bog and scrubland/immature woodland. Areas of wet woodland/scrub offer suitable breeding habitat for woodcock. However, given the separation distance and that these habitats are not considered to be a scarce resource within 25km of the Wind Farm Site, significant cumulative impacts are not anticipated.</p> <p>No significant impacts on this species were identified for any of the other wind farms within 5km. Furthermore, no significant effects were reported for any of the wind farm located within a 25km radius (county scale) of the Wind Farm Site.</p> <p>Taking into consideration the above reported effects and the predicted effects with the Proposed Development, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.</p>	
<p>Buzzard (Local Importance)</p>	<p>Buzzard was recorded hunting within the Wind Farm Site in addition to two probable breeding territories. The impacts of habitat loss, disturbance, displacement and barrier effects as a result of the Proposed Development are classed as of very low significance. No significant effects of collision risk are anticipated at the county, national or international level.</p> <p>The potential for developments at a county scale (25km) to result in significant cumulative or in combination effects when assessed alongside the Proposed Development were considered. Buzzard was identified as a KOR (where information available) for Meewuan and Derrinlough Wind Farms. Disturbance/displacement and collision risk were assessed to be of low to negligible significance for these wind farms. The habitats within the total eight identified wind farms within 25km of the Wind Farm Site comprise agricultural grassland, commercial forestry, cutover bog and scrubland/immature woodland.</p>	<p>Significant cumulative impacts are not predicted to occur at the local, county, national or international scale.</p>



KOR	Evaluation of Cumulative Impacts	Determination
	<p>Some of these habitats offer some foraging and breeding potential for buzzard. However, given the separation distance and that these habitats are not considered to be a scarce resource within 25km of the Wind Farm Site, significant cumulative impacts are not anticipated.</p> <p>No significant impacts on this species were identified for any of the other wind farms within 5km. Furthermore, no significant effects were reported for any of the wind farm located within a 25km radius (county scale) of the Wind Farm Site.</p> <p>Taking into consideration the above reported effects and the predicted effects with the Proposed Development, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.</p>	
<p>Sparrowhawk (Local Importance)</p>	<p>Sparrowhawk was recorded hunting within the Wind Farm Site in addition to two probable breeding territories. The impacts of habitat loss, disturbance, displacement and barrier effects as a result of the Proposed Development are classed as of very low significance. No significant effects of collision risk are anticipated at the county, national or international level.</p> <p>The potential for developments at a county scale (25km) to result in significant cumulative or in combination effects when assessed alongside the Proposed Development were considered. Sparrowhawk was identified as a KOR (where information available) for Derrinlough Wind Farm.</p> <p>Disturbance/displacement and collision risk were assessed to be of low to negligible significance for this wind farm. The habitats within the total eight identified wind farms within 25km of the Wind Farm Site comprise agricultural grassland, commercial forestry, cutover bog and scrubland/immature woodland. Some of these habitats offer some foraging and breeding potential for sparrowhawk. However, given the separation distance and that these habitats are not considered to be a scarce resource within 25km of the Wind Farm Site, significant cumulative impacts are not anticipated.</p> <p>No significant impacts on this species were identified for any of the other wind farms within 5km. Furthermore, no significant effects were reported for any of the wind farm located within a 25km radius (county scale) of the Wind Farm Site.</p>	<p>Significant cumulative impacts are not predicted to occur at the local, county, national or international scale.</p>



KOR	Evaluation of Cumulative Impacts	Determination
	Taking into consideration the above reported effects and the predicted effects with the Proposed Development, no residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality.	

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7.10

Conclusion

Following consideration of the residual effects (post-mitigation), it is concluded that the Proposed Development will not result in any significant effects on any of the identified KORs. No significant effects on receptors of International, National or County Importance were identified. Provided that the Proposed Development is constructed, operated and decommissioned in accordance with the design and best practice mitigation measures that are described within this application, significant individual or cumulative effects on the identified KORs are not anticipated.

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