

8. ORNITHOLOGY

8.1 Introduction

This chapter assesses the likely significant effects that all element of the Lyrenacarriga Wind Farm Development (the ‘Proposed Development’) may have on avian receptors. Particular attention has been paid to species of ornithological importance. These include species with national and international protection under the Wildlife Acts 1979-2012 and the EU Birds Directive 2009/147/EC among other relevant legislation. Where potential effects are identified, mitigation is described and residual impacts on avian receptors are assessed.

The “Proposed Development Area” is defined as all infrastructure located within the EIAR redline boundary with the exception of the turbine delivery route. The extent of this “Proposed Development Area” can be seen in Figure 8.1.

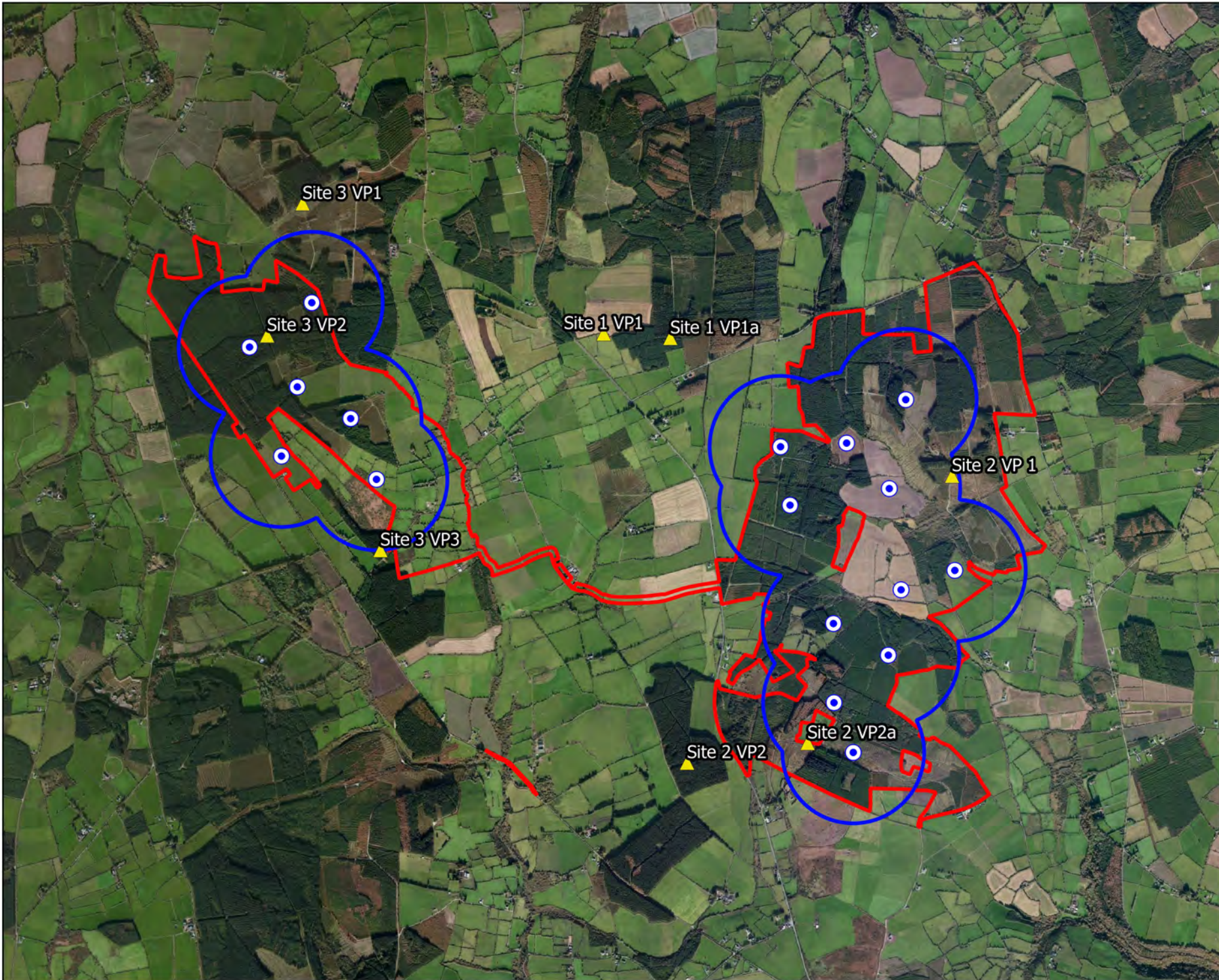
This chapter is supported by Technical Appendices 8-1 to 8-5, which contain the data from the surveys undertaken including full details of the survey times, weather conditions, and other relevant information together with the bird records themselves. Appendix 8-6 contains the Collision Risk Assessment (CRA) document which illustrates how the Collision Risk Modelling (CRM) was undertaken for this site. Appendix 8-7 contains the Bird Monitoring Programme.

The chapter is structured as follows:

- The Introduction provides a description of the Proposed Development and the relevant legislation, guidance and policy context regarding ornithology.
- This is followed by a comprehensive description of the ornithological survey and impact assessment methodologies that were followed to inform the robust assessment of likely significant effects on avian receptors.
- A description of the Baseline Ornithological Conditions and Receptor Evaluation is then provided. This is followed by an Assessment of Effects, which as per SNH (Scottish Natural Heritage) Guidance (2017), includes direct habitat loss, displacement and death from collision. Effects are described with regard to each phase of the Proposed Development: construction, operational and decommissioning. Potential cumulative effects in combination with other projects are fully assessed.
- Proposed mitigation and best practice measures to ameliorate the identified effects are described and discussed. This is followed by an assessment of residual effects taking into consideration the effect of the proposed mitigation and best practice measures.
- The conclusion provides a summary statement on the overall significance of predicted effects on ornithology.

The following list defines the meaning of the technical terms used in this chapter:

- “Key Ornithological Receptor” (KOR) is defined as a species occurring within the zone of influence of the development upon which likely significant effects are anticipated and assessed.
- “Zones of Influence” (ZOI) for individual ornithological receptors refers to the zone within which potential effects are anticipated ZOIs were assigned following best available guidance (SNH 2016 and McGuinness et.al 2015).



Map Legend

- Proposed Development Area
- Proposed Turbine Layout
- 500m Buffer of the Proposed Turbine Layout
- ▲ Vantage Point Locations



Drawing Title

Vantage Point Locations

Project Title

Lyrenacarriga Windfarm

Drawn By Patrick Manley	Checked By Padraig Cregg
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Project No. 170749	Drawing No. Fig. 8.1
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8.1.1 Background

The full development description is provided in Chapter 4 of the EIAR. The proposed development comprises 17 no. turbines with an overall blade tip height of up to 150 metres, a substation and battery storage compound, a permanent anemometry mast and all ancillary infrastructure, 2 no. construction compounds, 3 no. borrow pits, and associated felling and drainage works. A detailed description of the Proposed Development is included in Chapter 4 of this EIAR.

The Proposed Development will have an operational life of 30 years from the date of commissioning of the wind farm.

8.1.2 Legislation, Guidance and Policy Context

This EIAR is prepared in accordance with the requirements of the 2011/92/EU EIA Directive as amended by EIA Directive 2014/52/EU.

The following are the key legislative provisions applicable to habitats and fauna in Ireland:

- Irish Wildlife Acts 1976 to 2012 as amended.
- The European Communities (Birds and Natural Habitats) Regulations 2011 (transposes EU Birds Directive 2009/147/EC and EU Habitats Directive 92/43/EC).
- The International Convention on Wetlands of International Importance 1971.

In the absence of specific National Irish Ornithological Survey Guidance, the guidance documents published by Scottish Natural Heritage (SNH) have been followed to inform this assessment:

- SNH (2017). *Recommended bird survey methods to inform impact assessment of onshore wind farms*. Guidance document by Scottish Natural Heritage, Edinburgh, UK.
- SNH (2018) *Avoidance rate information & guidance note: Use of avoidance rates in the SNH wind farm collision risk model*. Guidance document by Scottish Natural Heritage, Edinburgh, UK. Available at: <http://www.snh.gov.uk/docs/B721137.pdf>.
- SNH (2016). *Assessing Connectivity with Special Protection Areas (SPAs)*. Guidance document by Scottish Natural Heritage, Edinburgh, UK.
- SNH (2012). *Assessing the Cumulative Impact of Onshore Wind Energy Developments*. Guidance document by Scottish Natural Heritage, Edinburgh, UK.
- SNH (2006). *Assessing Significance of Impacts from Onshore Windfarms on Birds Outwith Designated Sites*. Guidance document by Scottish Natural Heritage, Edinburgh, UK.
- SNH (2009). *Monitoring the impact of onshore wind farms on birds*. Guidance document by Scottish Natural Heritage, Edinburgh, UK.
- SNH (2000). *Wind farms and birds: calculating a theoretical collision risk assuming no avoidance action*. Guidance Note by Scottish Natural Heritage, Edinburgh, UK.

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*. Ecological Consulting.
- McGuinness, D., Muldoon, C., Tierney, N., Cummins, S., Murray, A., Egan, S. & Crowe, O. (2015). *Bird Sensitivity Mapping for Wind Energy Developments and Associated Infrastructure in the Republic of Ireland*. Guidance Document. Birdwatch Ireland.
- Birds of Conservation Concern in Ireland 2014-2019 (Colhoun, K. and Cummins, S. 2013).

This assessment has been prepared with respect to the various planning policies and strategy guidance documents listed below:

- Planning and Development Acts 2000 – 2019.
- Waterford County Development Plan 2011-2017.
- Cork County Development Plan 2014.
- DoEHLG (2013). *Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment*. Department of the Environment, Community and Local Government (where relevant).
- European Commission (2020). *Guidance document on wind energy developments and EU nature legislation*. European Commission, Brussels.
- European Commission (2011). *Wind energy development and Natura 2000*. Guidance document by the European Commission, Brussels.
- EPA (2017). *Draft revised guidelines on the information to be contained in Environmental Impact Statements*. Environmental Protection Agency, Wexford.
- EPA (2015). *Advice notes for preparing of Environmental Impact Statements (Draft)* (where relevant). Guidance document by Environmental Protection Agency, Wexford.
- EPA (2003). *Advice notes on current practice (in the preparation of Environmental Impact Statements)* (where relevant). Guidance document by Environmental Protection Agency, Wexford.
- EPA (2002). *Guidelines on the information to be contained in Environmental Impact Statements* (where relevant). Guidance document by Environmental Protection Agency, Wexford.
- NRA (2009). *Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 2)*. National Roads Authority, Dublin.
- European Commission (2002). *Assessment of plans and projects significantly affecting Natura 2000 sites*. Guidance document by European Commission, Brussels.

8.1.3 Statement of Authority and Competence

This ornithology chapter has been prepared by Senior Ornithologist, Mr. Pdraig Cregg (BSc., MSc.) with the assistance of Ornithologist, Mr Patrick Manley (BSc.) and Ecologist, Mr David Naughton (BSc.), both of MKO. All of which are suitably qualified, competent, professional ecologists with extensive experience in completing avifaunal assessments and are competent experts for the purposes of the preparation of this EIAR. The chapter has been reviewed by Pat Roberts (B.Sc. Environmental Science) who has over 15 years' experience in management and ecological assessment.

The scope of works and survey methodology was devised by Chartered Ecologist Dr Patrick Crushell (PhD, MCIEEM) and is compliant with the methodologies described in recent SNH guidance documents. Field surveys were undertaken by Tony Nagle (MSc.), Alan McCarthy (BSc.) and Jack Kennedy (BSc.). Dr Crushell and the surveyors are competent experts for the purposes of the preparation of this EIAR and suitably qualified.

Please refer to Appendix 8-8 for curriculum vitae (CVs).

8.2 Assessment Approach and Methodology

8.2.1 Desk Study

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

- Review of online web-mappers: National Parks and Wildlife Service (NPWS), National Biodiversity Data Centre (NBDC), Irish Wetland Bird Survey I-WeBS.

- Review of Bird Atlases: (Sharrock, 1976; Lack, 1986; Gibbons et al., 1993; Balmer et al., 2013).
- Review of Birds of Conservation Concern (BoCCI) in Ireland 2014-2019 (Colhoun & Cummins, 2013).
- Review of specially requested records from the NPWS Rare and Protected Species Database.
- Review of impact assessments associated with nearby developments including wind farms.

8.2.2 Consultation

8.2.2.1 Scoping and Consultation

Consultation was undertaken with the relevant statutory and non-statutory organisations as part of the EIAR scoping to inform the current assessment. Full details can be found in Section 2.6 of Chapter 2.

Table 8-1 provides a list of the organisations consulted with regard to Ornithology during the scoping process and notes where scoping responses were received.

Copies of all scoping responses are included in Appendix 2-2 of this EIAR. The recommendations of the consultees have informed the EIAR preparation process and the contents of this chapter. Table 2-3 in Chapter 2 of this EIAR describes where the comments raised in the scoping responses received have been addressed in this assessment.

Table 8-1 Consultation Responses

	Consultee	Response	Issues Raised	Action Required
01	An Taisce	No response to date	N/A	N/A
02	BirdWatch Ireland	No response to date	N/A	N/A
03	Irish Raptor Study Group	Response received on 29th May 2018	Acknowledgement of receipt of letter	N/A
04	Irish Red Grouse Association	No Response Received	N/A	N/A
05	Irish Wildlife Trust	No Response Received	N/A	N/A
06	National Parks and Wildlife Service	Response received 11 th November 2020	See Section 8.3.6 in this chapter	See Section 8.3.6 in this chapter
07	Department of Agriculture, Food and the Marine	Response received on 10th July 2018	Felling Licence required if tree felling will be undertaken	Felling licence will be acquired, as needed.
08	Department of Culture, Heritage, and the Gaeltacht	Response received on 18th July 2018	The DAU have requested: a survey for the occurrence of kingfisher and a survey (2 years) for breeding and wintering bird use.	Details of which is contained within this document

	Consultee	Response	Issues Raised	Action Required
09	Waterford County Council Heritage Officer	Response received 13 th June 2018	Impacts on qualifying species of the Blackwater Callows SPA in terms of potential risk of bird strike. Potential for Hen Harrier within the forested area should also be surveyed for and recorded in the EIA. Cumulative impacts with other wind farm developments in both Cork and Waterford and other proposed developments in the catchment such as the Waterford Blueway on the River Blackwater.	These are assessed in detail in this EIAR document

8.2.3 Identification of Target Species and Key Ornithological Receptors

The methodology for assessment followed a precautionary screening approach with regard to the identification of Key Ornithological Receptors. Following a comprehensive desk study, initial site visits and consultation, a list of “Target species” likely to occur in the zone of influence of the Proposed Development was derived. The observation/survey work carried out on the site was specifically designed to survey for these identified target species in accordance with SNH guidance (2017). The target species list (see Appendix 8-1) was drawn from:

- Annex I of the EU Birds Directive.
- Special Conservation Interests (SCI) of Special Protection Areas (SPA) within the zone of influence.
- Species protected under the fourth schedule of the Wildlife Acts 1976-2012 as amended.
- Red and Amber listed birds of Conservation Concern.

Following analysis of the collated bird survey data, it was possible to refine the list of Target species to identify “Key Ornithological Receptors” and exclude species which were not recorded during the extensive surveys and those for which pathways for significant effect were not identified.

8.2.4 Field Surveys

Field surveys were undertaken during the survey period September 2016 to September 2018 and October 2019 to March 2020. The winter 2019/20 surveys were undertaken to record the distribution and abundance of golden plover locally. The data provided in this EIAR chapter and appendices is robust and allows clear, precise and definitive conclusions to be made on the avian receptors identified within the subject site. In addition, Vantage Point surveys were carried out in the months of October, November and December 2018 to determine if there were any changes to the levels of activity compared to the previous two-year survey period. This additional 3-month survey period consisted of short 3-hour VP watches per month for comparative purposes and as it was below the required standard survey duration per season, it was not included in the core dataset for assessment. Survey data from the period October 2018 to December 2018 can be found in Appendix 8-5.

Field survey methodologies were devised to survey for the bird species composition and assemblages that occur within the study area. The study area will vary with the type of survey being discussed.

8.2.4.1 Background on Area Surveyed

The area proposed for development has contracted since the first surveys were undertaken in September 2016. Initially, the proposed development site consisted of seven separate areas. These seven areas were surveyed from 10 fixed vantage points (see Figure 8.9 in Appendix 8-5). As the layout of the Proposed Development evolved during the survey period, surveying continued at Sites 1, 2 & 3 between September 2016 and September 2018. Whereas Sites 4, 5, 6 & 7 were no longer considered as developable areas. All surveys in these areas ceased in August 2017. This data from the discontinued areas is provided in Appendix 8-5.

Following the collection of two years of the survey data between September 2016 and September 2018 the area proposed for development contracted further. The proposed development area no longer includes Site/Area 1 however this area was continuously surveyed throughout the 2-year survey period. The survey data collected at Area 1 provided useful supporting information and is included in the assessment of potential displacement impacts.

The area within the redline boundary as provided in Figure 8.1 is the proposed development area/site as discussed throughout the rest of this chapter.

8.2.4.2 Initial Site Assessment

A reconnaissance site visit was undertaken by Dr Patrick Crushell on the 1st of July 2016 to assess the potential value of habitat on site in relation to the target species identified during the desk study. During the visit, potential locations for Vantage Point surveys were also identified. An additional site visit undertaken by Tony Nagle on the 19th of July 2016 to assess the habitats and confirm the suitability of the previously identified vantage point locations prior to commencing surveys in September 2016.

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

8.2.4.3 Survey Methodologies

The survey work undertaken between September 2016 and September 2018 and October 2019 to March 2020 forms the core dataset for the assessment of effects on ornithology. The winter 2019/20 surveys were undertaken to record the distribution and abundance of golden plover locally. In the absence of specific national bird survey guidelines, the ornithological surveys were designed and undertaken in full accordance with *'Recommended bird survey methods to inform impact assessment of onshore wind farms'* (SNH, 2017).

The various survey types undertaken are described below.

8.2.4.3.1 Vantage Point Surveys

Vantage point surveys were undertaken in accordance with SNH guidance from September 2016 to September 2018. As previously discussed, Areas 1, 2 and 3 were continuously surveyed from six fixed vantage point locations between September 2016 and September 2018 (see Figure 8.1 below). In October 2017 VP1 was relocated slightly (see VP1a), while VP2 was relocated in August 2018 (see VP2a) to allow for optimised coverage of the evolving development site boundaries. Five of the six vantage points mentioned above provide view shed coverage of the proposed development area.

Area 1 is no longer included within the current development site proposal but was continuously surveyed throughout the 2-year survey period. The survey data collected at Area 1 provided useful supporting information and is included in the assessment of potential displacement impacts.

The locations of the vantage point surveys are presented in Figure 8.1 below and the survey effort is presented in Appendix 8-2, Table 1.

Viewshed Analysis

Viewshed analysis was carried out to inform coverage of the proposed development area from the five fixed vantage point locations which survey the wind farm site. Viewsheds were calculated using GIS software using a notional layer suspended at 20m, which is representative of the height considered for the Potential Collision Risk Area based on a proposed turbine model. While the relevance of being able to view as much of the site to ground level is acknowledged, the SNH guidance emphasizes 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.

The area visible from each vantage point was ground-truthed (i.e. confirmed during field surveys) to establish the physical visibility of the viewshed. The vantage points were selected to effectively view the visible airspace (>20m) over the development site.

The viewshed analysis was undertaken to ensure a maximum view shed of all (possible) turbine locations was achieved from the fewest number of vantage points. At the time of selection for VPs, the turbine model or swept heights were not yet fully defined. As such, all flights were recorded in height bands 0-20m, 20-140m and 140-175m, with the durations later combined to account for the PCH using the modelled swept height of 17-150m. This allows for the worst-case scenario turbine to be assessed. The visible view sheds at 20m are presented in Figure 8.2.

Data Recording and Digitisation

Data on bird observations and flight activity was collected from a scanning arc of 180° and a 2km radius by an observer at each fixed location for six hours per month. Surveys were scheduled to ensure all times when target species were likely to be present were surveyed including dawn, day and dusk watches. Target species were as per listed in Table 1 of Appendix 8-1.

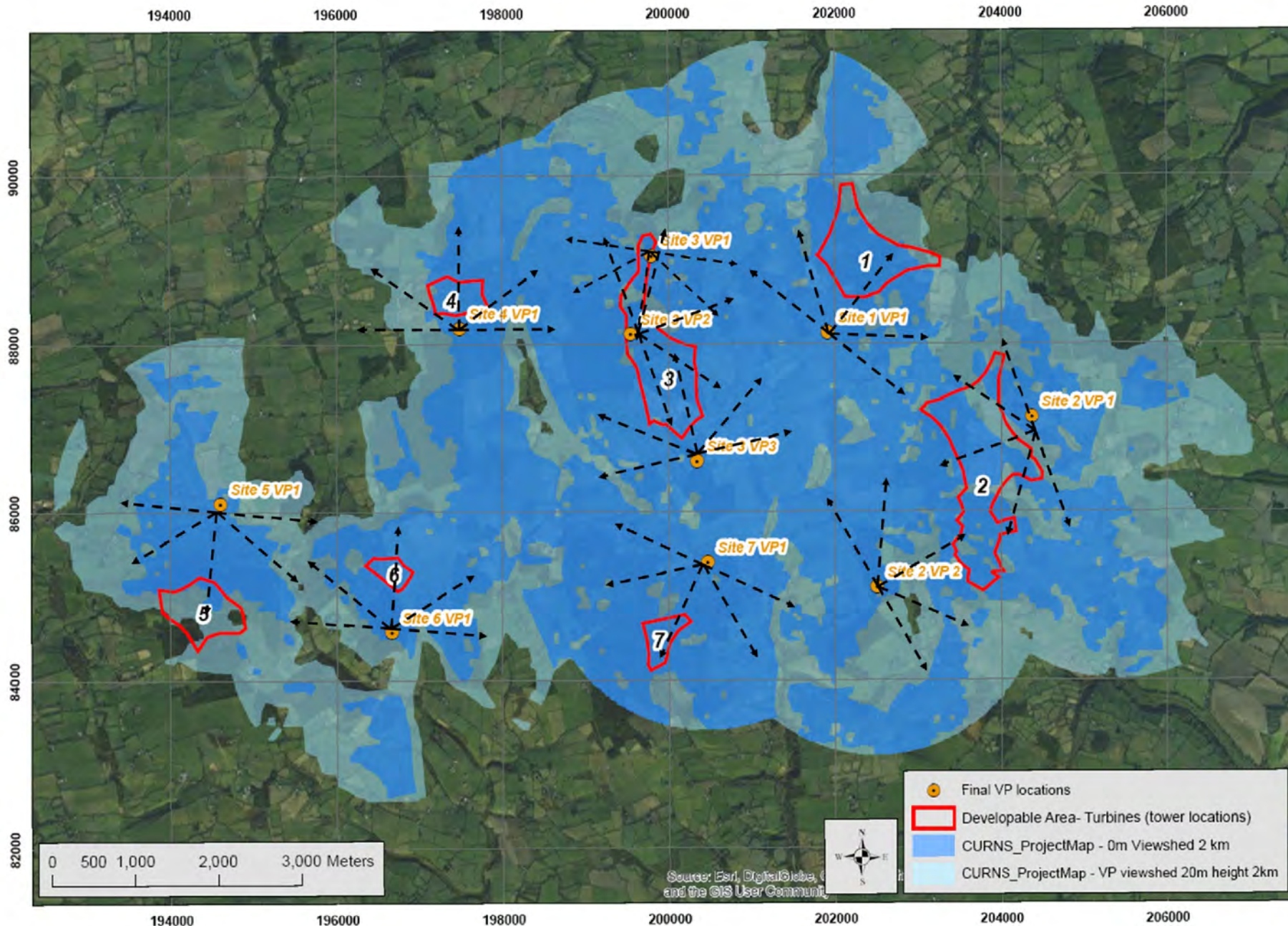
Survey effort for vantage point watches is presented in Appendix 8-2, Table 1. This includes full details of dates, times, survey locations, survey duration and weather conditions for each survey. Table 8-2 below shows a summary of the VP survey work undertaken.

Table 8-2 Vantage Point Survey Effort

Survey Season (Number of VPs)	Months	Minimum Effort per Month
2016/2017 Non-Breeding Season (10VPs)	Sep - Mar	6 hours/VP/month
2017 Breeding Season (10VPs)	Apr - Aug	6 hours/VP/month
2017 Breeding Season Continued (6VPs)	September	6 hours/VP/month
2017/2018 Non-Breeding Season (6VPs)	Oct - Mar	6 hours/VP/month
2018 Breeding Season (6VPs)	Apr - Sep	6 hours/VP/month

Observed flight activity was recorded as per defined flight bands which were chosen in relation to the maximum dimensions of proposed turbine models for the site. Bands were split into 0-20, 20-140m, 140m-175m and 175m+. The combined values of bands 0-20, 20-140m and 140-175m is considered potential collision height (PCH), based on a worst-case scenario for turbine modelling.

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



Drawing Title
Viewshed Analysis of VP Locations
Supplied by Wetland Surveys Ireland

Project Title Lyrenacarriga Windfarm	
Drawn By Patrick Crushell	Checked By Padraig Cregg
Project No. 170749	Drawing No. Fig. 8.2
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8.2.4.3.2 Breeding Raptor Surveys

Breeding raptor surveys (i.e. birds of prey and owls) were undertaken within the study area and its immediate surroundings. Raptor surveys, in the form of walked transects and short VP watches, were undertaken within and up to a 2km radius of the site boundary during the core breeding season (April 2017 & April/May 2018). In addition, a survey was undertaken at a VP located at Garryduff Quarry, which is approximately 7km from the proposed development area. The quarry was surveyed for peregrine falcon. The aim of these surveys was to identify any breeding attempts by raptor pairs and locate any occupied territories within the study area. Methodology followed Hardey et al. (2013).

Survey effort details are provided in Appendix 8-2 Table 2 to this report. Figure 8.3 shows the areas surveyed.

8.2.4.3.3 Breeding Woodcock Surveys

Breeding woodcock surveys were undertaken with reference to Gilbert et.al (1998). Site 2 was surveyed on the 2nd of May 2017, while Site 3 was surveyed on the 9th of May 2017. In 2018, Site 2 was surveyed on the 9th and 14th of May and Site 3 was surveyed on the 18th of April. The locations of these surveys are presented in Figure 8.4, below. In addition, woodland that is no longer within the proposed development area was visited, i.e. in Sites 1 and 4-7.

Surveys commenced one hour before sunset and continued for one hour after sunset or until it was too dark to see. Transects were slowly walked through areas of suitable woodland habitat within the study area. All observations of woodcock were recorded on to a map. The aim of the survey was to record any presence of roding (displaying) male woodcock and thereby establish the distribution and abundance of the species in the study area. This survey method also allowed the observer to survey for owls, i.e. barn owls and long-eared owls.

8.2.4.3.4 Hen Harrier Roost Surveys

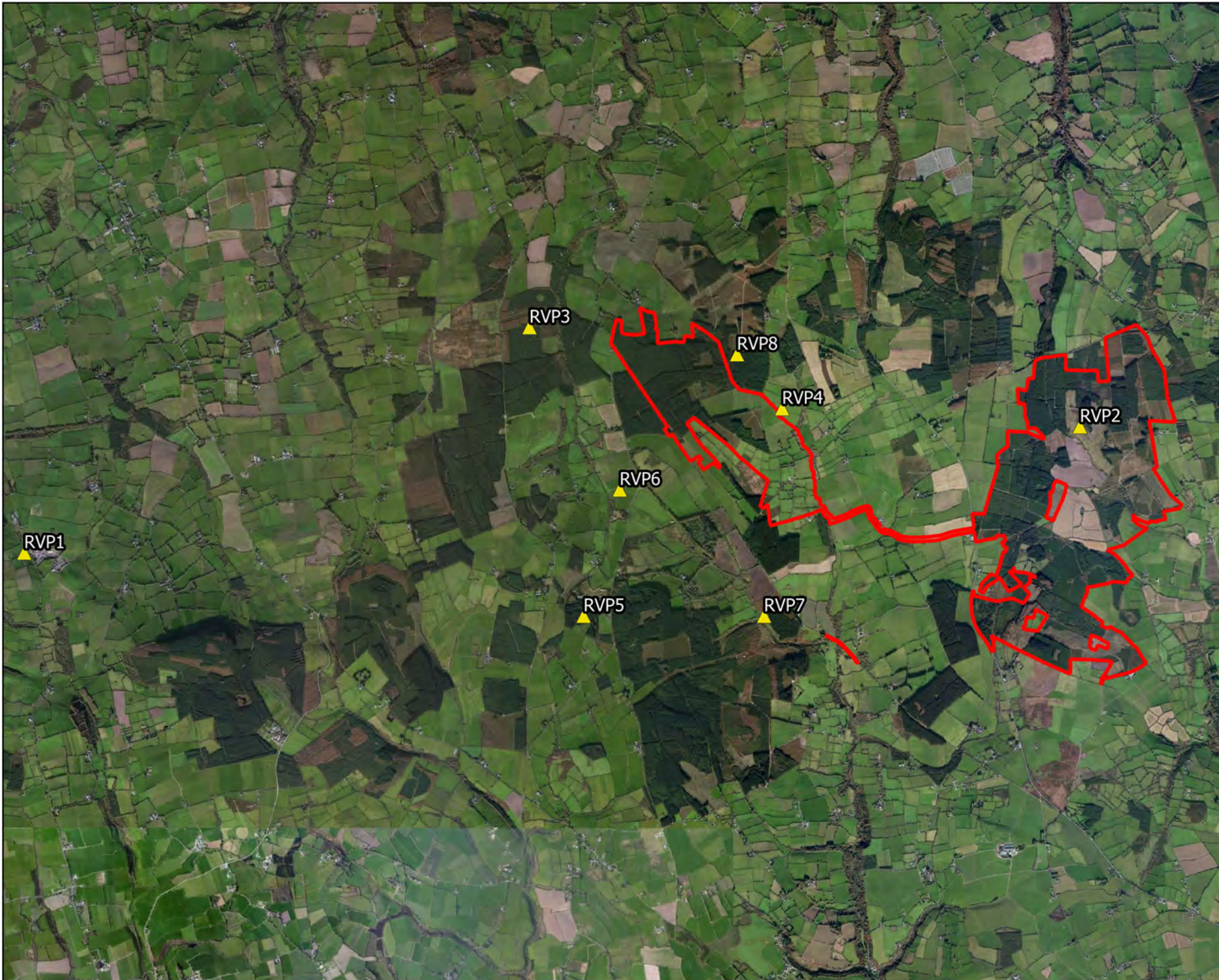
Potential hen harrier roost sites within 2km of the study area (as per SNH Guidance) were surveyed for the presence of hen harrier during the winter season. Survey work was undertaken in accordance with the methodology devised by Hardey et al. (2013) and the ‘Hen Harrier Roost Types and Guidelines to Roost Watching’ (unpublished guidance document by the Irish Hen Harrier Winter Survey, 2019). Surveys were carried out throughout the entirety of the 2017/2018 non-breeding season (October 2017 – March 2018). In addition, surveys were undertaken from HHVP1 in October and November 2018.

Full details of survey effort are provided in Appendix 8-2 Table 4. Figure 8.5 shows the locations of Hen Harrier Roost Survey VP locations.

8.2.4.3.5 Waterbird Surveys

During the 2016/17 winter season (September to March), significant wetland sites within 10km of the study area were surveyed for waterbird populations (i.e. waders, waterfowl, gulls, grebes and rails). The survey area extended approximately 10km outside the site boundary which exceeds the 500m recommendation stipulated in SNH Guidance. The extensive surveys aimed to provide contextual information for the proposed development site when compared to areas of suitable wintering habitat elsewhere in the surrounding hinterland. Count methodology was in line with survey methodology guidelines issued by SNH (2017) and BirdWatch Ireland (2015). Monthly counts were undertaken at each target wetland site over the winter season. Counts were conducted during daylight hours from suitable vantage points at the wetland sites.

Survey effort, including details of survey duration and weather condition, is presented in Appendix 8-2, Table 5 Figure 8.6 shows the surveyed area.



Map Legend

- Proposed Development Area
- ▲ Breeding Raptor VP Locations



Drawing Title

Breeding Raptor Survey Locations

Project Title

Lyrenacarriga Windfarm

Drawn By

Patrick Manley

Checked By

Padraig Cregg

Project No.

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Fig. 8.3

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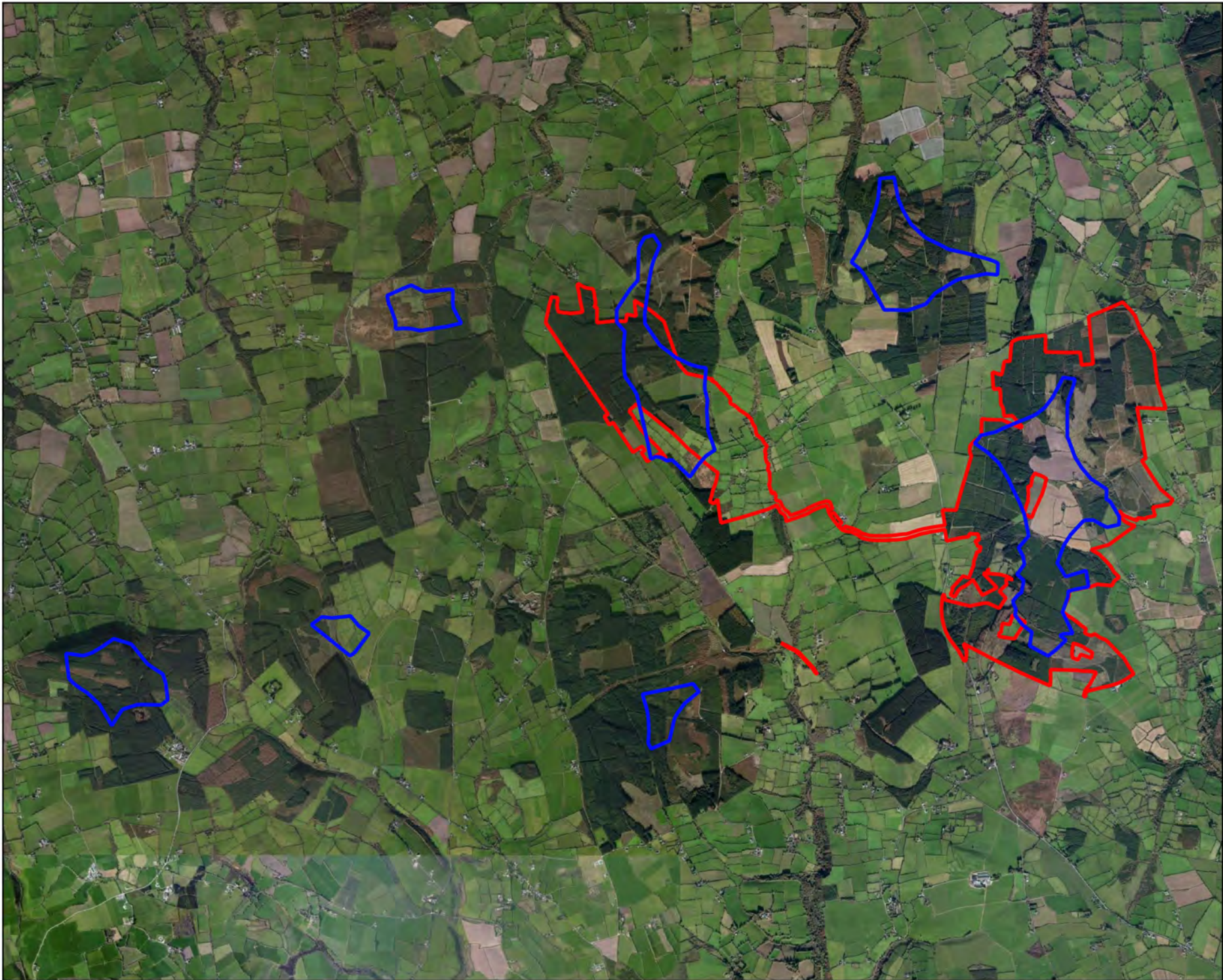
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Map Legend

- Proposed Development Area
- Breeding Woodcock Survey Areas



Drawing Title
Breeding Woodcock Survey Locations

Project Title
Lyrenacarriga Windfarm

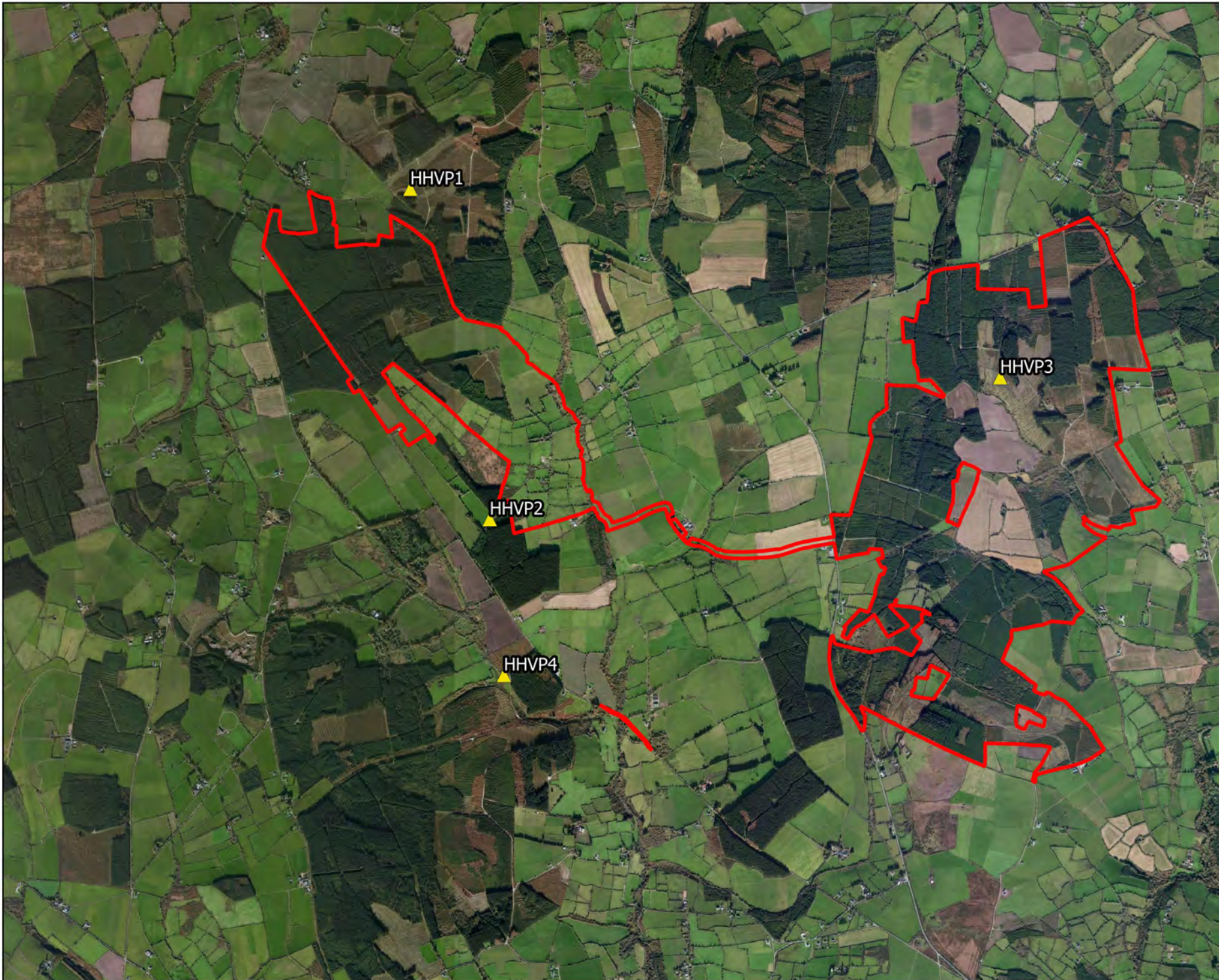
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Map Legend

- Proposed Development Area
- ▲ Hen Harrier Roost Survey Vantage Point Locations



Drawing Title

Hen Harrier Roost Survey Locations

Project Title

Lyencarriga Windfarm

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Map Legend

- Proposed Development Area
- 10km Waterbird Survey Area



Drawing Title	
Waterbird Survey Area	
Project Title	
Lyrenacarriga Windfarm	
Drawn By	Checked By
Patrick Manley	Padraig Cregg
Project No.	Drawing No.
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8.2.4.3.6 Golden Plover Surveys

Additional surveys for golden plover were undertaken between October 2019 and March 2020. Surveys were undertaken in suitable habitat to a 12km radius of the proposed development area. The core foraging range of golden plover during the winter months is 12km (Gillings and Fuller, 1999). The aim of the survey was to record the distribution and abundance of the local golden plover population. Estuarine habitat within the 12km survey radius was surveyed during the three hours either side of low tide. Survey methodology was based on methods outlined in Lewis & Tierney (2014). Golden plover also utilise terrestrial habitats for foraging and roosting. Terrestrial habitats likely to support wintering flocks of golden plover were also surveyed during these surveys.

Survey effort, including details of survey duration and weather condition, is presented in Appendix 8-2, Table 6. Figure 8.7 shows the surveyed area.

8.2.4.3.7 Multi-disciplinary Walkover

It is proposed to construct a 110 kV substation within the site and to connect from here via a 110kV loop-in connection to the existing 110kV network which runs through the site. It is proposed to connect the two clusters of turbines via underground cabling located within existing agricultural land and within the public road corridor. The cabling route measures approximately 3.3km. On the 29th May 2020, the grid connection route was visited and subject to a multi-disciplinary ecological survey. The route consists of an underground cable that is confined to the existing public road and agricultural habitats.

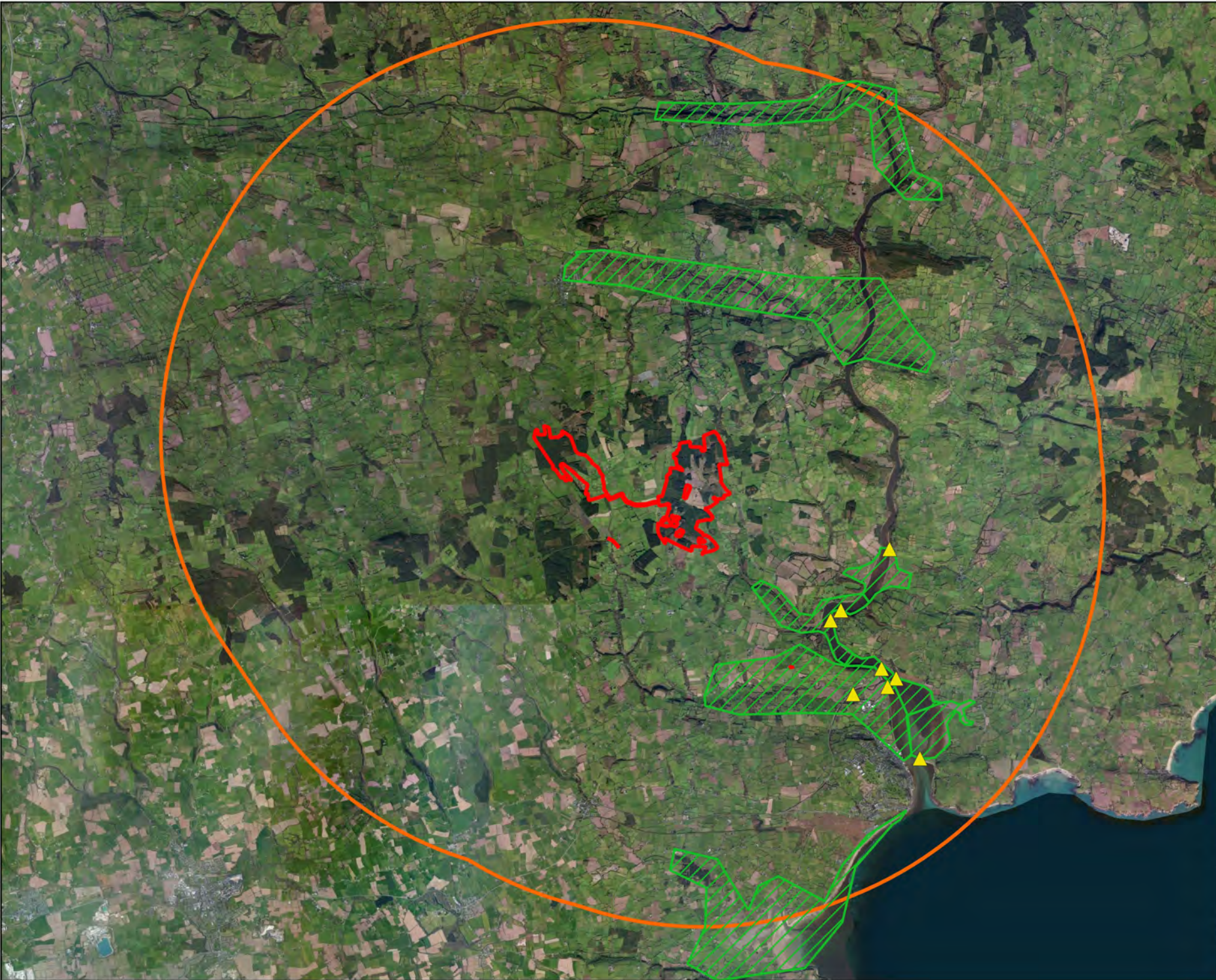
8.2.5 Ornithological Evaluation Criteria and Impact Assessment Methodology

8.2.5.1 Potential Effects Associated with Proposed Development

As per SNH Guidance, wind farms present three potential risks to birds (Drewitt & Langston 2006, 2008; Band et al. 2007):

- **Direct habitat loss** through construction of wind farm infrastructure;
- **Displacement** (sometimes called indirect habitat loss) if birds avoid the wind farm and its surrounding area due to turbine construction and 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 site has been utilised to predict the potential effects of the Proposed Development on birds. Effects are assessed with regard to the construction phase, the operational phase, decommissioning and cumulatively in consideration with other projects.



Map Legend

- Proposed Development Area
- 12km Core Foraging Range of Golden Plover from the Proposed Development Area
- Golden Plover Survey Areas
- Vantage Point Locations



Drawing Title
Golden Plover Survey Locations

Project Title
Lyrenacarriga Windfarm

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8.2.5.2 Geographical Framework

Guidance on Ecological Impact Assessment (CIEEM 2018) recommends categories of ornithological or nature conservation value that relate to a geographical framework (e.g. international, through to local). This assessment utilises the geographical framework described in Guidelines for Assessment of Ecological Impact of National Road Schemes (NRA 2009). The guidelines provide a basis for determination of whether a site is of importance on the following scales:

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

Locally Important (lower value) receptors contain habitats and species that are widespread and of low ecological significance and of importance only in the local area. Internationally Important sites are designated for conservation as part of the Natura 2000 Network (SAC or SPA) or provide the best examples of habitats or internationally important populations of protected flora and fauna.

8.2.5.3 Receptor Evaluation and Impact Assessment (Percival 2003)

Percival’s (2003) methodology for assessing the effects of wind farms on birds has been applied to assess the sensitivity of a species to the development type, the magnitude of the effect and the significance of the potential impact. The following tables (Table 8-3 - Sensitivity, Table 8-4 – Magnitude of effect, Table 8-5 – Determination of significance) outline the assessment criteria for each stage.

Table 8-3 Evaluation of Sensitivity for Birds (Percival 2003)

Sensitivity	Determining Factor
Very High	Species that form the cited interest of SPA’s 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 an SPA but which are not cited as 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% Irish population)
Medium	Species on Annex 1 of the EU Birds Directive. Species present in regionally important numbers (>1% regional (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 8-4 Determination of Magnitude of Effects (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 8-5 Significance matrix: combining magnitude and sensitivity to assess significance (Percival 2003)

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

8.2.5.4 Impact Assessment – EPA Criteria (2017 Draft)

Effects identified as per the Percival 2003 criteria have been equated with EPA impact assessment criteria described below.

The following terms were utilised when quantifying duration and frequency of effects:

- 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, for example through remediation or restoration
- Frequency – How often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)

Criteria for assessing impact significance and impact quality are provided in Table 8-6 and Table 8-7.

Table 8-6 Criteria for assessing impact significance based on (EPA, 2017)

Impact Magnitude	Definition
No change	No discernible change in the ecology of the affected feature
Imperceptible Effect	An effect capable of measurement but without significant consequences
Slight Effect	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate Effect	An effect that alters the character of the environment that is consistent with existing and emerging baseline trends
Significant Effect	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment
Profound Effect	An effect which obliterates sensitive characteristics

Table 8-7 Criteria for assessing impact quality based on (EPA, 2017)

Impact Type	Criteria
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)

EPA impact assessment criteria have been used in this assessment for consistency between the biodiversity and ornithology chapters. Percival (2003) has also been followed in the assessment of potential impacts given its specific focus on the interactions between wind farms and birds. The two assessment criteria have been used to independently characterise impacts to inform a robust assessment of potential impacts resulting from the subject development site on local avian communities.

8.2.5.5 Collision Risk Assessment

Collision risk is calculated using a mathematical model to predict the numbers 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 Scottish Natural Heritage (SNH) guidance which is sometimes referred to as the Band Model (Band et al. (2007).

Two stages are involved in the model:

- Stage 1: Determination of the number of birds or flights passing through the air space swept by the rotor blades of the wind turbines.
- Stage 2: Calculation of the probability of a bird strike occurring.

Please see Appendix 8-6 for full details on the collision risk modelling method.

8.2.6 Survey Justification

A comprehensive suite of bird surveys has been undertaken at the proposed development site between September 2016 and September 2018 and October 2019 to March 2020.

Results are derived from a continuous two years of surveying undertaken in accordance with SNH Guidance. In addition, a species-specific golden plover survey was undertaken during the 2019/20 winter season. These are the results that are analysed to inform this assessment.

The surveys undertaken provide the information necessary to allow a complete, comprehensive and robust assessment of the potential impacts of the proposed development on avian receptors. The survey duration and scope are considered entirely satisfactory.

8.2.6.1 Mitigation

The development has been designed to specifically avoid, reduce and minimise effects on all Ornithological Receptors. Where potential effects on Key Ornithological Receptors (KORs) are predicted, mitigation has been prescribed to avoid, reduce and remove such effects.

Proposed best practice design and mitigation measures are specifically set out in Section 8.10 and are realistic in terms of cost and practicality. They have been subject to detailed design and will effectively address the potential effects on the identified KORs.

The potential effects of the proposed development were considered and assessed to ensure that all effects on KORs are adequately addressed and no significant residual effects are likely to remain following the implementation of mitigation measures / best practice. Full details are provided in Section 8.10.

8.2.6.2 Limitations

The information provided in this EIAR chapter accurately and comprehensively describes the baseline environment; provides an accurate prediction of the likely effects of the proposed development; prescribes mitigation as necessary; and describes the predicted residual impacts. The specialist studies, analysis and reporting have been undertaken in accordance with the appropriate guidelines.

No significant limitations in the scope, scale or context of the assessment have been identified.

8.3 Baseline Conditions and Receptor Evaluation

8.3.1 Identification of Designated Sites within the Likely Zone of Influence of the Development

A screening assessment and Natura Impact Statement 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 Habitats Directive.

As per EPA draft Guidance 2017, “*A biodiversity section of an EIAR, should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement*” but should “*incorporate their key findings as available and appropriate*”. This section provides a summary of the key screening assessment findings with regard to Special Protection Areas. A summary of key assessment findings with regard to Special Areas of Conservation is provided in Chapter 7 of this EIAR.

Using GIS software, sites designated for nature conservation within the potential Zone of Influence (ZOI) of the Proposed Development were identified. The ZOI was derived utilising a precautionary approach. Initially, sites within a 15-kilometre radius of the proposed works were identified. Then designated sites located outside the 15km buffer zone were taken into account and assessed. In this case, no potential for impacts outside the 15km buffer was identified.

In addition, and in the absence of any specific European or Irish guidance, the Scottish Natural Heritage (SNH) Guidance, ‘Assessing Connectivity with Special Protection Areas (SPA)’ (2016) was consulted. This document provides guidance in relation to the identification of connectivity between Proposed Development and Special Protection Areas. The guidance takes into consideration the distances some species may travel beyond the boundary of their SPAs and outlines information on dispersal and foraging ranges of bird species which are frequently encountered when considering projects.

Only three SPAs were located within the Likely Zone of Influence of the proposed development site, which are listed below in Table 8-8 and illustrated on Figure 8.8. As previously discussed, this section provides a summary of the key screening assessment findings with regard to Special Protection Areas. A summary of the Natura Impact Statement (NIS) is provided in Section 8.8.2.

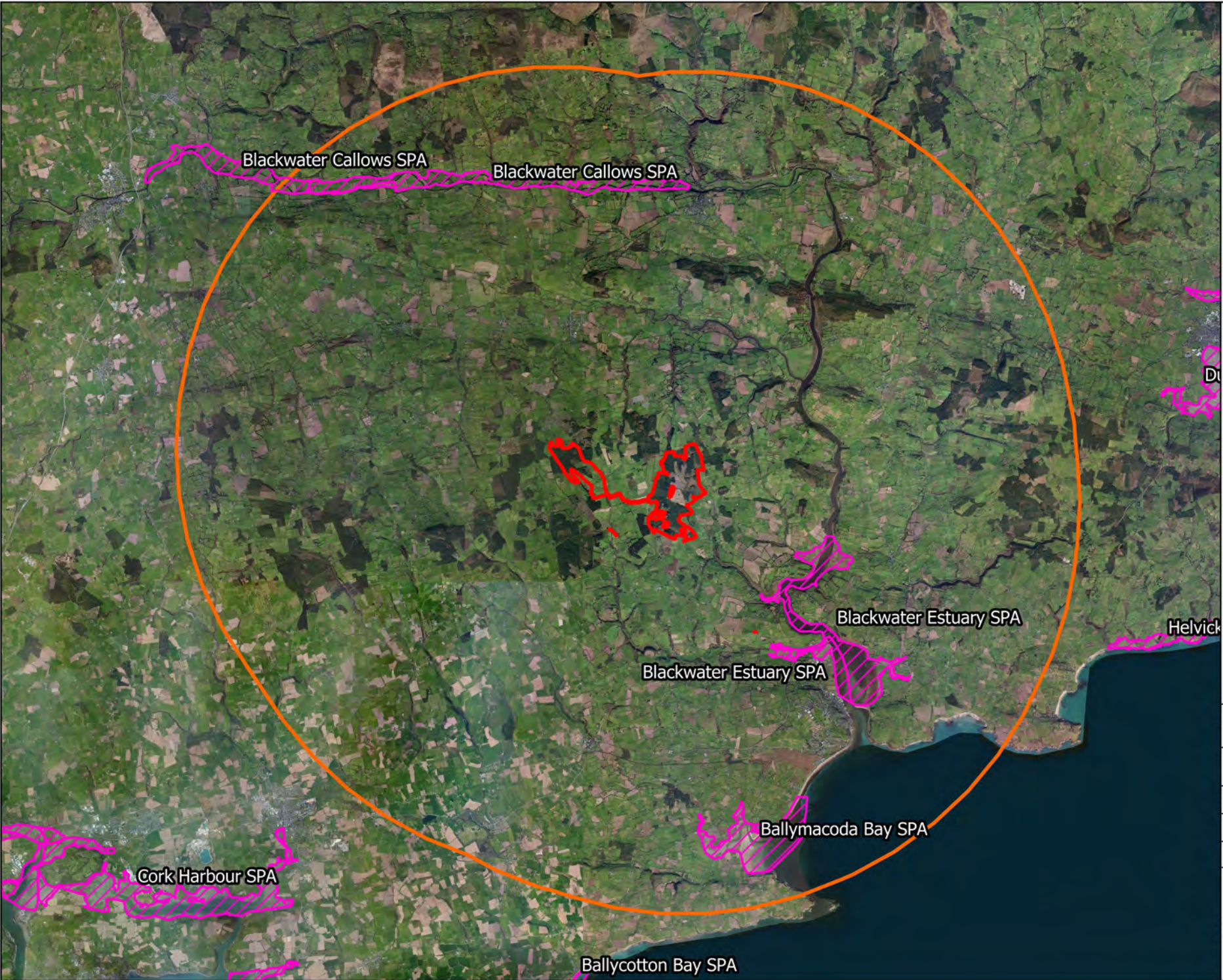
Table 8-8 Designated Sites in the Zone of Influence

European Site	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (www.npws.ie , 21/02/2018)	Conservation Objectives	Zone of Influence Determination & Identification of Pathways for Effect
<p>Blackwater Estuary SPA</p> <p>Distance: 3.5km</p>	<ul style="list-style-type: none"> ➤ Wigeon <i>Anas Penelope</i> (wintering population) ➤ Golden Plover <i>Pluvialis apricaria</i> (wintering population) ➤ Lapwing <i>Vanellus vanellus</i> (wintering population) ➤ Dunlin <i>Calidris alpine</i> (wintering population) ➤ Black-tailed Godwit <i>Limosa limosa</i> (wintering population) ➤ Bar tailed Godwit <i>Limosa lapponica</i> (wintering population) ➤ Curlew <i>Numenius arquata</i> (wintering population) ➤ Redshank <i>Tringa tetanus</i> (wintering population) ➤ Wetlands and Waterbirds 	<p>Detailed conservation objectives for this site (Version 1, May 2012) were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>This European Site is 3.5km to the south-east of the development site. There is no potential for direct impact as the proposed development is outside of the SPA boundary. However, as golden plover were recorded within the site, potential for direct effect on the species, occurring outside of the SPA has been identified in the form of collision risk.</p> <p>Wigeon, Lapwing, Dunlin, Black-tailed Godwit, Bar tailed Godwit, Curlew and Redshank are all designated for their wintering populations in the SPA. Wintering populations of these species are associated with coastal habitats. There is no suitable habitat within the proposed development site for wintering populations of these species. Therefore, no potential for significant effect on these species exists via disturbance/displacement. Potential for impact on supporting wetland habitats is full considered under the [A999] wetlands and waterbirds SCI.</p> <p>A potential pathway for indirect effects was identified in the form of bird disturbance and displacement to Golden Plover where they occur outside of the designated site. Golden Plover were recorded regularly onsite during winter months. Due to the nature and timing of these observations and the proximity of the site from the SPA, the potential for significant effects on this Special Conservation Interests (SCI) species cannot be excluded and further assessment is required.</p> <p>There is connectivity between the proposed development and this SPA via watercourses within the site boundary, including the Glenaboy, the Glendine and the Tourig Rivers.</p> <p>The proposed construction, operational and decommissioning works have the potential to cause deterioration of water quality, potentially affecting the downstream SCI 'Wetland and Waterbirds'. Impact to supporting wetland habitat for all SCI species is considered under the wetland and waterbirds designation.</p> <p>This SPA is therefore within the likely zone of impact, and further assessment is required.</p>




European Site	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (www.npws.ie , 21/02/2018)	Conservation Objectives	Zone of Influence Determination & Identification of Pathways for Effect
<p>Blackwater Callows SPA</p> <p>Distance: 9.9km</p>	<ul style="list-style-type: none"> ➤ Whooper Swan <i>Cygnus Cygnus</i> (wintering population) ➤ Wigeon <i>Anas Penelope</i> (wintering population) ➤ Teal <i>Anas crecca</i> (wintering population) ➤ Black-tailed Godwit <i>Limosa limosa</i> (wintering population) ➤ Wetlands and Waterbirds 	<p>This site has the generic conservation objective:</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 the additional objective:</p> <p>‘To maintain or restore the favourable conservation condition of the wetland habitat at Blackwater Callows SPA as a resource for the regularly-occurring migratory waterbirds that utilise it’</p>	<p>This European Site is 9.9km to the north of the development site. There is no potential for direct impact as the proposed development is outside of the SPA boundary.</p> <p>This SPA is in a separate hydrological catchment and does not have connectivity with the proposed development site. Therefore, there is no potential for indirect effects on supporting wetland habitat with regard to surface water pollution.</p> <p>Wigeon, teal and black-tailed godwit are all designated for their wintering populations. These SCI species were not recorded during the extensive suite of bird surveys carried out. There is no suitable habitat within the proposed development site for wintering populations of these species given the extent of plantation forestry occurring within the study area. The site is also located outside the zone of sensitivity of any species that is listed as particularly sensitive to wind energy development in Mc Guinness et.al (2015). There is therefore no potential for impact.</p> <p>The proposed development site is not located within the core foraging range of wintering Whooper swan, which is listed as less than 5km, as per SNH guidelines (2016). Whooper swan were only recorded on one occasion during dedicated bird surveys of the development. Consequently, the potential for direct and indirect impacts on whooper swan populations associated with the Blackwater Callows SPA can be discounted.</p> <p><i>No pathways for significant effect on the European Site was identified. Thus it can be excluded beyond reasonable scientific doubt, in view of best scientific knowledge, on the basis of objective information and in light of the conservation objectives of the European site, that the proposed development, individually or in combination with other plans and projects, would therefore not have the potential to have a significant effect on this European Site.</i></p>

European Site	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (www.npws.ie , 21/02/2018)	Conservation Objectives	Zone of Influence Determination & Identification of Pathways for Effect
<p>Ballymacoda Bay SPA</p> <p>Distance: 10.7km</p>	<ul style="list-style-type: none"> ➤ Wigeon <i>Anas Penelope</i> (Wintering) ➤ Teal <i>Anas crecca</i> (Wintering) ➤ Ringed Plover <i>Charadrius hiaticula</i> (Wintering) ➤ Golden Plover <i>Pluvialis apricaria</i> (Wintering) ➤ Grey Plover <i>Pluvialis squatarola</i> (Wintering) ➤ Lapwing <i>Vanellus vanellus</i> (Wintering) ➤ Sanderling <i>Calidris alba</i> (Wintering) ➤ Dunlin <i>Calidris alpina alpina</i> (Wintering) ➤ Black-tailed Godwit <i>Limosa limosa</i> (Wintering) ➤ Bar-tailed Godwit <i>Limosa lapponica</i> (Wintering) ➤ Curlew <i>Numenius arquata</i> (Wintering) ➤ Redshank <i>Tringa totanus</i> (Wintering) ➤ Turnstone <i>Arenaria interpres</i> (Wintering) ➤ Black-headed Gull <i>Chroicocephalus ridibundus</i> (Wintering) 	<p>Detailed conservation objectives for this site (Version 1, February 2015) were reviewed as part of the assessment and are available at www.npws.ie</p>	<p>This European Site is 10.7km to the south-east of the development site. There is no potential for direct impact as the proposed development is outside of the SPA boundary.</p> <p>There is no potential for indirect effects on supporting SCI habitats with regard to surface water pollution. The watercourses that discharge to the Atlantic Ocean and subsequently this coastal/marine SPA are located within a separate sub-catchment to the proposed development. Consequently, no hydrological connectivity or pathway for impact exists.</p> <p>All SCI species of this SPA are designated for their wintering populations within this SPA, with notable concentrations of Lesser Black-backed Gull.</p> <p>The SPA is designated for wintering populations of Wigeon, Teal, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank and Turnstone that are associated with coastal habitats. There is no suitable habitat within the proposed development site for wintering populations of these species, and they were not recorded during the surveys undertaken. The site is also located outside the zone of sensitivity of any species that is listed as particularly sensitive to wind energy development in Mc Guinness et.al (2015).</p> <p>Common Gull (<i>Larus canus</i>) (Wintering) were not recorded during the dedicated bird surveys as is therefore excluded from further assessment.</p> <p>The wind farm site is located within the potential core foraging range of the following SCI species as per Thaxter et.al (2012) and Gillings and Fuller (1999):</p> <ul style="list-style-type: none"> ▪ Lesser black-backed gull (<i>Larus fuscus</i>) ▪ Black-headed Gull (<i>Chroicocephalus ridibundus</i>) (Wintering) ▪ Golden Plover (<i>Pluvialis apricaria</i>)

European Site	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (www.npws.ie , 21/02/2018)	Conservation Objectives	Zone of Influence Determination & Identification of Pathways for Effect
	<ul style="list-style-type: none"> ➤ Common Gull <i>Larus canus</i> (Wintering) ➤ Lesser Black-backed Gull <i>Larus fuscus</i> (Wintering and concentration) ➤ Wetlands and Waterbirds 		<p>In addition, lesser black-backed gull, black-headed gull and golden plover were recorded during the extensive suite of bird surveys undertaken. Common gull was not recorded during the extensive suite of bird surveys undertaken. Although it is unlikely that any birds recorded during surveys are associated with the SPA populations, an assessment of ex-suite collision risk and disturbance/displacement is considered on a highly precautionary basis.</p> <p>The potential for significant effects on these SCI species cannot be excluded and further assessment is required in terms of ex-suite collision risk and disturbance/displacement. The site of the proposed development is dominated by plantation forestry and does not provide suitable supporting habitat for these species.</p> <p>This SPA is therefore within the likely zone of impact, and further assessment is required.</p>



Map Legend

-  Proposed Development Area
-  15km ZOI of the Proposed Development Area
-  Special Area of Conservation



Drawing Title
SPA Locations within the Zone of Influence

Project Title
Lyrenacarriga Windfarm

Drawn By Patrick Manley	Checked By Padraig Cregg
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Project No. 170749	Drawing No. Fig. 8.8
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Scale 1:200000	Date 18.11.2020
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8.3.2 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 entire development site lies within hectads W98 and X08. Table 8-9 presents a list of species of conservation interest species recorded from the relevant hectads:

Table 8-9 Breeding Bird Atlas Data (Hectad W98 & X08)

Species Name	Breeding Atlas 68-72		Breeding Atlas 88-91		Breeding Atlas 07-11		Conservation Status
	W98	X08	W98	X08	W98	X08	
Corncrake (<i>Crex crex</i>)	-	-	Seen	-	-	-	BD, RL
Hen Harrier (<i>Circus cyaneus</i>)	Conf	Conf	-	Seen	-	Poss	BD
Peregrine (<i>Falco peregrinus</i>)	-	-	-	-	Prob	Poss	BD
Merlin (<i>Falco columbarius</i>)	-	Poss	-	-	-	-	BD
Kingfisher (<i>Alcedo atthis</i>)	-	Prob	-	-	-	-	BD
Little Egret (<i>Egretta garzetta</i>)	-	-	-	-	-	Conf	BD
Barn Owl (<i>Tyto alba</i>)	-	Prob	-	-	-	-	RL
Woodcock (<i>Scolopax rusticola</i>)	-	Prob	Breed	-	Prob	-	RL
Curlew (<i>Numenius arquata</i>)	Prob	Prob	Seen	-	-	-	RL
Lapwing (<i>Vanellus vanellus</i>)	Prob	Prob	-	-	-	-	RL
Shoveler (<i>Anas clyptea</i>)	-	Poss	-	-	-	-	RL
Grey Wagtail (<i>Motacilla cinerea</i>)	-	Conf	Breed	Breed	Conf	Conf	RL
Yellowhammer (<i>Emberiza cintrinella</i>)	Conf	Conf	Breed	Breed	Conf	Conf	RL
Meadow Pipit (<i>Anthus pratensis</i>)	Conf	Conf	Breed	Breed	Conf	Conf	RL

BD=Birds Directive; RL = BoCCI Red List; Seen = recorded; Breed = breeding; Non-B = non-breeding; Poss = possible breeding; Prob = probable breeding; Conf = confirmed breeding; - = not-recorded

Table 8-10 shows those species recorded in the relevant hectads (W98 & X08) in the wintering birds' atlases that are also protected under the EU Birds Directive or mentioned on the Birds of Conservation Concern in Ireland (BoCCI) red list. Due to the proximity of the development site to Blackwater Estuary SPA, all Species of Conservation Interest (SCI's) from this SPA recorded in the relevant 10km hectads have been included in this list. Each of the SCI species for Blackwater Bay SPA (listed above in Table 8-8) are designated for wintering populations only.

Table 8-10 Wintering Bird Atlas Data (Hectad W98 & X08)

Species Name	Wintering Atlas 81-84		Wintering Atlas 07-11		Conservation Status
	W98	X08	W98	X08	
Golden Plover (<i>Pluvialis apricaria</i>)	Pres	Pres	Pres	Pres	BD, RL, SCI
White-tailed Eagle (<i>Haliaeetus albicilla</i>)	-		-	Pres	BD, RL
Bar-tailed Godwit (<i>Limosa lapponica</i>)	-	Pres	-	Pres	BD, SCI
Kingfisher (<i>Alcedo atthis</i>)	-	Pres	-	Pres	BD
Hen Harrier (<i>Circus cyaneus</i>)	Pres		-	Pres	BD
Peregrine (<i>Falco peregrinus</i>)	-	Pres	Pres	Pres	BD
Merlin (<i>Falco columbarius</i>)	Pres		-	Pres	BD
Red Kite (<i>Milvus milvus</i>)	-	Pres	-	-	BD
Little Egret (<i>Egretta garzetta</i>)	-	-	-	Pres	BD
Glossy Ibis (<i>Plegadis falcinellus</i>)	-	-	-	Pres	BD
Red-throated Diver (<i>Gavia stellata</i>)	-	Pres	-	-	BD
Mediterranean Gull (<i>Larus melanocephalus</i>)	-	-	-	Pres	BD
Curlew (<i>Numenius arquata</i>)	Pres	Pres	Pres	Pres	RL, SCI
Lapwing (<i>Vanellus vanellus</i>)	Pres	Pres	Pres	Pres	RL, SCI
Dunlin (<i>Calidris alpina</i>)	-	Pres	-	Pres	RL, SCI
Redshank (<i>Tringa totanus</i>)	-	Pres	-	Pres	RL, SCI
Wigeon (<i>Anas penelope</i>)	-	Pres	-	Pres	RL, SCI
Tufted Duck (<i>Aythya fuligula</i>)	-	-	-	Pres	RL
Herring Gull (<i>Larus argentatus</i>)	Pres	Pres	-	Pres	RL

Species Name	Wintering Atlas 81-84		Wintering Atlas 07-11		Conservation Status
	W98	X08	W98	X08	
Black-headed Gull (<i>Chroicocephalus ridibundus</i>)	Pres	Pres	-	Pres	RL
Woodcock (<i>Scolopax rusticola</i>)	Pres	Pres	-	Pres	RL
Black-tailed Godwit (<i>Limosa limosa</i>)	-	Pres	-	Pres	SCI
Grey Wagtail (<i>Motacilla cinerea</i>)	Pres	Pres	Pres	Pres	RL
Yellowhammer (<i>Emberiza cintrinella</i>)	-	Pres	Pres	Pres	RL
Meadow Pipit (<i>Anthus pratensis</i>)	Pres	Pres	Pres	Pres	RL

BD = EU Birds Directive Annex I; RL = BoCCI Red List; Pres = present in hectad; - = not recorded
 Pres = Present in hectad; SCI's = Species of Conservation Interest for nearby SPA.

8.3.3 Bird Sensitivity Mapping Tool

A Bird Sensitivity Mapping Tool for wind energy development was developed by BirdWatch Ireland and provides a measured spatial indication of where protected birds are likely to be sensitive to wind energy developments. The tool 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.

There is no bird sensitivity data available which overlaps the site. The entire site is located just north, but outside of an area classified as a 'Low' bird sensitivity zone.

8.3.4 Irish Wetland Bird Survey (I-WeBS) Records

The study area is not covered by an I-WeBS site and the nearest I-WeBS site (Lower Blackwater River) is located approximately 3.6km from the proposed development site. Data from I-WeBS sites in County Waterford and County Cork have been used to estimate wintering populations of waterbirds identified as KORs. Basis on a precautionary approach, the county with the lower population was taken as the county population used in the assessment. Datasets for the following sites were downloaded from www.birdwatchireland.ie and reviewed:

County Waterford

- > Ballinlough
- > Ballyscanlan Lake
- > Ballyshunnock Reservoir
- > Belle Lake
- > Blackwater Callows
- > Blackwater Estuary
- > Boatstrand-Annestown
- > Carrickavrantry Reservoir
- > Clonea Strand
- > Dungarvan Harbour
- > Garrarus & Kilfarrassy

- > Kilmeaden Cream (Blackknock)
- > Knockaderry Reservoir
- > Lower Blackwater River
- > Mid-Waterford Coast
- > Monanee Lake
- > Outer Tramore Bay
- > Pouldrew Pond
- > River Bride
- > River Suir Lower
- > Tramore Back Strand
- > Waterford Harbour
- > Whiting Bay
- > Whiting Bay Marsh

County Cork

- > Adrigole Harbour
- > Ballin Lough
- > Ballybranagan
- > Ballybutler (Butlerstown) Lake
- > Ballycotton Shanagarry
- > Ballycrenane/Warren
- > Ballydehob Estuary
- > Ballyhea Gravel Pit
- > Ballyhonock Lough
- > Ballymacoda
- > Ballynacarriga Lake
- > Bandon Estuary
- > Bandon River
- > Bantry Bay
- > Barley Cove Bay
- > Bear Haven
- > Blackwater Valley
- > Blarney Fern – Clogheenmilcon
- > Blarney Lake
- > Carrigillihy Lake
- > Castlemartyr Lake
- > Castlenalact Lake
- > Charleville Lagoons
- > Classes Lakes/Gravel Pits
- > Clonakilty Bay
- > Cloonties Lake
- > Cork Harbour
- > Corran Lake
- > Courtmacsherry Bay, Broadstown Bay & Dunworley
- > Croagh Bay
- > Crookhaven
- > Curraghlicky Lake
- > Gallanes Lough, Clonakilty
- > Garryhesta Gravel Pit
- > Glandore Harbour/Union Hall
- > Ilen Estuary
- > Inishcarra Reservoirs
- > Kilcolman Marsh
- > Kilkeran Lake

- > Lissagriffin Lake
- > Lough Aderry
- > Lough Atarriff
- > Lough Cluhir
- > Lough Gorm
- > Madame Lake (Bateman's Lough)
- > Mahona Lough
- > Myross Island & Inlet (Blind Harbour)
- > Nohoval Lake
- > Ringabella Creek
- > Roaringwater Bay
- > Rosbrin Cove
- > Rosscarbery
- > Sherkin Island
- > Shreeland Lakes (incl. Lough Doo)
- > Stick Estuary (Oysterhaven)
- > The Lough Cork
- > Toormore Bay

8.3.5 Blackwater Estuary SPA (Golden Plover)

Blackwater Estuary SPA, which is located approximately 3.5km to the southeast of the development site boundary, is designated for wintering waterbird populations. The Blackwater Estuary is of high ornithological importance for wintering waterfowl, providing good quality feeding areas for a high diversity of waterfowl species, including golden plover. At high tide, the birds roost along the shoreline and salt marsh fringe, in the Kinsalebeg area. At low tide, intertidal flats between the main channel of the River Blackwater and Ballynaclash Quay are exposed on both sides of the channel. These mud flats are utilised for foraging for the wintering waterbirds associated with the SPA.

The NPWS Site Synopsis Form for this SPA (July 2014) presents the golden plover wintering population at this site as nationally important (2,628) based on I-WeBS data examining the mean peaks for the five winters between 1995 and 2000. On examination of the most recent I-WeBS data for the Blackwater Estuary, available online, a peak count of 953 birds (combination of Lower Blackwater River, OM304, and Blackwater Estuary, OM404) was recorded between the most recent five-year winter seasons of 2010/11 and 2014/15.

I-WeBS counts are undertaken at high-tide, when golden plover are likely to be foraging in agricultural grasslands near the estuary (Burke et al 2018). It is therefore highly probable that the I-WeBS data provides an underestimation of the wintering populations of golden plover at the Blackwater Estuary SPA.

To get an accurate estimation of the local golden plover population including those utilising the Blackwater Estuary SPA, dedicated golden plover surveys were conducted between October 2019 and March 2020. The results for these surveys can be found in section 8.4.1 below.

8.3.6 NPWS Rare and Protected Species Dataset

An initial information request was sent to the NPWS requesting records from the Rare and Protected Species Database on the 21st of January 2019. To ensure the most up to date records were included in this chapter of the ELAR, the NPWS were contacted on the 4th of February 2019, 31st of July 2019 and again on the 30th October 2020. The sections below provide the records obtained from the NPWS regarding rare and protected bird species.

Hen Harrier

The NPWS identified that there were two sightings of hen harrier within the W98 10km hectad and one record of a possible hen harrier breeding site within the hectad X08 during 1998. As previously discussed, the entire development site lies within hectads W98 and X08. There were no records of hen harrier during any of the subsequent survey years (i.e. 2005, 2010 or 2015) within the relevant 10km hectads in which the site is located. There was no evidence of confirmed hen harrier breeding activity on or near the site between 1998 and 2015.

Peregrine

The NPWS identified a historical breeding peregrine site within the W98 10km hectad, which was unoccupied during the 2017 National Peregrine Survey.

8.4

Field Survey Results

A comprehensive list of all bird species recorded during surveys is provided in Table 2 of Appendix 8-1. The target species listed below were recorded within the zone of influence of the proposed development site during the ornithological surveys. The list is ordered in accordance with conservation significance: Annex I species, SCIs of designated sites, Red and Amber listed species (BoCCI) and raptors.

- Golden Plover (*Annex I species and SCI of nearby SPA*)
- Whooper Swan (*Annex I species*)
- Hen Harrier (*Annex I species*)
- Merlin (*Annex I species*)
- Peregrine (*Annex I species*)
- Black-headed Gull (*Red listed with regard to Breeding populations*)
- Woodcock (*Red listed with regard to Breeding populations*)
- Lesser Black-backed Gull (*a significant wintering population is present in the adjacent Blackwater Estuary SPA: however, this species is not an SCI of the SPA*)
- Buzzard (*Raptor, Schedule IV of the Wildlife Act; 1976*)
- Sparrowhawk (*Raptor, Schedule IV of the Wildlife Act; 1976*)
- Kestrel (*Raptor, Schedule IV of the Wildlife Act; 1976*)
- Long-eared Owl (*Raptor, Schedule IV of the Wildlife Act; 1976*)
- Common Snipe (*Amber listed regarding Breeding & Wintering populations*)

The following sections describe the observations of each target species under the individual survey headings. Survey data and mapping for each target species is provided in the technical appendices. Appendix 8-3 presents results summary tables including:

- Summary of seasonal Vantage Point Survey Effort.
- Summary of the monthly distribution of flight activity recorded for the target species during the vantage point watches.
- Summary of VP observations of target species within PCH and proximity of development site.
- Summary of monthly distribution of Waterbird Survey results per species observed during these surveys.

8.4.1

Golden Plover

The core survey data for golden plover is provided in Appendix 8-4 and supporting survey data is provided in Appendix 8-5. Results summary tables are present in Appendix 8-3.

Core Vantage Point Surveys

There were 22 observations of golden plover recorded during the VP surveys (see Figure 8.1.1 in Appendix 8-4). Twenty flights were recorded within potential collision height from the VP surveys at Site 2 or Site 3. Of this total only nine were recorded within or partially within 500m of the proposed turbine layout. All flight activity was associated with the wintering season only. Numbers ranged from 1-200 birds. The majority of the golden plover observed were recorded in foraging habitat (e.g. agricultural grassland offsite i.e. outside of the proposed development area, as shown in Figure 8.1.1. The associated flight activity is strongly associated with the foraging habitat available in the agricultural grassland.

Waterfowl Surveys

There were three observations of golden plover recorded during dedicated waterfowl surveys, all of which were in excess of 4.5km from the proposed development site (see Appendix 8-3, Table 4). Two of these occurred around Newport East, approximately 4.8km east of the Development Site. On the 2nd of November 2016 a flock of 1,429 birds were observed, while on the 14th of December 2016 a flock of five golden plover were observed.

The remaining observation consisted of a flock of nine birds recorded at Ferrypoint (approximately 10km southeast of the Development Site) on the 15th of March 2017.

Golden Plover Surveys

There were fourteen observations of golden plover during the dedicated golden plover surveys within the 12km survey radius of the proposed development. Observed flocks ranged from 35 to 6,500 individuals. Flocks were observed in three areas, the Blackwater Estuary SPA, the Ballymacoda Bay SPA and along the river Blackwater near Tallow, approximately 5km north of the proposed development area. The mean population recorded during these surveys was 1,860.

There were six observations of golden plover at the Blackwater Estuary SPA, ranging from 85 to 2,500 birds. There were six observations within the Ballymacoda Bay SPA, ranging from 170 to 6,500 birds. Of these, only three observations were within the core foraging range of golden plover from the proposed development area. Within the core foraging range of the proposed development area, flock sized ranged from 1,000 to 6,500 birds. There was one observation of golden plover along the River Bride near Tallow, this was an observation of a flock of 50 birds in December 2019. Observations are presented in Appendix 8-4, Figure 8.7.1.

Supporting Data

There were nine observations recorded during surveys at Site 1 VP1(a), more than one kilometre from the nearest proposed turbine. These flights have been considered in the discussion and evaluation of potential disturbance displacement effects. In addition to these nine observations, there was also a record of a flock of 136 golden plover, observed roosting at Site 1 on the 18th of December 2016. The flock was recorded more than one kilometre from the proposed development area.

There were four observations of golden plover during vantage point surveys across the four discontinued sites between September 2016 and August 2017 (see Figure 8.1.1 in Appendix 8-4). All four observations occurred during the 2016/17 winter season survey period and occurred in excess of 1.7km east of the proposed development boundary. Three observations occurred at Site 6 while the remaining observation was from Site 5. The three observations at Site 6 were all of a flock of 130 birds in flight between October and November. The remaining observation from Site 5 consisted of a flock of 14 birds recorded on the 21st of March 2017.

No additional observations of this species were recorded during the extensive surveys between 2016 and 2018.

8.4.2 Whooper Swan

The core survey data for whooper swan is provided in Appendix 8-4. Results summary tables are present in Appendix 8-3.

Core Vantage Point Surveys

Whooper swan were only recorded once during vantage point surveys. The observation consisted of a pair of birds flying within PCH (see Figure 8.1.2 in Appendix 8-4). The observation occurred on the 7th of November 2016 at Site 2 VP2.

Waterfowl Surveys

There were 23 observations of Whooper swan recorded during dedicated waterfowl surveys, all of which were in excess of 4.5km from the proposed development site (see Appendix 8-3, Table 5). Flock sizes range from five to 209 birds. Birds were recorded at nine different survey sites during the winter 2016/17 survey season.

No additional observations of this species were recorded during the extensive surveys between 2016 and 2018.

8.4.3 Hen Harrier

The core survey data for hen harrier is provided in Appendix 8-4 and supporting survey data is provided in Appendix 8-5. Results summary tables are present in Appendix 8-3.

Core Vantage Point Surveys

Hen harrier were recorded in flight on six occasions during VP surveys between September 2016 and September 2018 (see Appendix 8-4, Figure 8.1.3). Only four of these flights occurred within 500m of the proposed turbine layout.

All flights occurred during the winter months, five during the 2016/2017 season and one during the 2017/2018 winter season. All observations were of individual birds, predominantly observed flying low while hunting. No evidence of roosting was recorded during this survey type.

No observations were recorded within potential collision height from the VP surveys at Site 2 or Site 3.

Hen Harrier Winter Roost Surveys

This species was recorded twice during the dedicated Hen Harrier Roost Surveys in the 2017/18 survey season. On the 27th of October 2017 a male hen harrier was observed in flight and landing to roost in an area of scrub approximately 1.4km from the proposed development site. On the 14th of January 2018 a ringtail flew over an area of heath and conifers within the southern section of Site 3 and out of the view. See Appendix 8-4, Figure 8.5.1.

Supporting Data

Two observations were recorded during surveys at Site 1 VP1(a), more than 1.2km from the nearest proposed turbine. These flights have been considered in the discussion and evaluation of potential disturbance displacement effects.

There were four observations of hen harrier during vantage point surveys across the four discontinued sites between September 2016 and August 2017 (see Figure 8.1.3 in Appendix 8-4). All four observations occurred during the 2016/17 winter survey season and occurred in excess of 1.5km from the nearest proposed turbine. Three observations occurred at Site 7 while the remaining observation was from Site 4. This observation from Site 4 was of a male hen harrier, the surveyor noted that this bird was possibly just emerging from a roost site after dawn on the 30th of December 2016. This is the same location as mentioned above where roosting was recorded on the 27th of October 2017.

No additional observations of this species were recorded during the extensive surveys between 2016 and 2018.

8.4.4 Merlin

The core survey data for merlin is provided in Appendix 8-4 and supporting survey data is provided in Appendix 8-5. Results summary tables are present in Appendix 8-3.

Core Vantage Point Surveys

During the 2016-2018 surveys, merlin was observed on one occasion (see Appendix 8-4, Figure 8.1.4). The observation consisted of an individual bird in flight during December 2017. The flight was below the potential collision risk height. This observation was recorded more than 500m from the proposed turbine layout as provided on Figure 8.1.4.

Supporting Data

An additional flight was recorded more than 1.5km from the development site during a survey at Site 1 VP1(a). In December 2017, this bird was recorded flying below possible collision height. This flight has been considered in the discussion and evaluation of potential disturbance displacement effects, there is no associated collision risk.

No additional observations of this species were recorded during the extensive surveys between 2016 and 2018.

8.4.5 Peregrine

The core survey data for peregrine is provided in Appendix 8-4 and supporting survey data is provided in Appendix 8-5. Results summary tables are presented in Appendix 8-3.

Core Vantage Point Surveys

Peregrine were recorded on seven occasions during VP surveys (see Appendix 8-4, Figure 8.1.5). Only five of these observations occurred within 500m of the proposed turbine layout as provided in Figure 8.1.5. All observations were of individual birds. There were no observations during the core breeding season (April – July) as all records occurred between the months of August and November. Four flights were recorded within potential collision height from the VP surveys at Site 2 or Site 3.

Breeding Raptor Surveys

Garryduff Quarry was visited in both the 2017 and 2018 breeding seasons as the most likely location from the wider area to support peregrine. There was no evidence of occupancy recorded, nor was there any observations of peregrine during the surveys undertaken in 2017 or 2018. This quarry is located in the townland of Garryduff approx. 7km west of the proposed development boundary.

Waterfowl Surveys

There was one incidental observation of a single peregrine during a waterfowl survey on the 14th of March 2017 at Tallow Bridge, approximately 4.5km to the north of the proposed development site.

Supporting Data

Four observations were recorded during surveys at Site 1 VP1(a), more than one kilometre from the nearest proposed turbine. These flights have been considered in the discussion and evaluation of potential disturbance displacement effects.

There was one observation of an individual peregrine during vantage point surveys across the four discontinued sites between September 2016 and August 2017. This observation occurred on the 23rd of February 2017 at Site 6, approximately 3.5km from the proposed development site boundary (see Figure 8.1.5 in Appendix 8-4).

No additional observations of this species were recorded during the extensive surveys between 2016 and 2018.

8.4.6 Black-headed Gull

The core survey data for this species is provided in Appendix 8-4. Results summary tables are present in Appendix 8-3.

Core Vantage Point Surveys

Black-headed gull were only recorded twice during core Vantage Point (VP) surveys between September 2016 and September 2018 (see Appendix 8-4, Figure 8.1.6). On the 7th of November 2016 a flock of three birds were observed flying within potential collision height (PCH), in addition a single bird was observed flying at PCH on the 4th of December 2016.

Waterfowl Surveys

There were 55 observations of black-headed gull during dedicated waterfowl surveys, all of which were in excess of 3km from the proposed development site (see Appendix 8-3, Table 6). Birds were recorded at 14 different survey sites during the winter 2016/17 survey season. Numbers recorded ranged from an individual bird to a flock of 237 birds.

No additional observations of this species were recorded during the extensive surveys between 2016 and 2018.

8.4.7 Woodcock

The core survey data for woodcock is provided in Appendix 8-4 and supporting survey data is provided in Appendix 8-5. Results summary tables are presented in Appendix 8-3.

Breeding Woodcock Surveys

There were two observations of woodcock during dedicated Breeding Woodcock Surveys in May 2017. A pair of woodcock were recorded in flight at Site 2 on the 2nd of May 2017. On the 9th of May 2017 an individual was seen in flight at Site 3.

There were eight observations of woodcock recorded during dedicated Breeding Woodcock Surveys in 2018. Seven of the observations occurred at Site 2, while there was one at Site 3. Seven observations were of individual birds calling and/or in flight while a pair of woodcock were seen calling and flying together on the 14th of May 2018.

All flights and observations of roding woodcock are displayed on Figure 8.4.1 of Appendix 8-4. While the presence of roding woodcock indicates confirmed breeding the exact locations of nesting birds can be difficult to estimate as males will display over quite a large area.

Supporting Data

During Breeding Woodcock surveys in May 2017, this species was occasionally recorded in the wider surroundings of the proposed development area. A single woodcock was recorded in flight at Site 1 on the 2nd of May 2017. On the 30th of May 2017 a pair of woodcock was observed in flight at Site 7, approximately 1.4km south of the development site. There was one observation of woodcock recorded during dedicated Breeding Woodcock Surveys in 2018 at Site 1.

There was one observation of an individual woodcock during vantage point surveys across the four discontinued sites between September 2016 and August 2017. This observation occurred on the 30th of December 2016 at Site 4 approximately 1.5km from the proposed development area.

This species was only recorded once during the winter walkover surveys undertaken. The observation was of an individual bird seen from Site 3 Transect 1, on the 11th of December 2017.

Woodcock was observed on one occasion during the additional vantage point surveys conducted in October to December 2018. A single woodcock was observed at Site 2.

No additional observations of this species were recorded during the extensive surveys between 2016 and 2018.

8.4.8 Lesser Black-backed Gull

The core survey data for lesser black-backed gull is provided in Appendix 8-4 and supporting survey data is provided in Appendix 8-5. Results summary tables are presented in Appendix 8-3.

Core Vantage Point Surveys

There were 43 observations of lesser black-backed gull flights during the two years of VP surveys (see Figure 8.1.7 in Appendix 8-4). The vast majority of these observations occurred within 500m of the proposed turbine layout. Forty-one flights were recorded within potential collision height from the VP surveys at Site 2 or Site 3.

Numbers recorded ranged from individuals to a flock of 120 birds. Only twelve flights were recorded during the core-breeding season months (April – August). Of these twelve flights only one occurred during May, three in July while the rest occurred in August.

In addition, there was an observation of an individual bird, perched during a VP survey at Site 2 VP1 on the 9th of November 2016.

Waterfowl Surveys

There were 19 observations of lesser black-backed gull during dedicated waterfowl surveys for the 2016/17 winter season. Birds were recorded at eight different survey sites during the winter 2016/17 survey season, each of which were in excess of 4km from the proposed development area (see Appendix 8-3, Table 7). Numbers recorded ranged from an individual bird to a flock of 347 birds

Supporting Data

Two flights were recorded during surveys at Site 1 VP1(a), both of which were more than 1.5km from the nearest proposed turbine. These flights have been considered in the discussion and evaluation of potential disturbance displacement effects.

There were eleven additional observations of lesser black-backed gull during vantage point surveys across the four discontinued sites between September 2016 and August 2017 (see Figure 8.1.7 in Appendix 8-4). Numbers recorded ranged from individuals to a flock of 59 birds.

Lesser black-backed gull was observed on one occasion during the additional vantage point surveys conducted in October to December 2018. A single bird was observed at Site 3.

No additional observations of this species were recorded during the extensive surveys between 2016 and 2018.

8.4.9 Buzzard

The core survey data for buzzard is provided in Appendix 8-4 and supporting survey data is provided in Appendix 8-5. Results summary tables are presented in Appendix 8-3.

Core Vantage Point Surveys

Buzzard were observed in flight on 128 occasions during the “Core” two-year VP survey period (see Figure 8.1.8 in Appendix 8-4). The majority of these observations were of individuals, while pairs were observed on 17 occasions, and three birds observed on six occasions. A number of the flights containing multiple birds exhibited territorial breeding behaviour. Furthermore, on the 11th of July 2018 a pair of juvenile buzzards were observed flying around a probable nest site to the south of Site 3.

This species was recorded during each month surveyed throughout the two-year period. In addition, there were three observations of birds not in flight, either perched or heard only. Eighty-two flights were recorded within potential collision height from the VP surveys at Site 2 or Site 3.

Breeding Raptor Surveys

This species was recorded once during a Breeding Raptor Survey on the 23rd of April 2018. A pair of buzzard were observed flying south from RVP2 over conifer plantation before being lost from view. This observation was within Site 2 of the proposed development area.

Waterfowl Surveys

There were six incidental observations of buzzard during dedicated waterfowl surveys for the 2016/17 winter season, all of which were in excess of 3km from the proposed development site (see Appendix 8-3, Table 8). Each observation was recorded at a different survey site.

Supporting Data

There were fifty observations of buzzard during surveys at Site 1 VP1(a), all of which were more than one kilometre from the nearest proposed turbine. These flights have been considered in the discussion and evaluation of potential disturbance displacement effects.

There were 49 additional observations of buzzard during vantage point surveys across the four discontinued sites between September 2016 and August 2017, all of which were in excess of 1.5km from the proposed development site (see Figure 8.1.8 in Appendix 8-4). Numbers recorded consisted of individuals, pairs and a party of three. A nest site was identified during VP surveys at Site 7, approximately 1km from the proposed development site (see Figure 8.1.8.1 in Appendix 8-4).

This species was only recorded once during Breeding Walkover Surveys throughout the two-year survey period. An individual bird was observed during a walked transect at Site 2 on the 3rd of April 2017.

Buzzard was only recorded once during winter walkover surveys. The observation was of an individual bird perched on a tree from Site 3 on the 14th of November 2017 (See Figure 8.3).

No additional observations of this species were recorded during the extensive surveys between 2016 and 2018.

8.4.10 Sparrowhawk

The core survey data for sparrowhawk is provided in Appendix 8-4 and supporting survey data is provided in Appendix 8-5. Results summary tables are presented in Appendix 8-3.

Core Vantage Point Surveys

During the “Core” (two-year) Vantage Point surveys, sparrowhawk were recorded in flight on 31 occasions (see Figure 8.1.9 in Appendix 8-4). Observations consisted solely of individual birds. Twenty-seven observations were recorded during the non-breeding seasons, while the remaining eleven observations occurred during the breeding seasons. Nine flights from Site 2 and Site 3 VP surveys were within the potential collision risk height.

In addition, there was a single observation of a perched sparrowhawk. This observation occurred on the 15th of July 2017 during a VP survey at Site 3 VP2. Two or three juveniles were heard calling from an area of forestry, within the proposed development site. This confirms that sparrowhawk nested in this area during the 2017 breeding season. The exact location of the nest could not be identified within the onsite forestry surrounding Site 3 VP2, however the nest is presumed to have been located onsite.

Hen Harrier Roost Surveys

There was one incidental observation of sparrowhawk during a hen harrier roost survey on the 29th of December 2017. A pair of sparrowhawk were observed in flight over an area of gorse scrub, beyond the site boundary.

Supporting Data

There were seven observations of sparrowhawk during surveys at Site 1 VP1(a), all of which were more than one kilometre from the nearest proposed turbine. These flights have been considered in the discussion and evaluation of potential disturbance displacement. In addition, there were two observations of a perched Sparrowhawk during winter 2016 from Site 1 VP1.

There were 17 observations of sparrowhawk during vantage point surveys across the four discontinued sites between September 2016 and August 2017, all of which were in excess of 1.5km from the proposed development site (see Figure 8.1.9 in Appendix 8-4). All observations were of individuals with the exception of a pair observed flying together on the 19th of May 2017 at Site 6. There were an additional two observations of calling juveniles in July and August 2017 at Site 4 which were not seen. This confirms breeding locally. This breeding territory at Site 4 is located approximately two kilometres from the proposed development site.

Sparrowhawk were only recorded once during Breeding Walkover Surveys throughout the two-year survey period. A juvenile bird was observed during a walked transect at Site 4 on the 12th of August 2017, approximately 1.5m from the proposed development site. While this area is no longer considered part of the proposed development area, this observation is further evidence that this species is breeding locally.

Sparrowhawk was only recorded twice during winter walkover surveys. On the 13th of October 2016 an individual bird was recorded at Site 3, while on the 7th of November 2016 an individual was seen at Site 2.

This species was observed on one occasion during the additional vantage point surveys conducted in October to December 2018. A single sparrowhawk was observed at Site 3.

No additional observations of this species were recorded during the extensive surveys undertaken.

8.4.11 Kestrel

The core survey data for kestrel is provided in Appendix 8-4 and supporting survey data is provided in Appendix 8-5. Results summary tables are presented in Appendix 8-3.

Core Vantage Point Surveys

During the “Core” (two-year) Vantage Point surveys, kestrel were recorded in flight on 78 occasions (see Appendix 8-4, Figure 8.1.10). Flights were evenly distributed throughout the two years with birds recorded in almost every month surveyed. Four of the 78 observations consisted of pairs observed during August and September while the remaining observations were of individuals. Thirty-five flights from Site 2 and Site 3 VP surveys were within the potential collision risk height.

In addition, there was an observation of an individual bird, perched during a VP survey at Site 3 VP3 on the 18th of November 2016.

Hen Harrier Roost Surveys

There was one incidental observation of a single kestrel hunting over an area of gorse scrub during a hen harrier roost survey at HHVP1 on the 29th of December 2017.

Waterfowl Surveys

There was one incidental observation of a single kestrel during a waterfowl survey at Kinsalebeg on the 4th of November 2016, approximately 8km from the proposed development site.

Supporting Data

There were 18 observations of kestrel during surveys at Site 1 VP1(a), all of which were more than one kilometre from the nearest proposed turbine. These flights have been considered in the discussion and evaluation of potential disturbance displacement.

There were 15 observations of kestrel during vantage point surveys across the four discontinued sites between September 2016 and August 2017 (see Appendix 8-4, Figure 8.1.10). All observations were of individuals in flight. No breeding behaviour was observed during these surveys. There was an observation of an individual kestrel during a winter walkover survey within Site 5 on the 27th of October 2016.

Kestrel was only recorded once during Breeding Walkover Surveys throughout the two-year survey period. An individual bird was observed perched on a tree during a walked transect at Site 2 on the 25th of September 2017.

Kestrel were only recorded twice during winter walkover surveys. On the 23rd of September 2016 an individual kestrel was recorded to the north of Site 3, while on the 14th of October 2017 an individual was observed at Site 2.

This species was observed on seven occasions during the additional vantage point surveys conducted in October to December 2018. All observations were of a single kestrel, with six observations occurring at Site 3 and one at Site 2.

No additional observations of this species were recorded during the extensive surveys undertaken.

8.4.12 Long-eared Owl

Raw survey data for long-eared owl is provided in Appendix 8-5.

Supporting Data

There was one incidental observation of long-eared owl during a breeding woodcock survey on the 23rd of May 2017 at Site 6, more than 3km from the proposed development site. A pair of chicks were heard calling at dusk from an area of forestry. While no nest site was located, this observation confirms breeding in the wider surroundings of the proposed development site. The exact location was not recorded due to no visual observation of the birds.

No additional observations of this species were recorded during the extensive surveys undertaken.

8.4.13 Common Snipe

The core survey data for common snipe is provided in Appendix 8-4 and supporting survey data is provided in Appendix 8-5.

Vantage Point Surveys

Common snipe were recorded on nine occasions in flight during the vantage point surveys, and on a further eight occasions as non-flight observations. Sixteen of these observations were recorded in the winter months (October to March). Common snipe were only recorded once during the breeding season: on the 4th of April 2018. Flight line data for these observations were not recorded.

Wildfowl Distribution Surveys

Common snipe were recorded on only two occasions during the wildfowl distribution surveys. A flock of 60 birds were observed at Newport East, approximately 5.7km to the north of the proposed development site, on the 14th of December 2016, and fourteen birds were observed at the same location on the 8th of February 2017.

Supporting Data

There were three observations of common snipe during surveys at Site 1 VP1(a). All of these observations were in November and December 2018 and ranged from an individual to a flock of six birds.

Common snipe was observed on one occasion during the additional vantage point surveys conducted in October to December 2018. A pair were observed at Site 2.

No additional observations of this species were recorded during the extensive surveys undertaken.

8.4.14 Other species of Note

As discussed in detail in Section 8.2.4.3.5, Waterbird Surveys were undertaken at significant wetland sites within 10km of the study area. Numerous species were recorded at these wetlands, several kilometres from the windfarm, but never on or near the proposed development site. This is likely due to a lack of suitable waterfowl habitat onsite. These species included bar-tailed godwit, black-tailed godwit, brent goose, curlew, dunlin, little egret, redshank, ringed plover, shelduck, shoveler and wigeon. The dominant habitat type within the proposed development site is conifer plantation. This habitat does not provide suitable foraging or roosting habitat for any of the species listed above. Furthermore, none of these species were observed flying over the proposed development site during the extensive two-year survey effort.

In addition, between October 2019 and March 2020 a Golden Plover Survey was undertaken to a 12km radius of the proposed development site. Numerous species were recorded at these wetlands, several kilometres from the windfarm, but never on or near the proposed development site, bar-tailed godwit, black-tailed godwit, brent goose, curlew, dunlin, little egret, redshank, ringed plover, shelduck, shoveler, kingfisher and wigeon.

8.4.15 Passerines (Red listed Species)

The BoCCI Red listed species meadow pipit was recorded during the surveys undertaken. This species was recorded in suitable breeding habitat primarily around the margins of the proposed development site. While breeding status for this species was not recorded during surveys, it is assumed breeding occurred in these areas.

8.5 Evaluation

A determination of population importance of birds within the likely zone of influence is provided in the sections below following criteria described in Section 8.2.5. Estimates of National population sizes were obtained from the NPWS Article 12 Reporting (2008-2012) which details the status and trends of Ireland's Bird species. Where relevant, estimates for mean county population has been derived following a review of IWeBS sites in County Waterford and County Cork.

8.5.1 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 from either winter season was 200 birds flying above or near the proposed development site. This maximum number does

not correspond with the classification criteria for National or International Importance (Burke et al. 2018).

To estimate the county population, a review of all County Waterford and County Cork I-WeBS sites was conducted. It should be noted that many of the Waterford/Cork I-WeBS sites are coastal in nature and the population estimate provided based on I-WeBS figures below is likely to be an underestimate of the county population. The following mean count values have been recorded for Waterford/Cork I-WeBS sites over the most recent 5-season period, i.e., for the period 2011/12 – 2015/16 (I-WeBS sites with a mean count value of zero have been omitted from this list):

County Waterford

- > Blackwater Estuary (mean = 74)
- > Dungarvan Harbour (mean = 2,717)
- > Lower Blackwater River (mean = 879)
- > River Suir Lower (mean = 20)
- > Tramore Back Strand (mean = 1,218)

County Cork

- > Ballycotton Shanagarry (mean = 2,155)
- > Ballymacoda (mean = 4,412)
- > Clonakilty Bay (mean = 680)
- > Cork Harbour (mean = 2,054)
- > Ilen Estuary (mean = 61)
- > Inishcarra Reservoirs (mean = 1,847)
- > Lissagriffin Lake (mean = 71)
- > Rosscarbery (mean = 1,710)

Based on the above, the mean wintering population from Waterford I-WeBS sites is 4,908 and Cork I-WeBS is 12,990.

Therefore, taking a precautionary approach, a regularly occurring population of 49 birds (1% of Waterford county population) is considered of County Importance in the context of the development site.

Flocks of County Importance were recorded flying over the site on six occasions, across four different survey dates, during the extensive suite of VP surveys undertaken at Site 2 and Site 3. In addition, there were six observations of flocks of County Importance recorded during VP surveys at the discontinued Sites 1 and Site 6 in the wider area.

The population recorded at the proposed development site was therefore assigned **County Importance** on the basis of a resident/regularly occurring wintering population assessed to be important to the county level.

Breeding

This species was not recorded during either the 2017 or 2018 breeding seasons. No evidence of breeding activity was recorded. Furthermore, the breeding range of this species is restricted to the west and north-west of the country, north of Galway Bay.

The species is not dependent on the proposed development site for breeding.

8.5.2 Whooper Swan

Wintering

As per the latest national wintering estimates provided in Burke et al (2018), the national wintering population of whooper swan in the Republic of Ireland is 11,852. Using these latest I-WeBS figures, 1% of the National population of whooper swan is 119. Therefore, as per NRA 2009, a regularly occurring population of 119 Whooper Swans is required for classification as Nationally Important.

The Swan Census 2015 (Crowe et. al., 2015) was consulted regarding the population data for whooper swan in County Waterford and County Cork. Based on the 2015 Swan Census data, in January 2015 the County Waterford population was 320 individuals and the County Cork population was 244 Individuals. Based on the above, on a precautionary bases, a population of 2-3 Whooper Swans is required for County Importance classification in this area.

Whooper swan were only recorded once on or near the site throughout the two-year survey period. The observation consisted of a pair of birds in flight. No evidence of feeding or roosting activity was recorded within the proposed development site. There was no evidence to suggest that the proposed development site is located on a migratory corridor for the species.

Numbers of ecological significance as per NRA (2009) criteria were not recorded during either winter season. This species is not dependant on the proposed development site for wintering.

Breeding

The species only visits the country during the winter months.

8.5.3 Hen Harrier

Wintering

The estimated national wintering population of hen harrier in Ireland is 269-349 therefore 1% of the ROI National wintering population is 2-3 birds. As per NRA 2009, a regularly occurring wintering population of 2-3 hen harrier is required for classification as Nationally/Internationally Importance.

A single male hen harrier was recorded in flight on eight occasions during VP surveys on site between September 2016 and September 2018. In addition, there were four observations at Site 7 and Site 4 (offsite), with the observation at Site 4 consisting of a male emerging from a possible roost site in gorse scrub. During a hen harrier roost survey, a male was also observed landing in this area of gorse scrub at dusk confirming a roost site, approximately 1.4km from the proposed development area (i.e. from Site 3).

It is assumed that the individuals recorded during the winter season are associated with a wintering population of **County** importance.

Breeding

This species was not recorded during either the 2017 or 2018 breeding seasons despite dedicated breeding raptor surveys and vantage point surveys. No evidence of breeding activity was recorded. The proposed development site is not of significance to breeding hen harrier populations.

8.5.4 Merlin

As per the latest NPWS Article 12 reporting document, the estimated population of Merlin is between 200 – 400 pairs.

There were only two records of this species during the two-year survey period. Both observations occurred during the month of December 2017. Neither flight was recorded within the potential collision risk zone, or within 500m of the proposed turbine layout.

This species was not recorded during either the 2017 or 2018 breeding seasons despite dedicated breeding raptor surveys and vantage point surveys.

Merlin typically only utilise forestry during the breeding season for nesting. This species was only (infrequently) recorded during the winter months. The proposed development site is not of significance to merlin.

8.5.5 Peregrine

The estimated national breeding population of peregrine in Ireland is 515 pairs or 1,300 wintering birds (NPWS Article 12 Reporting, 2008-2012). Therefore, 1% of the ROI National wintering population is 13 birds. As per NRA 2009, a regularly occurring population of 13 peregrine is required for classification as Nationally/Internationally Importance.

There were ten observations of this species at the proposed development site during winter VP surveys: between Sites 1, 2 and 3. Two of the ten observation were recorded during the breeding season (in April and August respectively) however, no evidence of breeding activity was recorded. There is no suitable breeding habitat within the proposed development site.

Taking a precautionary approach, 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.

8.5.6 Black-headed Gull

This species is Red listed under BoCCI for breeding populations only. There were only two observations of this species on or near the site. Both observations occurred during winter months. In addition, this species' wintering populations are also classified as a Special Conservation Interest for Ballymacoda Bay SPA, which is approx. 10.7km from the development site. However, given the proximity of the nearby (3.7km) Blackwater Estuary SPA, the birds recorded onsite were considered to be associated with the population that winters at the estuary.

This is a widespread and numerous wintering species in Ireland, however it was only recorded twice on/near the proposed development site. Numbers of ecological significance as per NRA criteria were not recorded. The site is not of significance to breeding or wintering populations for this species.

8.5.7 Woodcock

Woodcock is Red listed during the breeding season in Ireland. The species is not Red listed with regard to wintering populations.

In total, during dedicated Breeding Woodcock Surveys in May 2017 and April and May 2018, woodcock were recorded on 13 occasions. Observations included flights, calls and pairs observed in flight over suitable breeding habitat. This species has been assigned probable breeding status at the

proposed development site. 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.

8.5.8 Lesser Black-backed Gull

Lesser Black-backed Gull is an SCI of Ballymacoda Bay SPA (004023) with respect to wintering populations. In addition, the adjacent Blackwater Estuary SPA contains a regularly occurring wintering population. The separation distance between the proposed development and these SPAs is approximately 10.7km and 3.5km respectively. It is therefore likely based on its proximity that the birds recorded onsite are associated with the Blackwater Estuary SPA.

Lesser black-backed gull is listed on the NPWS Natura 2000 form (2017) and Site Synopsis (2014) as a non-SCI species that contributes to the integrity of the Blackwater Estuary SPA (004028).

To estimate the county population, a review of all County Waterford and County Cork I-WeBS sites was conducted. It should be noted that many of the Waterford/Cork I-WeBS sites are coastal in nature and the population estimate provided based on I-WeBS figures below is likely to be an underestimate of the county population. The following mean count values have been recorded for Waterford/Cork I-WeBS sites over the most recent 5-season period, i.e. for the period 2011/12 – 2015/16 (I-WeBS sites with a mean count value of zero have been omitted from this list).

County Waterford

- > Ballyshunnock Reservoir (mean = 54)
- > Blackwater Estuary (mean = 777)
- > Clonea Strand (mean = 5)
- > Dungarvan Harbour (mean = 306)
- > Lower Blackwater River (mean = 94)
- > River Suir Lower (mean = 5)
- > Tramore Back Strand (mean = 116)
- > Waterford Harbour (mean = 142)
- > Whiting Bay (mean = 4)

County Cork

- > Adrigole Harbour (mean = 2)
- > Ballin Lough
- > Ballybranagan (mean = 482)
- > Ballybutler (Butlerstown) Lake (mean = 31)
- > Ballycotton Shanagarry (mean = 1,089)
- > Ballycrenane/Warren (mean = 280)
- > Ballydehob Estuary (mean = 11)
- > Ballyhea Gravel Pit
- > Ballyhonock Lough (mean = 50)
- > Ballymacoda (mean = 1,427)
- > Bandon Estuary (mean = 33)
- > Bandon River (mean = 34)
- > Bantry Bay (mean = 28)
- > Barley Cove Bay (mean = 34)
- > Bear Haven (mean = 15)
- > Charleville Lagoons (mean = 45)
- > Clonakilty Bay (mean = 329)
- > Cork Harbour (mean = 168)
- > Courtmacsherry Bay, Broadstown Bay & Dunworley (mean = 793)
- > Croagh Bay (mean = 44)

- > Crookhaven (mean = 9)
- > Ilen Estuary (mean = 12)
- > Inishcarra Reservoirs (mean = 394)
- > Kilcolman Marsh (mean = 4)
- > Lissagriffin Lake (mean = 426)
- > Lough Aderry (mean = 294)
- > Madame Lake (Bateman's Lough) (mean = 55)
- > Ringabella Creek (mean = 52)
- > Rosscarbery (mean = 95)
- > Stick Estuary (Oysterhaven) (mean = 59)

Based on the above, the mean wintering population from Waterford I-WeBS sites is 1,503 and Cork I-WeBS is 6,295.

Therefore, taking a precautionary approach, a regularly occurring population of 15 birds (1% of Waterford county population) is considered of County Importance in the context of the development site.

This species was recorded in excess of 40 occasions during surveys at the proposed development site. Flocks regularly exceeded the 15-bird county importance threshold. Observations occurred predominately during the non-breeding season, particularly during autumn and spring months.

The population recorded at the proposed development site was therefore assigned **County Importance** on the basis of a resident/regularly occurring wintering population assessed to be important to the county level.

8.5.9 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.

8.5.10 Sparrowhawk

Sparrowhawk is not listed on Annex I of the Birds Directive. The species is Amber listed in Ireland (BoCCI) during the breeding season only. 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.

8.5.11 Kestrel

Kestrel is not listed on Annex I of the Birds Directive. The species is Amber listed in Ireland (BoCCI) during the breeding season only. 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.

8.5.12 Long-eared Owl

The species is Green listed in Ireland (BoCCI). There was one incidental observation of long-eared owl during a breeding woodcock survey on the 23rd of May 2017 at Site 6, more than 3km from the proposed development site. Breeding was confirmed at this location. There is no evidence to suggest that the proposed development site is utilised by this species. On the basis of no regularly occurring population, the proposed development site is not of significance to long-eared owl.

8.5.13 Common Snipe

Common snipe are amber listed in Ireland during both the breeding and winter seasons (BoCCI). The population recorded within the proposed development site was assigned **Local Importance (Higher Value)** on the basis of a regularly occurring population assessed to be important at the local level.

8.5.14 Passerines (Red Listed)

Meadow pipit are Red listed in Ireland during the breeding season. Meadow pipit was recorded regularly during surveys. However, this is an abundant species in Ireland, populations recorded were deemed to be of no greater than **Local Importance (Lower Value)**.

8.6 Identification of Key Ornithological Receptors

Table 8-11 Avifaunal Receptor Evaluation and Selection Criteria Rational

Species	Conservation Status	NRA Evaluation (NRA, 2009)	Rational for inclusion/exclusion as KOR	KOR Yes/No
Golden Plover	Annex I, EU Birds Directive; SCI of Blackwater Estuary SPA (004028); BoCCI Red List & Irish Wildlife Act.	<u>Wintering</u> Flocks of County Importance recorded	<p>Taking a precautionary, the potential for habitat loss, while minimal, could not be excluded. An assessment of potential direct habitat loss is therefore deemed to be required and has been undertaken accordingly.</p> <p>The species was recorded within the site boundary. An assessment of potential displacement effect is therefore deemed to be required and has been undertaken accordingly.</p> <p>This species was recorded flying within the potential collision risk zone during vantage point surveys. A collision risk assessment is therefore deemed to be required and has been undertaken accordingly.</p>	Yes
Whooper Swan	Annex I, EU Birds Directive; SCI of Blackwater Callows SPA (004094); BoCCI Amber List & Irish Wildlife Act.	<u>Wintering</u> No population of ecological significance recorded	<p>Numbers of ecological significance were not recorded on or near the site during the extensive suite of surveys undertaken. There is no potential for significant direct habitat loss or displacement.</p> <p>No pathways for significant direct or indirect effects were identified.</p> <p>In two years of vantage point surveys, this species was recorded on a single occasion flying for 90 seconds across the site. This level of flight activity is considered to result in negligible collision risk, as per Appendix 8-6.</p>	No
Hen Harrier	Annex I, EU Birds Directive; BoCCI	<u>Wintering</u>	Suitable foraging habitat was recorded within and surrounding the development site. The potential for habitat loss, while minimal, cannot be	Yes

Species	Conservation Status	NRA Evaluation (NRA, 2009)	Rational for inclusion/exclusion as KOR	KOR Yes/No
	Amber List & Irish Wildlife Act.	Numbers of County Importance recorded	<p>excluded. An assessment of potential direct habitat loss is therefore deemed to be required and has been undertaken accordingly.</p> <p>Hen Harrier were recorded onsite and/or within 500m of the proposed development area. An assessment of potential displacement effects is therefore deemed to be required and has been undertaken accordingly.</p> <p>This species was recorded flying within the potential collision risk zone during vantage point surveys. A collision risk assessment is therefore deemed to be required and has been undertaken accordingly.</p>	
		<p><u>Breeding</u></p> <p>No population of ecological significance recorded</p>	<p>No evidence of breeding activity was recorded. There is no evidence to suggest that the development site is of significance to this species during the breeding season.</p> <p>There is no potential for significant direct habitat loss or displacement.</p> <p>No pathways for significant direct or indirect effects were identified.</p>	No
Merlin	Annex I, EU Birds Directive; BoCCI Amber List & Irish Wildlife Act.	<p><u>Wintering</u></p> <p>No population of ecological significance recorded</p>	<p>There is no evidence to suggest that the development site is of significance to this species. There is no potential for significant direct habitat loss or displacement.</p> <p>This species was not recorded flying within the potential collision risk zone during vantage point surveys. Collision risk is unlikely to be significant for this species.</p> <p>No pathways for significant direct or indirect effects were identified.</p>	No

Species	Conservation Status	NRA Evaluation (NRA, 2009)	Rational for inclusion/exclusion as KOR	KOR Yes/No
Peregrine	Annex I, EU Birds Directive; BoCCI Green List & Irish Wildlife Act.	<u>Wintering</u> Local Importance (Higher Value)	<p>This species was observed on five occasions within 500m of the proposed turbine layout. The potential for habitat loss, while minimal, could not be excluded. An assessment of potential direct habitat loss is therefore deemed to be required and has been undertaken accordingly.</p> <p>The species was recorded within the site boundary. An assessment of potential displacement effect is therefore deemed to be required and has been undertaken accordingly.</p> <p>This species was recorded flying within the potential collision risk zone during vantage point surveys. A collision risk assessment is therefore deemed to be required and has been undertaken accordingly.</p>	Yes
Black-headed Gull	BoCCI Red Listed (Breeding Populations); SCI of Ballymacoda Bay SPA (004094); Irish Wildlife Act.	<u>Wintering</u> No population of ecological significance recorded	<p>Only two observations of this species during the extensive suite of surveys undertaken, both of which occurred during the 2016 winter months.</p> <p>There is no evidence to suggest that the proposed development site is of significance to this species.</p> <p>No pathways for significant direct or indirect effects were identified.</p> <p>In two years of vantage point surveys, this species was recorded on two occasions flying across the proposed development site. This level of flight activity is considered to result in negligible collision risk. A collision risk assessment is therefore not required.</p>	No
Woodcock	BoCCI Red Listed (Breeding Populations) & Irish Wildlife Act	<u>Breeding</u>	<p>This species was assigned confirmed breeding status within the proposed development site during both the 2017 and 2018 breeding season. An</p>	Yes

Species	Conservation Status	NRA Evaluation (NRA, 2009)	Rational for inclusion/exclusion as KOR	KOR Yes/No
		Local Importance (Higher Value)	<p>assessment of potential direct habitat loss is therefore deemed to be required and has been undertaken accordingly.</p> <p>The species was recorded within the proposed development site. An assessment of potential displacement effect is therefore deemed to be required and has been undertaken accordingly.</p> <p>No (breeding season) flights were recorded within potential collision height during VP surveys. There is therefore no evidence to suggest collision risk is likely to be significant for this species.</p>	
Lesser Black-backed Gull	SCI of Ballymacoda Bay SPA (004094); BoCCI Amber List (Breeding Populations).	<u>All Seasons</u> Flocks of County Importance recorded	<p>The potential for habitat loss, while minimal, cannot be excluded. An assessment of direct habitat loss is therefore deemed to be required and has been undertaken accordingly.</p> <p>The species was regularly recorded within the site boundary. An assessment of potential displacement effect is therefore deemed to be required and has been undertaken accordingly.</p> <p>This species was regularly recorded flying within the potential collision risk zone during vantage point surveys. A collision risk assessment is therefore deemed to be required and has been undertaken accordingly.</p>	Yes
Buzzard	BoCCI Green List & Irish Wildlife Act	<u>All Seasons</u> Local Importance (Higher Value)	<p>The potential for habitat loss, while minimal, cannot be excluded. An assessment of potential direct habitat loss is therefore deemed to be required and has been undertaken accordingly.</p> <p>The species was recorded within the site boundary. An assessment of potential displacement effect is therefore deemed to be required and has been undertaken accordingly.</p>	Yes

Species	Conservation Status	NRA Evaluation (NRA, 2009)	Rational for inclusion/exclusion as KOR	KOR Yes/No
			This species was recorded flying over the site within the potential collision risk zone. A collision risk assessment is therefore deemed to be required and has been undertaken accordingly	
Sparrowhawk	BoCCI Amber List & Irish Wildlife Act.	<u>All Seasons</u> Local Importance (Higher Value)	<p>The potential for habitat loss, while minimal, cannot be excluded. An assessment of potential direct habitat loss is therefore deemed to be required and has been undertaken accordingly</p> <p>The species was recorded within the site boundary. An assessment of potential displacement effect is therefore deemed to be required and has been undertaken accordingly.</p> <p>This species was recorded flying over the site within the potential collision risk zone. A collision risk assessment is therefore deemed to be required and has been undertaken accordingly.</p>	Yes
Kestrel	BoCCI Amber List & Irish Wildlife Act.	<u>All Seasons</u> Local Importance (Higher Value)	<p>The potential for habitat loss, while minimal, cannot be excluded. An assessment of potential direct habitat loss is therefore deemed to be required and has been undertaken accordingly.</p> <p>The species was recorded within the site boundary. An assessment of potential displacement effect is therefore deemed to be required and has been undertaken accordingly</p> <p>This species was recorded flying over the site within the potential collision risk zone. A collision risk assessment is therefore deemed to be required and has been undertaken accordingly</p>	Yes

Species	Conservation Status	NRA Evaluation (NRA, 2009)	Rational for inclusion/exclusion as KOR	KOR Yes/No
Long-eared Owl	BoCCI Green List & Irish Wildlife Act.	<u>Breeding</u> Local Importance (Higher Value)	<p>While breeding activity was recorded, it was more than 3km from the proposed development site. There is no evidence to suggest that the development site is of significant ecological value to this species.</p> <p>The species was not recorded within the site boundary. There is no potential for significant direct habitat loss or displacement.</p> <p>No pathways for significant direct or indirect effects were identified.</p> <p>This species was not recorded during VP surveys.</p>	No
Common Snipe	BoCCI Amber List & Irish Wildlife Act.	<u>All Seasons</u> Local Importance (Higher Value)	<p>The potential for habitat loss, while minimal, cannot be excluded. An assessment of potential direct habitat loss is therefore deemed to be required and has been undertaken accordingly</p> <p>The species was recorded within the wind farm site. An assessment of potential displacement effect is therefore deemed to be required and has been undertaken accordingly</p> <p>This species was recorded flying over the site at potential collision height. A collision risk assessment is therefore deemed to be required and has been undertaken accordingly</p>	Yes
Passerines (Red listed species)	BoCCI Red List (Breeding Populations & Irish Wildlife Act.	<u>All Seasons</u> Local Importance (Lower Value)	<p>Significant effects are not anticipated given the nature of the habitats within the development footprint and the assemblage of bird species recorded. As per SNH guidance, it is generally considered that passerine species are not significantly impacted by wind farms.</p>	No

8.7 KOR Sensitivity Determination

Criteria developed by Percival (2003) is presented in Table 8-3 (Section 8.2.5.3) for assessing bird sensitivity within the study area. Species classed as Very High, High, Medium and Low sensitivity were recorded during surveys. For example, golden plover is a cited qualifying interest of Blackwater Estuary SPA (004028) for wintering populations. Flocks of County Importance were regularly observed flying over the proposed development site during winter months, while a flock of County Importance was also observed roosting on site in December 2016. This KOR species has been classified as **Very High** sensitivity on a precautionary basis due to the proximity of the proposed development site to the SPA for which golden plover is classified as an SCI. An explanation for the classification of each of species is provided below.

Very High Sensitivity KORs include:

- › Golden Plover (cited qualifying interest of Blackwater Estuary SPA)

High Sensitivity KORs include:

- › Hen Harrier (Ecologically sensitive species)
- › Lesser Black-backed Gull (Non-SCI species that contributes to the integrity of the Blackwater Estuary SPA)

Medium Sensitivity KORs include:

- › Peregrine (Annex I; EU Birds Directive)
- › Woodcock (Red listed species with regard to breeding populations)

The remaining KORs identified in the study area were classified as **Low Sensitivity**:

- › Buzzard
- › Sparrowhawk
- › Kestrel
- › Common Snipe

8.8 Likely and Significant Effects

This section of the assessment of effects is structured as follows:

- › Assessment of 'Do nothing' Effect.
- › Assessment of effects in relation to sites designated for nature conservation.
- › Assessment of effects in relation to Key Ornithological Receptors
- › Summary of potential effects associated with proposed infrastructure

All elements of the Proposed Development have been considered in assessing effects on ecological receptors, including:

- › Site preparation works, upgrades to existing roads and tracks, construction of new site roads.
- › Drainage works.
- › Machinery access to the turbine locations.
- › Excavation of turbine base foundations and borrow pits.
- › Erection of turbines.
- › Laying of grid connection cables.

- Construction of other site infrastructure including substations and control buildings, met mast, temporary construction compound and along the turbine delivery route.

8.8.1 Do-Nothing Effect

If the proposed Project was not developed, the site will continue to function as it does at present, with no changes made to the current land-use of commercial forestry and agriculture. The avian communities on the site would likely remain similar to its current state as activity levels and land use would not change significantly. In the specific case of forestry within the proposed development site, its value and suitability for local avian receptors will vary with the management of the forestry. Forestry plantations in their initial years prior to canopy closure have the potential to support certain species (e.g., hen harrier), and as the forestry matures it is utilised by other species that favour woodland conditions. Therefore, as forestry matures/ is felled there is potential for ongoing loss/creation of supporting habitat.

8.8.2 Effects on Designated Areas

The Proposed Development is not located within the boundaries of any European or Nationally designated sites important for nature conservation (see Figure 8.8). There will be no direct effects on any designated site as a result of the construction, operation and decommissioning of the proposed development site.

There are no pNHAs or NHAs considered as KORs in their own right for the following reasons:

- Distance/buffer from the proposed development site; and/or
- Nature of the conservation sites (e.g. terrestrial nature of habitats).

In relation to European sites, an AA Screening Assessment and Natura Impact Statement have been prepared to provide the competent authorities with the information necessary to complete an Appropriate Assessment for the proposed development in compliance with Article 6(3) of the Habitats Directive.

As per EPA draft Guidance 2017, “a biodiversity section of an ELAR, should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement” but should “incorporate their key findings as available and appropriate”. This section provides a summary of the key assessment findings with regard to Special Protection Areas. A summary of key assessment findings with regard to Special Areas of Conservation is provided in Chapter 7.

The Screening for Appropriate Assessment concluded as follows:

“It cannot be excluded beyond reasonable scientific doubt, in view of best scientific knowledge on the basis of objective information and in light of the conservation objectives of the relevant European sites, that the proposed development, individually or in combination with other plans and projects, would have a significant effect on the following European Sites:

- Blackwater River (Cork/Waterford) SAC,
- Blackwater Estuary SPA, and
- Ballymacoda Bay SPA.”

As a result, an Appropriate Assessment of the proposed development is required, and a Natura Impact Statement has been prepared in respect of the proposed development. The Natura Impact Assessment concludes as follows:

“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.”

8.8.3 Effects on Key Ornithological Receptors during Construction and Operation

8.8.3.1 Golden Plover (*Wintering*)

Table 8-12 Impact Characterisation for Golden Plover based on Percival (2003) & EPA (2017).

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
Direct Habitat Loss	<p>No evidence of roosting was recorded onsite. While there are areas of suitable foraging habitat within the proposed development site (i.e. arable grassland), the site is largely dominated by conifer plantation. The majority therefore of the land that will be lost to the development footprint is of limited ecological value to golden plover.</p> <p>There is an abundance of more favourable foraging habitat (e.g. agricultural grassland) in the surrounding area that will remain post construction.</p> <p>Construction activity associated with the development has the potential to result in the runoff of silt, nutrients and other pollutants. This gives rise to the potential for an indirect impact on water quality and supporting habitat of waterbirds for the Blackwater Estuary SPA (004028). The significance of any potential impacts is limited by the design of the scheme, which avoids all major infrastructure within 75m of any watercourse.</p> <p>Significant effects with regard to direct habitat loss are not predicted.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of <i>Very High</i> sensitivity species and <i>Negligible</i> Impact corresponds to a Low effect significance</p>	Long-term Slight Negative Effect
Displacement	<p>There is potential for construction activities to result in disturbance of foraging golden plover however this is unlikely to significantly impact this species given</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p>	Short-term Slight Negative Effect

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	<p>the majority of the impacted land is of limited ecological value to golden plover, i.e., commercial forestry. Furthermore, the wider surroundings contain extensive areas of optimal forging habitat (e.g., agricultural grassland) to render any potential impact inconsequential.</p> <p>No evidence of roosting activity occurred within proximity of the development site. A flock of county importance was observed roosting within Site 1, which is more than one kilometre away from the proposed development site. Significant disturbance displacement impacts are not predicted, given the separation distance involved.</p> <p>There is no evidence to suggest that the proposed development site lies on a migratory/ regular commuting route for the species, therefore a barrier effect is not anticipated.</p> <p>Significant displacement effects are not predicted.</p>	<p>The cross tabulation of <i>Very High</i> sensitivity species and <i>Negligible</i> Impact corresponds to a Low effect significance</p>	
Operational Phase			
Direct Habitat Loss	Direct or indirect effects are not anticipated	No Effect	No Effect
Displacement	<p>A review of 29 other studies suggests Golden Plover will approach wind turbines to an average distance of 175 m in non-breeding season (Hötcker et al. 2006). It is noted that significant displacement impacts are not predicted, given the majority of the proposed turbines are sited in commercial forestry. A habitat that is not favoured by this species.</p> <p>Additionally, there are extensive areas of suitable habitat in the wider area, outside any potential displacement buffer, should any potential displacement effect occur.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of <i>Very High</i> sensitivity species and <i>Negligible</i> Impact corresponds to a Low effect significance</p>	Long-term Slight Negative Effect

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	Significant displacement effects are not predicted.		
Collision	<p>Collision risk for waders is generally deemed to be low, due to a relatively low cursory flight path, coupled with high flight manoeuvrability (McGuinness et.al 2015). A review of pan-European collision assessments revealed much lower golden plover collision records than other species, though this was not controlled for survey effort or corpse recovery rates (Hötker et al. 2006).</p> <p>The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk model has been undertaken and full details are provided in Appendix 8-6. The dominant habitat within the proposed development is conifer plantation. This habitat is not favoured by golden plover. The majority of the golden plover observed were recorded in foraging habitat (e.g. agricultural grassland offsite), as shown in Figure 8.1.2.1. This flight activity is not random but rather strongly associated with the foraging habitat available in the agricultural grassland.</p> <p>Those flights recorded in excess of 500m from turbines and associated with grassland have been excluded from the analysis. Therefore, the collision risk assessment only utilises flight observations recorded within, or partially within, 500m of the proposed turbine layout.</p> <p>County Context The collision risk has been calculated at a rate of 3.29 collisions per year. Annual mortality of adult golden plover has been calculated at 27% per annum (Sandercock, 2003). If 3.29 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., 4,908) by 0.24%. The predicted collision risk is considered insignificant (>1%) in the context of county populations.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of <i>Very High</i> sensitivity species and <i>Negligible</i> Impact corresponds to a Low effect significance</p>	Long-term Slight Negative Effect

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	<p>Local Context</p> <p>If for the purposes of the assessment, it is assumed that all observations of golden plover within the potential collision risk zone were associated with birds from the (smaller) local wintering population (i.e. within 12km of the proposed development site) the significance of the impact would continue to be negligible: If 3.29 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. 1,860) by 0.65%.</p> <p>The predicted collision risk is deemed <i>negligible (<1%)</i> in the context of the county and for the local population.</p>		

8.8.3.2 Hen Harrier (Wintering)

Table 8-13 Impact Characterisation for Hen Harrier based on Percival (2003) & EPA (2017).

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
Direct Habitat Loss	<p>Only five flights of this species were recorded within the proposed development site during the two years of surveying undertaken, the majority of observations of this species consisted of individuals commuting or foraging.</p> <p>No winter roosting sites were recorded within the proposed development site between September 2016 and August 2018.</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

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	Significant effects are not anticipated given the very low levels of activity recorded.		
Displacement	<p>No roosting hen harrier were recorded within the proposed development area. The proposed development area was only used infrequently for foraging and commuting. Whilst a bird was observed roosting in the same location on two occasions, this was over 1.4km from the proposed development site and no potential for displacement is predicted.</p> <p>Significant effects are not anticipated, given how infrequently the site was visited and with the availability of large areas of similar habitat in the wider surroundings.</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 <i>Low</i> effect significance</p>	Short-term Slight Negative Effect
Operational Phase			
Direct Habitat Loss	Direct or indirect effects are not anticipated	No Effect	No Effect
Displacement	<p>Hen harrier were rarely observed utilising the habitats within the wind farm site for foraging. As previously discussed, the separation distance (1.4km) between the site where roosting was recorded, and the proposed development site is too great for disturbance displacement to occur.</p> <p>In total, there were only five observations of hen harrier within the proposed development site throughout the two-years surveyed. Significant displacement effects are not predicted given how infrequently the proposed development site was visited by this species.</p> <p>In addition, the habitats found on site are not considered rare locally. Significant displacement impacts are not 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 <i>Low</i> effect significance</p>	Long-term Slight Negative Effect

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Collision	<p>The species was recorded flying with the potential collision risk zone during VP surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 8-6.</p> <p>The collision risk has been calculated at a rate of 0.007 collisions per year, or one bird every 134 years. The predicted collision risk is insignificant.</p>	<p>The magnitude of the effect is assessed as Negligible.</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>	Long-term Imperceptible Negative Effect

8.8.3.3 Lesser Black-backed Gull (Wintering)

Table 8-14 Impact Characterisation for Lesser Black-backed Gull based on Percival (2003) & EPA (2017).

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
Direct Habitat Loss	<p>The species was frequently recorded during vantage point surveys commuting across the proposed development site. The wider landscape contains large areas of agricultural grassland it is likely that birds crossing the site were moving between foraging sites. The majority of proposed development infrastructure will be sited in commercial forestry, a habitat of limited ecological value to this species.</p> <p>Construction activity associated with the development has the potential to result in the runoff of silt, nutrients and other pollutants. This gives rise to the potential for an indirect impact on water quality and supporting habitat of waterbirds for the Blackwater Estuary. The significance of any potential</p>	<p>The magnitude of the effect is assessed as Negligible.</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>	Long-term Slight Negative Effect

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	<p>impacts is limited by the design of the scheme, which avoids all major infrastructure within 75m of any watercourse.</p> <p>Significant effects with regard to direct habitat loss are not anticipated.</p>		
Displacement	<p>As previously discussed, the vast majority of observations of this species involved commuting flights across the site. The commercial forestry where most of the proposed infrastructure will be located is not of ecological value to this species. There is however some foraging habitat of the proposed development site (e.g. agricultural grassland).</p> <p>On a precautionary basis it is assumed that some temporary displacement may occur around the margins of the site. However, given the extent of suitable habitat in the wider area; 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 a <i>High</i> sensitivity species and <i>Low</i> Impact corresponds to a <i>Low</i> effect significance</p>	Short-term Slight Negative Effect
Operational Phase			
Direct Habitat Loss	Direct or indirect effects are not anticipated	No Effect	No Effect
Displacement	<p>This species was observed in flight within 500m of the proposed turbine layout on 34 occasions. There are small areas of suitable foraging habitat (i.e., grassland) within the proposed development site, however, the majority of onsite areas are largely dominated by conifer plantation, which is of no ecological value to this species.</p> <p>Extensive areas of suitable foraging habitat will remain post construction and there is an abundance of suitable habitat in the surrounding areas. 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 a <i>High</i> sensitivity species and <i>Low</i> Impact corresponds to a <i>Low</i> effect significance</p>	Long-term Slight Negative Effect

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Collision	<p>The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk has been undertaken and full details are provided in Appendix 8-6.</p> <p>The collision risk has been calculated at a rate of 5.4 collisions per year. Annual mortality of adult lesser black-backed gull has been calculated at approximately 10% per annum (Wanless et al, 1996). If 5.4 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., 1,503) by 3.59%. The predicted collision risk is considered low (1-5%) in the context of county populations.</p> <p>The predicted collision risk is deemed Low (1-5%) in the context of the county population, 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>High</i> sensitivity species and <i>Low</i> Impact corresponds to a Low effect significance</p>	Long-term Slight Negative Effect

8.8.3.4 Peregrine (Wintering)

Table 8-15 Impact Characterisation for Peregrine based on Percival (2003) & EPA (2017).

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
Direct Habitat Loss	<p>There were five observations of this species within 500m of the proposed turbine layout throughout the entire survey period: September 2016 to September 2018. Significant effects are not predicted particularly given the low levels of activity recorded. In addition, extensive areas of suitable foraging</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></p>	Long-term Slight Negative Effect

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	<p>habitat will remain post construction given the internal infrastructure is only a small proportion of the total development area.</p> <p>Significant effects are not predicted.</p>	Impact corresponds to a Low effect significance	
Displacement	<p>There were five observations of this species within 500m of the proposed turbine layout throughout the entire survey period: September 2016 to September 2018. Significant displacement effects are not anticipated, given how infrequently this species was encountered and owing to the abundance of similar suitable foraging habitat in the wider surroundings of the proposed development site.</p> <p>Significant displacement effects are not predicted.</p>	<p>The magnitude of the effect is assessed as Low.</p> <p>The cross tabulation of Medium sensitivity species and Low Impact corresponds to a Low effect significance</p>	Short-term Slight Negative Effect
Operational Phase			
Direct Habitat Loss	Direct or indirect effects are not anticipated	No Effect	No Effect
Displacement	<p>In total, this species was recorded on five occasions within 500m of the proposed turbine layout between September 2016 to September 2018. The availability of alternative suitable habitat in the surroundings and the overall infrequency of occurrence of the species at the site, limit the potential for significant disturbance displacement effects.</p> <p>Significant displacement effects are not predicted.</p>	<p>The magnitude of the effect is assessed as Low.</p> <p>The cross tabulation of Medium sensitivity species and Low Impact corresponds to a Low effect significance</p>	Long-term Slight Negative Effect
Collision	Peregrine were recorded foraging over the development site during VP surveys, predominantly during winter months. A “Random” collision risk model has been undertaken and full details are provided in Appendix 8-6.	The magnitude of the effect is assessed as Negligible .	Long-term Imperceptible Negative Effect

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	The collision risk has been calculated at a rate of 0.023 collisions per year. This equates to 0.69 birds during the 30-year lifespan of the windfarm. The predicted collision risk is insignificant.	The cross tabulation of <i>Medium</i> sensitivity species and <i>Negligible</i> Impact corresponds to a Very Low effect significance	

8.8.3.5 Woodcock (Breeding)

Table 8-16 Impact Characterisation for Woodcock based on Percival (2003) & EPA (2017).

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
Direct Habitat Loss	<p>This species was recorded roding within the proposed development site during both the 2017 and 2018 breeding seasons, indicating breeding in the afforested sections of the site. The majority of the development infrastructure will be sited in forestry. Therefore, some breeding habitat will be lost to the development footprint. There is therefore potential for a measurable reduction in breeding density of woodcock at the local scale.</p> <p>However, extensive areas of suitable foraging and nesting habitat will remain post construction.</p> <p>Considering the above, no significant habitat loss is 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>Medium</i> sensitivity species and <i>Medium</i> Impact corresponds to a Low effect significance</p>	Long-term Slight Negative Effect
Displacement	Roding (displaying) woodcock were recorded within the proposed development site during both the 2017 and 2018 breeding season surveys.	The magnitude of the effect is assessed as <i>Medium</i> .	Short-term Slight Negative Effect

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	<p>These observations indicate that woodcock bred within the proposed development site. There is therefore potential for a measurable reduction in breeding density of woodcock at the local scale.</p> <p>However, the proposed development site does not contain habitats that are of particularly high quality or unique to the local area. Therefore, were displacement to occur it would not result in the loss of a scarce resource for the local woodcock population.</p> <p>Significant displacement effects are not predicted to occur at the county, national and international scale.</p>	<p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Medium</i> Impact corresponds to a Low effect significance</p>	
Operational Phase			
Direct Habitat Loss	Direct or indirect effects are not anticipated	No Effect	No Effect
Displacement	<p>Woodcock were confirmed to be breeding within the proposed development site during both the 2017 and 2018 breeding season surveys. There is therefore potential for a measurable reduction in breeding density of woodcock at the local scale. However, the proposed development site does not contain habitats that are unique to the local area nor are commercial forestry plantation of particularly high-quality breeding habitat for this species.</p> <p>Significant effects are not predicted to occur at the county, national and international scale.</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
Collision	No flights were recorded at the potential collision height during vantage point surveys. There is therefore no evidence to suggest collision risk is likely to be significant for this species.	No Effect	No Effect

8.8.3.6 Buzzard (All Seasons)

Table 8-17 Impact Characterisation for Buzzard based on Percival (2003) & EPA (2017).

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
Direct Habitat Loss	<p>This species was frequently encountered at the proposed development site. However, the majority of the observations likely relate to one or two resident pairs. No more than three birds were recorded at a time. The felling of forestry may temporarily reduce the distribution and availability of trees of sufficient stature to provide potential nest sites. However, significant areas of suitable nesting and foraging habitat will continue to exist within the development site.</p> <p>Substantial areas of undisturbed suitable nesting and foraging habitat will remain beyond the development footprint. Significant effects are not anticipated 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>Low</i> Impact corresponds to a Very Low effect significance</p>	Long-term Slight Negative Effect
Displacement	<p>On the 11th of July 2018 a pair of juvenile buzzards were observed flying around a probable nest site approximately 1km to the south of Site 3. Construction in forestry areas could potentially cause displacement of breeding Buzzard if nesting occurs adjacent to the development infrastructure. However, given the availability of potential alternative nesting sites in the wider area, no significant effects are anticipated.</p> <p>Significant displacement effects are not anticipated 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>Low</i> Impact corresponds to a Very Low effect significance</p>	Short-term Slight Negative Effect
Operational Phase			
Direct Habitat Loss	Direct or indirect effects are not anticipated	No Effect	No Effect

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Displacement	<p>On the 11th of July 2018, a pair of juvenile buzzards were observed flying around a probable nest site one kilometre to the south of Site 3. Pearce Higgins et al. (2009) describes buzzard to show significant turbine avoidance extending to at least 500m. Despite this, significant effects are not anticipated, given that extensive areas of suitable nesting and foraging habitat exist and will remain both on site and in the wider area (i.e., outside the 500m buffer zone). Particularly as onsite habitats are not considered unique to the proposed development area.</p> <p>Significant displacement effects are not anticipated 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>Low</i> Impact corresponds to a Very Low effect significance</p>	Long-term Slight Negative Effect
Collision	<p>The species was recorded flying with the potential collision risk zone during VP surveys. A “Random” collision risk has been undertaken and full details are provided in Appendix 8-6.</p> <p>The collision risk has been calculated at a ratio of 1.05 collisions per year. The predicted collision risk is insignificant in the context of the county, national and international population.</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

8.8.3.7 Sparrowhawk (All Seasons)

Table 8-18 Impact Characterisation for Sparrowhawk based on Percival (2003) & EPA (2017).

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
Direct Habitat Loss	<p>There were two breeding territories identified. Only one of these was located within the proposed development site. The felling of forestry may temporarily reduce the distribution and availability of trees of sufficient stature to provide potential nest sites. However, significant areas of suitable nesting habitat will continue to exist within the proposed development site.</p> <p>Substantial areas of undisturbed suitable nesting and foraging habitat will remain beyond the development footprint. Significant effects are not anticipated 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>Low</i> Impact corresponds to a Very Low effect significance</p>	Long-term Slight Negative Effect
Displacement	<p>As previously discussed, one sparrowhawk territory was identified within the proposed development site. Construction in forestry areas could potentially cause displacement of breeding Sparrowhawk if nesting adjacent to construction works. However, given the availability of potential alternative nesting sites in the wider area no significant effects are anticipated.</p> <p>Significant displacement effects are not anticipated 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>Low</i> Impact corresponds to a Very Low effect significance</p>	Short-term Slight Negative Effect
Operational Phase			
Direct Habitat Loss	Direct or indirect effects are not anticipated	No Effect	No Effect

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Displacement	<p>As previously discussed, one sparrowhawk territory was identified within the proposed development site. The proposed development site does not contain habitats that are unique to the local area. Therefore, were displacement to occur it would not result in the loss of a scarce resource for the local sparrowhawk population.</p> <p>Significant displacement effects are not anticipated 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>Low</i> Impact corresponds to a Very Low effect significance</p>	Long-term Slight Negative Effect
Collision	<p>The species was recorded flying with the potential collision risk zone during VP surveys. A “Random” collision risk has been undertaken and full details are provided in Appendix 8-6.</p> <p>The collision risk has been calculated at a ratio of 0.038 collisions per year, equating to one bird every 26.3 years. The predicted collision risk is insignificant.</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 Slight Negative Effect

8.8.3.8 Kestrel (All Seasons)

Table 8-19 Impact Characterisation for Kestrel based on Percival (2003) & EPA (2017).

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
Direct Habitat Loss	<p>The Proposed Development site is dominated by conifer plantation, surrounded by areas of improved agricultural grassland. Direct loss of breeding and foraging habitat will be minimal.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p>	Long-term Slight Negative Effect

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	<p>There will be some loss of nesting habitat and minimal loss of potential foraging area.</p> <p>Substantial areas of undisturbed suitable breeding and foraging habitat will remain, both within the development site and the wider area. Significant effects are not predicted.</p>	<p>The cross tabulation of <i>Low</i> sensitivity species and <i>Low</i> Impact corresponds to a Very Low effect significance</p>	
Displacement	<p>Disturbance from construction activities could result in the partial loss of kestrel breeding habitat. However, significant areas of suitable nesting and foraging habitat will continue to remain post construction.</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>Low</i> sensitivity species and <i>Low</i> Impact corresponds to a Very Low effect significance</p>	Short-term Slight Negative Effect
Operational Phase			
Direct Habitat Loss	Direct or indirect effects are not anticipated	No Effect	No Effect
Displacement	<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). Significant effects are not anticipated at the county, national or international scale, given that extensive areas of suitable foraging habitat exist and will remain in the wider area. Onsite habitats are not considered unique to the proposed development area.</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>Low</i> sensitivity species and <i>Low</i> Impact corresponds to a Very Low effect significance</p>	Long-term Slight Negative Effect

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Collision	<p>The species was recorded flying with the potential collision risk zone during VP surveys. A “Random” collision risk has been undertaken and full details are provided in Appendix 8-6.</p> <p>The collision risk has been calculated at a ratio of 0.55 collisions per year, equating to one bird every 1.8 years. The predicted collision risk is insignificant.</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

8.8.3.9 Common Snipe (All Seasons)

Table 8-20 Impact Characterisation for Common Snipe (All Seasons) based on Percival (2003) & EPA (2017).

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Construction Phase			
Direct Habitat Loss	<p>Snipe favour open habitats for foraging and breeding. It is likely that there will be a partial loss of snipe breeding and wintering habitat within the proposed development site as a result of construction works (e.g. including resulting from the new site drainage). Habitat loss will be restricted to the small areas of open habitat onsite. It is noted that the majority of proposed development infrastructure will be sited in commercial forestry, a habitat of very limited ecological value to this species.</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 a <i>Low</i> Sensitivity species and <i>Low</i> Impact corresponds to a Very Low effect significance.</p>	Long-term Slight Negative Effect
Displacement & Barrier Effect	<p>Disturbance from construction activities could result in the loss of snipe breeding and wintering habitat locally. Pearce Higgins et. al (2009), found a</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p>	Short-term Slight Negative Effect

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	<p>50% reduction in breeding density of snipe within 500m of turbines. The majority of the open habitat onsite is located within 500m of turbines. There is therefore potential for a measurable reduction in breeding density of snipe within the development and its immediate surroundings. However, habitat loss will be restricted to the small areas of open habitat onsite and its immediate surroundings. It is noted that the majority of proposed development infrastructure will be sited in commercial forestry, a habitat of very limited ecological value to this species.</p> <p>Should any potential displacement effect occur, there are extensive areas of suitable habitat in the wider area, to render this potential impact inconsequential. Significant impacts are not predicted.</p>	<p>The cross tabulation of a <i>Low</i> Sensitivity species and <i>Low</i> Impact corresponds to a Very Low effect significance.</p>	
Operational Phase			
Direct Habitat Loss	Direct or indirect effects are not anticipated at any geographical scale.	No Effect	No Effect
Displacement & Barrier Effect	<p>As previously discussed, Pearce Higgins et. al (2009), found a 50% reduction in breeding density of snipe within 500m of turbines. A 500m buffer around the turbines would cover the majority of the open habitat onsite, therefore it is likely that there will be a measurable reduction in breeding density of snipe within the development and its immediate surroundings.</p> <p>However, habitat loss will be restricted to the small areas of open habitat onsite and its immediate surroundings. It is noted that the majority of the proposed development site is located in commercial forestry. A habitat not favoured by this species.</p> <p>Furthermore, there are large areas of open habitat in the wider surroundings to render any potential displacement impact insignificant.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of a <i>Low</i> Sensitivity species and <i>Low</i> Impact corresponds to a Very Low effect significance.</p>	Long-term Slight Negative Effect

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
	Significant displacement during the operational phase is not anticipated.		
Collision	<p>The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 8-6.</p> <p>The collision risk has been calculated at a ratio of 0.36 collisions per year or one bird every 2.8 years. The predicted collision risk is insignificant.</p>	<p>The magnitude of the effect is assessed as <i>Low</i>.</p> <p>The cross tabulation of a <i>Low</i> Sensitivity species and <i>Low</i> Impact corresponds to a Very Low effect significance.</p>	Long-term Slight Negative Effect

8.8.4 Effects on Key Ornithological Receptors during Decommissioning

8.8.4.1 All Species

Table 8-21 Impact Characterisation for Ecological Receptors based on Percival (2003) & EPA (2017).

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
Decommissioning Phase			
Direct Habitat Loss	Direct or indirect effects are not anticipated	No Effect	No Effect
Displacement	As above for construction phase for each species listed as a KOR.	As above for construction phase for each KOR	As above for construction phase for each KOR

8.9 Effect Associated with the Underground Cable connecting the two sites and Grid Connection

It is proposed to construct a 110 kV substation within the site and to connect the site to the National Grid from here via a 110kV loop-in connection to the existing 110kV overhead line which runs through the site.

It is proposed to connect the two clusters of turbines via underground internal collector cabling located within existing agricultural land and within the public road corridor. The underground cabling route measures approximately 3.3km. In addition, it is proposed to widen a small section of road and add a small stretch (300 metres) of access road along the turbine delivery route. The potential for the underground cable connection and turbine delivery route to impact birds is discussed below.

The existing habitats (e.g., existing roads and agricultural land) have limited potential to support species of conservation interest in the area. On a precautionary basis it is assumed that some habitat loss and temporary displacement may occur during construction works. However, given the extent of suitable habitat in the wider area; significant habitat loss and displacement effects are not 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., golden plover) and Negligible Impact corresponds to a Low effect significance. Golden plover was used as an example as it is the highest sensitivity species identified as a KOR at this site. The significance of the potential impact is classed as a Short-term Slight Negative Effect following EPA criteria (2017).

8.10 Mitigation and Best Practice Measures

This section describes the measures that are in place to mitigate adverse 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.

8.10.1 Mitigation by Design

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

- Hard standing areas have been designed to the minimum size necessary to minimise habitat loss.
- The turbine collector route has been selected to utilise built infrastructure i.e. public roads and improved agricultural grassland.

8.10.2 Mitigation During Construction, Operation and Decommissioning

The following sections describe the mitigation measures to be implemented during each phase of the proposed development.

8.10.2.1 Construction Phase Mitigation

The following measures are proposed for the construction phase:

- A Construction and Environmental Management Plan (CEMP) has been prepared. The CEMP will be in place prior to the start of the construction phase. The CEMP is included as an Appendix 4-4, Appendix 3 of this NIS.
- The removal of woody vegetation will be undertaken outside the bird breeding season which runs from the 1st of March to the 31st of August inclusive. Where sections of woody vegetation are removed for the purposes of the junction and road upgrades, these will be replaced with suitable hedge/tree species which are common in the local context.
- 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.
- Plant machinery will be turned off when not in use.
- All plant and equipment for use will comply with best practise Construction Plant and Equipment Permissible Noise Levels Regulations and other relevant legislation.
- An Ecological Clerk of Works (ECoW) will be appointed. Duties will include:
 - Undertake a pre-construction transect/walkover bird survey to ensure that significant effects on breeding birds will be avoided.
 - Inform and educate on-site personnel of the ornithological and ecological sensitivities within the Proposed Development site.
 - Oversee management of ornithological and ecological 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.

8.10.2.1.1 Protection of Water Quality

As the on-site drainage provides connectivity to downstream potential supporting habitat for waterbirds, deterioration in water quality has been assessed. The mitigation measures described for the protection of water quality in Section 5.2.2 of the NIS of this EIAR and associated appendices, will ensure that there is no potential adverse indirect effect on the SCI species as a result of any deterioration in water quality.

8.10.2.2 Operational Phase Mitigation

No operational phase impacts requiring mitigation were identified.

8.10.2.3 Decommissioning Phase Mitigation

The potential impacts on water quality associated with the decommissioning phase of the proposed development will be similar to those associated with the construction phase. Therefore, all measures described in Section 5.2.2.2 of the NIS of this EIAR and associated Appendices will be implemented in full during decommissioning for the protection of water quality and downstream designated sites. The potential impacts associated with disturbance/displacement during the decommissioning phase of the proposed development will be similar to those associated with the construction phase. Therefore, all measures described in the preceding sections above will be implemented in full.

8.11 Monitoring

8.11.1 Commencement and Pre-Construction Monitoring

Pre-commencement surveys will be undertaken prior to the initiation of works at the wind farm. The verification survey will include a thorough walkover survey to a 500m radius of the development footprint and/or all works areas, where access allows. If winter roost sites 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 season or breeding season (respectively) of the construction phase. If it is found to be active during the construction phase no works shall be undertaken within a 500m buffer (Forestry Commission Scotland, 2006; Ruddock & Whitfield, 2007) in line with best practise. No works shall be permitted within the buffer until it can be demonstrated that the roost or nest is no longer occupied.

All site staff and subcontractors will be made aware of any restrictions to be imposed by means of a toolbox talk and a map of the ‘no-work zone’ will be made available to all construction staff. The restricted area will also be marked off using hazard-tape fencing to alert all personnel on site to the suspension of works within that area.

Where no roosting, nesting or breeding activity of species of high conservation concern is identified in works areas, construction activity can proceed, with ongoing monitoring in parallel to ensure adherence of protection protocols throughout the season.

8.11.2 Post Construction Monitoring

In line with best practise measures, a detailed post-construction Bird Monitoring Programme has been prepared for the operational phase of the Proposed Development, please refer to Appendix 8-7 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 are proposed to be scheduled to coincide with Years 1, 2, 3, 5, 10 & 15 of the lifetime of the wind farm. Monitoring measures are based on guidelines issued by the Scottish Natural Heritage (SNH, 2009). The following individual components are proposed:

- Flight activity surveys: vantage point surveys
- Targeted bird collision surveys (corpse searches) will be undertaken with trained dogs. The surveys will include detection and scavenger trials, to correct for these two biases and ensure the resulting data is robust.

8.12 Residual Effects

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

- Golden Plover
- Hen Harrier
- Peregrine
- Woodcock
- Lesser Black-backed Gull
- Buzzard
- Sparrowhawk
- Kestrel
- Snipe

As per Percival 2003 criteria, effect significance of greater than **Low** was not identified for any KOR.

As per EPA 2017 criteria, effect significance of greater than *Slight* was not identified for any KOR.

Taking into consideration the effect significance levels identified and the proposed best practice and mitigation; significant residual effects on KORs with regard to direct habitat loss, displacement or collision mortality are not anticipated.

8.13 Cumulative Effects

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

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

8.13.1 Other Projects and Plans

Assessment material for this in combination impact assessment was compiled on the relevant developments within the vicinity of the proposed project. The material was gathered through a search of relevant online Planning Registers, reviews of relevant EIS/EIAR documents, planning application details and planning drawings, and served to identify past and future projects, their activities and their environmental impacts. The projects considered in relation to the potential for in combination effects and for which all relevant data was reviewed (e.g., individual EISs/EIARs, layouts, drawings etc.) include those listed below.

8.13.1.1 Plans Considered in the Cumulative Impact Assessment

The following plans were considered in the cumulative impact assessment:

- Waterford County Development Plan 2011-2017
- Cork County Development Plan 2014.
- Regional Planning Guidelines for the South – West Region 2010 – 2022
- National Biodiversity Action Plan 2017-2021

These policies and objectives of these plans have been taken into account in this cumulative assessment.

8.13.1.2 Projects Considered in the Cumulative Impact Assessment

A review of the Planning Register for Waterford County Council shows that there has been a number of planning applications lodged within the vicinity of the EIAR study area. Many of the existing/proposed developments within the EIAR study area relate to one-off housing or are agricultural in nature, owing to the scale and nature of these development significant cumulative impacts are not predicted. There are a number of previous applications for wind farm development and associated infrastructure. Further details on these applications are available below.

Forestry and Agricultural Practices

Some areas within the site and surrounding area are planted with commercial forestry. 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.

The remaining land use within the site and surrounding area is predominantly agriculture in the form of livestock grazing. These land uses have also been taken into account in this cumulative assessment.

Other Developments

The review of the Cork County Council and Waterford County Council planning register documented relevant general development planning applications in the vicinity of proposed development site and the grid connection route, most of which relate to the provision and/or alteration of one-off rural housing and agriculture-related structures. Owing to the scale and nature of these developments significant cumulative impacts are not anticipated.

It should also be noted that any potential cumulative effects in relation to the existing infrastructure on site is also considered. At present an existing 110kV overhead line runs through the Proposed Development site. This is existing infrastructure that the local avian community will have become accustomed to in the landscape. Not all bird species are considered to be equally susceptible to collisions with overhead lines. Susceptible species groups include swans and geese. During the comprehensive suite of surveys undertaken, neither swans nor geese species were recorded with any regularity or in high numbers in close proximity to the wind farm site. Significant cumulative impacts are not predicted.

More detail can be found in Chapter 2, Section 2.7.

Other Wind Farm Developments

The wind farm projects within a 20-kilometre radius of the Lyrenacarriga Windfarm proposal are provided in Table 8-22 below and are presented in terms of their proximity to the Proposed Development and whether the project is permitted/operational or pending/under appeal. A total of four wind farms, and 28 existing/permitted turbines fall within a 20-kilometre radius of the proposal as detailed in Table 8-22. The density of turbines within a 20-kilometre radius of the proposal is considered low as shown in Chapter 2 Figure 2.2.

Table 8-22 Wind Farms Within 20km of the development site

No.	Name	County	No. of Turbines	Status	Distance to Proposed Lyrenacarriga Development Boundary (km)
1	Barranafaddock	Waterford	12	Constructed	15
2	Woodhouse Part 1	Waterford	5	Constructed	11.2
3	Woodhouse Part 2	Waterford	3	Constructed	11.2
4	Knocknamona	Waterford	8	Permitted	11.8

➤ Barranafaddock Wind Farm

Barranafaddock is c. 15km the proposed development site. The EIS was consulted to determine cumulative impacts from the proposed development site. The EIS identified a pair of hen harrier utilising habitats in the vicinity of the development for foraging. The turbine layout avoided any suitable foraging habitat for hen harrier. The EIS concluded that impacts will be “not significant and limited to disturbance and minor habitat changes”.

No significant residual effects on avian receptors were identified.

Based on the information available in the Barranafaddock EIS, significant cumulative impacts are not anticipated.

> Woodhouse Wind Farm

Woodhouse is c. 11.2km from the proposed development site. This windfarm consists of eight turbines in two parts, one with five turbines and one with three turbines. The EIS, including all eight turbines, was consulted to determine cumulative impacts from the proposed development site. The EIS concluded that, given the low ecological interests at the site, “impacts on the ecology by the proposed development will not be significant”.

No significant residual effects on avian receptors were identified.

Based on the information available in the Woodhouse EIS, significant cumulative impacts are not anticipated.

> Knocknamona Wind Farm

Knocknamona is c. 11.8km the proposed development site. The EIS was consulted to determine cumulative impacts from the proposed development site. The EIS concluded that “there could be a temporary non-significant impact on nesting birds at the site during the construction phase”. It also concluded that collision risk is of “low significance” and displacement due to the windfarm is “not considered to be a significant effect”.

No significant residual effects on avian receptors were identified.

Based on the information available in the Knocknamona EIS, significant cumulative impacts are not anticipated.

8.13.2 Assessment of Cumulative Effects

Following consideration of the residual effects (post-mitigation) it is noted that the Proposed Development on its own, 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.

Important migratory routes for any species were not identified in any of the assessments undertaken. Therefore, significant cumulative barrier effect is not anticipated.

No potentially significant cumulative habitat loss, disturbance displacement or collision risk effects on any of the KORs has been identified with regard to the development proposal.

No residual additive, antagonistic or synergistic effects have been identified with regard to habitat loss, displacement or collision mortality for any KOR.

8.14 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. A comprehensive suite of bird surveys was undertaken at the proposed development which have informed the impact assessment.

Provided that the Proposed Development is constructed, operated and decommissioned in accordance with the design, best practice and mitigation that is described within this application, significant individual or cumulative effects on ornithology are not anticipated at the international, national or county scales or on any of the identified KORs.