8.0 ORNITHOLOGY

8.1 INTRODUCTION

This chapter presents an assessment of the likely impact of the proposed Oweninny Wind Farm Phase 3 on bird populations of conservation importance and presents an Ornithology Impact Assessment of the proposed development[1] and should be read in conjunction with the site layout plans, Chapter 3 (Description of the Proposed Development) and Chapter 7 (Biodiversity – Flora and Fauna). Details of the assessment methodology and existing site conditions are presented, potential impacts are assessed, and mitigation measures are recommended, where required.

The objectives of the ornithological evaluation included:

- To obtain baseline ornithological data at the proposed development site;
- To determine the ornithological value of the identified ecological receptors;
- To assess the potential impacts, including direct, indirect and secondary impacts which may result from the proposed works during construction, operation and decommissioning phases;
- To recommend mitigation measures to avoid and/or reduce impacts; and
- To identify any residual impacts post mitigation and enhancement measures.

The potential impacts of the proposed development on European sites (sites designated as Special Protection Areas [SPAs] that form part of the Natura 2000 network) in the Zone of Influence (ZoI) have been evaluated. This appraisal is presented separately in the form of a Natura Impact Statement (NIS) (which accompanies the Planning Application documentation as a standalone document).

The proposed development will be located on the eastern part of Oweninny Bog, which is located in North Mayo, approximately 12km west of Crossmolina and 15km east of Bangor Erris, and just north of the N59 National Primary Road. The overall area of Oweninny Bog is approximately 5,190 hectares, while the site area of the proposed development is approximately 2,282 hectares.

It is proposed that 18 no. wind turbines will be located across the proposed development site. This chapter has considered detailed information available from previous studies in the area and other data sources for this landholding, including habitat data and protected bird species.

[1] Note: The proposed development refers to all elements of the project which includes; the proposed windfarm site, the proposed grid connection and the works area associated with the turbine delivery route

Full details of the proposed development are provided in chapter 3 of this Environmental Impact Assessment Report (EIAR) (Description of the Proposed Development).

8.2 STATEMENT OF AUTHORITY

The survey team comprised ornithologists from TOBIN Consulting Engineers (TOBIN), Biosphere Environmental Services (BES), Eire Ecology and ornithological consultant, Kenneally Wildlife Services. This survey team carried out ornithological survey work including breeding surveys in 2019, 2020, 2021 and 2022, and winter surveys in 2019/2020, 2020/2021 and 2021/2022.

Field surveys were undertaken by BES during the breeding survey season in 2019 and winter survey season in 2019/20. The competent persons in this team were Dr Brian Madden (BES), Jackie Hunt (BES), Mick Hogan (BES) and Joe Adamson (BES). Field surveys were undertaken by TOBIN during the breeding survey seasons in 2020, 2021 and 2022 and winter survey seasons in 2020/2021, 2021/2022. The competent persons in this team were John Meade (TOBIN), John Sherry (TOBIN), Sophia Couchman (TOBIN), Kit Lawson (TOBIN), Jason Cahill (TOBIN), Tony Kenneally (Kenneally Wildlife services). Red Grouse surveys were undertaken by Eire Ecology, the surveys were undertaken by John Curtin and Shane O'Neill. All of the surveyors listed above are competent experts for the purposes of the preparation of this EIAR and suitably qualified.

This ornithological chapter has been compiled by John Meade, Senior Ornithologist and John Sherry Project Ecologist with TOBIN in conjunction with the ecology team of TOBIN. It was reviewed by Áine Sands, Senior Ecologist in TOBIN. The collision risk modelling and assessment was carried out by Natural Power Consultants.

John Meade - TOBIN

John Meade is a Senior Ornithologist with TOBIN and holds a B.Sc. in Zoology and a H. Dip in BFIS and GIS. John is very experienced in the areas of research, ornithology and environmental consultancy. This includes over 15 years graduate experience of environmental monitoring, data management and survey work. John's experience consists of scoping, designing and undertaking a range of ornithological field surveys including bird sensitivity, habitat mapping and protected species surveys (including but not limited to Waterbirds and Waders, Whooper Swans, Merlin, Red Grouse, Hen Harrier, Barn Owl, Woodcock, Raptor, Countryside, Moorland and General Breeding and Wintering Birds surveys). John has also been involved in preparing Environmental Reports to inform Environmental Impact Assessment Reports, Appropriate

Assessment Screening reports and Natura Impact Statements for a wide range of infrastructural projects for local authorities, semi-state, and private commercial clients. John has assisted on numerous energy and road projects including motorway upgrades and bypasses. John has also undertaken field surveying for Irish Water's Water Supply Project: Eastern and Midlands Region, and for many wind farm developments.

John Sherry - TOBIN

John (B.Sc.) is a qualified Project Ecologist with TOBIN and has over three years post-graduate experience in ecology and environmental consultancy. John has mainly been involved in the surveying and reporting of large-scale renewable infrastructure projects where he has carried out Appropriate Assessment Screening reports, Natura Impact Statements, Environmental Impact Assessment Reports and Ecological Management Plans. John has a proven knowledge of field skills and has been involved with the planning and implantation of a variety of surveys including habitat surveys, non-volant mammal surveys and bat assessments. However, he has mainly been focused on ornithological surveys involving winter and breeding bird surveys associated largely with proposed wind farms or infrastructure developments.

Áine Sands - TOBIN

Áine Sands is a Senior Ecologist with TOBIN and has over six years post graduate experience in ecology and environmental consultancy. Áine has predominantly been involved in large public and private infrastructure projects where she has carried out numerous Screenings for Appropriate Assessments, Natura Impact Statements and Ecological Impact Assessments for the proposed developments. Áine has a strong understanding of National and European legislation associated with biodiversity and is cognisant of relevant rulings by the Court of Justice of the European Union (CJEU). Áine also has experience with undertaking ecological surveys for protected habitats and species.

Gillian Vallejo - Natural Power (Collision Risk Model)

Gillian heads up Natural Power's ecological and geospatial modelling team. Gillian has been working in the renewable energy industry since 2010, providing data services and expert advice for over 80 offshore and onshore renewable energy developments, as well as statutory bodies and steering groups. Gillian has substantial experience in a range of empirical data analysis techniques and specialises in the analysis of data for Ecological Impact Assessment (EIA) and operational monitoring for renewable energy projects including offshore, onshore, and

underwater collision risk modelling (CRM), displacement analysis, individual-based and matrix-based Population Viability Analysis (PVA), Potential Biological Removal (PBR) and fatality estimation from carcass search data. Gillian's expertise also includes General Linear Modelling and its extensions including methods for dealing with autocorrelated and/or overdispersed data, data simulation, sensitivity analysis, and power analysis. Gillian also has substantial GIS knowledge with experience in handling, presenting and analysing spatial data using a variety of software. Gillian is experienced in the use of a range of data management and analysis software including R (including use of MRSea, iPCoD and sCRM), JAGS, ArcGIS, QGIS, GRASS GIS, Vortex, Distance and Excel.

8.3 PHASES OF THE DEVELOPMENT

The key phases of the proposed development as relevant to the evaluation of ecological impacts will consist of the construction, operational and decommissioning phases. The entire project as detailed in Chapter 3 of this EIAR (Description of the Proposed Development) has been assessed throughout this chapter.

8.1.1 Construction Phase

The following are key activities that will be undertaken during the construction phase and could potentially cause significant effects on the environment. They therefore need to be given particular consideration in the evaluation of ornithological impacts:

- Site clearance and any drainage requirements at turbine locations and substation location to facilitate construction;
- Construction of the proposed development and associated infrastructure, including: access tracks/routes, temporary compounds, turbine hardstanding, onsite substation, underground grid connection, bridges, culverts and temporary construction works associated with the turbine delivery route.
- The use of heavy machinery and associated disturbance within the 'works area' during construction;
- The excavation of soils/peat for the installation of turbines, substation base and associated hard standing areas and any associated drainage requirements;
- The use of concrete and other potentially harmful substances at each works area; and
- Management, storage and reuse of excavated material during the construction phase.

8.3.1 Operation Phase

The operation phase of the development will include the following key activities, which could potentially cause significant effects on the environment, and will therefore need to be considered in the evaluation of ornithological impacts:

- Rotating blades of operating turbines within the wind farm envelope; and

- Maintenance of turbines and site infrastructure throughout the lifetime of the proposed development.

8.3.2 Decommissioning Phase

The decommissioning phase of the development will include the following key activities, that could potentially cause significant effects on the environment, and will therefore need to be given particular consideration in the evaluation of ornithological impacts:

- The activity of decommissioning machinery and associated personnel; and
- Decommissioning of turbines including blades, hubs and towers.

8.4 STUDY AREA

As discussed in Chapter 3 of this EIAR (Description of the Proposed Development), the proposed development includes an 18 no. turbine wind farm in County Mayo and all associated infrastructure. The wind farm site will be located on the eastern part of Oweninny Bog, approximately 12km west of Crossmolina and 15km east of Bangor Erris, and just north of the N59 National Primary Road. The overall area of Oweninny Bog is approximately 5,090 hectares, while the site area of the proposed development is approximately 2,282 hectares. The study area for the Ornithological Assessment comprised the proposed wind farm site and the wider surrounding hinterland up to 2km (the determination of this study area can be seen in section 8.6.5). (Figure 8-1).

8.5 ZONE OF INFLUENCE

The Zone of Influence (ZoI) is the likely area over which the proposed development could have potential impacts on a given receptor. The ZoI was first assessed through a desk study review of ecological information that was pertinent to the proposed development, focusing on a 15km buffer around the proposed development. The ZoI over which significant impacts may occur will differ for different key avian receptors (KARs), depending on the pathway. Significant impacts are deemed to be those impacts resulting in a likely change in conservation status of a KAR. According to the National Roads Authority (NRA) guidelines (NRA 2009c[2]), KARs will be features of sufficient value to be material in the decision-making process for which potential impacts are likely. According to the NRA Guidelines, KARs are therefore defined as features of Local (Higher Value), County, National, or International Importance.

[2] National Roads Authority (NRA; now known as Transport Infrastructure Ireland) (2009c). Guidelines for Assessment of Ecological Impacts of National Road Schemes. Available from https://www.tii.ie/technical-services/environment/planning/Guidelines-for-Assessment-of-Ecological-Impacts-of-National-Road-Schemes.pdf

The first step in determining the ZoI is to analyse the characteristics of the proposed development and identify the range of the ZoI using the source-pathway-receptor conceptual model. The mechanism for defining the ZoI is summarised as follows:

- The nature, size and location of the proposed development were considered;
- The sensitivities of the relevant ecological receptors were considered; and
- The potential impact sources and pathways were identified.

The ZoI for the various ecological receptors for which the proposed development could have potential impacts are outlined in Table 8-1 below.

Table 8-1: Zone of Influence Informing the Assessment

Ecological Feature	Potential Source(s) of Impact from Proposed Development	Potential Effect	ZoI (metres from proposed development site)	Rationale
Breeding Birds	Vegetation clearance, noise, physical human presence and construction works in suitable breeding or feeding habitats during the construction and to a lesser extent the decommissioning phases. Collision risk during the operational phase.	Habitat loss	0m (i.e. within proposed development footprint)	Species habitats and nests within the proposed development site boundary are most at risk of direct habitat loss. There will be no construction or operational works outside the redline boundary.
		Direct mortality of nests	0m (i.e. within proposed development footprint)	
		Noise and human presence causing disturbance to breeding or feeding sites.	2km	It is noted that the ZoI will vary with species and type of impact; relevant factors include conservation status, sensitivity to disturbance, and species core foraging distance. A maximum of 2km from the proposed development site was selected as recommended by SNH (2017)[3].
		Collision Risk	500m	The collision risk zone for sensitive avian species is defined as a buffer extending 500m from the proposed development/planning

[3] Scottish Natural Heritage (SNH) (2017). Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms (Version 2).

Ecological Feature	Potential Source(s) of Impact from Proposed Development	Potential Effect	ZoI (metres from proposed development site)	Rationale
				application boundary as recommended in SNH (2017)[3].
Wintering Birds	Vegetation clearance, noise, physical human presence and construction works in suitable feeding or roosting habitats during the construction and to a lesser extent the decommissioning phases. Collision risk during the operational phase.	Habitat loss	0m (i.e. within proposed development footprint)	Species habitats and nests within the proposed development site boundary are most at risk of direct habitat loss. There will be no construction or operational works outside the redline boundary.
		Noise and human presence causing disturbance to feeding and roosting sites	2km	It is noted that the ZoI will vary with species and type of impact; relevant factors include conservation status, sensitivity to disturbance, and species core foraging distance. A maximum of 2km from the proposed development site was selected as recommended by SNH (2017)[3].
		Collision Risk	500m	The collision risk zone for sensitive avian species is defined as a buffer extending 500m from the proposed development/planning application boundary as recommended in SNH (2017)[3].

8.6 METHODOLOGY

The ornithological appraisal included three main elements to inform the baseline ornithological assessment. These included consultation with key stakeholders (Section 8.6.2), a desktop ecological evaluation (Section 8.6.3), and field surveys (Section 8.6.5). The approach and methodology followed have regard to the guidance documents listed in Section8.6.1.

8.6.1 Legislation, Polices and Guidance

The following legislation, plans and policies have been considered in this chapter, where relevant:

- European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011), as amended.
- The EIA Directive 2011/92/EU, as amended by Directive 2014/52/EU;
- European Union (EU) (Environmental Impact Assessment and Habitats) (No. 2) Regulations 2015 (S.I. No. 320/2015);
- Environmental Liability Directive (2004/35/EC);
- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, herein referred to as the Habitats Directive;
- Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds, herein referred to as the Birds Directive;
- The EU Water Framework Directive (2000/60/EC);
- Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on Article 6(3) and (4) of the Habitats Directive (92/43/EEC)
- The Wildlife Acts 1976 to 2020 (as amended), herein referred to as the Wildlife Acts;
- Objectives relevant to ornithology in the latest County Development Plans of the relevant counties potentially impacted by the proposed development, specifically Co. Mayo);
- Relevant policies in Actions for Biodiversity 2011-2016, Ireland's 2nd National Biodiversity Plan produced by the Department of Arts, Heritage and the Gaeltacht in 2011 (now the Department of Culture, Heritage and the Gaeltacht); and
- Ireland 3rd National Biodiversity Action Plan, 2017 – 2021 produced by the Department of Culture, Heritage and the Gaeltacht.[4]

The potential for effects on nature conservation interests was assessed, taking into consideration the habitats and species that are likely to be affected by the proposed development. This approach included consideration (as appropriate) of the following guidance documents:

- EPA (2022). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.
- Bird Species of Medium and High Conservation Concern Listed in the Publication Birds of Conservation Concern in Ireland (BoCCI) 2020 – 2026;

[4] Note this plan is currently being updated and has been in development since 2021. Public consultation was undertaken in 2022, with the new plan to be adopted for the period 2023 to 2027.

- Scottish Natural Heritage (SNH) (2000). Wind Farms and Birds: Calculating a Theoretical Collision Risk Assuming no Avoidance Action;
- SNH (2006). Assessing Significance of Impacts from Onshore Wind Farms on Birds Outwith Designated Areas;
- SNH (2009). Monitoring the Impact of Onshore Wind Farms on Birds;
- SNH (2010). Avoidance Rates Information and Guidance Note: Use of Avoidance Rates in the SNH Wind Farm Collision Risk Model;
- SNH (2012). Assessing the Cumulative Impact of Onshore Wind Energy Developments;
- SNH (2016). Assessing Connectivity with Special Protection Areas (SPAs);
- SNH (2017). Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms (Version 2); and
- Mc Guinness, S., 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.

8.6.2 Consultation

Consultation with various state agencies and environmental Non-Governmental Organisations (NGO's) was undertaken between October 2019 and March 2022 to inform the EIAR. All project consultation is detailed in Chapter 1 (Introduction) of the EIAR. Consultees were informed of updates to the site layout, as appropriate. Consultation letters were sent (February 2021) to the following key parties relevant to this chapter:

- An Bord Pleanála;
- Mayo County Council;
- Development Applications Unit (DAU) and National Parks and Wildlife Service (NPWS);
- Birdwatch Ireland; and
- Irish Raptor Study Group.

Table 8-2 below details the responses received in relation to Ornithology from the above consultees. Further information on consultation responses is provided in Chapter 1 of this EIAR (Introduction).

Table 8-2: Summaries of the Key Consultee Responses

Consultation Response	EIAR Section
Department of Culture, Heritage and the Gaeltacht (Development Applications Unit [DAU]) A detailed letter was provided outlining the level of detail required in the EIAR. In relation to ornithology the DAU requested that surveys for all relevant species should be undertaken and should cover bird usage, potential collision risk, habitat loss, barrier effect and displacement effects. The survey period should be	All ornithology considerations raised by the DAU have been addressed within this chapter (Chapter 8 Ornithology) and appropriate mitigation has been identified and will be actioned.

Consultation Response	EIAR Section
undertaken all year round for a minimum of two years. The DAU further advised that target species for the site include Hen Harrier, Merlin, Red Grouse, Woodcock and Breeding Waders and advised that Hen Harrier winter roosts have been recorded within the area. Lastly, the DAU advised that cumulative impacts on birds from all windfarms in the area need to be assessed in the assessment.	
NPWS – Scientific Unit A data request form was issued to the Scientific Unit of the NPWS requesting further ornithology data within the study area.	A response has not yet been received at the time of writing this report.

8.6.3 Desk Study

The ornithological desk study for this proposed development included the following steps:

- Identification of KARs and all sites designated for nature conservation within the ZoI of the proposed development. Rationale for establishing the ZoI included, inter alia, distance from the site (refer to Section 8.5above);
- A review of all NPWS site synopsises for designated sites within the ZoI of the proposed development;
- A species list for the proposed development study area was generated using the National Biodiversity Data Centre biodiversity maps (NBDC; www.biodiversityireland.ie) in order to determine if any rare or protected species have been recorded in this area and the likelihood of any such species being present at the proposed development site. The proposed development site is contained within the hectads F91, F92, G01 and G02, this includes the grid connection which is located within hectad F92. A species list for the 10km grid squares F91, F92, G01, G02 (i.e. the hectads that overlap with the study area, which contain information of ecological records from a wide range of scientific sources readily accessible to the public from the NBDC) was also generated to determine if any rare or protected species occur in the wider Mayo area;
- A review of Ordnance Survey maps and aerial photography to determine the broad habitats that occur within the study area and thus typical bird communities;
- A review of relevant ecological reports, and rehabilitation plans previously completed for the study area; and
- Published data from NPWS and BirdWatch Ireland.

8.6.4 Identification of Target Species – Ornithology

The standard guidance for carrying out ornithological surveys at a wind farm is the SNH (2017) '*Recommended bird survey methods to inform impact assessment of onshore wind farms'*. Within this document it is stated that *'the location and scale of the proposal and sensitivity of the bird interest present will determine the target species and the duration of the survey period'*.

Target species are the subject of the assessment and are a key factor in understanding survey requirements. Target species in general are those species which are afforded a higher level of legal protection due to their unfavourable conservation status and/or those species whose behaviour makes them more susceptible to impacts from wind farms. Species groups which fall into this category include raptors (particularly soaring birds of prey), water birds (including migratory waterfowl), gulls and waders[5]. A species which was not highlighted for special consideration during the desk study can become the target of the assessment following field surveys. Ultimately the results of field surveys dictate the target of the assessment.

Species which do not fall under the above criteria but are of local importance may also need to be considered. These species are termed secondary species. The recording of target species

[5] Powlesland, R. G. (2009). Impacts of Wind Farms on Birds: A Review. *Science for conservation*, (289).

observations is prioritised over secondary species. In general, it is considered that passerines[6] are little impacted by wind farms, as per SNH (2017)[8], however, passerines species listed as red under the Birds of Conservation Concern Ireland (BoCCI) (Gilbert *et al.*, 2021)[7], such as meadow pipit, have been considered in this report.

Key target species likely to occur within the study area during the breeding and wintering seasons have been identified and included the following: Hen Harrier, Peregrine Falcon, Red Grouse, Whooper Swan, Golden Plover, Snipe, Kestrel and Merlin. These species are Annex I, are BoCCI Red-listed species and/or occur within nearby SPAs, with populations found to occur within the ZoI of the proposed development. These species are the focus of the breeding and winter bird surveys at the site. Secondary Species, species of regional conservation concern or BoCCI amber-listed species were also considered and included other raptor species, waders, gulls and waterbirds.

8.6.5 Field Surveys

Field surveys were undertaken by skilled and appropriately experienced ornithologists between the period from April 2019 to September 2022 (refer to Table 8-3 below). The data was collected in line with the SNH (2017)[3] guidelines, was robust and allowed TOBIN to draw accurate, definitive and coherent conclusions on the possible impacts of the proposed development on ornithological receptors.

During these surveys, areas of scientific and/or conservation interest in the vicinity of the proposed development were investigated. Relevant survey maps and reports are included as Appendices or figures below and are summarised in Section 8.7. Further details of the survey methodologies are presented in the subsequent paragraphs.

Table 8-3: Survey Works and Periods Conducted

Survey		Study area (Distance from proposed development site)	Survey Dates	Personnel
Breeding Bird Surveys	Vantage Point Surveys	0m (Within Proposed	April to September 2019	BES

[6] Passerines (perching birds) are typically small birds of the order Passeriformes, whose behaviour is thought to make them less susceptible to impacts from wind farm.

[7] Gilbert G., Stanbury, A., Lewis, L. (2021). Birds of Conservation Concern in Ireland 2020-2026. Irish Birds 9: 523-544.

Survey		Study area (Distance from proposed development site)	Survey Dates	Personnel
		Development site)	April to July 2020; April to September 2021; April to September 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Breeding Bird Transects	500m	April to July 2020; April to September 2021; April to September 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Hinterland Gull Surveys	0m (Within Proposed Development site)	April to July 2020; April to July 2021; April to July 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Lowland Wader Surveys	500m	April to July 2020; April to July 2021; April to July 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Raptor and Merlin Surveys	2km	April to July 2020; April to September 2021; April to September 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Woodcock Surveys	0m (Within Proposed Development site)	May to June 2020; May to June 2021; May to June 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Red Grouse Tape Lure Survey	0m (Within Proposed Development site)	March 2021; March 2022	Eire Ecology
	Vantage Point Surveys	0m (Within Proposed	October 2019 to March 2020	BES

Survey		Study area (Distance from proposed development site)	Survey Dates	Personnel
Wintering Bird Surveys		Development site)	October 2020 to March 2021; October 2021 to March 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Wintering Bird Transects	500m	October 2020 to March 2021; October 2021 to March 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Hinterland Waterbird Surveys	2km	October 2020 to March 2021; October 2021 to March 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)
	Hen Harrier Roost Surveys	2km	October 2020 to March 2021; October 2021 to March 2022	TOBIN and Kenneally Wildlife and Ecological Services (Tony Kenneally)

8.6.5.1 Vantage Point Surveys

Vantage Point (VP) surveys aim to quantify the level of flight activity and its distribution over the survey area. The primary purpose of the surveys is to provide data to inform a Collision Risk Model (CRM), which makes predictions of mortality from collisions with turbines. Vantage points are fixed locations, which are strategically positioned to provide a maximum viewshed of the survey area from a minimum number of locations. The surveyed area should include the entire wind farm envelope where turbines may be positioned and should extend to a 500m radius from the outermost turbines (Figure 8-1). The viewshed of a given VP should extend to a distance of no greater than 2km and include an arc of no greater than 180 degrees, as per SNH (2017)[8]. Seven VPs were selected to ensure a viewshed of all potential turbine locations, given the lowest swept area of turbines at the time of the survey. Surveys were undertaken on a monthly basis over a three year period between April 2019 and September 2022 (excluding two months in August and September 2020).

[8] Scottish Natural Heritage (SNH) (2017). Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms. SNH Guidance. Scottish Natural Heritage, Battleby. Version 2`.

The VP methodology followed guidelines issued by the SNH (2017)[8]. The minimum requirement of 36 hours per VP per season (breeding and non-breeding) was achieved. Totalling 216 hours per VP over the survey period. During the 2020 breeding season the 36 hour recommendation was concentrated between the months of April to July (equalling 9 hours surveying per VP, per month), this was to reflect the shorter breeding periods of some target species, namely Golden Plover and Dunlin. As no breeding activity for Golden Plover or Dunlin were recorded in 2020, the survey effort for the 2021 and 2022 breeding seasons extended between the month of April to September.

The timing of watches was tailored to the ecology of the target species present on site, including dawn, day and dusk surveys. Field information recorded included: dates, VP location, weather, survey start and end time, species observed, time of observation, number of individuals per observation, height of flight, duration of flight, reference number to flight line. All flight lines of target species were mapped on field sheets. Behavioural observations were also recorded. The flight lines of wintering and breeding species recorded during surveys are shown in Appendix 8.1.

The VPs and viewshed are illustrated on Figure 8-2.

8.6.5.1.1 Viewsheds

A review of viewsheds (i.e. the geographical area that is visible from a location) was undertaken for the VPs used to survey the proposed development, using ESRI ArcGIS Viewshed Analysis. All viewsheds were found to have sufficient cover and visibility over the site to allow for robust data collection and assessment.

The VPs and viewshed are illustrated on Figure 8-2.

8.6.5.1.2 Collision Risk Model

Following VP surveys, the CRM was prepared and is included in Appendix 8.2 of this EIAR. The CRM methodology was based on the Scottish Natural Heritage (SNH) guidance (SNH, 2000)[9] and Madden (2015)[10].

[9] Scottish Natural Heritage (2000). Windfarms and Bords: Calculating a Theoretical Collision Risk Assuming No Avoiding Action. Scottish Natural Heritage
[10] Masden, E. (2015). Developing an Avian Collision Risk Model to Incorporate Variability and Uncertainty. Scottish Marine and Freshwater Science Vol 6 No 14. Scottish Government, Edinburgh.

Birds which use the airspace around turbines are susceptible to collision with operating turbines. Bird flights considered to represent a potential collision risk were those flight lines that passed within the collision risk zone (CRZ) at potential collision height (PCH). The CRZ incorporated a 279 m buffer of the proposed turbine locations, representing half the rotor diameter of the turbine specification proposed at the site (158/2 = 79 m) plus a precautionary surrounding buffer zone of 200m. PCH is defined as the area of space occupied by the turbine rotors. PCH was considered to be within the height band of 25-200m[11] above ground level. (see Appendix 8.2 for further details).

A CRM was only prepared for those species that were observed flying at PCH and those species with sufficient amounts of flight activity (the threshold used was of three flights, or at least 10 individuals, recorded within the CRZ at PCH within either season, over the course of all survey years). A phased approach was used in the CRM with an initial modelling exercise using basic models to identify species with potential for a significant collision risk, and then used structured models to provide more realistic assessments of collision risk for those species. These structured models incorporate spatial and temporal variability in flight activity patterns and also include estimates of uncertainty. However, there are still assumptions behind the models that could affect the reliability of the predicted collision risk. For example, if there is significant variation in flight activity patterns with time of day, the sampling approach may produce biased estimates and wider confidence intervals.

8.6.5.2 Transect Surveys

Both winter and breeding transect surveys were undertaken at the proposed development site. A transect survey follows a defined linear route through a specific area. To achieve maximum coverage of suitable habitat, several routes were needed. These transects covered a large and representative portion of the survey area. Where access allowed, all areas of suitable habitat were surveyed on site to a 500m radius from the planning/development boundary, as per SNH (2017)[8] (refer to Figure 8-1 below). The transect surveys were walked at a standard speed. Notes on aural and visual registrations of bird species were recorded during field surveys. Visual registrations were recorded with the aid of binoculars (e.g. 8 x 42) and if necessary, with the aid of a telescope (e.g. 20-45 x 60 scope). Particular emphasis was paid to waders in areas of bare peat and other target species.

[11] This height is based on predictions of turbine hub heights and rotor blade lengths.

Breeding season transect surveys were conducted between April and September and winter season transect surveys were conducted between October to March. This is the recommended period for conducting breeding and wintering bird surveys. Birds present were recorded by sight and song/call. For all species, every effort was made to minimise disturbance risks that might be caused by the human intrusion associated with undertaking the survey. The surveyor regularly stopped to allow rapid detection of species presence, such as displaying birds and to take appropriate avoidance measures.

All bird species were recorded by call and sightings and based on the summary findings, bird breeding was categorised as:

- Probable/confirmed breeder (B);
- No breeding evidence though possibly breeding (NC); and
- Non-Breeder, i.e. wintering, passage migrant or habitat unsuitable (NB).

The aim of the transect walkover surveys was to establish the distribution and abundance of birds within the study area.

The transect survey routes are illustrated in Figure 8-4 below.

8.6.5.3 Breeding Raptor Survey

The breeding raptor survey methodology broadly followed Hardey *et al.* (2013)[12], –as recommended by SNH (2017)[8]. The recommendations made by Hardey *et al.* (2013)[12] for at least four visits to the study area was achieved during the 2020, 2021and 2022 breeding season. Suitable habitat for breeding raptors was surveyed each month from April to July 2020 and April to September 2021 and 2022. The timing of visits was tailored to the ecology of targeted breeding raptor species, spanning dawn, day and dusk. To account for the wide-ranging nature of breeding raptors, the study area included both the proposed wind farm site and the surrounding hinterland to a 2km radius from the planning/development boundary.

The aim of this survey was to establish the distribution and abundance of breeding raptors (with particular reference to breeding Hen Harrier, Merlin and Peregrine) within the study area.

8.6.5.4 Hen Harrier Roost Surveys

Hen Harrier winter roost surveys were also undertaken within the study area between October 2020 to March 2022. Hen Harrier Roost Surveys were conducted where suitable roosting habitat was found onsite or within the study area. Hen Harriers may roost communally in winter,

[12] Hardy, J., Crick, H., Wernham, C., Riley, H., Etheridge, B., Thompson, D. (2013). Raptors: A Field Guide for Surveys and Monitoring.

generally in rank grassland (Clarke and Watson, 1997)[13]. Suitable roosting habitat is typically restricted to dense vegetation, such as heather or young commercially planted conifers. Although this species breeds in upland areas, wintering birds disperse widely and can frequently be found in lowland areas. Hen Harrier Roost Surveys were conducted at a vantage point close to Lough Dahybaun between October 2020 and March 2021 and was expanded to 5 VPs across the site for the winter 2021/22 season.

The Hen Harrier Roost Survey methods followed those set out by Gilbert *et al.* (1998) and were in accordance with recommendations outlined in '*The 2015 National Survey of Breeding Hen Harrier in Ireland'* (Ruddock *et al.* 2016) report. Surveyors were in place an hour and a half before sunset and recorded all observations of Hen Harrier until last visible light. Information recorded by surveyors from the vantage points included the number of Hen Harrier entering or exiting a roost, the time, age, and sex, where it was possible to discern.

The Hen Harrier Roost Vantage Points are illustrated on Figure 8-3.

8.6.5.5 Breeding Merlin Survey

The Merlin survey methodology broadly followed Hardey *et al.*, (2013)[12] as recommended by SNH (2017)[8]. The recommendations made by Hardey *et al.*, (2013)[12] for at least four visits to the study area was achieved during the 2020 and 2021 breeding season. Suitable nesting/breeding habitat for Merlin has been identified by Lusby *et al* (2017)[14] as edges of conifer plantation adjacent to open areas of moors or heathland. Suitable Merlin nesting/breeding habitat within the site was surveyed each month from April to July 2020, April to September 2021 and April to September 2022. To account for the wide-ranging nature of breeding Merlin, the study area included both the proposed wind farm site and any suitable habitat within the surrounding hinterland to a 500m radius from the planning/development boundary, as per Lusby *et al*, (2010)[15] recommendations.

8.6.5.6 Breeding Woodcock Survey

During the 2020, 2021 and 2022 breeding season, Woodcock surveys were undertaken in areas of suitable habitat within the proposed development site. Suitable habitat was defined as

[13]Clarke, R. & Watson, D. (1997). The hen harrier winter roost survey. *Raptor*, *24*, 41-45.
14Lusby, J., Corkery, I., McGuiness, S., Fernández-Bellon, D., Toal, L., Norriss, D., Breen, D., O'Donaill, A., Clarke, D., Irwin, S., Quinn, J. L. and O'Halloran, J., 2017. Breeding ecology and habitat selection of Merlin Falco columbarius in forested landscapes. Bird Study, 64(4), pp.445-454

[15] Lusby, J., Fernández-Bellon, D., Norriss, D., & Lauder, A. (2010). Assessing the effectiveness of monitoring methods for Merlin *Falco columbarius* in Ireland: the Pilot Merlin Survey 2010.

woodland of all types and extensive areas of bracken in upland areas. The survey methodology followed the recommendations of Gilbert *et al.* (1998)[16] for surveying Woodcock. Three survey visits were undertaken between May and June 2020, 2021 and 2022. Surveyors were in position from an hour before sunset until an hour after sunset. The aim of the survey was to record the presence of roding (displaying) male woodcock and thereby establish the distribution and abundance of the species in the study area. Counts of roding Woodcock are converted to density estimates. The highest of three densities of roding males, if any located, provides an index of the peak density of breeding pairs.

8.6.5.7 Red Grouse Tape Lure Survey

A targeted Red Grouse Tape Lure survey was undertaken by Eire Ecology on behalf of TOBIN in March 2021 and 2022. The survey followed the methodologies outlined in the National Red Grouse Survey 2006-2008 (Cummins *et al.* 2010)[17]. The survey involved an observer walking parallel linear transects across the site area with suitable habitat using transects spaced 500m apart thus surveying 250m either side. The transect method involved walking in a straight line (where possible) using landscape features and/or a GPS unit to walk towards pre-selected points. The surveyor carried a battery-powered megaphone which was attached to mobile with a recording of the call of the male Red Grouse on it (tape lure). The recorded call often elicits a response from grouse. The observer then stops and scans with binocular for any Red Grouse activity. All result from the survey have been included within this report. A copy of the report is included in Appendix 8.3 of this report.

The Red Grouse survey transect is illustrated on Figure 8-4.

8.6.5.8 Breeding Waders and Gull Surveys

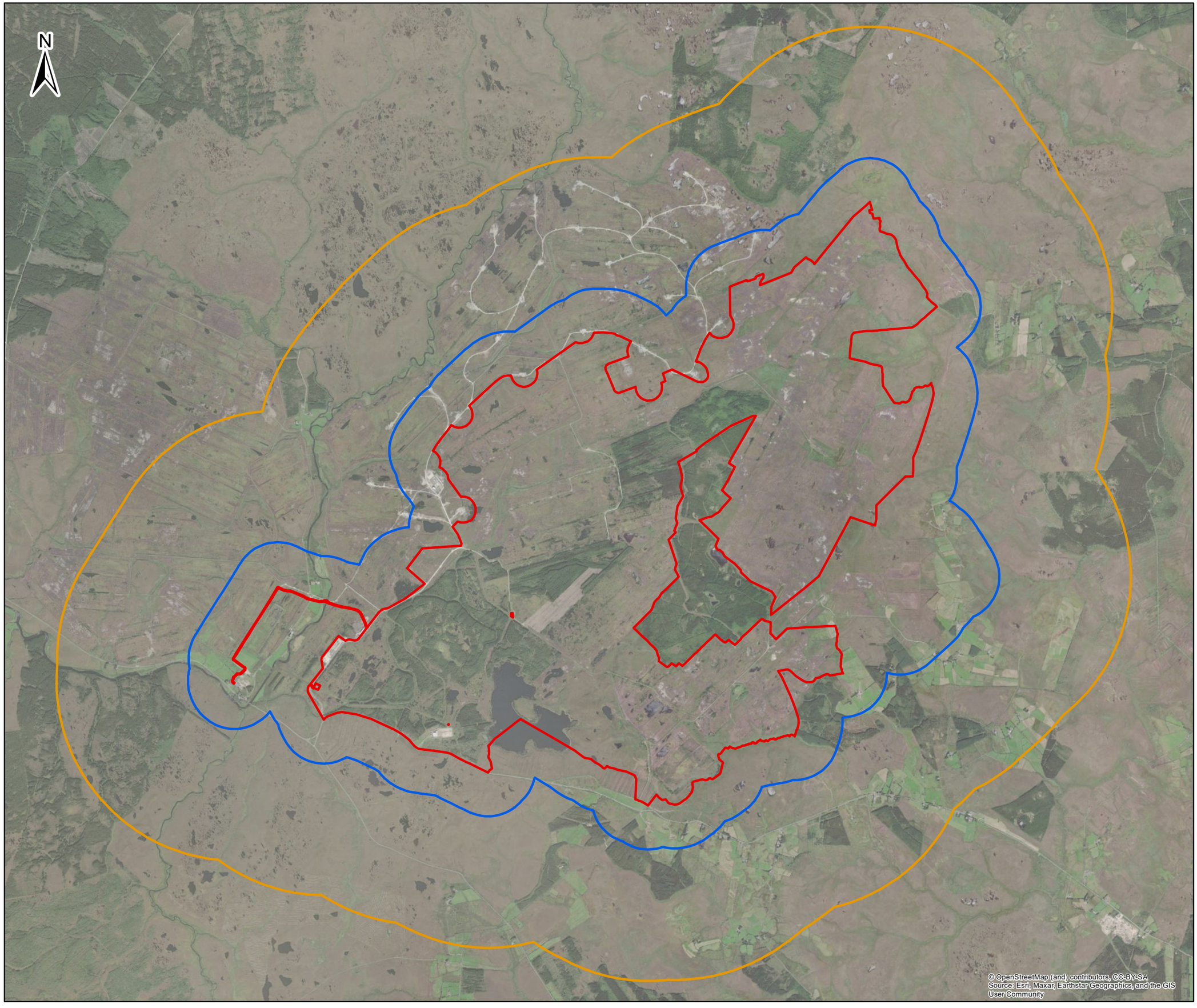
Lowland breeding Waders and Gulls surveys were also undertaken within the study area between April to July, in 2020, 2021 and 2022. The Breeding Wader survey followed methodologies outlined in Gilbert *et. al* (1998)[16] and Brown & Shepherd (1993)[18]. Suitable wader habitat around lakes and watercourses within the site were surveyed. The aim of the survey was to establish the distribution and abundance of breeding waders within the study area.

[16] Gilbert, G., Gibbons, D & Evans, J. (1998). Bird Monitoring Methods. RSPB, Sandy
[17] Cummins, S., Bleasdale, A., Douglas, C., Newton, S., O'Halloran, J. & Wilson, H.J. (2010) The status of Red Grouse in Ireland and the effects of land use, habitat and habitat quality on their distribution. Irish Wildlife Manuals, No. 50. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
[18] Brown, A. F. and Shepherd, K. B. (1993) *A method for censusing upland breeding waders.* Bird Study, 40, pp. 189-195.

Where surveyors encountered colony breeding species, such as breeding gulls, survey methods were further adapted to ensure the most accurate count data was produced. All assemblages of gulls were counted and recorded.

8.6.5.9 Limitations

The information contained in this chapter of the EIAR includes robust data with which the likely impacts as a result of the proposed development were assessed. Where relevant, residual impacts are described in detail. No significant limitations were identified in terms of scale, scope or context in the preparation of the Ornithology Chapter of this EIAR.



Legend

- Planning Application Boundary
- 2km Study Area
- 500m Study Area

0 0.5 1 1.5 2
Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D02	22/03/2023	Draft issue	S.P	J.D
D01	01/02/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Figure 8-1: Breeding and Winter Bird Study Area

Scale @ A3: 1:40,000

Prepared by:	Checked:	Date:
S.Pezzetta	J.Sherry	March 2023

Project Director: D.Grehan

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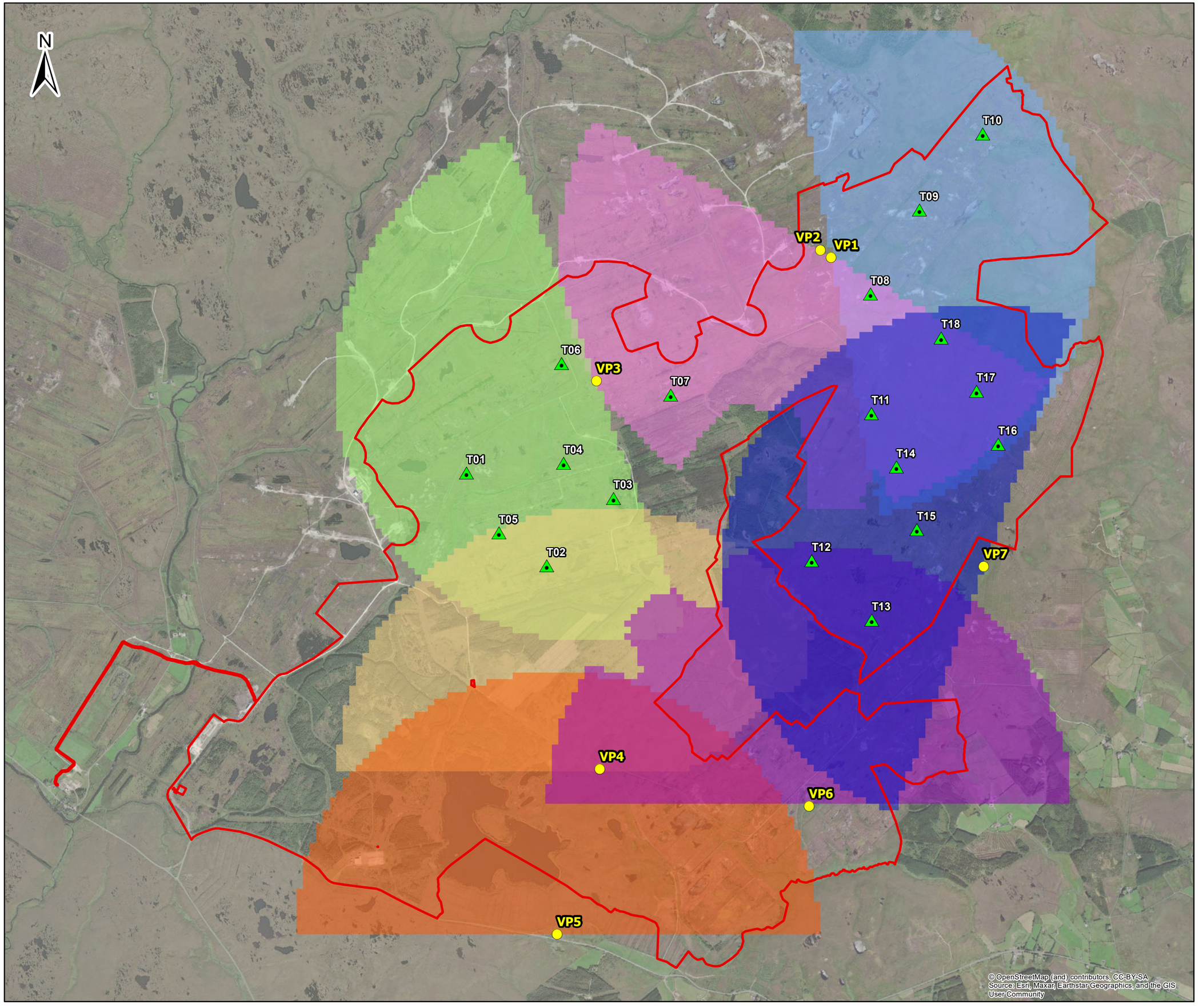
10889-002-B.W.BIR.Std.A-S.BO-TOB-D02

Draft: D02



Legend

- Planning Application Boundary
- Proposed Turbine Locations
- Vantage Points

VP7
- Not Visible
- Visible

VP6
- Not Visible
- Visible

VP5
- Not Visible
- Visible

VP4
- Not Visible
- Visible

VP3
- Not Visible
- Visible

VP2
- Not Visible
- Visible

VP1
- Not Visible
- Visible

0 0.25 0.5 0.75 1
Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
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D01	01/02/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Figure 2-3: Vantage Points and Viewshed

Scale @ A3: 1:27,000

Prepared by:	Checked:	Date:
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Project Director: D.Grehan

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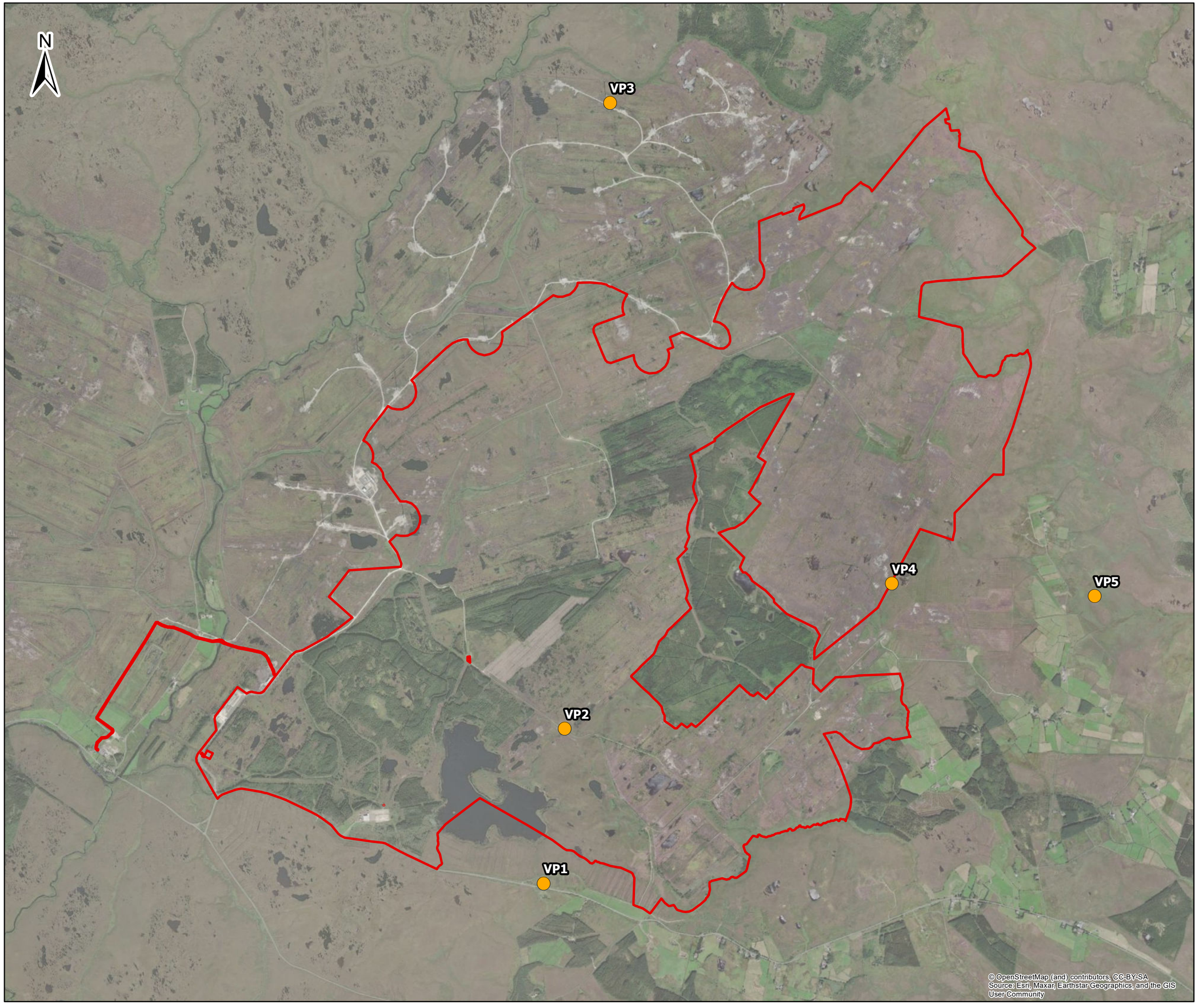
Draft: D02

10889-003-VPs-VdA-TOB-D02



Legend

- Planning Application Boundary
- Hen Harrier Vantage Points

0 0.25 0.5 0.75 1
Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
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D02	22/03/2023	Draft issue	S.P	J.D
D02	01/02/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project:
Oweninny Wind Farm
Phase 3

Title:
Figure 8-3:
Hen Harrier Roost Vantage Points

Scale @ A3: 1:30,000

Prepared by:	Checked:	Date:
S.Pezzetta	J.Sherry	March 2023

Project Director: D.Grehan

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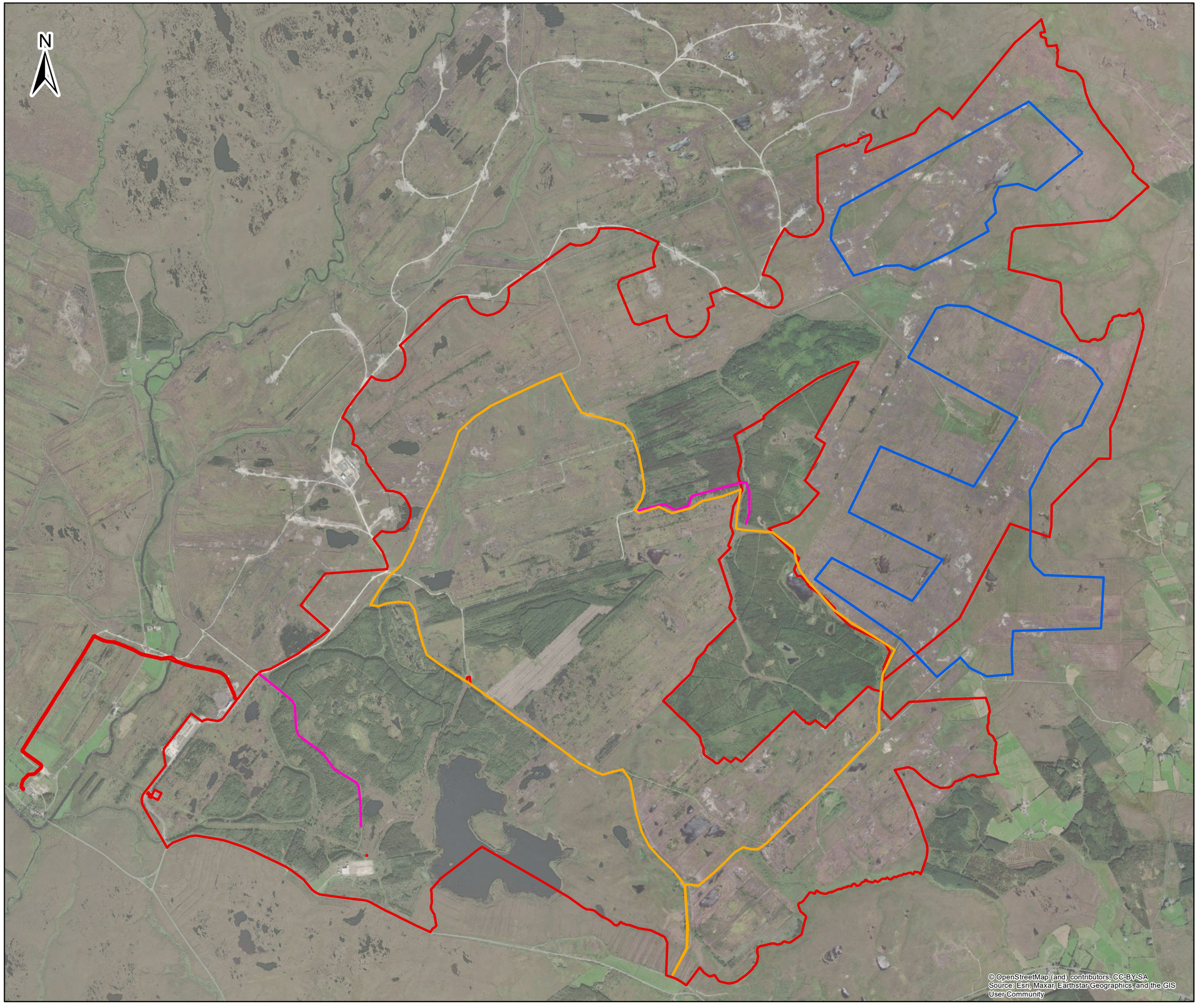
D02



Legend

- Planning Application Boundary
- Breeding Wader Transects
- Breeding and Winter Bird Transects
- Breeding Woodcock Transect

0 0.25 0.5 0.75 1
Kilometres

NOTES

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Issue	Date	Description	By	Chkd.
D02	22/03/2023	Draft issue	S.P	J.D
D01	01/02/2023	Draft issue	S.P	J.S

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Figure 8-4: Breeding and Winter Bird Transects

Scale @ A3: 1:25,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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Draft: D02

8.6.6 Baseline Evaluation Criteria

Ecological resources/receptors are evaluated following NRA (2009c)[2] guidelines (refer to Table 8-4 below) which set out the importance of the resource/receptor in a geographic context. These guidelines are consistent with the approach recommended in the '*Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal*' (CIEEM, 2018)[19].

The information gathered from desk studies and field surveys was used to make an Ecological Impact Assessment (EcIA) of the proposed development upon the identified ecological receptors on an importance scale ranging from international - national - county importance - local importance, high value - local importance, low value. Those features identified as being of high local importance or greater, are then given particular mention in the ecological evaluation as KARs when considering the potential for significant impacts and subsequent requirement for appropriate mitigation. The criteria shown in Table 8-4 have been used in evaluating ecological value within the study area.

In addition, to the criteria listed in Table 8-4 the evaluation of habitats and species also considers other factors such as potential ecological value, secondary supporting values where habitats may perform a secondary ecological function and the social values of an ecological feature such as educational, recreational and economic value.

All potential impacts are assessed against parameters as set out within the NRA guidance (NRA 2009c)[2]and take cognisance of guidance produced by the EPA, '*Guidelines on the information to be contained in Environmental Impact Assessment Reports*' (EPA, 2022)[20]. and CIEEM (CIEEM, 2018)[19]. Via this approach, a scientific and repeatable method is applied whereby all aspects of a potential impact are considered.

The following parameters are described when characterising impacts (following CIEEM [2018], EPA [2022 and NRA [2009c]):

- **Direct and Indirect Impacts**: An impact can be caused either as a direct or as an indirect consequence of a proposed development;

[19] CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.
[20] Environmental Protection Agency (EPA) (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports.

- **Magnitude**: Magnitude measures the size of an impact, which is described as high, medium, low or very low;
- **Extent**: The area over which the impact occurs – this should be predicted in a quantified manner;
- **Duration**: The time for which the impact is expected to last prior to recovery or replacement of the resource or feature;
- **Temporary**: Up to 1 Year;
- **Short Term**: The effects would take 1-7 years to be mitigated;
- **Medium Term**: The effects would take 7-15 years to be mitigated;
- **Long Term**: The effects would take 15-60 years to be mitigated;
- **Permanent**: The effects would take 60+ years to be mitigated;
- **Likelihood**:
  - Certain/Near Certain: >95% chance of occurring as predicted;
  - Probable: 50-95% chance as occurring as predicted;
  - Unlikely: 5-50% chance as occurring as predicted and
  - Extremely Unlikely: <5% chance as occurring as predicted.
- **Frequency and Timing:** The timing of impacts in relation to important seasonal and/or life-cycle constraints should be evaluated. Similarly, the frequency with which activities (and concomitant impacts) would take place can be an important determinant of the impact on receptors and should also be assessed and described;
- **Reversibility**: An irreversible effect is one from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation.

Table 8-4: Criteria for Establishing Receptor Importance (NRA, 2009c)

Importance	Ecological Valuation

International Importance	• European Site including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.
	• Proposed Special Protection Area (pSPA).
	• Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended).
	• Features essential to maintaining the coherence of the Natura 2000 Network.
	• Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.
	• Resident or regularly occurring populations (assessed to be important at the national level) of the following:
	  ○ Species of bird listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or
	  ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
	• Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).
	• World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972).
	• Biosphere Reserve (UNESCO Man & The Biosphere Programme).
	• Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).

Importance	Ecological Valuation
	• Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). • Biogenetic Reserve under the Council of Europe. • European Diploma Site under the Council of Europe.

National Importance	• Site designated or proposed as a Natural Heritage Area (NHA).
	• Statutory Nature Reserve.
	• Refuge for Fauna and Flora protected under the Wildlife Acts.
	• National Park.
	• Undesignated site fulfilling the criteria for designation as an NHA, Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Acts; and/or a National Park.
	• Resident or regularly occurring populations (assessed to be important at the national level) of the following:
	  ○ Species protected under the Wildlife Acts; and/or
	  ○ Species listed on the relevant Red Data list.
	• Site containing 'viable areas 'of the habitat types listed in Annex I of the Habitats Directive.

County Importance	• Area of Special Amenity.
	• Area subject to a Tree Preservation Order.
	• Area of High Amenity, or equivalent, designated under the County Development Plan.
	• Resident or regularly occurring populations (assessed to be important at the County level) of the following:
	  ○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
	  ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
	  ○ Species protected under the Wildlife Acts; and/or
	  ○ Species listed on the relevant Red Data list.
	• Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.
	• County important populations of species or viable areas of semi-natural habitats or natural heritage features identified in the National or Local Biodiversity Action Plan (BAP), if these have been prepared.
	• Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.
	• Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (Higher Value)	• Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared.
	• Resident or regularly occurring populations (assessed to be important at the Local level) of the following:
	  ○ Species of bird listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
	  ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
	  ○ Species protected under the Wildlife Acts; and/or
	  ○ Species listed on the relevant Red Data list.
	• Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;

Importance	Ecological Valuation
	• Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
Local Importance (Lower Value)	• Sites containing small areas of semi-natural habitat that are of some local importance for wildlife. • Sites or features containing non-native species that are of some importance in maintaining habitat links.

The following parameters are described when characterising significance of effects (source: EPA, 2022)[20]:

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

Based on these parameters, an impact is then considered to be either significant or not significant and likely to be either beneficial or adverse. Likely significant effects are predicted on the basis of the proposed development as set out in Chapter 3: Description of the Proposed Development.

8.6.6.1 Evaluating Sensitivity

The sensitivity of birds is defined by Percival (2003)[21] as its ecological importance and nature conservation interest at the site being assessed. Table 8-5 outlines the criteria used in Percival's method to evaluate the sensitivity of a species. A number of factors are used to determine this sensitivity:

- Whether the species is on Annex I of the EU Birds Directive;
- Whether the species is particularly ecologically sensitive – this includes large birds of prey and rare breeding birds (including divers, common scoter, hen harrier, golden eagle, red-necked phalarope, roseate tern and chough);
- Whether the site contains species at nationally important numbers (>1% of Irish population);
- Whether the site contains species at regionally important numbers (>1% of regional population, with the region usually taken as the county); and

[21] Percival, S. M. (2003). Birds and wind farms in Ireland: a review of potential issues and impact assessment. Ecology Consulting, 17, 2234-2236.

- Whether the species is subject to special conservation measures, e.g. as red or amber listed species on the BirdWatch Ireland's list of Birds of Conservation Concern (BoCCI - Gilbert *et al.*, 2021)[22].

The sensitivity is further affected by any nature conservation designations in the area. The determination of sensitivity needs to take into account whether a species contributes to the overall objectives of the designation (including whether the species is noted as a special conservation interest species of the site), and specifically for internationally important SPAs, it needs to consider whether the species contributes to the overall integrity of the site. The determination of sensitivity is summarised in Table 8-5.

Table 8-5: Determination of Sensitivity (Percival, 2003)[21]

Sensitivity	Determining Factor
Very High	Species that form the cited interest of SPAs and other statutorily protected nature conservation areas. Cited means mentioned in the citation text for the site as a species for which the site is designated.
High	Species that contribute to the integrity of 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 EC Birds Directive Species present in regionally important numbers (>1% regional (county) population) Other species on BirdWatch Ireland's Red list of BOCCI
Low	Any other species of conservation interest, including species on BirdWatch Ireland's amber list of BOCCI not covered above.

8.6.6.2 Determining the Magnitude of the Possible Impact

Determining the magnitude of possible impacts on ornithological receptors follows the methodology set out by Percival (2003)[21]. Once the species/population in the study area have been evaluated in terms of their sensitivity, the next step is to determine the magnitude of the possible impacts that may occur on those species/populations. The significance of any one impact is a product of the sensitivity of the receptor, the magnitude of the impact and the probability of that impact occurring. Percival's methodology states *'the test of significance of an impact will be whether the wind farm impact is causing a significant change to the population, its range or distribution'.* The population against which the extent of the impact is felt should be quantified. Percival (2003)[21] defines this population as a local ecological unit of sufficient size. This population provides a baseline against which the possible effect can be assessed. A key

[22] Gilbert G., Stanbury, A., Lewis, L. (2021). Birds of Conservation Concern in Ireland 2020-2026. Irish Birds 9: 523-544.

point in the assessment is whether the proposed development would result in a reduction in the carrying capacity of the local area. The availability of alternative habitat in the wider area is also an important consideration. The magnitude of the possible impact is summarised in Table 8-6 below.

Table 8-6: Determination of Magnitude of Effect (Percival, 2003)[21]

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

To assess the significance of the potential impact, the relationship between sensitivity and magnitude must be understood. The methodology set out by Percival (2003)[21] achieves this by cross-tabulating the magnitude with the sensitivity, using Table 8-7 below, to provide a prediction of the significance of each potential impact.

Table 8-7: Significance Matrix (Percival, 2003)[21]

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

8.7 EXISTING ENVIRONMENT

8.7.1 Outputs of the Desktop Assessment

8.7.1.1 Designated Conservation Sites

A review of important designated sites for avian species within the potential ZoI of the proposed development were identified. Important sites included SPAs, RAMSAR sites, Wildfowl Sanctuaries and National Parks. This included sites within 15km of the proposed development and/or those over 15km away but where a potential pathway for effect was identified, such as surface water connectivity. Figure 8-5 illustrates the location of designated conservation sites within the ZoI 15km buffer around the proposed development site. Distances from each designated conservation site to the proposed development and identified potential pathways for effect are provided in Table 8-8 below.

Table 8-8: Designated Sites

Designated sites	Special Conservation Interests / Scientific Interests	Distance from proposed development	Potential Pathway for Effect
International Sites (European Sites)			
Owenduff/Nephin Complex SPA (004098)	• Merlin (*Falco columbarius*) [A098] • Golden Plover *(Pluvialis apricaria)* [A140]	3km west of the proposed development site boundary	This SPA is located approximately 3.8km west of the Proposed Development site. The SPA is designated for two Special Conservation Interests (SCIs); Merlin and Golden Plover. Both species are known to breed within the SPA (NPWS, 2015)[23]. Considering the distance between the SPA and the Proposed Development site there is no potential for the disturbance of the species within the SPA. The core foraging range for Merlin is 5km while the core foraging range for Golden Plover is 3km (SNH, 2016)[24]. Considering the distance between the Proposed Development site and the SPA, and the habitat present within the Proposed Development site (bog habitat) there is potential that Merlin may forage within the Proposed Development site boundary. However, the Proposed Development site contained comparatively low numbers of Merlin and no important migration flight line routes or breeding territories were found, furthermore the Proposed Development at

[23] NPWS, (2015). Site Synopsis – Owenduff/Nephin Complex SPA. Aviabel online at: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004098.pdf [accessed January 2023].
[24] Scottish Natural Heritage (SNH) (2016). Assessing Connectivity with Special Protection Areas (SPAs) Guidance. Version 3.

Designated sites	Special Conservation Interests / Scientific Interests	Distance from proposed development	Potential Pathway for Effect
			the operational stage has very limited potential to give rise to collision risk to Merlin following the results of the collision risk model. No source-pathway-receptor link exists between the Proposed Development site and the SCIs of this SPA.
Lough Conn and Lough Cullin SPA (004228)	• Tufted Duck *(Aythya fuligula)* [A061] • Common Scoter *(Melanitta nigra)* [A065] • Common Gull *(Larus canus)* [A182] • Greenland White-fronted Goose *(Anser albifrons flavirostris)* [A395] • Wetland and Waterbirds [A999]	11km southwest of the proposed development site boundary	The SPA is designated for four Special Conservation Interests species. Greenland white-fronted goose and tufted duck have been recorded using the site during the winter, while common scoter and common gull are known to breed within the SPA (NPWS, 2014)[25]. Considering the distance between the SPA and the Proposed Development site there is no potential for the disturbance of the species within the SPA. The core foraging range for Greenland White-fronted Goose is 5-8km (SNH 2016)[24]; therefore, the proposed development is located beyond the core foraging range of this special conservation interest species. Core foraging ranges have not been described for the remaining SCIs, but a review of disturbance distances from Goodship & Furness (2022)[26] for wintering Tufted duck (<50m), breeding Common Scoter (300-500m) and breeding Common Gull (200-300m), show that the distance from the proposed development will not cause disturbances to these SCIs. Additionally, the habitats within the Proposed Development site boundary are considered to be sub-optimal compared to other habitats surrounding the Proposed Development site boundary there is no potential for likely significant effects on these special conservation interest species during the construction, operation and decommissioning phases. A surface water pathway exists between the Proposed Development and this SPA via the Shanvolahan and Deel rivers which flow approximately 30km downstream into the SPA. A source-pathway-receptor link therefore occurs between the Proposed Development site and the SPA.

[25] NPWS (2014). Site Synopsis – Lough Conn and Lough Cullin SPA. Available online at: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004228.pdf [accessed January 2023]
[26] Goodship, N.M. and Furness, R.W. (MacArthur Green) Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283.

Designated sites	Special Conservation Interests / Scientific Interests	Distance from proposed development	Potential Pathway for Effect
Killala Bay/Moy Estuary SPA (004036)	• Ringed Plover *(Charadrius hiaticula)* [A137] • Golden Plover *(Pluvialis apricaria)* [A140] • Grey Plover *(Pluvialis squatarola)* [A141] • Sanderling *(Calidris alba)* [A144] • Dunlin *(Calidris alpina)* [A149] • Bar-tailed Godwit *(Limosa lapponica)* [A157] • Curlew *(Numenius arquata)* [A160] • Redshank *(Tringa totanus)* [A162] • Wetland and Waterbirds [A999]	14km northeast of the proposed development site boundary	The SPA is located approximately 14km northeast of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development site, there is no potential for disturbance of SCI species within the SPA. The core winter foraging ranges have not been described for the SCI species of this SPA but a review of disturbance distances from Goodship & Furness (2022)[26] for all the wintering SCIs showed a maximum disturbance distance of 650m (Curlew). Based on this, the proposed development will not cause disturbances to any of the SCIs within the SPA. Additionally, the habitats within the project site boundary are considered to be sub-optimal compared to other habitats surrounding the Proposed Development site boundary there is no potential for likely significant effects on these special conservation interest species. A surface water pathway exist between the Proposed Development and this SPA via the Kilfian South and Cloonaghmore rivers which flow approximately 24km downstream into the SPA. A source-pathway-receptor link therefore occurs between the Proposed Development site and the SPA.
Carrowmore Lake SPA (004052)	• Sandwich Tern *(Sterna sandvicensis)* [A191]	14km west of the proposed development site boundary	The SPA is located approximately 14km west of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development there is no potential for the disturbance of Sandwich terns within the SPA. There is potential that Sandwich Tern may be connected to the Proposed Development site via their large foraging range, which can range from 30 to 70km from breeding colonies (Eglington &

Designated sites	Special Conservation Interests / Scientific Interests	Distance from proposed development	Potential Pathway for Effect
			Parrow, 2014)[27], However Sandwich terns are almost exclusively marine feeders, meaning they do not have to travel to or through the site, due to the location of the SPA (i.e. the coast is located to the west of SPA and the Proposed Development is located to the east. In addition, there were no recordings of Sandwich Tern over the course of the survey period and there is no habitat within the Proposed Development site to support the SCIs. No source-pathway-receptor links exists between the Proposed Development site and the SAC.
Blacksod Bay/Broad Haven SPA (004037)	• Great Northern Diver (*Gavia immer*) [A003] • Brent Goose (*Branta 8-35ernicla hrota)* [A046] • Common Scoter (*Melanitta nigra)* [A065] • Red-breasted Merganser (*Mergus serrator)* [A069] • Ringed Plover (*Charadrius hiaticula)* [A137] • Sanderling (*Calidris alba)* [A144] • Dunlin (*Calidris alpina alpina*) [A149] • Bar-tailed (*Godwit Limosa lapponica)* [A157] • Curlew (*Numenius arquata*) [A160] • Sandwich Tern (*Sterna*	17km west of the proposed development site boundary	The SPA is located approximately 17km west of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development site there is no potential for the disturbance of SCI species within the SPA. The core winter foraging ranges have not been described for SCI species of this SPA, however, the habitats within the project site boundary are considered to be sub-optimal compared to other habitats surrounding the Proposed Development site boundary there is no potential for likely significant effects on these special conservation interest species. A surface water pathway exists between the Proposed Development and this SPA via the Owenmore river which flow approximately 30km downstream into the SPA. A source-pathway-receptor link therefore occurs between the Proposed Development site and the SPA.

27 Eglington S., & Perrow M. (2014). Literature review of tern (Sterna & Sternula spp.) foraging ecology. The Joint Nature Conservation Committee, Norwich. Aviable online at: https://data.jncc.gov.uk/data/926cdbbd-c384-42a9-b9e5-81abd778bbd0/JNCC-Report-500-Annex8-Eglington-Perrow2014.pdf [accessed January 2023].

Designated sites	Special Conservation Interests / Scientific Interests	Distance from proposed development	Potential Pathway for Effect
	sandvicensis) [A191] • Dunlin (*Calidris alpina schinzii*) [A466] • Wetlands and waterbirds [A999]		
Illanmaster SPA (004074)	• Storm Petrel (*Hydrobates pelagicus*) [A014]	22km	The SPA is located approximately 22km northwest of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development there is no potential for the disturbance of Storm Petrel within the SPA. There is potential that Storm petrel may be connected to the Proposed Development site via their large foraging range. However, Storm petrel are exclusively marine feeders meaning they do not have to travel to or through the site due to the location of the SPA (i.e. the coast is located to the north of SPA and the Proposed Development is located to the southeast). In addition, there were no recordings of Storm petrel over the course of the survey period and there is no habitat within the Proposed Development site to support the SCIs. No source-pathway-receptor links exists between the Proposed Development site and the SAC.
Doogort Machair SPA (004235)	• Dunlin (*Calidris alpina schinzii*) [A466]	29km	The SPA is located approximately 29km southwest of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development there is no potential for the disturbance of Dunlin within the SPA. There is no potential that the breeding Dunlin within the SPA are connected to the Proposed Development site due to their short foraging range (core range of 500m[24]). In addition, there were limited recordings of Dublin over the course of the survey period indicating the Proposed

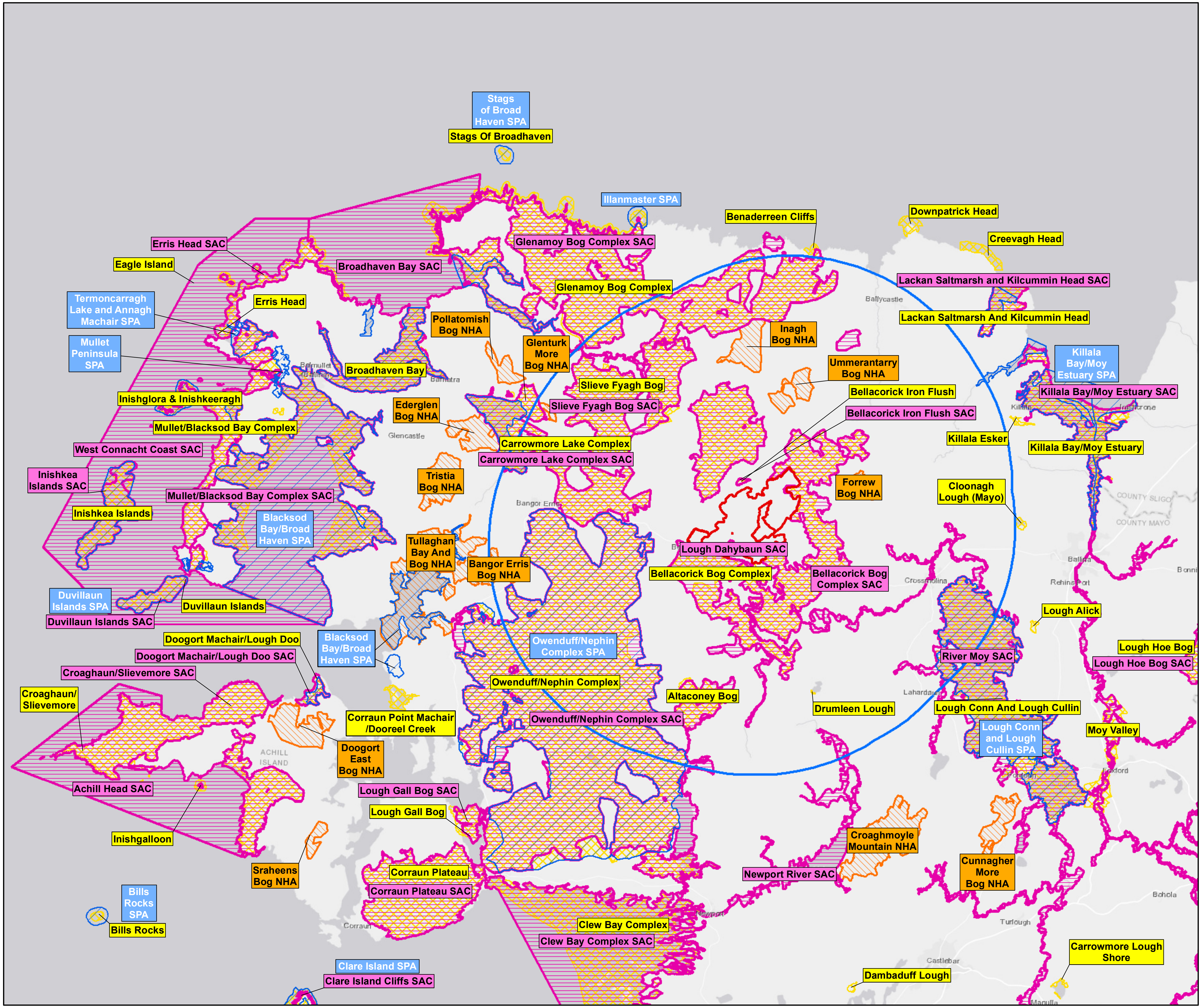
Designated sites	Special Conservation Interests / Scientific Interests	Distance from proposed development	Potential Pathway for Effect
			Development site is not a supporting site for this SCI. No source-pathway-receptor links exists between the Proposed Development site and the SAC.
Stags of Broad Haven SPA (004072)	• Storm Petrel *(Hydrobates pelagicus)* [A014] • Leach's Storm-petrel *(Oceanodroma leucorhoa)* [A015]	29km	The SPA is located approximately 29km northwest of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development there is no potential for the disturbance of SCIs within the SPA. There is potential that Storm petrel and Leach's Storm-petrel may be connected to the Proposed Development site via their large foraging ranges. However as these are exclusively marine feeders, they do not have to travel to or through the site due to the location of the SPA (i.e. the coast is located to the north of SPA and the Proposed Development is located to the southeast). In addition, there were no recordings of either species over the course of the survey period and there is no habitat within the Proposed Development site to support these SCIs. No source-pathway-receptor links exists between the Proposed Development site and the SAC.
Mullet Peninsula SPA (004227)	• Corncrake *(Crex crex)* [A122]	32km	The SPA is located approximately 32km west of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development, there is no potential for the disturbance of Corn crake within the SPA. There also no potential that Corn crake are connected to the Proposed Development site via their foraging ranges, as the species remains in its breeding territories once established. In addition, there were no recordings of the species over the course of the survey period and there is no habitat within the Proposed Development site to support the SCI.

Designated sites	Special Conservation Interests / Scientific Interests	Distance from proposed development	Potential Pathway for Effect
			No source-pathway-receptor links exists between the Proposed Development site and the SAC.
Termoncarragh Lake and Annagh Machair SPA (004093)	• Barnacle Goose *(Branta leucopsis)* [A045] • Lapwing *(Vanellus vanellus)* [A142] • Greenland White-fronted Goose *(Anser albifrons flavirostris)* [A395] • Corncrake *(Crex crex)* [A122] • Dunlin *(Calidris alpina schinzii)* [A466] • Chough (Pyrrhocorax pyrrhocorax) [A346] • Whooper Swan (*Cygnus cygnus*) [A038]	34km	The SPA is located approximately 34km west of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development, there is no potential for the disturbance of SCIs within the SPA. There also no potential that the SCIs are connected to the Proposed Development site via their foraging ranges, due to the lack of suitable habitat for Choughs and Barnacle goose and the short commuting and foraging distances of some species (including Whooper swan, Greenland white fronted goose, Lapwing, Corn crake and Dunlin). In addition, there were no or limited recordings of these species over the course of the survey period indicating the Proposed Development area is not a supporting site to the SPA. No source-pathway-receptor links exists between the Proposed Development site and the SAC.
Duvillaun Islands SPA (004111)	• Barnacle Goose *(Branta leucopsis)* [A045] • Storm Petrel *(Hydrobates pelagicus)* [A014] • Fulmar *(Fulmarus glacialis)* [A009]	37km	The SPA is located approximately 37km west of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development, there is no potential for the disturbance of SCIs within the SPA. There is potential that these species may be connected to the Proposed Development site via their large foraging ranges. However as these species are exclusively marine or coastal feeders, they do not have to travel to or through the site due to the location of the SPA (i.e. the coast is located to the west of SPA and the Proposed Development is located to the east). In addition, there were no recordings of either species over the course of the survey period and there is no habitat within the Proposed Development site to support the SCIs.

Designated sites	Special Conservation Interests / Scientific Interests	Distance from proposed development	Potential Pathway for Effect
			No source-pathway-receptor links exists between the Proposed Development site and the SAC.
Inishglora and Inishkeeragh SPA (004084)	• Herring Gull *(Larus argentatus)* [A184] • Shag *(Phalacrocorax aristotelis)* [A018] • Storm Petrel *(Hydrobates pelagicus)* [A014] • Lesser Black-backed Gull *(Larus fuscus)* [A183] • Cormorant *(Phalacrocorax carbo)* [A017] • Arctic Tern *(Sterna paradisaea)* [A194] • Barnacle Goose *(Branta leucopsis)* [A045]	37km	The SPA is located approximately 37km west of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development, there is no potential for the disturbance of SCIs within the SPA. There is potential that some species may be connected to the Proposed Development site via their large foraging ranges. However as these are exclusively marine or coastal feeders, they do not have to travel to or through the site due to the location of the SPA (i.e. the coast is located to the west of SPA and the Proposed Development is located to the east). In addition, there were no or limited recordings these species over the course of the survey period and there is no habitat within the Proposed Development site to support the SCIs. No source-pathway-receptor links exists between the Proposed Development site and the SAC.
Inishkea Islands SPA (004004)	• Little Tern *(Sterna albifrons)* [A195] • Arctic Tern (*Sterna paradisaea)* [A194] • Dunlin (*Calidris alpina schinzii)* [A466] • Ringed Plover (*Charadrius hiaticula*) [A137] • Common Gull (*Larus canus*) [A182] • Shag (*Phalacrocorax aristotelis*) [A018] • Purple Sandpiper	43km	The SPA is located approximately 43km west of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development, there is no potential for the disturbance of SCIs within the SPA. There is potential that some species may be connected to the Proposed Development site via their large foraging ranges. However, as the majority are exclusively marine or coastal feeders, they do not have to travel to or through the site due to the location of the SPA (i.e. the coast is located to the west of SPA and the Proposed Development is located to the east). In addition, there were no or limited recordings these species over the course of the survey period and there is no habitat within the Proposed Development site to support the SCIs.

Designated sites	Special Conservation Interests / Scientific Interests	Distance from proposed development	Potential Pathway for Effect
	(*Calidris maritima*) [A148] • Turnstone (*Arenaria interpres*) [A169] • Sanderling (*Calidris alba*) [A144] • Barnacle Goose (*Branta leucopsis*) [A045] • Herring Gull (*Larus argentatus*) [A184]		Common Gull was recorded attempting to breed within the Proposed Development site. However, the Common Gull within the Proposed Development site were found to be resident over the survey period, and the population is not believed to be associated with this SPA. No source-pathway-receptor links exists between the Proposed Development site and the SAC.
Clare Island SPA (004136)	• Shag *(Phalacrocorax aristotelis)* [A018] • Chough *(Pyrrhocorax pyrrhocorax)* [A346] • Common Gull *(Larus canus)* [A182] • Razorbill *(Alca torda)* [A200] • Kittiwake *(Rissa tridactyla)* [A188] • Fulmar *(Fulmarus glacialis)* [A009] • Guillemot *(Uria aalge)* [A199]	43km	The SPA is located approximately 43km southwest of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development, there is no potential for the disturbance of SCIs within the SPA. There is potential that some species may be connected to the Proposed Development site via their large foraging ranges. However as the majority are exclusively marine or coastal feeders, they do not have to travel to or through the site due to the location of the SPA (i.e. the coast is located to the west of SPA and the Proposed Development is located to the east). In addition, there were no or limited recordings these species over the course of the survey period and there is no habitat recorded within the Proposed Development site to support the SCIs. Common Gull was recorded attempting to breed within the Proposed Development site. However, the Common Gull within the Proposed Development site were found to be resident over the survey period, and the population is not believed to be associated with this SPA. No source-pathway-receptor links exists between the Proposed Development site and the SAC.

Designated sites	Special Conservation Interests / Scientific Interests	Distance from proposed development	Potential Pathway for Effect
Lough Carra SPA (004051)	• Common Gull *(Larus canus)* [A182]	43km	The SPA is located approximately 43km southwest of the Proposed Development site and thus occurs outside the ZoI of direct habitat impacts and dusts effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SPA. Considering the distance between the SPA and the Proposed Development, there is no potential for the disturbance of SCIs within the SPA. Common Gull was recorded attempting to breed within the Proposed Development site. However, the Common Gull within the Proposed Development site were found to be resident over the survey period, and the population is not believed to be associated with this SPA. No source-pathway-receptor links exists between the Proposed Development site and the SAC.
Other National Sites			
Owenboy, Nephin Mor Forest Nature Reserve	Site utilised by Greenland White fronted geese	2km south-east of the proposed development site	There is limited foraging habitat to support Greenland White Fronted Geese within the proposed development site. Considering the distance and lack suitable habitat within the site, there is no potential for significant effects.
Knockmoyle, Sheskin Nature Reserve	Site supports a range of breeding and wintering bird species.	2.3km northwest of the proposed development site	Considering the distance and lack suitable habitat within the site, there is no potential for significant effects.
Knockmoyle/Sheskin RAMSAR Site (Code: 372)	Site supports a range of breeding and wintering bird species.	700m north of the proposed development site	
Owenboy RAMSAR Site (Code: 371)	Site supports a range of breeding and wintering bird species.	2km south of the proposed development site	Considering the distance and lack suitable habitat within the site, there is no potential for significant effects.
Owenduff Catchment RAMSAR site (Code: 336)	Site supports a range of breeding and wintering bird species.	3.3km west of the proposed development site	Given the distance and lack hydrological connectivity, there is no potential for significant effects.
Ballycroy National Park	Site supports a range of breeding and wintering bird species.	13kms south west of the proposed development site	Given the distance and lack hydrological connectivity, there is no potential for significant effects.



Stags of Broad Haven SPA
Stags Of Broadhaven
Illanmaster SPA
Benaderreen Cliffs
Downpatrick Head
Creevagh Head
Erris Head SAC
Eagle Island
Broadhaven Bay SAC
Glenamoy Bog Complex SAC
Glenamoy Bog Complex
Lackan Saltmarsh and Kilcummin Head SAC
Lackan Saltmarsh And Kilcummin Head
Termoncarragh Lake and Annagh Machair SPA
Erris Head
Pollatomish Bog NHA
Glenturk More Bog NHA
Inagh Bog NHA
Mullet Peninsula SPA
Broadhaven Bay
Ummerantarry Bog NHA
Killala Bay/Moy Estuary SPA
Slieve Fyagh Bog
Bellacorick Iron Flush
Killala Bay/Moy Estuary SAC
Inishglora & Inishkeeragh
Ederglen Bog NHA
Slieve Fyagh Bog SAC
Bellacorick Iron Flush SAC
Mullet/Blacksod Bay Complex
Killala Esker
Carrowmore Lake Complex
Killala Bay/Moy Estuary
West Connacht Coast SAC
Carrowmore Lake Complex SAC
Inishkea Islands SAC
Tristia Bog NHA
Forrew Bog NHA
Cloonagh Lough (Mayo)
Mullet/Blacksod Bay Complex SAC
Inishkea Islands
Blacksod Bay/Broad Haven SPA
Tullaghan Bay And Bog NHA
Lough Dahybaun SAC
Bangor Erris Bog NHA
Bellacorick Bog Complex
Bellacorick Bog Complex SAC
Duvillaun Islands SPA
Duvillaun Islands
Duvillaun Islands SAC
Lough Alick
Doogort Machair/Lough Doo
Blacksod Bay/Broad Haven SPA
Owenduff/Nephin Complex SPA
Lough Hoe Bog
Doogort Machair/Lough Doo SAC
River Moy SAC
Lough Hoe Bog SAC
Croaghaun/Slievemore SAC
Owenduff/Nephin Complex
Croaghaun/Slievemore
Altaconey Bog
Drumleen Lough
Lough Conn And Lough Cullin
Corraun Point Machair /Dooreel Creek
Owenduff/Nephin Complex SAC
Lough Conn and Lough Cullin SPA
Moy Valley
Doogort East Bog NHA
Achill Head SAC
Lough Gall Bog SAC
Lough Gall Bog
Inishgalloon
Croaghmoyle Mountain NHA
Sraheens Bog NHA
Corraun Plateau
Newport River SAC
Cunnagher More Bog NHA
Corraun Plateau SAC
Bills Rocks SPA
Bills Rocks
Clew Bay Complex
Clew Bay Complex SAC
Carrowmore Lough Shore
Clare Island SPA
Clare Island Cliffs SAC
Dambaduff Lough
Ballycastle
Belmullet
Glencastle
Bangor Erris
Crossmolina
Killala
Ballina
COUNTY SLIGO
COUNTY MAYO
Lahardaun
ACHILL ISLAND
Corraun
Newport
Castlebar
Turlough
Foxford
Bohola

Legend

- Planning Application Boundary
- 15km Buffer from Planning Application Boundary
- Special Protection Area (SPA)Special
- Area of Conservation (SAC)Natural
- Heritage Area (NHA)
- Proposed Natural Heritage Area (pNHA)

0 2.5 5 7.5 10
Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

D02	22/03/2023	Draft issue	S.P	J.D
D01	01/02/2023	Draft issue	S.P	J.S
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Figure 8-5: Designated Sites

Scale @ A3: 1:250,000

Prepared by: S.Pezzetta | Checked: J.Sherry | Date: March 2023

Project Director: D.Grehan

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8.7.1.2 National Biodiversity Data Centre Data

A search of the National Biodiversity Data Centre (NBDC) database was carried out for protected avifauna within hectads F91, F92, G01 and G02 which encompass the proposed development site. Results of protected birds are displayed in Table 8-9 below.

Table 8-9: Protected Birds Previously Recorded

Species name	Hectad	Conservation status
Barn Swallow *(Hirundo rustica)*	F91, F92, G01, G02	WA, Amber Listed
Barnacle Goose *(Branta leucopsis)*	F92	WA, Amber Listed
Black-headed Gull *(Larus ridibundus*)	F92, G01	WA, Red Listed
Common Coot *(Fulica atra)*	G01	WA, EU HD Annex II, III, Amber Listed
Common Grasshopper Warbler *(Locustella naevia)*	F91, F92, G01, G02	WA, Amber Listed
Common Kestrel *(Falco tinnunculus)*	F91, F92, G01, G02	WA, Amber Listed
Common Linnet *(Carduelis cannabina)*	F91, F92, G01, G02	WA, Amber Listed
Common Pheasant *(Phasianus colchicus)*	F91, G01, G02	WA, EU HD Annex II, III
Common Pochard *(Aythya ferina)*	F91	WA, EU HD Annex II, III, Amber Listed
Common Sandpiper *(Actitis hypoleucos)*	F91, F92, G01, G02	WA, Amber Listed
Common Snipe *(Gallinago gallinago)*	F91, F92, G01, G02	WA, EU HD Annex II, III, Amber Listed
Common Starling *(Sturnus vulgaris)*	F91, F92, G01, G02	WA, Amber Listed
Common Wood Pigeon *(Columba palumbus)*	F91, F92, G01, G02	WA, EU HD Annex II, III
Corn Crake *(Crex crex)*[28]	F92, G01, G02	WA, EU HD Annex I
Dunlin *(Calidris alpina)*	F91, F92, G02	WA, EU HD Annex I
Eurasian Curlew *(Numenius arquata)*	F91, F92, G01, G02	WA, EU HD Annex II, Red Listed
Eurasian Teal *(Anas crecca)*	F91, F92, G01, G02	WA, EU HD Annex II, III, Amber Listed
Eurasian Wigeon *(Anas penelope)*	F92, G01	WA, EU HD Annex II, III, Amber Listed

[28] The most recent record of Corn Crake record was recorded in July 1991 and has not been observed since. It is considered to extirpated within the areas surrounding the proposed development and therefore was not considered for as a target species or surveyed for as part of this proposed development.

Species name	Hectad	Conservation status
Eurasian Woodcock *(Scolopax rusticola)*	F91, F92, G01, G02	WA, EU HD Annex II, III, Amber Listed
European Golden Plover *(Pluvialis apricaria)*	F91, F92, G01, G02	WA, EU HD Annex I, II, III, Red Listed
Great Black-backed Gull (*Larus marinus)*	F91, F92	WA,
Great Cormorant *(Phalacrocorax carbo)*	F91, F92, G01	WA, Amber Listed
Greylag Goose *(Anser anser)*	G01	Invasive Species, WA, EU HD Annex II, III, Amber Listed
Hen Harrier *(Circus cyaneus)*	F91, F92, G01, G02	WA, Annex I
Herring Gull (Larus argentatus)	F92	WA, Red Listed
House Martin *(Delichon urbicum)*	F91, F92, G01, G02	WA, Amber Listed
House Sparrow *(Passer domesticus)*	F91, F92, G01, G02	WA, Amber Listed
Jack Snipe *(Lymnocryptes minimus)*	F91, F92, G02	WA, EU HD Annex II, III
Lesser Black-backed Gull *(Larus fuscus)*	F91, F92	WA, Amber Listed
Little Grebe *(Tachybaptus ruficollis)*	F92, G01	WA, Amber Listed
Mallard *(Anas platyrhynchos)*	F91, F92, G01, G02	WA, EU HD Annex II, III
Merlin *(Falco columbarius)*	F91, F92, G01, G02	WA, EU HD Annex I
Mew/Common Gull *(Larus canus)*	F91, F92, G01, G02	WA, Amber Listed
Mute Swan *(Cygnus olor)*	F91, G01	WA, Amber Listed
Northern Lapwing *(Vanellus vanellus)*	F91, G01, G02	WA, EU HD Annex II, Red Listed
Northern Wheatear *(Oenanthe oenanthe)*	F91, F92, G01, G02	WA, Amber Listed
Peregrine Falcon *(Falco peregrinus)*	F91, F92, G02	WA, EU HD Annex I
Red Grouse *(Lagopus lagopus)*	F91, F92, G01, G02	WA, EU HD Annex II, III, Red Listed
Ringed Plover *(Charadrius hiaticula)*	F92, G02	WA, Amber Listed
Rock Pigeon *(Columba livia)*	G01	WA, EU HD Annex II
Sand Martin *(Riparia riparia)*	F91, F92, G01, G02	WA, Amber Listed
Sky Lark *(Alauda arvensis)*	F91, F92, G01, G02	WA, Amber Listed
Snowy Owl *(Bubo scandiaca)*	F91, F92	WA, EU HD Annex I
Spotted Flycatcher *(Muscicapa striata)*	F92, G01, G02	WA, Amber Listed
Tufted Duck (*Aythya fuligula*)	F91, G01	WA, EU HD Annex II, Annex III, Amber Listed
Twite *(Carduelis flavirostris)*	F91, G01, G02	WA, Red Listed

Species name	Hectad	Conservation status
White-tailed Eagle (*Haliaeetus albicilla*)	F91	WA
Whooper Swan (*Cygnus cygnus)*	F91, G01, G02	WA, EU HD Annex I
Yellowhammer *(Emberiza citrinella)*	F92, G01, G02	WA, Red Listed

Note: EU HD = European Union Habitats Directive, WA = Wildlife Acts.

8.7.1.3 Bird Sensitivity to Wind Energy Mapping Tool

A Bird Sensitivity to Wind Energy Mapping Tool was accessed (September 2022) through the NBDC map viewer (www.biodiversityireland.ie). The tool has been developed by Birdwatch Ireland to provide spatial data on where birds are likely to be sensitive to wind energy developments in Ireland. Sensitivity of an area is based on a scale of Highest, High, Medium and Low which is derived from species behavioural, distributional and ecological data.

The proposed development is not located within an area which has been designated a sensitivity zone. Areas to the west and south west of the proposed development have been designated as 'Low' sensitivity.

8.7.2 Outputs of the Field Surveys

A list of target species recorded during all ornithology surveys within the ZoI of the proposed development are listed in Table 8-10 and discussed individually hereunder. The recorded species list includes Annex I Birds Directive species, BoCCI Red list species, waterfowl, waders and raptors. The flight lines and transect maps of wintering and breeding species recorded during surveys are shown in Appendix 8.1.

Table 8-10: Target Species Recorded during Bird Surveys from 2019-2022 and Conservation Status.

Species name	Conservation status
Mute Swan *(Cygnus olor)*	BoCCI Amber List (Breeding and Wintering)
Whooper Swan (*Cygnus cygnus*)	Annex I Birds Directive (BD); BoCCI Amber List (Breeding and Wintering)
Mallard *(Anas platyrhynchos)*	BoCCI Amber List (Breeding and Wintering)
Teal *(Anas crecca)*	BoCCI Amber List (Breeding and wintering)
Tufted Duck (*Aythya fuligula*)	BoCCI Amber List (Breeding and wintering)
Little Grebe (*Tachybaptus ruficollis*)	BoCCI Amber List (Breeding and Wintering)
Cormorant *(Phalacrocorax carbo)*	BoCCI Amber List (Breeding and Wintering)

Species name	Conservation status
Grey Heron *(Ardea cinerea)*	BoCCI Green List (Breeding and Wintering)
Red Grouse (*Lagopus lagopus*)	BoCCI Red List (Breeding)
Hen Harrier *(Circus cyaneus)*	Annex I BD, BoCCI Amber List (Breeding)
Kestrel *(Falco tinnunculus)*	BoCCI Red List (Breeding)
Peregrine *(Falco peregrinus)*	Annex I BD; BoCCI Green List (Breeding)
Sparrowhawk (*Accipiter nisus)*	BoCCI Green List (Breeding)
Buzzard *(Buteo buteo)*	BoCCI Green List (Breeding)
Merlin *(Falco columbarius)*	Annex I BD, BoCCI Amber List (Breeding)
Golden Eagle (*Aquila chrysaetos*)	Annex I BD; BoCCI Red List (Breeding)
Egyptian Vulture (*Neophron percnopterus*)	N/A – Very rare vagrant bird
Curlew *(Numenius arquata)*	BoCCI Red List (Breeding and Wintering)
Whimbrel (*Numenius phaeopus*)	BoCCI Green List (Passage)
Dunlin (*Calidris alpina*)	BoCCI Red List (Breeding and Wintering)
Redshank (*Tringa totanus*)	BoCCI Red List (Breeding and Wintering)
Greenshank *(Tringa nebularia)*	BoCCI Green List (Wintering)
Golden Plover *(Pluvialis apricaria)*	Annex I BD, BoCCI Red List (Breeding and Wintering)
Lapwing *(Vanellus vanellus)*	BoCCI Red List (Breeding and Wintering)
Ringed Plover (*Charadrius hiaticula*)	BoCCI Amber List (Breeding and Wintering)
Common Sandpiper (*Actitis hypoleucos*)	BoCCI Amber List (Breeding)
Snipe *(Gallinago gallinago)*	BoCCI Red List (Breeding and Wintering)
Woodcock *(Scolopax rusticola)*	BoCCI Red List (Breeding)
Black-headed Gull *(Chroicocephalus ridibundus)*	BoCCI Amber List (Breeding and Wintering)
Lesser Black-backed Gull *(Larus fuscus)*	BoCCI Amber List (Breeding and Wintering)
Herring Gull *(Larus argentatus)*	BoCCI Amber List (Breeding and Wintering)
Common Gull *(Larus canus)*	BoCCI Amber List (Breeding and Wintering)
Great Black-backed Gull *(Larus marinus)*	BoCCI Green List (Breeding and Wintering)

Species name	Conservation status
Kingfisher (*Alcedo atthis*)	BoCCI Amber List (Breeding)
Meadow Pipit *(Anthus pratensis)*	BoCCI Red List (Breeding)
Grey Wagtail *(Motacilla cinerea)*	BoCCI Red List (Breeding)

8.7.2.1 Key Target Species

Recorded key target species for this proposed development, which have been described in section 8.6.4 are this discussed hereunder, they include Hen Harrier, Kestrel, Peregrine Falcon, Merlin, Golden Plover, Snipe, Red Grouse and Whooper Swan.

8.7.2.1.1 Hen Harrier

Hen Harrier are common at the site in winter and were recorded during the 2019/2020, 2020/2021 and 2021/2022 winter seasons. Hen Harrier was also recorded during the 2019 and 2020 breeding seasons, although these were only on individual occasions at the beginning and end of the breeding season, while the individuals were potentially travelling to their breeding grounds. A total of 67 sightings were recorded over the survey period, during vantage point, breeding and winter bird transects, hen harrier roost and waterfowl surveys. Hen Harrier were recorded throughout the site mostly on open patches of bog and heather, typically occurring in small numbers, usually just one bird hunting or flying but sometimes occurred as pairs, with three recorded at once on one occasion.

Two winter roosts were recorded over the survey period, one to the south of the site and a second roost recorded to the east. The roost to the south of the site is located approximately 500m from the nearest proposed infrastructure (Appendix 8.1.). During the 2020/2021 and 2021/2022 winter season, Hen Harrier were regularly recorded roosting at this location, typically in small numbers - mostly one to three individuals (peak was observed in December 2021). From the 2021/2022 winter season, additional Hen Harrier VPs have been surveyed to confirm the existence of additional roosts in the surrounding area from these surveys. It resulted in the observation of a second roost site, located to the east of the site, approximately 500m from the nearest infrastructure (Appendix 8.1). During three months of the 2021/2022 winter season, Hen Harrier were found to be roosting at this location, from November 2021 to January 2022. They occurred in small numbers, reaching a maximum of three during the months of December 2021 and January 2022. These records of Hen Harrier and their abundances appear to correspond with typical mean numbers historically recorded at roosts in north county

Mayo between 2004 and 2020 (O'Donoghue's, 2021[29]). As a result, the populations recorded within the study area would be valuated as of County importance (Table 8-4).

8.7.2.1.2 Kestrel

Kestrel are common throughout the site and were recorded during the 2020, 2021 and 2022 breeding season, and 2019/2020, 2020/2021 and 2021/2022 winter seasons. A total of 92 sightings were recorded over the survey period during vantage point, and breeding and winter bird transect surveys (Appendix 8.1). The species typically occurred in small numbers, usually just one bird observed hunting or flying, and, on one occasion, two birds were sighted together. Sightings were mostly located along the edges of conifer plantations, hunting or seen flying across open areas of bog. There were no confirmed records of breeding/nest/juveniles over the survey period, but, given the number of sightings and the suitable foraging habitat contained within the site, the species is considered to have a probable breeding status within the proposed development site or within its immediate vicinity. The population within the site is considered of Local Importance (Higher Value).

8.7.2.1.3 Merlin

Merlin were recorded within the site during the 2020, 2021 and 2022 breeding season and the 2020/2021 and 2021/2022 winter seasons. A total of 17 sightings were recorded over the survey period during vantage point, breeding bird transects, Merlin and raptor surveys and waterfowl surveys. Each of the sightings involved the observation of just one bird, while hunting or flying (Appendix 8.1). During the breeding seasons, Merlin was recorded as having a possible breeding status onsite, as birds were often recorded within or near suitable breeding habitat, although there were no confirmed records of nests or juveniles during the surveys. The majority of Merlin records over the Breeding season related to birds seen to the east and north of the site (within the 2km study area), the nearest recorded flying 10m from proposed infrastructure. As these locations contained more suitable foraging and nesting habitat, and are more remote from human disturbance, breeding is more probable at there, in comparison to the proposed development site, although no nests or juveniles could be found in either location over the survey period. During the winter seasons, Merlin was infrequently recorded and typically occurred towards the north of the proposed development site. Due to their low level of flight activity, Merlin were not included in the collision risk modelling. The population within the site is considered of Local Importance (Higher Value).

[29] O'Donoghue, B. (2021). Hen Harrier *Circus cyaneus* ecology and conservation during the non-breeding season in Ireland. *Bird Study*. 67. 1-16.

8.7.2.1.4 Peregrine

Peregrine was recorded infrequently during surveys, with observations during the 2019 and 2022 breeding seasons, and the 2019/2020 and 2020/2021 winter seasons. A total of eight sightings were recorded over the survey period during vantage point and breeding bird transect surveys. The species typically occurred in small numbers, usually just one bird observed hunting or flying (Appendix 8.1). There is limited/no suitable nesting habitat within the study area and there was no evidence of breeding behaviour recorded over the survey period. Due to its low level of flight activity, Peregrine were not included in the collision risk modelling. The population within the site is considered of Local Importance (Higher Value).

8.7.2.1.5 Golden Plover

Golden Plover were regularly recorded at the site during the 2019/2020, 2020/2021 and 2021/2022 winter seasons and during late 2019, 2021 and 2022 breeding seasons. A total of 2,635 sightings were recorded over the survey period during vantage point surveys, breeding bird transects, winter bird transects and waterfowl surveys, the vast majority of which (2,591) occurred during the winter seasons. Flocks varied between months, with a mean flock size of c.50 birds, with a flock of up to 400 being recorded in February 2021. The majority of golden plover recorded relate to flights or roosting flocks, which were relatively spread across the site and within the 2km study area (Appendix 8.1). There were no confirmed records of Golden Plover breeding on site and, as only five of the sightings occurred within the late breeding seasons in 2019, 2021 and 2022, these records likely relate to birds on migration or failed breeders from elsewhere. The population within the site is considered of Local Importance (Higher Value).

8.7.2.1.6 Snipe

Snipe were regularly recorded during surveys, with a total of 288 observations recorded during the 2019, 2020, 2021 and 2022 breeding seasons and the 2020/2021 and 2021/2022 winter seasons. Observations were spread throughout the site on wetter sections of cutover bog, as well as around the large number of permanent and temporary pools present throughout the proposed development site (Appendix 8.1). The majority of recordings of snipe were flushed from the ground, while breeding activity, which included drumming and courtship display flights, were regularly recorded during the breeding bird seasons, often observed in suitable breeding habitat. Therefore, the species is assumed as a probable breeder at a number of locations within the proposed development site, and likely to have nested and produced young, although it could

not be confirmed due to the cryptic nature of the species. The population within the site is considered of Local Importance (Higher Value).

8.7.2.1.7 Red Grouse

Red Grouse are regularly observed at the site, specifically at the few areas of pristine bog with abundant heather. During targeted red grouse surveys conducted during the 2021 and 2022 breeding season, a total of 14 (2021) and 22 (2022) birds were recorded (Appendix 8.1). The majority of the records occurred to the northeast of the site, within intact blanket bog and its vicinity. These totals equate to 0.45 (2021) and 0.67 (2022) red grouse per km square, which are lower than the national average of 1.11 birds per square kilometre for all one-kilometre squares with potentially suitable habitat surveyed during the 2006-2008 national Red Grouse Survey (Cummins *et al.*, 2010)[17]. Similarly, large sections of the proposed development site have been deemed as unsuitable for Red Grouse (low quality or cutover bog) and so the population within the site is considered of Local Importance (Higher Value). Other records include five sightings which occurred in the 2020, 2021 and 2022 breeding season during breeding bird transects and during 2021/2022 winter season as an incidental sighting while driving through the site. Red grouse is recorded as probably breeding in the areas of intact blanket bog to northeast of the site.

8.7.2.1.8 Whooper Swan

Whooper Swan were recorded 88 times during vantage point and walkover surveys during the winter seasons of 2019/2020, 2020/2021 and 2021/2022, with no records of whooper swans during the breeding season surveys. Flocks were typically small and ranged from a single bird up to eight (Appendix 8.1). The peak number of eight individuals is less than 1% of the county Mayo population of 973 (Burke *et al* 2021)[30] and so this population is considered of Local Importance (Higher Value). The majority of whooper swan recorded relate to flights, which were relatively spread across the site. There were no consistent records of Whooper Swan during any of the winter seasons, which suggests that birds seen were commuting to breeding or wintering grounds elsewhere. A smaller proportion of records note small flocks feeding or roosting on small lakes within the site, including a roost that is found on Lough Dahybaun. The roost is located on suitable habitat over 500m away from the proposed infrastructure.

[30] Burke, B., McElwaine, J.G., Fitzgerald, N., Kelly, S.B.A., McCulloch, N., Walsh, A.J. and Lewis, L.J., (2021). Population size, breeding success and habitat use of Whooper Swan *Cygnus cygnus* and Bewick's Swan *Cygnus columbianus bewickii* in Ireland: results of the 2020 International Swan Census. *Irish Birds*, *43*, pp.57-70.

8.7.2.2 Secondary Target Species

Recorded secondary target species for the proposed development, which have been described in section 8.6.4 are discussed hereunder. These include species of regional conservation concern or BoCCI amber listed and include other species, waders, gulls and waterbirds. BOCCI red listed species of passerines, such as meadow pipit and Grey Wagtail, have also been considered in this report as their ecological characteristics may make these species vulnerable to significant impacts from the proposed development.

8.7.2.2.1 Mute Swan

Mute Swan were regularly recorded within the study area, with a total of 71 observations over vantage point, transect and waterfowl surveys, during the winter seasons of 2019/2020 and 2021/2022 and the breeding seasons of 2019, 2020 and 2021 (Appendix 8.1). The highest level of activity was recorded on Lough Dahybaun, located at the southern edge of the proposed development site. Although the majority of sightings relate to a pair of birds regularly seen foraging on the lake, breeding was confirmed in 2020, when a single cygnet was recorded with the adult pair. The resident population consists of that single pair of swans that are seen year-round, although the proposed development site is also used by other single adults, or pairs, that occasionally commute and/or forage on smaller pools. This population is considered to be of Local Importance (Higher Value).

8.7.2.2.2 Mallard

Mallard are common within the study area and were recorded in both the 2020 and 2021 breeding seasons (and are confirmed breeding at the proposed development site), and the 2019/2020, 2020/2021 and 2021/2022 winter seasons. A total of 349 observations were recorded within the study area, during vantage point, breeding and winter bird transects, Hen harrier roost, and waterfowl surveys (Appendix 8.1). The species typically occurred in small numbers of between 1 and 4 birds, but flocks of up to 11 were also recorded. Birds were often recorded on, or near, water bodies, such as the numerous lakes or drainage ditches scattered throughout the site. The resident population is likely to be made up of 3-4 pairs of mallard that move around the proposed development site and are resighted on different water bodies. This population is considered to be of Local Importance (Higher Value).

8.7.2.2.3 Teal

Teal are common within the study area and recorded in both the 2020 and 2021 breeding season (and confirmed breeding at the site), and the 2019/2020, 2020/2021 and 2021/2022 winter seasons. A total of 208 observations were recorded within the site, during vantage point, breeding and winter bird transects, and waterfowl surveys (Appendix 8.1). The species typically occurred in small numbers, but flocks of up to 7 individuals were recorded during winter months. During the breeding season, Teal were often recorded in pairs on, or near, water bodies such as the numerous lakes or drainage ditches scattered throughout the proposed development site. During the winter, birds were often seen in small flocks of between two and six individuals, foraging on the lakes and pools present within the proposed development site. This population is considered to be of Local Importance (Higher Value).

8.7.2.2.4 Little Grebe

Little Grebe are common within the study area and were recorded in the 2020 and 2022 breeding season (and confirmed breeding at the proposed development site), and the 2020/2021 and 2021/2022 winter seasons. A total of 51 Little Grebe sightings were recorded within the proposed development site during vantage point, breeding and winter bird transects, and waterfowl surveys (Appendix 8.1). The species typically occurred in small numbers, but flocks of up to five individuals were recorded during winter months. During the breeding season, Little Grebe were often recorded in pairs on, or near, water bodies, within the proposed development site. During the winter, birds were often seen in small flocks of between two and five individuals foraging on the the proposed development site's wetlands. This population is considered to be of Local Importance (Higher Value).

8.7.2.2.5 Tufted Duck

Tufted ducks are common during winter months within the study area, having been recorded in the 2019/2020, 2020/2021 and 2021/2022 winter seasons, and also during the 2020 breeding season. Tufted duck were recorded a total of 169 times within the proposed development site, during vantage point, hen harrier roost, and waterfowl surveys (Appendix 8.1). During winter months, the species typically occurred in small numbers, but flocks of up to 24 were sighted, typically feeding or roosting on Lough Dahybaun. During the breeding season, in April 2020, four tufted duck (three male and one female) were recorded at three occasions, during a vantage point survey on VP4. The species was recorded in suitable habitat (small lake/pond), but

breeding was not confirmed, as they were not recorded again in subsequent visits. This population is considered to be of Local Importance (Higher Value).

8.7.2.2.6 Cormorant

Cormorant were recorded within the study area in all the breeding and wintering seasons from 2019-2022 . Cormorant were recorded a total of 23 times within the site, during vantage point and waterfowl surveys (Appendix 8.1). The species typically occurred in small numbers, usually just one bird feeding or roosting, but up to four were recorded on one occasion, flying over the site, in the winter 2019/2020 season. The majority of sightings occurred on, or around, Lough Dahybaun, in the southern section of the site. There was no evidence that birds recorded during the breeding bird seasons were breeding onsite. This population is considered to be of Local Importance (Higher Value).

8.7.2.2.7 Grey Heron

Grey Heron are common within the study area in all the breeding and wintering seasons from 2019-2022. Grey heron were recorded a total of 46 times within the site, during vantage point, breeding and winter bird transects and waterfowl surveys (Appendix 8.1). The species typically occurred in small numbers, usually just one bird feeding or flying. There was no evidence that birds recorded during the breeding bird seasons were breeding onsite. Birds were often recorded on or near water bodies, as the lakes and/or drainage ditches at the proposed development site. This population is considered to be of Local Importance (Higher Value).

8.7.2.2.8 Sparrowhawk

Sparrowhawk were recorded infrequently within the study area during the 2019, 2020, 2021 and 2022 breeding season, and the 2020/2021 and 2021/2022 winter seasons. There was a total of 16 sightings over the survey period during vantage point, breeding and winter bird transect surveys (Appendix 8.1). Recording of this species was exclusively made-up solitary birds, while hunting or flying. Sparrowhawk was recorded as having a possible breeding status onsite, as observations were recorded near suitable nesting habitat (large areas of conifer plantation). This population is considered to be of Local Importance (Higher Value).

8.7.2.2.9 Buzzard

Buzzard were rarely recorded within the study area, and only found three times during the 2020/2021 winter season and 2022 breeding season, during vantage point surveys.

Observations involved a single bird, which was observed flying or hunting. Further information regarding flightlines and observations can be found in Appendix 8.1. Numbers of ecological significance were not recorded over the survey period and so the proposed development site is not of significance to the species.

8.7.2.2.10 Golden eagle

Golden Eagle was recorded once during a vantage point survey within the 2019 breeding season. This was a record within the site of an adult bird flying over. It was likely on passage through the site, as it was not recorded again. Further information regarding flightlines and observations can be found in Appendix 8.1. Numbers of ecological significance were not recorded over the survey period and so the proposed development site is not of significance to the species.

8.7.2.2.11 Egyptian vulture

Egyptian Vulture *(Neophron percnopterus)* was recorded once during a vantage point survey within the 2021 breeding season. This was a rare, vagrant bird, not typically found in Ireland. It was likely on passage through the site, as it was not recorded again. Further information regarding flightlines and observations can be found in Appendix 8.1. Numbers of ecological significance were not recorded over the survey period and so the proposed development site is not of significance to the species.

8.7.2.2.12 Curlew

Curlew were recorded on one occasion at Lough Dahybaun in June 2020. The were no records of curlew breeding within the proposed development site during the surveys and this bird recorded was likely on migration or a failed breeder from elsewhere. Further information regarding flightlines and observations can be found in Appendix 8.1. Numbers of ecological significance were not recorded over the survey period and so the proposed development site is not of significance to the species.

8.7.2.2.13 Whimbrel

Whimbrel was only recorded once within the proposed development site, during the end of 2019 breeding season, where it was observed foraging and flying during vantage point surveys. This bird was likely on its migration to its wintering grounds. No other observations of Whimbrel were recorded. Further information regarding flightlines and observations can be found in

Appendix 8.1. Numbers of ecological significance were not recorded over the survey period and so the proposed development site is not of significance to the species.

8.7.2.2.14 Dunlin

Dunlin were rarely recorded within the site and was only found twice, one bird in July 2021 and a pair in July 2022 during the breeding season, where they were observed during a breeding wader survey. The birds were located roughly in the same location in both 2021 and 2022, in suitable breeding habitat approximately 1.7km from the nearest infrastructure site, however there was no evidence to that it bred at this location and it was not recorded here during previous visits or in subsequent surveys. Further information regarding these observations can be found in Appendix 8.1. This population is considered to be of Local Importance (Higher Value).

8.7.2.2.15 Redshank

Redshank were rarely recorded within the site and was only found twice in April 2020 during the breeding season, where it was observed during a breeding wader survey and a gull survey. These records related to single bird, foraging in suitable breeding habitat approximately 1.9km from the nearest infrastructure site, however there was no evidence to that it bred at this location and it was not recorded here during previous visits or in subsequent surveys. Further information regarding flightlines and observations can be found in Appendix 8.1. This population is considered to be of Local Importance (Higher Value).

8.7.2.2.16 Greenshank

Greenshank were occasionally recorded within the site, occurring within the 2021 breeding season and the 2020/2021 and 2021/2022 winter seasons. A total of 14 sightings were recorded over the survey period during vantage point surveys, breeding bird transects, hen harrier roost watches and waterfowl surveys. The species typically occurred in small numbers, usually just one bird observed foraging or flying with one record of two birds seen together. Greenshank was recorded as having a possible breeding status onsite, as birds were often recorded within or near suitable breeding habitat, however, there were no confirmed breeding records during the surveys.Further information regarding flightlines and observations can be found in Appendix 8.1. This population is considered to be of Local Importance (Higher Value).

8.7.2.2.17 Lapwing

Lapwing were only observed once during the end of the 2021 breeding season, where two birds were recorded flying over the site during vantage point surveys. These birds were likely on migration to their wintering grounds. No other observations of lapwing were recorded. Further information regarding flightlines and observations can be found in Appendix 8.1. Numbers of ecological significance were not recorded over the survey period and so the proposed development site is not of significance to the species.

8.7.2.2.18 Ringed Plover

Ringed Plover were commonly recorded onsite mostly during the 2020, 2021 and 2022 breeding seasons, with a small number recorded in the late 2020/2021 and 2021/2022 winter seasons. A total of 181 sightings were recorded over the survey period during, vantage point surveys, breeding bird transects, and winter bird transect surveys. Sightings typically recorded pairs or individuals, with the highest count of three birds recorded at once. The majority of records related to pairs of Ringed Plover recorded within the large areas of cutover bog to the northeast, east and southeast of the site. During the breeding seasons pairs were recorded as having either a confirmed or probable breeding status in these areas, as suitable habitat could be found, birds were observed preforming courtship displays, appeared to be holding permanent territories (recorded in same areas on repeat visits) or some birds were recorded performing distraction displays. Further information regarding flightlines and observations can be found in Appendix 8.1. This population is considered to be of Local Importance (Higher Value).

8.7.2.2.19 Common Sandpiper

Common Sandpiper were commonly recorded onsite mostly during the 2020, 2021 and 2022 breeding seasons. A total of 77 sightings were recorded over the survey period during, vantage point surveys and breeding bird transects. Sightings typically recorded pairs or individuals. Birds were often recorded on or near waterbodies such as the numerous lakes or drainage ditches scattered throughout the site and was noted as being a probable breeder on site as pairs were often recorded in suitable habitat. There were no confirmed breeding records of Common Sandpiper during the surveys. Further information regarding flightlines and observations can be found in Appendix 8.1. This population is considered to be of Local Importance (Higher Value).

8.7.2.2.20 Woodcock

Woodcock are rare at the proposed development site and were only recorded on two occasions during Winter walkover surveys in December 2020 and January 2021. The woodcock were both flushed from scrub and woodland habitat. There were no records of woodcock during any of the breeding season surveys including during targeted breeding woodcock surveys. Further information regarding flightlines and observations can be found in Appendix 8.1. Numbers of ecological significance were not recorded over the survey period and so the proposed development site is not of significance to the species.

8.7.2.2.21 Black-headed Gull

Black-headed Gull are rare at the proposed development site and were only recorded on one occasion during the Winter VP survey in January 2022. The Black-headed Gull was observed flying north over the site from VP7. They were not confirmed breeding during the surveys. Further information regarding flightlines and observations can be found in Appendix 8.1. Numbers of ecological significance were not recorded over the survey period and so the proposed development site is not of significance to the species.

8.7.2.2.22 Lesser Black-backed Gull

Lesser Black-backed Gull were recorded during surveys in the 2019, 2020, 2021 and 2022 breeding seasons, with a small number recorded in the late 2020/2021 and 2021/2022 winter seasons. A total of 71 sightings were recorded during vantage points and breeding and winter transect surveys during both the breeding and winter surveys. The majority of recordings were of one or two birds flying over waterbodies or bog habitat with a maximum of 7 birds seen flying over during the 2020 breeding season. The Lesser Black-backed Gull were regularly found in the breeding season throughout the proposed development site and were rarely recorded in winter. They were not confirmed breeding at the site and the site contained few areas of suitable nesting habitat, the large amount of records seen over the breeding season are likely to be non-breeders or juveniles. Further information regarding flightlines and observations can be found in Appendix 8.1. This population is considered to be of Local Importance (Higher Value).

8.7.2.2.23 Herring Gull

Herring Gull are rare at the proposed development site and were only recorded on one occasion during the Winter VP survey in December 2021. The Herring Gull was observed flying north over the site from VP5. They were not confirmed breeding during the surveys. Further

information regarding flightlines and observations can be found in Appendix 8.1. Numbers of ecological significance were not recorded over the survey period and so this species is considered to be of Local Importance (Lower Value).

8.7.2.2.24 Common Gull

Common Gull were recorded 163 times throughout the 2019, 2020, 2021 and 2022 breeding seasons during vantage point, breeding transect and targeted gull surveys. The species typically occurred in small numbers, ranging from single individual to flocks up to seven birds on occasion. The species were predominantly recorded around Lough Dahybaun but was recorded at a number of other small lakes present around the proposed development site. They were confirmed breeding within the study area at several different locations throughout the breeding surveys, the nearest confirmed location being 1.7km from proposed infrastructure and the nearest probable location being 500m. Further information regarding flightlines and observations can be found in Appendix 8.1. This population is considered to be of Local Importance (Higher Value).

8.7.2.2.25 Great Black-backed Gull

Great Black-backed Gull were recorded 30 times during both the during the 2019, 2020 and 2021 breeding season and the 2020/2021 winter season. The majority of recording were of single individuals in flight with a maximum count of 2 birds seen on 5 occasions. Great Black-backed Gull were found in the breeding season throughout the site area and were rare in winter. They were not confirmed breeding at the site. Further information regarding flightlines and observations can be found in Appendix 8.1. This population is considered to be of Local Importance (Higher Value).

8.7.2.2.26 Kingfisher

Kingfisher are rare at the proposed development site and was only recorded on one occasion during the breeding bird transect surveys in 2020. It's likely the species uses watercourses within and downstream of the proposed development site for foraging. No breeding or evidence of occupied nests or juveniles were recorded during the survey period. Numbers of ecological significance were not recorded over the survey period and so this species is considered to be of Local Importance (Lower Value).

8.7.2.2.27 Meadow Pipit

Meadow Pipit are common at the site in both the breeding and winter seasons and are confirmed breeding at the site. A total of 813 observations were recorded during the surveys. Most of the records were of small flocks of between 2 and 6 individuals seen displaying, flying over or heard singing during the surveys. A maximum individual count of 18 birds was recorded in April 2020. Breeding was confirmed at a number of locations and there is probable breeding status throughout the site. Further information regarding flightlines and observations can be found in Appendix 8.1. This population is considered to be of Local Importance (Higher Value).

8.7.2.2.28 Grey Wagtail

Grey Wagtail were occasionally recorded close to waterbodies and ponds and are confirmed to be breeding within the proposed development site, the nearest confirmed recorded being 500m from proposed infrastructure (amenity track). There were four observations of the species which were recorded during the 2020 breeding season and one recording during the 2021/ 2022 winter season. Further information regarding flightlines and observations can be found in Appendix 8.1. This population is considered to be of Local Importance (Higher Value).

8.7.2.3 Other Species of Lower Conservation Concern

Other avian species were recorded within the proposed development site but were not included within the evaluation due to their Green listed conservation status[7] and/or have been described as being little impacted by wind farms as per SNH (2017)[8]. As a result of this status, it is highly unlikely that the proposed development would have significant effects on their populations and were not included in collision risk modelling due to their low concern status. The species list is shown below in Table 8-11, and their populations considered to be of Local Importance (Lower Value)

Table 8-11: Species of lower concern Recorded during Bird Surveys from 2019-2022 and Conservation Status.

Species name		
Barn Swallow (*Hirundo rustica*)	Grasshopper Warbler (*Locustella naevia)*	Pheasant (*Phasianus colchicus)*
Blackbird (*Turdus merula*)	Great Tit (*Parus major)*	Raven (*Corvus corax)*
Blackcap (*Sylvia atricapilla*)	Hooded Crow (*Corvus cornix)*	Reed Bunting (*Emberiza schoeniclus)*

Species name		
Blue Tit (*Cyanistes caeruleus*)	Jay (*Garrulus glandarius)*	Robin (*Erithacus rubecula)*
Chaffinch (*Fringilla coelebs)*	Lesser Redpoll (*Acanthis cabaret)*	Sand Martin (*Riparia riparia)*
Cuckoo (*Cuculus canorus)*	Linnet (*Linaria cannabina)*	Sedge warbler (*Acrocephalus schoenobaenus)*
Common Crossbill (*Loxia curvirostra)*	Long-tailed Tit (*Aegithalos caudatus)*	Siskin (*Spinus spinus)*
Coal Tit (*Periparus ater)*	Magpie (*Pica pica)*	Song Thrush (*Turdus philomelos)*
Dunnock (*Prunella modularis)*	Mistle Thrush (*Turdus viscivorus)*	Stonechat (*Saxicola rubicola)*
Goldcrest (*Regulus regulus)*	Moorhen (*Gallinula chloropus)*	Willow warbler (*Phylloscopus trochilus)*
Goldfinch (*Carduelis carduelis)*	Northern Wheatear (*Oenanthe oenanthe)*	Wren (*Troglodytes troglodytes)*

8.7.2.4 Evaluation of Avifauna

An evaluation of avifauna recorded during the surveys is provided below in Table 8-12

Table 8-12: Key Ornithological Receptor Evaluation and Selection Criteria

Name	NRA Evaluation (NRA 2009c)[2]	NRA Criteria (Baseline data)	Key Avian Receptor	Percival Sensitivity Evaluation (Percival 2003)[21]	Determining Criteria
Mute Swan	Locally Important (Higher value)	• Present year round; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, protected under Wildlife Act.	Yes	Low	Any other species of conservation concern.
Whooper Swan	Locally Important (Higher value)	• Wintering population; • Resident or regularly occurring populations (but was not found to be occurring at 1% of the county population; assessed to be important at the local level) of the following: ▪ Species of bird, listed on Annex I and/ or referred to in Articles 4 (2) of the Birds Directive)	Yes	Medium	Species on Annex I of the EU Birds Directive.
Mallard	Locally Important (Higher value)	• Present year round; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, protected under Wildlife Act.	Yes	Low	Any other species of conservation concern.

Name	NRA Evaluation (NRA 2009c)[2]	NRA Criteria (Baseline data)	Key Avian Receptor	Percival Sensitivity Evaluation (Percival 2003)[21]	Determining Criteria
Teal	Locally Important (Higher value)	• Present year round; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, protected under Wildlife Act.	Yes	Low	Any other species of conservation concern.
Tufted Duck	Locally Important (Higher value)	• Wintering population; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, protected under Wildlife Act.	Yes	Low	Any other species of conservation concern.
Cormorant	Locally Important (Higher value)	• Present year round; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, protected under Wildlife Act.	Yes	Low	Any other species of conservation concern.
Grey Heron	Locally Important (Higher value)	• Present year round • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, protected under Wildlife Act.	Yes	Low	Any other species of conservation concern.

Name	NRA Evaluation (NRA 2009c)[2]	NRA Criteria (Baseline data)	Key Avian Receptor	Percival Sensitivity Evaluation (Percival 2003)[21]	Determining Criteria
Red Grouse	Locally Important (Higher value)	• Present in winter and summer; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, listed on the relevant Red Data List.	Yes	Medium	Red List BoCCI
Hen Harrier	County Importance	• Recorded regularly at roosting sites during the winter months; • Resident or regularly occurring populations (assessed to be important at the County level) of the following: ▪ Species of bird, listed on Annex I and/ or referred to in Articles 4 (2) of the Birds Directive); and ▪ County important populations of the species.	Yes	High	Species on Annex I of the EU Birds Directive.
Kestrel	Locally Important (Higher value)	• Present year round; • Probable breeder at the site; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, listed on the relevant Red Data List.	Yes	Medium	Red List BoCCI
Peregrine	Locally Important (Higher value)	• Foraging at the site in all seasons; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, listed on Annex I and/ or referred to in	Yes	Medium	Species on Annex I of the EU Birds Directive.

Name	NRA Evaluation (NRA 2009c)[2]	NRA Criteria (Baseline data)	Key Avian Receptor	Percival Sensitivity Evaluation (Percival 2003)[21]	Determining Criteria
		Articles 4 (2) of the Birds Directive)			
Buzzard	No Population of Ecological Significance	• Recoded in low numbers foraging at the site in all seasons;	No	Low	Any other species of conservation concern.
Golden Eagle	No Population of Ecological Significance	• Recorded on one occasion flying over the study area	No	Medium	Species on Annex I of the EU Birds Directive.
Egyptian Vulture	No Population of Ecological Significance	• Recorded on one occasion flying over the study area	No	Low	NA – Very rare vagrant species.
Sparrowhawk	Locally Important (Higher value)	• Probable breeder at the site; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, protected under Wildlife Act.	Yes	Low	Any other species of conservation concern.
Merlin	Locally Important (Higher value)	• Present in breeding season; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, listed on Annex I and/ or referred to in Articles 4 (2) of the Birds Directive)	Yes	Medium	Species on Annex I of the EU Birds Directive.
Curlew	No Population of Ecological Significance	• Recoded in low numbers, on passage and foraging at the site in winter	No	Medium	Red List BoCCI

Name	NRA Evaluation (NRA 2009c)[2]	NRA Criteria (Baseline data)	Key Avian Receptor	Percival Sensitivity Evaluation (Percival 2003)[21]	Determining Criteria
Whimbrel	No Population of Ecological Significance	• Recoded in low numbers, on passage and foraging at the site in winter	No	Low	Any other species of conservation concern.
Dunlin	Locally Important (Higher value)	• Present in breeding season, but scarce; • No evidence of breeding recorded within the study area over the survey period but has been recorded as possibly breeding in the past (Copland *et al.,* 2011)[31]. • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, listed on the relevant Red Data List.	Yes	Medium	Red List BoCCI
Redshank	Locally Important (Higher value)	• Present on passage, but scarce; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, listed on the relevant Red Data List.	Yes	Medium	Red List BoCCI

31 Copland, A., Farrell, C. and McCorry, M. 2011. Breeding bird populations on the Oweninny cutaway peatlands, County Mayo. Irish Birds, 9: 197-208.

Name	NRA Evaluation (NRA 2009c)[2]	NRA Criteria (Baseline data)	Key Avian Receptor	Percival Sensitivity Evaluation (Percival 2003)[21]	Determining Criteria
Greenshank	Locally Important (Higher value)	• Present in breeding season, but scarce; • No evidence of breeding recorded within the study area over the survey period; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, protected under Wildlife Act.	Yes	Low	Locally Important (Higher value)
Golden Plover	Locally Important (Higher value)	• Present in winter months and late breeding season (birds on migration); • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, listed on Annex I and/ or referred to in Articles 4 (2) of the Birds Directive).	Yes	Medium	Species on Annex I of the EU Birds Directive.
Lapwing	No Population of Ecological Significance	• Present on passage, and in low numbers	No	Medium	Red List BoCCI
Ringed Plover	Locally Important (Higher value)	• Breeding within site boundary; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, protected under Wildlife Act.	Yes	Low	Any other species of conservation concern.

Name	NRA Evaluation (NRA 2009c)[2]	NRA Criteria (Baseline data)	Key Avian Receptor	Percival Sensitivity Evaluation (Percival 2003)[21]	Determining Criteria
Common Sandpiper	Locally Important (Higher value)	• Breeding within site boundary; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, protected under Wildlife Act.	Yes	Low	Any other species of conservation concern.
Snipe	Locally Important (Higher value)	• Displaying birds onsite and likely breeder within 500m of site boundary; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, listed on the relevant Red Data List.	Yes	Medium	Red List BoCCI
Woodcock	No Population of Ecological Significance	• Present in low numbers in winter.	No	Medium	Red List BoCCI
Black-headed Gull	No Population of ecological Significance	• Low number of records in winter and summer	No	Low	Any other species of conservation concern.
Lesser Black-backed Gull	Locally Important (Higher value)	• Present in winter and summer; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, protected under Wildlife Act.	Yes	Low	Any other species of conservation concern.
Herring Gull	No Population of Ecological Significance	Low number of records in winter and summer	No	Low	Any other species of conservation concern.

Name	NRA Evaluation (NRA 2009c)[2]	NRA Criteria (Baseline data)	Key Avian Receptor	Percival Sensitivity Evaluation (Percival 2003)[21]	Determining Criteria
Common Gull	Locally Important (Higher value)	• Present in summer; • Breeding onsite; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, protected under Wildlife Act..	Yes	Low	Any other species of conservation concern.
Great Black-backed Gull	Locally Important (Higher value)	• Present in winter and summer; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, protected under Wildlife Act.	Yes	Low	Any other species of conservation concern.
Kingfisher	No Population of Ecological Significance	Recorded on one occasion	No	Medium	Species on Annex I of the EU Birds Directive.
Meadow Pipit	Locally Important (Higher value)	• Present year round; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, listed on the relevant Red Data List.	Yes	Medium	Red List BoCCI
Grey Wagtail	Locally Important (Higher value)	• Present year round; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, listed on the relevant Red Data List.	Yes	Medium	Red List BoCCI

Name	NRA Evaluation (NRA 2009c)[2]	NRA Criteria (Baseline data)	Key Avian Receptor	Percival Sensitivity Evaluation (Percival 2003)[21]	Determining Criteria
Other Species of Lower Conservation Concern	Locally Important (Lower Value)	• Several passerines or other species which were recorded during surveys during winter or breeding seasons, or present all year round; • Resident or regularly occurring populations (assessed to be important at the local level) of the following: ▪ Species of bird, protected under Wildlife Act.	No	Low	Green Listed (BoCCI) and/or not identified as being impacted by wind farms.

8.8 POTENTIAL EFFECTS

The identification and description of effects presented below takes account of the characteristics of the receiving environment as described throughout Section 8.7 with particular reference to the KARs identified in Section 8.7.2. Effects are presented in relation to each phase of the project (i.e. construction, operation and decommissioning).

The effects described in this section are those ecological impacts predicted due to the proposed development prior to the consideration of any appropriate mitigation measures (refer to Section 8.11 for further details on mitigation measures). Residual effects describe potential effects that remain after all mitigation measures are considered, and are discussed in Section 6.10.

8.8.1 Do Nothing Effect

If the proposed development were not to proceed, then the existing environment would continue to be managed as it is currently and KARs would likely remain as described in the sections above or reflect existing regional, national or global trends.

8.8.2 Effects on Designated Sites (for Avian Species)

A Screening for Appropriate Assessment (AA) and Nature Impact Statement (NIS) were prepared as part of the planning application. The Screening for AA Report investigated the potential for the proposed development to have significant effects on European Site(s), either alone or in-combination, with other plans or projects. For the purpose of this ornithology chapter only SPAs will be discussed below. More details on SACs within the ZoI can be seen in the AA screening and NIS for this proposed development or within Chapter 7 (Biodiversity) of this EIAR.

Twelve SPAs were identified within the ZoI as part of the Screening for AA as having potential for being impacted by the proposed development. From this twelve and in the absence of mitigation, three were identified to be at potential risk from the potential degradation of habitat quality from the release of suspended solids and/or pollutants; the disturbance to Annex I species of the EU Birds Directive as a result of construction, operational and decommissioning works and activities; and/or the potential mortality for Annex I species of the EU Birds Directive as results of collision with operational turbines. The AA Screening Report conclusion (submitted with this application) is:

"Following an evaluation of the relevant information, including details of the works carried out within the project site boundary and its relationship with European sites a total of 25 Natura 2000 sites (nine SACs and fifteen SPAs) were identified within the ZoI for the Proposed development.

It has been determined during the screening process, following the examination, analysis and evaluation of the relevant information, and in applying the precautionary principle that there is ***no potential for significant impacts*** *on seven of these European sites:*

- *Bellacorick Iron Flush SAC*
- *Bellacorick Bog Complex SAC*
- *Owenduff/Nephin Complex SPA*
- *Carrowmore Lake Complex SAC*
- *Glenamoy Bog Complex SAC*
- *Slieve Fyagh Bog SAC*
- *Newport River SAC*
- *Carrowmore Lake SPA*
- *Illanmaster SPA*
- *Doogort Machair SPA*
- *Stags of Broad Haven SPA*
- *Mullet Peninsula SPA*
- *Termoncarragh Lake and Annagh Machair SPA*
- *Duvillaun Islands SPA*
- *Inishglora and Inishkeeragh SPA*
- *Inishkea Islands SPA*
- *Clare Island SPA*
- *Lough Carra SPA*

However, upon examination of the relevant information including in particular the nature of the Proposed Development, the proximity of European sites, the application of the precautionary principle and in the absence of mitigation measures, that ***there is potential for significant impacts*** *on six of these European sites:*

- *Lough Dahybaun SAC,*
- *River Moy SAC,*
- *Owenduff/Nephin Complex SAC,*
- *Lough Conn and Lough Cullin SPA and*
- *Killala Bay/Moy Estuary SPA.*
- *Blacksod Bay/Broad Haven SPA*

It is therefore recommended that a Stage 2 assessment is required for these six Natura 2000 sites."

An NIS was prepared as part of this application and it considers that, following the application of detailed mitigation measures, potential significant adverse effects will be avoided.

Consequently, it is determined that there will be no risk of adverse effects on the qualifying interest habitats and species, the special conservation interest habitats and species, and/or on the overall site integrity, nor in the attainment of their specific conservation objectives.

A number of other designated sites including 15 National Sites (NHAs and pNHA), three RAMSAR sites, one National Park and three Nature Reserves, considered to be important for avian species, occur within proximity to the proposed development site (refer to Figure 8-5). The majority of these designated sites broadly coincide with European site boundaries and, therefore, have been assessed in the AA Screening and NIS reports accompanying the planning application for the proposed development. With the implementation of mitigation measures outlined in the NIS, no impacts to the above-mentioned sites are anticipated. All other sites not located within the boundary of a European site were considered to occur outside the ZoI of the proposed development. No impacts to the scientific interests are therefore anticipated.

8.8.3 Effects on Birds

8.8.3.1 Construction Phase

The potentially likely significant effects to avian communities within the vicinity of the proposed development site during the construction phase have been divided into two main areas, (i) habitat loss and fragmentation; and (ii) disturbance displacement. These effects are associated with both the direct habitat loss associated with construction works and the disturbance caused by the activity of machinery and staff during the construction phase of the proposed development.

8.8.3.1.1 Habitat Loss and Fragmentation

The construction of turbine bases, access tracks, substation, grid connection, met mast and all other associated construction will result in a land take which will, consequently, reduce the availability of local habitat for birds. Assessing the impact of this habitat loss has been achieved by quantifying the area of each habitat which will be lost. The magnitude of this impact can be determined relative to the proportion of habitat available, which will be lost, relative to the availability of these habitats both onsite and within the wider surroundings, which are utilised by key target species. The habitat loss to hard infrastructure impact was assessed using habitat loss mapping and habitat loss data from the Biodiversity Chapter (Chapter 7). Habitat loss and fragmentation can also arise from disturbance effects, which is discussed in more detail in 8.8.3.1.2. The habitat lost to the proposed infrastructure is considered to last the lifetime of the

wind farm (30 years) and will likely remain in situ following wind turbine dismantling. This impact is therefore considered **Permanent.**

Table 8-13 below assesses the potential effects of habitat loss and fragmentation on the KARs within the proposed development area (Table 8-12). The methodology of the assessment of the impact of habitat loss and fragmentation follows Percival (2003)[21] (refer to Table 8-6 and Table 8-7) and EPA (2022)[20].

Table 8-13: Assessing the Potential Impact on Local Avian Communities from Habitat Loss and Fragmentation Associated with Construction Activities

Species (Sensitivity)	**Habitat loss and Fragmentation** (Magnitude)	**Significance Evaluation*** (Percival 2003[21] & EPA 2022[20])
Mute Swan (Low)	Land taken during the construction phase of the proposed development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. Based on a consistent survey effort from 2019 to 2022, the species was recorded, year-round, primarily within Lough Dahybaun and other local water bodies. Given that the internal infrastructure constitutes a small proportion (c. 93.3 ha) equating to 4% of the total proposed development area, that no suitable Mute swan habitat will be removed, the wide-ranging nature of the species and the availability of similar suitable habitats in the surroundings (e.g. grassland/waterbodies), the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Permanent, slight negative effects**
Whooper Swan (Medium)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. Based on a consistent survey effort from 2019 to 2022, the species was recorded during winter months and in low numbers (consisting of 88 observations, ranging from a single bird up to eight). Given that the internal infrastructure constitutes a small proportion (c. 93.3 ha) equating to 4% of the total proposed development area, that no suitable Whooper Swan habitat will be removed, the wide-ranging nature of the species and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/waterbodies), the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Permanent, slight negative effects**
Mallard (Low)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. Exceptional rainfall during the winter period floods sections of the site which provide foraging opportunity to local water birds. Based on a consistent survey effort 2019 to 2022, the species was recorded year-round. Given that the internal infrastructure constitutes a small proportion (c. 93.3 ha) equating to 4% of the total proposed development area, that no suitable Mallard habitat will be removed and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/ waterbodies), the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Permanent, slight negative effects**

Species (Sensitivity)	Habitat loss and Fragmentation (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2022[20])
Teal (Low)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. Exceptional rainfall during the winter period floods sections of the site which provide foraging opportunity to local water birds. Based on a consistent survey effort 2019 to 2022, the species was recorded year-round. Given that the internal infrastructure constitutes a small proportion (c. 93.3ha of 2,382.7 ha i.e. 4%) of the total proposed development area and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/ waterbodies), the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Permanent, slight negative effects**
Tufted Duck (Low)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. Exceptional rainfall during the winter period floods sections of the site which provide foraging opportunity to local water birds. Based on a consistent survey effort 2019 to 2022, the species was recorded year-round. Given that the internal infrastructure constitutes a small proportion (c. 93.3 ha) equating to 4% of the total proposed development area, that no suitable Tufted Duck habitat will be removed and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/ waterbodies), the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Permanent, slight negative effects**
Cormorant (Low)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. Lands which will fall within the development footprint are sub-optimal for foraging apart from waterways and provide no suitable breeding habitat for this species. This species was primarily recorded commuting across the site and feeding at Lough Dahybaun. Based on a consistent survey effort from 2019 to 2022, the species was recorded rarely onsite during both winter and summer months. The species was most often recorded on waterbodies on the site. Given that the internal infrastructure constitutes a small proportion (c. 93.3 ha equating to 4%) of the total proposed development area, that no suitable Cormorant habitat will be removed, the sub-optimal nature of the habitats onsite and the availability of optimal habitats in the surroundings, the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Permanent, slight negative effects**

Species (Sensitivity)	Habitat loss and Fragmentation (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2022[20])
Grey Heron (Low)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. Lands which will fall within the development footprint are sub-optimal for foraging and provide no suitable breeding habitat for this species. This species was primarily recorded commuting across the site. Based on a consistent survey effort from 2019 to 2022, the species was recorded regularly onsite during both winter and summer months. Given that the infrastructure constitutes a small proportion (c. 93.3ha of 2,382.7 ha i.e. 4%) of the total proposed development area, that no suitable Grey Heron habitat will be removed and the availability of optimal habitats in the surroundings, the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Permanent, slight negative effects**
Red Grouse (Medium)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. Based on a consistent survey effort from 2019 to 2022 and following targeted Red Grouse surveys in 2021 and 2022 the species was recorded onsite in winter and summer. Given that the internal infrastructure constitutes a small proportion (c. 93.3 ha) equating to 4% of the total proposed development area, of which only a small proportion (c. 6.3ha) will remove suitable Red Grouse habitat and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath), the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Permanent, moderate negative effects**
Hen Harrier (High)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. No direct loss of roosting habitat will result from land lost to construction works, infrastructure is located 500m (from the proposed substation) or 300m (from the proposed amenity track) to the nearest recorded roost. No nest sites were located for the species at the site and the species is not known to traditionally breed in the area. Based on a consistent survey effort 2019 to 2022, the species was recorded in low numbers during the winter months. Given that the internal infrastructure constitutes a small proportion (c. 93.3 ha) equating to 4% of the total proposed development area, that no identified Hen Harrier roosting habitat will be removed, the wide-ranging nature of the species and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/wet grassland/ scrub), the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (High) of the species and the magnitude (Low) of the effect. Evaluation: **Medium** significance. **Permanent, moderate negative effects**

Species (Sensitivity)	Habitat loss and Fragmentation (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2022[20])
Kestrel (Medium)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. No direct loss of nesting habitat will result from land lost to construction works. No nest sites were located for the species at the site, but the species is likely breeding within 2km of the site. Based on a consistent survey effort from 2019 to 2022, the species was found to be present year-round, foraging onsite. Given that the infrastructure constitutes a small proportion (c. 93.3ha of 2,382.7 ha i.e. 4%) of the total proposed development area, that no suitable breeding habitat for Kestrel will be removed, the adaptability of the species to various habitats and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/woodland/grassland/ scrub), the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Permanent, moderate negative effects**
Peregrine (Medium)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance No direct loss of nesting habitat will result from land lost to construction works. Based on a consistent survey effort 2019 to 2022, the species was recorded during the summer and winter months foraging onsite. Given that the internal infrastructure constitutes a small proportion (c. 93.3 ha equating to 4%) of the total proposed development area, that no suitable Peregrine Falcon breeding habitat will be removed, the wide-ranging nature of the species and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/ grassland/ scrub), the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Permanent, moderate negative effects**
Sparrowhawk (Low)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. No direct loss of nesting habitat will result from land lost to construction works. Based on a consistent survey effort 2019 to 2022, the species was recorded in low numbers during the summer and winter months foraging onsite. Given that the internal infrastructure constitutes a small proportion (c. 93.3 ha) equating to 4% of the total proposed development area, that no breeding or nesting habitat for Sparrowhawk will be removed, the wide-ranging nature of the species and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/mature tall trees/grassland/ scrub), the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Permanent, slight negative effects**
Merlin (Medium)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. No direct loss of nesting habitat will result from land lost to construction works. No nest sites were located for the species at	Percival Significance is calculated as a product of the sensitivity (Medium) of the

Species (Sensitivity)	Habitat loss and Fragmentation (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2022[20])
	the site but is likely to be breeding within 2km of the site. Based on a consistent survey effort 2019 to 2022, the species was recorded infrequently in low numbers during the summer and winter months. Given that the internal infrastructure constitutes a small proportion (c. 93.3 ha) equating to 4% of the total proposed development area, that no breeding or nesting habitat for Merlin will be removed and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/wet grassland/ scrub), the magnitude of the impact is judged of **Low Concern.**	species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Permanent, moderate negative effects**
Dunlin (Medium)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. Lands which will fall within the development footprint are considered sub-optimal breeding and foraging habitat for this species compared to the habitats outside the survey area. Based on a consistent survey effort from 2019 to 2022, the species was recorded rarely onsite during summer months. The species was most often recorded on fringing habitat surrounding the site. Given that the internal infrastructure constitutes a small proportion (ca. 93.3ha of 2,382.7 ha i.e. 4%) of the total proposed development area and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/wet grassland/ scrub), the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Permanent, moderate negative effects**
Redshank (Medium)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. Lands which will fall within the development footprint are considered sub-optimal breeding and foraging habitat for this species compared to the habitats outside the survey area. Based on a consistent survey effort from 2019 to 2022, the species was recorded rarely onsite during summer months. The was no evidence of breeding recorded, the species was most often recorded on fringing habitat surrounding the site. Given that the internal infrastructure constitutes a small proportion (93.3ha of 2,382.7 ha i.e. 4%) of the total proposed development area and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/wet grassland/ scrub), the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Permanent, moderate negative effects**
Greenshank (Low)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. No direct loss of nesting habitat will result from construction land use. This species was a confirmed breeder within the wider surroundings, the nearest recorded being 230m from proposed infrastructure (amenity track). Although the species was recorded within the site, where it was recorded singing/calling/displaying,	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect.

Species (Sensitivity)	Habitat loss and Fragmentation (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2022[20])
	no nest was located, and juveniles recorded. Based on a consistent survey effort 2019 to 2022, the species was recorded infrequently in low numbers during the summer and winter months. Given that the internal infrastructure constitutes a small proportion (93.3ha of 2,382.7 ha i.e. 4%) of the total proposed development area and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/wet grassland/ scrub), the magnitude of the impact is judged of **Low Concern.**	Evaluation: **Very Low** significance. **Permanent, slight negative effects**
Golden Plover (Medium)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. Based on a consistent survey effort from 2019 to 2022, the species was recorded occasionally during early or late summer month (while on migration, no evidence of breeding was recorded) or during the winter months but in important numbers on occasion. Given that the internal infrastructure constitutes a small proportion (ca. 93.3ha of 2,382.7 ha i.e. 4%) of the total proposed development area and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/ wet grassland/ scrub), this species was found not to be dependent on the habitats onsite for feeding, roosting or breeding. The effect of habitat loss is deemed of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Permanent, moderate negative effects**
Ringed Plover (Low)	The construction of access roads and all turbine hardstand areas will result in the loss of potential Ringed Plover breeding habitat (cutover bog located at the south and east of the proposed development site). The breeding population trend for this species in Ireland is unknown. Many breeding Ringed Plover territories were recorded on the site, i.e. within c.500m of proposed infrastructure. Given the survey effort from 2019 to 2022 the number of breeding territories was found to be high. This species has a widespread distribution throughout the country. Given that the internal infrastructure constitutes a small proportion (c. 93.3ha of 2,382.7 ha i.e. 4%) of the total proposed development area and the availability of similar suitable habitats in the surroundings (e.g. cutover bog beside rivers and small ponds), the magnitude of the impact is judged to be of **Low Concern**.	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Permanent, slight negative effects**
Common Sandpiper (Low)	The construction of access roads and all turbine hardstand areas will result in the loss of potential Common Sandpiper breeding habitat. The breeding population trend for this species in Ireland is unknown. Many breeding Common Sandpiper territories were recorded on the site, i.e. within c.500m of proposed infrastructure. Given the survey effort from 2019 to 2022 the number of breeding territories was found to be low. This species has a widespread distribution throughout the west of the	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect.

Species (Sensitivity)	Habitat loss and Fragmentation (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2022[20])
	country. Given that the internal infrastructure constitutes a small proportion (c. 93.3ha of 2,382.7 ha i.e. 4%) of the total proposed development area and the availability of similar suitable habitats in the surroundings (e.g. heath/bog beside rivers and small ponds), the magnitude of the impact is judged to be of **Low Concern**.	Evaluation: **Very Low** significance. **Permanent, slight negative effects**
Snipe (Medium)	The construction of access roads and all turbine hardstand areas will result in the loss of Snipe breeding habitat. Breeding Snipe territories were recorded onsite. Given the survey effort from 2019 to 2022 the number of breeding territories was found to be low. This species has a widespread distribution throughout the country. Given that the internal infrastructure constitutes a small proportion (c. 93.3ha of 2,382.7 ha i.e. 4%) of the total proposed development area and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/ wet grassland/ scrub), the magnitude of the impact is judged to be of **Low Concern**.	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Permanent, moderate negative effects**
Lesser Black-backed Gull (Low)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. Onsite habitats are sub-optimal for foraging and provide no suitable breeding habitat for this species. This species was primarily recorded commuting across the site Based on a consistent survey effort from 2019 to 2022, the species was recorded rarely foraging onsite during winter. Given that the internal infrastructure constitutes a small proportion (c. 93.3ha of 2,382.7 ha i.e. 4%) of the total proposed development area, the low value of onsite habitats for this species (e.g. primarily peatland and scrub) and the availability of optimal habitats in the surroundings (local river catchment), the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Permanent, slight negative effects**
Common Gull (Low)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. This species was primarily recorded commuting across the site and breeding onsite in low numbers. Based on a consistent survey effort from 2019 to 2022, the species was recorded rarely foraging onsite. Given that the internal infrastructure constitutes a small proportion (c. 93.3ha of 2,382.7 ha i.e. 4%) of the total proposed development area, the low value of onsite habitats for this species (e.g. primarily peatland and scrub) and the availability of optimal habitats in the surroundings (local river catchment), the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance.

Species (Sensitivity)	Habitat loss and Fragmentation (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2022[20])
		Permanent, slight negative effects
Great Black-backed Gull (Low)	Land taken during the construction phase of the development will be discernible, but the overall character of habitats will be similar to the pre-development circumstance. Onsite habitats are sub-optimal for foraging and provide no suitable breeding habitat for this species. This species was primarily recorded commuting across the site. Based on a consistent survey effort from 2019 to 2022, the species was recorded rarely foraging onsite during winter. Given that the internal infrastructure constitutes a small proportion (c. 93.3ha of 2,382.7 ha i.e. 4%) of the total proposed development area, the low value of onsite habitats for this species (e.g. primarily peatland and scrub) and the availability of optimal habitats in the surroundings (local river catchments), the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Permanent, slight negative effects**

Note: * Under this rating system "very low significance" or "low significance" can be understood to mean there will be no significant effect

8.8.3.1.2 Disturbance Displacement (Potential Indirect Impacts)

At the proposed development, potential disturbance displacement effects may result during its construction phase. These effects will vary with species, habitat, breeding status, range and with the duration of the construction phase. Details of the construction of the proposed development can be found in Chapter 3 (Description of the Proposed Development) and the Construction Environmental Management Plan (CEMP), including the duration of the construction activities, which is considered to be approximately 24 months. This impact is therefore considered a **Short Term Negative Effect**.

Table 8-14 below assesses the potential effect of the disturbance displacement on key avian ecological receptor species observed within the proposed development area. The methodology of the assessment of the impact of disturbance displacement will follow Percival (2003)[21] and EPA (2022)[20]. Locations of each species discussed below can be seen in the results figures located in Appendix 8.1.

Table 8-14: Assessing the Potential Impact on Local Avian Communities from Disturbance Displacement Associated with Construction Activities

Species (Sensitivity)	Disturbance Displacement (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2017[20])
Mute Swan (Low)	Disturbance due to construction works can result in effective habitat loss through displacement. This effect will be short term, expected to last the duration of the construction phase. This species was recorded onsite from 2019 to 2022, mostly within Lough Dahybaun, where a territorial pair were regularly observed and were recorded breeding, other smaller numbers (one to two birds) were recorded irregularly in other lakes/wetland habitats. Given the short-term nature of the construction works, and the availability of other lakes and wetland habitats within the wider landscape, the magnitude of the impact is judged of **Low.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Short term, slight negative effects**
Whooper Swan (Medium)	Disturbance due to construction works can result in effective habitat loss through displacement. This effect will be short term in nature for the duration of the construction phase. This species was recorded onsite from during the winter months from 2019 to 2022. There were no consistent records of Whooper Swan during any of the winter seasons, which suggests that birds seen were commuting to breeding or wintering grounds elsewhere. A smaller proportion of records note small flocks feeding or roosting on small lakes within the site, including a roost that is found on Lough Dahybaun. The nearest roost located on suitable habitat is over 500m away from the proposed infrastructure. Given the short-term nature of the construction works and the availability of optimal habitats within the wider landscape, the magnitude of the impact is judged of **Low.**	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Short term, moderate effects**
Mallard (Low)	Disturbance displacement due to construction works will not result in significant effects for this species. The species was recorded onsite from 2019 to 2022. The species typically occurred in small numbers of between one and four birds, but flocks of up to 11 were also recorded. Birds were often recorded on, or near, water bodies, such as the numerous lakes or drainage ditches scattered throughout the site. The resident population is likely to be made up of 3-4 pairs of mallard that move around the proposed development.	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance.

Species (Sensitivity)	Disturbance Displacement (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2017[20])
	Given the short-term duration of construction phase, the low occurrence of this species within the proposed development area, and the availability of similar suitable habitats in the surroundings (e.g. drainage ditches where breeding pairs may establish nest sites during summer months and winter populations may utilise for foraging), the magnitude of the impact is judged of **Low.**	**Short term, slight negative effects**
Teal (Low)	Disturbance displacement due to construction works will not result in significant effects for this species. The species typically occurred in small numbers, but flocks of up to seven individuals were recorded during winter months. During the breeding season, Teal was often recorded in pairs on, or near, water bodies such as the numerous lakes or drainage ditches scattered throughout the proposed development site. During the winter, birds were often seen in small flocks of between two and six individuals, foraging on the lakes and pools present within the proposed development site. Given the short-term duration of the construction phase, the low number of birds of this species and the availability of similar suitable habitats in the surroundings (e.g. drainage ditches where breeding pairs may establish nest sites during summer months and winter populations may utilise for foraging), the magnitude of the impact is judged of **Low.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Short term, slight negative effects**
Tufted Duck (Low)	Disturbance displacement due to construction works will not result in significant effects for this species. During winter months, the species typically occurred in small numbers, but flocks of up to 24 were sighted, typically feeding, or roosting on Lough Dahybaun. The species was rarely recorded on other waterbodies. Given the short-term duration of the construction phase, the low number of birds of this species and the availability of similar suitable habitats in the surroundings (e.g. suitable local ponds for diving ducks the winter populations may utilise for foraging), the magnitude of the impact is judged of **Low.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Short term, slight negative effects**
Cormorant (Low)	Disturbance displacement due to construction works will not result in significant effects for this species.	Percival Significance is calculated as a product of the sensitivity (Low) of the

Species (Sensitivity)	Disturbance Displacement (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2017[20])
	The species typically occurred in small numbers, usually just one bird feeding or roosting, but up to four were recorded on one occasion. The majority of sightings occurred on, or around, Lough Dahybaun, in the southern section of the site. Given the short-term duration of construction works, the low number of birds of this species and the availability of similar suitable habitats in the surroundings (e.g. suitable local lakes and rivers the local populations may utilise for foraging), the magnitude of the impact is judged of **Low.**	species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Short term, slight negative effects**
Grey Heron (Low)	Disturbance displacement due to construction works will not result in significant effects for this species. The species typically occurred in small numbers, usually just one bird feeding or flying. Birds were often recorded on or near water bodies, as the lakes and/or drainage ditches at the proposed development site. Given the short-term duration of construction works, the low number of birds of this species and the availability of similar suitable habitats in the surroundings (e.g. suitable local lakes and rivers the local populations may utilise for foraging), the magnitude of the impact is judged of **Low.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Short term, slight negative effects**
Red Grouse (Medium)	Disturbance displacement due to construction works will not result in significant effects for this species. The majority of the records occurred to the northeast of the site, within intact blanket bog and its vicinity. The numbers recorded her were found to be lower than the national average. Given the short-term duration of construction works, the low number of birds of this species and the availability of similar suitable habitats in the surroundings (e.g. suitable bogs with optimum heather the local populations may utilise for foraging), the magnitude of the impact is judged of **Low.**	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Short term, moderate effects**
Hen Harrier (Medium)	Disturbance due to construction works can result in effective habitat loss through displacement. This effect will be short term in nature for the duration of the construction phase.	Percival Significance is calculated as a product of the sensitivity (Medium) of the

Species (Sensitivity)	Disturbance Displacement (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2017[20])
	Hen Harrier was regularly observed in winter and recorded in low numbers during the breeding seasons. Hen Harrier was recorded throughout the site mostly on open patches of bog and heather, typically occurring in small numbers, usually just one bird hunting or flying but sometimes occurred as pairs, with three recorded at once on one occasion. Two winter roosts were recorded over the survey period, one to the south of the site and a second roost recorded to the east. The closest roost was recorded over 500m from proposed infrastructure. Given the short-term nature of the construction works, the wide-ranging nature of the species and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/ grassland/ scrub), the magnitude of the impact is deemed of **Low.**	species and the magnitude (Low) of the effect. Evaluation: **Low** significance **Short term, slight negative effects**
Kestrel (Medium)	Disturbance displacement due to construction works will not result in significant effects for this species. The species typically occurred in small numbers, usually just one bird observed hunting or flying, and, on one occasion, two birds were sighted together. Sightings were mostly located along the edges of conifer plantations, hunting or seen flying across open areas of bog. There were no confirmed records of breeding/nest/juveniles over the survey period, but, given the number of sightings and the suitable foraging habitat contained within the site, the species is considered to have a probable breeding status within its immediate vicinity Given the short-term duration of construction works, the low number of observations and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/ grassland/ scrub), the magnitude of the impact is judged of **Low.**	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance **Short term, slight negative effects**
Peregrine (Medium)	Disturbance due to construction works can result in effective habitat loss through displacement. This effect will be short term in nature for the duration of the construction phase, but. Can occur in both the breeding and wintering seasons over the construction phase.	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance.

Species (Sensitivity)	Disturbance Displacement (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2017[20])
	Disturbance distances for this species range between 500-750m, as recommended by Ruddock & Whitfield (2007)[32]. The species is unlikely to be displaced (by construction effects) from the area based on the occasional use of the site. Given the short-term duration of the construction works, the wide-ranging nature of the species and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/ wet grassland/ scrub), the magnitude of the impact is judged of **Low.**	**Short term, slight negative effects**
Sparrowhawk (Low)	Disturbance displacement due to construction works will not result in significant effects for this species. Sightings of this species was exclusively made-up solitary birds hunting or flying often near the large areas of conifer plantation. The species favourable conservation status limits the potential for ecologically significant effect. Given the short-term duration of construction works and the availability of similar suitable habitats in the surroundings (e.g. bog/ heath/ grassland/ woodland/scrub), the magnitude of the impact is judged of **Low.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Short term, slight negative effects**
Merlin (Medium)	Disturbance due to construction works can result in effective habitat loss through displacement. This effect will be short term in nature for the duration of the construction phase. Potential exists for this species to experience disturbance effects in both summer and winter during construction works. This species was recorded infrequently both onsite and within 150m of the site boundary. No evidence of breeding was confirmed during the survey period. Given the short-term duration of the construction works, and the availability of similar suitable habitats in the surroundings (e.g. bog/heath/grassland/scrub), the magnitude of the impact is judged of **Low.**	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Short term, slight negative effects**

[32] M. Ruddock & D.P. Whitfield (2007) A Review of Disturbance Distances in Selected Bird Species. Scottish Natural Heritage.

Species (Sensitivity)	Disturbance Displacement (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2017[20])
Dunlin (Medium)	Disturbance due to construction works can result in effective habitat loss through displacement. This effect will be short term in nature for the duration of the construction phase. Potential exists for this species to experience disturbance effects in both summer and winter during construction works. Dunlin were rarely recorded within the site and was only found twice, one bird in July 2021 and a pair in July 2022. The birds were located roughly in the same location in both 2021 and 2022, in suitable breeding habitat approximately 1.7km from the nearest infrastructure site, however there was no evidence to that it bred at this location, and they were not recorded here during previous visits or in subsequent surveys. Given the distance of the construction works from the construction works (approx. 1.7km), birds displaced from this location as a result of disturbance effects are expected to return following constructions of the development, additionally the wider surroundings contain similar suitable habitat (e.g. bog/ heath/ wet grassland). Therefore, the magnitude of this effect is deemed to be **Low.**	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Short term, moderate negative effects**
Redshank (Medium)	Disturbance due to construction works can result in effective habitat loss through displacement. This effect will be short term in nature for the duration of the construction phase. Potential exists for this species to experience disturbance effects in both summer and winter during construction works. Redshank were recorded twice in April 2020 during the breeding season. These records related to single bird, foraging in suitable breeding habitat approximately 1.9km from the nearest infrastructure site, there was no evidence to that it bred at this location and it was not recorded here during previous visits or in subsequent surveys. Given the distance of the construction works from the construction works (approx. 1.9km), birds displaced from this location as a result of disturbance effects are expected to return following constructions of the development, additionally the wider surroundings contain similar suitable habitat (e.g. bog/ heath/ wet grassland). Therefore, the magnitude of this effect is deemed to be **Low.**	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Short term, moderate negative effects**

Species (Sensitivity)	Disturbance Displacement (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2017[20])
Greenshank (Low)	Disturbance due to construction works can result in effective habitat loss through displacement. This effect will be short term in nature for the duration of the construction phase. Potential exists for this species to experience disturbance effects in both summer and winter during construction works. Greenshank were occasionally recorded within the site, occurring within the 2021 and 2022 breeding season and the 2020/2021 and 2021/2022 winter seasons, typically found on wetland or bog habitats within the northern portions of the site. The species typically occurred in small numbers, usually just one bird observed foraging or flying with one record of two birds seen together. Greenshank was recorded as having a possible breeding status onsite, as birds were often recorded within or near suitable breeding habitat, however, there were no confirmed breeding records during the surveys. Individuals displaced as a result of disturbance effects occurring during construction works are expected to return following constructions of the development, additionally the wider surroundings contain similar suitable habitat (e.g. bog/ heath/ wet grassland). Therefore, the magnitude of this effect is deemed to be of **Low.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Short term, slight negative effects**
Golden Plover (Medium)	Disturbance due to construction works can result in effective habitat loss through displacement. This effect will be short term in nature for the duration of the construction phase. Potential exists for this species to experience disturbance effects in the non-breeding season during construction works. Golden Plover were regularly recorded at the site during the winter seasons and during late. Flocks varied between months, with a mean flock size of c.50 birds, with a flock of up to 400 being recorded in February 2021. The majority of golden plover recorded relate to flights or roosting flocks, which were concentrated to the northeastern end of the site on cutover bog and within the 2km study area. There were no confirmed records of Golden Plover breeding on site. Flocks displaced as a result of disturbance effects occurring during construction works are expected to return following constructions of the development, additionally the wider surroundings contain similar	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Short term, moderate negative effects**

Species (Sensitivity)	Disturbance Displacement (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2017[20])
	suitable habitat which will be retained (e.g. bog/ heath/ wet grassland). The effect of disturbance displacement is deemed of **Low** magnitude**.**	
Ringed Plover (Low)	Disturbance due to construction works can result in effective habitat loss through displacement. This effect will be short term in nature for the duration of the construction phase. Potential exists for this species to experience disturbance effects in summer during construction works. Therefore, it is vital construction occurs only outside of the breeding season. Ringed Plover were recorded onsite during the breeding seasons, with a small number recorded in the late winter seasons. Sightings typically recorded pairs or individuals, with the highest count of three birds recorded at once. The majority of records related to pairs of Ringed Plover recorded within the large areas of cutover bog to the northeast, east and southeast of the site on unvegetated cutover bog or gravel deposits. During the breeding seasons pairs were recorded as having either a confirmed or probable breeding status. Some these records were contained within the footprint of the proposed development. On a precautionary basis it is assumed that some temporary displacement may occur. However, given the extent of suitable habitat in the wider area (e.g. cutover bog/ heath/ wet grassland); significant displacement during the construction phase is not anticipated. Therefore, the magnitude of this effect is deemed to be of **Low.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Short term, slight negative effects**
Common Sandpiper (Low)	Disturbance due to construction works can result in effective habitat loss through displacement. This effect will be short term in nature for the duration of the construction phase. Potential exists for this species to experience disturbance effects in summer during construction works. Therefore, it is vital construction occurs only outside of the breeding season. Common Sandpiper were commonly recorded onsite during the breeding seasons. Birds were often recorded on or near waterbodies such as the numerous lakes or drainage ditches scattered throughout the site and was noted as being a probable breeder on site as pairs were often recorded in suitable habitat.	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Short term, slight negative effects**

Species (Sensitivity)	Disturbance Displacement (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2017[20])
	Individuals displaced from these habitats as a result of disturbance effects occurring during construction works are expected to return following constructions of the development, additionally the wider surroundings contain similar suitable habitat (e.g. bog/ heath/ wet grassland/running water/ponds). Therefore, the magnitude of this effect is deemed to be of **Low.**	
Snipe (Medium)	Disturbance due to construction works can result in effective habitat loss through displacement. This effect will be short term in nature for the duration of the construction phase. Snipe were regularly recorded during the breeding and winter seasons. Observations were spread throughout the site on wetter sections of cutover bog, as well as around the large number of permanent and temporary pools present throughout the proposed development site. The majority of recordings of snipe were flushed from the ground, while breeding activity, was regularly recorded during the breeding bird seasons. The species is assumed as a probable and confirmed breeder at a number of locations within the proposed development site, some these records were contained within the footprint of the proposed development. On a precautionary basis it is assumed that some temporary displacement may occur during construction works. However, given the extent of suitable habitat in the wider area (e.g. cutover bog/ heath/ wet grassland); significant displacement during the construction phase is not anticipated. Therefore, the magnitude of this effect is deemed to be of **Low.**	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Short term, moderate negative effects**
Lesser Black-backed Gull (Low)	It is considered that disturbance displacement due to construction works will not greatly impact this species. The habitats onsite do not provide optimum feeding or breeding opportunities for this species which limits the potential for ecologically significant effects. Given the short-term nature of the construction works, and the availability of optimal habitats in the surroundings, the magnitude of the impact is judged of **Low.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect.

Species (Sensitivity)	Disturbance Displacement (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2017[20])
		Evaluation: **Very Low** significance. **Short term, slight negative effects**
Common Gull (Low)	Disturbance due to construction works can result in effective habitat loss through displacement. This effect will be short term in nature for the duration of the construction phase. Potential exists for this species to experience disturbance effects in summer during construction works. Therefore, it is vital construction occurs only outside of the breeding season. Common Gull were recorded regularly during the breeding seasons. The species typically occurred in small numbers, ranging from single individual to flocks up to seven birds on occasion. The species were predominantly recorded around Lough Dahybaun but was recorded at a number of other small lakes present immediately to the north the proposed development site. They were confirmed breeding within the study area at several different locations throughout the breeding surveys, the nearest confirmed location being 1.7km from proposed infrastructure and the nearest probable location being 500m. Given the distance of the construction works from the construction works (at its closed approx. 500m), birds displaced from this location as a result of disturbance effects are expected to return following constructions of the development, additionally the wider surroundings contain similar suitable habitat (e.g. bog/ lake/ wet grassland). Therefore, the magnitude of this effect is deemed to be **Low.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Short term, slight negative effects**
Great Black-backed Gull (Low)	It is considered that disturbance displacement due to construction works will not greatly impact this species. The habitats onsite do not provide feeding or breeding opportunities for this species which limits the potential for ecologically significant effects. Given the short-term nature of the construction works, and the availability of optimal habitats in the surroundings, the magnitude of the impact is judged of **Low Concern.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance.

Species (Sensitivity)	Disturbance Displacement (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2017[20])
		Short term, slight negative effects

Note: * Under this rating system "very low significance" or "low significance" can be understood to mean there will be no significant effect.

8.8.3.2 Operational Phase

8.8.3.2.1 Collision Risk

The potential for birds to collide with turbines is one of the main impacts to consider in the assessment of possible impacts of an operating wind farm. Bird collision is dependent on a number of factors: species of bird involved the number of flights and individuals per flight, turbine height and blade length, weather (i.e. fog), topography, geography, etc. As the collision risk is only associated with operating wind farms and considering the 30-year life span of this wind farm, impacts are considered to be **Long Term**.

It is considered that the physical characteristic of the bird plays a crucial role in predicting the probability of a bird suffering a collision while passing through the airspace occupied by an operating turbine. The probability is predicted based on the bird wing length, weight, tail length and total body length (Janss, 2000)[33]. Moreover, flight behaviour can be influenced by wing loading (ratio of body weight to wing area) and aspect ratio (ratio of wingspan squared to wing area) which can affect collision risk. High wing loading is associated with species which demonstrate low manoeuvrability (e.g. swans and several species of geese), which can determine the probability of a bird successfully avoiding an imminent collision with a turbine (Drewitt & Langston, 2008)[34]. Other species such as farmland passerines are generally more manoeuvrable and, as a consequence, are less susceptible to collisions (Bright *et al.,* 2008)[35].

Most birds take avoiding action when they encounter operating turbines in the landscape. Birds in flight may detect either the wind farm as a whole or an individual turbine and alter their flight paths accordingly. Avoidance may also occur as an emergency action performed by birds at close quarters with the rotating blade of an operating turbine (Band *et al.,* 2007)[36]. To account for this avoidance rate, an analysis of collision risk must incorporate an 'avoidance factor', which is associated with the ability of birds to successfully avoid collisions with objects in their environment. A high proportion of birds successfully avoid collisions with operating turbines, which is reflected in a recommended default avoidance rate of 98% (SNH, 2018)[37] (in situations

[33] Janss, G.F.E. (2000). Avian mortality from power lines: a morphologic approach of a species-specific mortality. Biological Conservation 95:353-359.
[34] Drewitt and Langston (2006) Assessing the impact of wind farms on birds. Ibis. 148, 29-42.
[35] Bright, J., Langston, R., Bullman, R., Evans, R., Gardner, S., & Pearce-Higgins, J. (2008). Map of bird sensitivities to wind farms in Scotland: a tool to aid planning and conservation. *Biological Conservation*, *141*(9), 2342-2356.
[36] Band, W., Madders, M. & Whitfield, D.P. (2007) Developing field and analytical methods to assess avian collision risk at wind farms. In: de Lucas, M., Janss, G.F.E. & Ferrer, M. (Eds.) Birds and Wind Farms: Risk Assessment and Mitigation, pp 259-275. Quercus, Madrid
[37] SNH (2018) Avoidance rates for the onshore SNH Wind Farm Collision Risk Model.

where a species-specific avoidance rate is not available, further details are outlined in the CRM report included in Appendix 8.2 of this EIAR).

At the proposed wind farm site, potential exists for birds flying through the airspace occupied by operating turbines to collide with turbines. To determine collision risk to key KAR, a CRM has been prepared (Appendix 8.2). For the purposes of the analysis, all collisions are considered fatal, either directly or indirectly through injury. The modelling methods differ between species, and contributing factors used in the analysis include the duration of the flight within the potential collision zone, the number of birds per observation, wingspan and flight speed, individual's body lengths, the number of hours in which a given species can be expected to be active and the time of year in which a species is likely to be present. The particulars of bird species and specifications of the turbine in combination contribute to the CRM analysis. Details of the collision risk analysis, including target species selection criteria, is presented in the CRM report attached in Appendix 8.2 of this EIAR.

Based on the above, the CRM was prepared for the following species: Kestrel, Golden Plover, Whooper Swan, Lesser Black-backed Gull and Great Black-backed Gull.

8.8.3.2.1.1 Kestrel

Kestrel was included in a collision risk model due to the amount of flight activity recorded over the survey period and the amount of time in which these flights were recorded at PCH. As Kestrel are expected to spend time traveling within the site ('non-directional flight') rather than passing directly through, the observed time spent flying within the CRZ at PCH is calculated and extrapolated up to predict the number of transits through the rotor-swept volume per season (Band *et al.*, 2007)[36]. The model estimates that, based on a 158m rotor diameter turbine model and based on the predicted avoidance rate for Kestrel of 95% (SNH 2018)[37], the proposed development would be responsible for an annual collision rate of 0.09 per year (which would equate to 2.7 collisions over the 30-year lifespan of the wind farm).

According to Percival (2003)[21] the magnitude of impact on a species population as a result of collisions would be negligible if the estimated mortalities does not increase the natural mortality rate by 1%. Calculations to determine this were conducted in Table 8-15. No accurate figures for the population of Kestrel in county Mayo were available to use in this calculation and so only the national population was assessed. The estimated 0.09 collisions per year will not increase the national natural mortality rate above 1%, therefore collision risk impacts on this species breeding population will be **negligible and not significant.**

Table 8-15: Potential Increase in Mortality to the National Kestrel Population as a Result of Collision Risk.

Parameter	Description	Source	Result
pop	National Population size	(Lewis *et al,* 2019)[38]	13,500
surv	Adult survival rate	(Village, 1990)[39]	0.69
mort	Adult mortality rate	1 – surv	0.31
m1	Annual population mortality rate	mort x pop	4185
m2	Predicted collision risk	CRM (Appendix 8.2)	0.09
m+	Increase in annual mortality due to collisions (%)	m2/m1 x 100	**0.002%**

8.8.3.2.1.2 Golden Plover

Golden Plover was included in a collision risk model due to the amount of flight activity recorded over the survey period and the amount of time in which these flights were recorded in the CRZ and at PCH. As Golden Plover were recorded roosting and feeding within the study area, they are expected to spend time traveling within the site ('non-directional flight') rather than passing directly through, the observed time spent flying within the CRZ at PCH is calculated and extrapolated up to predict the number of transits through the rotor-swept volume, per season (Band *et al.*, 2007)[36]. The model estimated that, based on a 158m rotor diameter turbine model, and based on the predicted avoidance rate for Golden Plover of 98% (SNH 2018)[37] an annual collision of 5.29 was calculated (which would equate to 158.7 collisions over the 30-year lifespan of the wind farm).

According to Percival (2003)[21], the magnitude of impact on a species population as a result of collisions, would be negligible if the estimated mortalities does not increase the natural mortality rate by 1%. Calculations to determine this were conducted in Table 8-16. No accurate figures for the wintering population of Golden Plover in county Mayo were available to use in this calculation and so only the national population was assessed. The estimated 5.29 collisions per year will not increase the national natural mortality rate above 1%, therefore collision risk impacts on this species wintering population will be **negligible and not significant.**

[38] Lewis, L. J., Coombes, D., Burke, B., O'Halloran, J., Walsh, A., Tierney, T. D. & Cummins, S. (2019) Countryside Bird Survey: Status and trends of common and widespread breeding birds 1998-2016. Irish Wildlife Manuals (in prep). National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

[39] Village, A. (1990), Village, A. 1990 *The kestrel*/Poyser, London [598.53 VIL] as quoted by BirdFacts (https://app.bto.org/birdfacts/results/bob3040.htm [accessed February 2023].

Table 8-16: Potential Increase in Mortality to the National Wintering Golden Plover Population as a Result of Collision Risk.

Parameter	Description	Source	Result
pop	National Population size	(Burke *et al.*, 2019)[40]	80,707
surv	Adult survival rate	(Sandercock, 2003)[41].	0.73
mort	Adult mortality rate	1 – surv	0.27
m1	Annual population mortality rate	Pop x mort	21,791
m2	Predicted collision risk	CRM (Appendix 8.2)	5.29
m+	Increase in annual mortality due to collisions (%)	m2/m1 x 100	**0.024%**

8.8.3.2.1.3 Whooper Swan

Whooper swan was included in the collision risk model due to the amount of flight activity recorded over the survey period and the amount of time in which these flights were recorded in the CRZ at PCH. The model estimates that, using a 158m rotor diameter turbine model and based on the predicted avoidance rate for Whooper Swan of 99.5% (SNH 2018)[37] an annual collision of 0.11 was calculated (which would equate to 3.3 collisions over the 30-year lifespan of the wind farm).

According to Percival (2003)[21] the magnitude of impact on a species population as a result of collisions, would be negligible if the estimated mortalities does not increase the natural mortality rate by 1%. Calculations to determine this were conducted in Table 8-17. Figures for the wintering population of Whooper Swan in county Mayo were available to use in this calculation and so the national and county Mayo populations were both assessed. The estimated 0.11 collisions per year will not increase the natural mortality rate above 1% for either the Republic of Ireland or county Mayo population therefore impacts on this species wintering population will be **negligible and not significant.**

Table 8-17: Potential Increase in Mortality to the National and County Mayo Wintering Whooper Swan Population as a Result of Collision Risk

Parameter	Description	Source	National	Mayo
pop	Population size	(Burke *et al.*, 2021)[30]	14,467	973
surv	Adult survival rate	(Brazil, 2003)[42]	0.80	0.80
mort	Adult mortality rate	1 – surv	0.20	0.20
m1	Annual population mortality rate	Pop x mort	2893	195

[40] Burke, Brian & Lewis, Lesley & Fitzgerald, Niamh & Frost, Teresa & Austin, Graham & Tierney, David. (2019). Estimates of waterbird numbers wintering in Ireland, 2011/12-2015/16. 41. 1-12.
[41] Sandercock B.K. 2003. Estimation of survival rates for wader populations: a review of mark-recapture methods. Wader Study Group Bull. 100: 163–174
42 Brazil, M. 2003 The whooper swan Poyser, London [598.484 BRA] as quoted by BirdFacts (https://app.bto.org/birdfacts/results/bob1540.htm) [accessed February 2023].

Parameter	Description	Source	National	Mayo
m2	Predicted collision risk	CRM (Appendix 8.2)	0.11	0.11
m+	Increase in annual mortality due to collisions (%)	m2/m1 x 100	**0.003%**	**0.056%**

8.8.3.2.1.4 Lesser Black-backed Gull

Lesser Black-backed Gull was included in a collision risk model due to the amount of flight activity recorded over the survey period and the amount of time in which these flights were recorded at PCH. The model estimated that based on a 158m rotor diameter turbine model and based on the predicted avoidance rate for Lesser Black-backed Gull of 99.5% (Furness, 2019)[43], an annual collision of 0.03 was calculated (which would equate to 0.9 collisions over the 30-year lifespan of the wind farm).

According to Percival (2003)[21] the magnitude of impact on a species population as a result of collisions, would be negligible if the estimated mortalities does not increase the natural mortality rate by 1%. Calculations to determine this were conducted in Table 8-18. Figures for the population of Lesser Black-backed Gull in county Mayo were available to use in this calculation and so the national and county Mayo populations were both assessed. The estimated 0.03 collisions per year will not increase the natural mortality rate above 1% for either the Republic of Ireland or county Mayo population therefore impacts on this species wintering population will be **negligible and not significant.**

Table 8-18: Potential Increase in Mortality to the National and County Mayo Lesser Black-backed Gull Population as a Result of Collision Risk.

Parameter	Description	Source	National	Mayo
pop	Population size	(Cummins *et al.* 2019)[44]	14,224	406 – 2860
surv	Adult survival rate	(Wanless *et al.*, 1996)[45]	0.91	0.91
mort	Adult mortality rate	1 – surv	0.09	0.09

[43] Furness, R.W. (2019) Avoidance rates of herring gull, great black-backed gull and common gull for use in the assessment of terrestrial wind farms in Scotland. Scottish Natural Heritage Research Report No. 1019.
[44] Cummins, S., Lauder, C., Lauder, A. & Tierney, T. D. (2019) The Status of Ireland's Breeding Seabirds: Birds Directive Article 12 Reporting 2013 – 2018. Irish Wildlife Manuals, No. 114. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland
[45] Wanless, S., Harris, M. P, Calladine, J. & Rothery, P. 1996. Modelling responses of Herring Gull and Lesser Black-backed Gull populations to reduction of reproductive output: implications for control measures. Journal of Applied Ecology 33: 1420–1432. as quoted by BirdFacts (https://app.bto.org/birdfacts/results/bob5910.htm) [accessed February 2023].

Parameter	Description	Source	National	Mayo
m1	Annual population mortality rate	Pop x mort	1280	37 – 257
m2	Predicted collision risk	CRM (Appendix 8.2)	0.03	0.03
m+	Increase in annual mortality due to collisions (%)	m2/m1 x 100	**0.002%**	**0.081% - 0.011%**

8.8.3.2.1.5 Great Black-backed Gull

Great Black-backed Gull was included in a collision risk model due to the amount of flight activity recorded over the survey period and the amount of time in which these flights were recorded at PCHs. The model estimated that based only on a 158m rotor diameter turbine model and based on the predicted avoidance rate for Great Black-backed Gull of 99.5% (Furness, 2019)[43], an annual collision of 0.01 was calculated (which would equate to 0.3 collisions over the 30-year lifespan of the wind farm).

According to Percival (2003)[21] the magnitude of impact on a species population as a result of collisions, would be negligible if the estimated mortalities does not increase the natural mortality rate by 1%. Calculations to determine this were conducted in

Table 8-19. Figures for the population of Great Black-backed Gull in county Mayo were available to use in this calculation and so the national and county Mayo populations were both assessed. The estimated 0.01 collisions per year will not increase the natural mortality rate above 1% for either the Republic of Ireland or county Mayo population therefore impacts on this species wintering population will be **negligible and not significant.**

Table 8-19: Potential Increase in Mortality to the National and County Mayo Great Black-backed Gull Population as a Result of Collision Risk.

Parameter	Description	Source	National	Mayo
pop	Population size	(Cummins *et al.*, 2019)[44]	6162	236 – 2160
surv	Adult survival rate*	(Wanless *et al.*, 1996)[45]	0.91*	0.91*
mort	Adult mortality rate	1 – surv	0.09	0.09
m1	Annual population mortality rate	Pop x mort	555	21 – 194
m2	Predicted collision risk	CRM (Appendix 8.2)	0.01	0.01
m+	Increase in annual mortality due to collisions (%)	m2/m1 x 100	**0.001%**	**0.048% - 0.005%**

***= The adult survival rate of Great Black Backed Gull is unknown, due to lack of studies and data available. The survival rate of the Lesser Black-backed Gull was used instead, as both species are similar in ecology, diet and some overlap in the habitats used by each .**

8.8.3.2.1.6 Mallard

Mallard was included in a collision risk model due to the amount of flight activity recorded over the survey period and the amount of time in which these flights were recorded within the CRZ at PCH. The model estimated that based only on a 158m rotor diameter turbine model and based on the predicted avoidance rate for Mallard of 98% (SNH, 2018)[37], an annual collision of 0.11 was calculated (which would equate to 3.3 collisions over the 30-year lifespan of the wind farm).

According to Percival (2003)[21] the magnitude of impact on a species population as a result of collisions, would be negligible if the estimated mortalities does not increase the natural mortality rate by 1%. Calculations to determine this were conducted in Table 8-20. Figures for the population of Mallard in county Mayo were not available to use in this calculation and so only the national population was assessed. The estimated 0.11 collisions per year will not increase the natural mortality rate above 1% for either the Republic of Ireland or county Mayo population therefore impacts on this species wintering population will be **negligible and not significant.**

Table 8-20: Potential Increase in Mortality to the National Mallard Population as a Result of Collision Risk.

Parameter	Description	Source	Result
pop	National Population size	(Balmar *et al.*, 2013)[46]	30800
surv	Adult survival rate	(Robinson, 2005)[47]	0.67
mort	Adult mortality rate	1 – surv	0.33
m1	Annual population mortality rate	Pop x mort	10,164
m2	Predicted collision risk	.CRM (Appendix 8.2)	0.11
m+	Increase in annual mortality due to collisions (%)	m2/m1 x 100	**0.001%**

8.8.3.2.1.7 Other Species

All other species recorded in section 8.7.2 were not included in the collision risk modelling due to their low level of flight activity, the resulting in a very low predicted collision risk, which would have negligible impacts on their respective populations and is **not likely to be significant**.

8.8.3.2.2 Disturbance Displacement and Barrier Effect

The presence of turbines in the landscape could potentially deter birds from using the area and its surroundings, resulting in a disturbance displacement effect. Disturbance can result in a significant impact if it reduces the availability of resources for KAR.

It is considered that the availability of alternative feeding habitat may play a role in the disturbance effects when resources are limited, birds are less sensitive to disturbance impacts (Percival, 2005[48]; Powlesland, 2009[5]). If disturbance displacement is said to be impacting an avian receptor, then the significance of the impact is a product of the scale of the deterrence, as opposed to the ability of the wider surroundings to support displaced individuals (Langston & Pullan, 2003)[49].

An additional possible disturbance effect is the disruption to flight lines, which may result in a wind farm acting as a partial barrier to bird movements. Such a disturbance effect could be felt as either a barrier to a migration route or between a roost and feeding site. The ecological impact

[46] Balmer, D., Gillings, S., Caffrey, B., Swan, B., Downie, I. & Fuller, R. (2013) Bird Atlas 2007-11 The breeding and wintering birds of Britain and Ireland. British Trust for Ornithology
[47] Robinson, R.A. (2005) BirdFacts: profiles of birds occurring in Britain & Ireland. BTO, Thetford (https://app.bto.org/birdfacts/results/bob1860.htm) [accessed February 2023]
[48] Percival, S.M. (2005) Birds and wind farms—what are the real issues? *British Birds 98*: 194–204.
[49] Langston & Pullan (2003) Wind farms and Birds: An analysis of the effects of wind farms on birds. Guidance on environmental assessment criteria and site selection issues. RSPB

could prove significant if the increased energy expenditure involved in avoiding the barrier depleted the body fat reserves of an already stressed population.

The effect of disturbance/displacement is expected to decrease over time. The foraging behaviour of local avian communities is expected to adjust as habituation occurs to the disturbance. In addition, Percival (2001)[21] recommends locating turbines at a minimum of 200m apart to facilitate the free movement of birds and thereby avoid a barrier effect. In the case of the proposed development, all turbines are proposed to be located at distances greater than 400m from their nearest neighbour. Table 8-21 below assesses the potential impact of disturbance displacement on avian communities during the operational phase of the development.

Table 8-21: Assessing the Potential Impact on Key Avian Receptors from Disturbance Displacement and Barrier Effect (Operational Phase)

Species (Sensitivity)	**Disturbance/Displacement and Barrier Effect** (Magnitude)	**Significance Evaluation*** (Percival 2003[21] & EPA 2022[20])
Mute Swan (Low)	There is potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site to the mute swans recorded over the survey period. This can result in effective habitat loss. However, the habitats onsite are not typically considered suitable for this species and the species was largely confined to large waterbodies, such as Lough Dahybaun. Literature suggests disturbance distances for swans of up to 200-560m (Ree, 2012)[50]. Given the infrequency of observations, the low numbers present and the absence of a regular flight path across the site and the availability of optimal habitat within the surroundings, disturbance displacement and barrier effects are deemed to be of **Low** magnitude.	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Long term, slight negative effect**
Whooper Swan (Medium)	There is potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site. This could result in effective habitat loss. Literature suggests disturbance distances for swans of up to 200-560m (Ree, 2012)[50] or up to 600m (McGuinness *et al.* 2015) [51]. However, as a result of habituation, swans have been found to feed closer to turbines, especially later in the winter as food resources deplete (Fijn *et al.*, 2012)[52]. Disturbance displacement is judged not to be a factor for this population of Whooper Swan based on the opportunistic use of the site during migration and temporary flooding events and the concentration of the majority of the local population offsite in the local river floodplains. Furthermore, should displacement occur, extensive areas of suitable habitat exist within the local tributaries and adjacent agricultural fields. In the Netherlands, Bewick's Swan (*Cygnus columbianus*) have been shown to avoid operating turbines without resorting to large deflections from their course when flying either around or between turbines (Fijn *et al.*, 2012)[52]. Overall, effects associated with operational disturbance displacement and the barrier effects are deemed to be of **Medium** magnitude. In the event a barrier effect exists for migrating	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Medium) of the effect. Evaluation: **Medium** significance. **Long term, moderate negative effect**

[50] Ree E. C. (2012) Impacts of wind farms on swans and geese: a review. Wildlife 62: 37-72.
[51] McGuinness et al., (2015) Bird sensitivity mapping for wind energy development and associated infrastructure in the Republic of Ireland. BWI.
[52] Fijn et al., (2012) Habitat use, disturbance and collision risk for Bewick Swans *Cygnus columbianus bewickii* wintering near a wind farm in the Netherlands. Wildlife 62: 97-116

Species (Sensitivity)	Disturbance/Displacement and Barrier Effect (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2022[20])
	birds, the additional energy expenditure involved in birds diverting around the wind farm are not considered significant in the context of the overall distances involved in migrating. Moreover, waterbirds utilise natural features in the landscape, such as watercourses, to navigate (Robinson *et al.*, 2004)[53], thus it can be reasonably concluded that the majority of water birds will utilise the local rivers (offsite) when migrating.	
Mallard (Low)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site, which could result in effective habitat loss. The majority of observations of this species were made in wetland habitats at the site, primarily along the local rivers and wetlands within the proposed development site. The favourable conservation status of this species limits the potential for ecologically significant effects. Langston and Pullan (2003)[49] noted no disturbance related effects associated with operating turbines for Mallard. Given the low frequency of occurrence and low numbers per observation and the absence of a regular flight path across the site, effects associated with disturbance displacement and barrier effect are judged of **Low** magnitude.	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Long term, slight negative effect**
Teal (Low)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site which could result in effective habitat loss. The majority of observations of this species were made in wetland habitats at the site, primarily along the local rivers and wetlands within the proposed development site. The favourable conservation status of this species limits the potential for ecologically significant effects. Langston and Pullan (2003)[49] noted no disturbance related effects associated with operating turbines for Teal[49]. Given the low frequency of occurrence and low numbers per observation and the absence of a regular flight path across the site, effects associated with disturbance displacement and barrier effect are judged of **Low** magnitude.	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Long term, slight negative effect**
Tufted Duck (Low)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site which could result in effective habitat loss. The majority of	Percival Significance is calculated as a product of the

[53] Robinson, J., Colhoun, K., McElwaine, J., Rees, EC. (2004). Whooper Swan Cygnus cygnus (Iceland population) in Britain and Ireland 1960/61-1999/2000. Waterbird Review Series, The Wildfowl & Wetlands Trust/Joint Nature Conservation Committee, Slimbridge.

Species (Sensitivity)	Disturbance/Displacement and Barrier Effect (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2022[20])
	observations of this species were made in wetland habitats at the site, primarily along the local lakes and wetlands within the proposed development site. The favourable conservation status of this species limits the potential for ecologically significant effects. Langston and Pullan (2003)[49] noted no disturbance related effects associated with operating turbines for Tufted Duck. Given the low frequency of occurrence and low numbers per observation and the absence of a regular flight path across the site, effects associated with disturbance displacement and barrier effect are judged of **Low** magnitude**.**	sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Long term, slight negative effect**
Cormorant (Low)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site which could result in effective habitat loss. The majority of observations of this species were made along the rivers to the west of the proposed development site and Lough Dahybaun. The range expansion which this species is experiencing limits the potential for ecologically significant effects. There was no breeding recorded within the study area. Given the low frequency of occurrence and low numbers per observation and the absence of a regular flight path across the site, effects associated with disturbance displacement and barrier effect are judged of **Low** magnitude**.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Long term, slight negative effect**
Grey Heron (Low)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site, which could result in effective habitat loss. The majority of observations of this species were made in habitats fringing the site, primarily along the trees and rivers to the west of the proposed development site. The favourable conservation status of this species limits the potential for ecologically significant effects. There was no heronry recorded within the study area. Given the low frequency of occurrence and low numbers per observation and the absence of a regular flight path across the site, effects associated with disturbance displacement and barrier effect are judged of **Low** magnitude**.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Long term, slight negative effect**
Red Grouse (Medium)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site. Although, this species is breeding in areas of heather dominant bog onsite it was noted that as flight activity was below rotor blade height (as is typical of the	Percival Significance is calculated as a product of the sensitivity (Medium) of the

Species (Sensitivity)	Disturbance/Displacement and Barrier Effect (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2022[20])
	flight behaviour of foraging Red Grouse), a barrier effect is not likely to occur. Given the low numbers recorded per observation, the availability of alternative habitat nearby and the absence of regular flight paths across the site, effects associated with disturbance displacement and barrier effect are judged of **Low** magnitude**.**	species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Long term, slight negative effect**
Hen Harrier (High)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site. In Bright *et al*(2006)[54] displacement has been suggested to occur up to 500m around a construction site. There were no records of Hen Harrier breeding either onsite or in the wider surroundings. The majority of observations were confined to the winter; it is considered that these individuals were likely birds dispersing from breeding grounds to lower lying areas for the winter and also individuals roosting onsite. A study of foraging Hen Harrier at an existing wind farm in Co. Galway has shown this species to forage to within 50m of turbines (Madden *et al*, 2007)[55]. Given the infrequency of observations of this species, disturbance displacement and barrier effects are deemed to be of **Low** magnitude.	Percival Significance is calculated as a product of the sensitivity (High) of the species and the magnitude (Low) of the effect. Evaluation: **Medium** significance. **Long term, moderate negative effect**
Kestrel (Medium)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site. Kestrels demonstrate low displacement associated with operating wind farms (Madders *et al*, 2006)[56]. No nest sites were confirmed onsite or within a 500m radius of the planning/ development boundary and the widespread distribution of this species limits the potential for ecologically significant effects. Given the low numbers recorded per observation (1 to 2 individuals), the availability of alternative habitat nearby and the absence of regular flight paths across the site, effects associated with disturbance displacement and barrier effect are judged of **Low** magnitude**.**	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Long term, slight negative effect**

[54] Bright, J. A., Langston, R. H. W., Bullman, R., Evans, R. J., Gardner, S., Pearce-Higgins, J., & Wilson, E. (2006). Bird Sensitivity Map to provide locational guidance for onshore wind farms in Scotland. *Royal society for the protection of birds research report*, (20).
[55] Madden, B., & Porter, B. (2007). Do wind turbines displace Hen Harriers Circus cyaneus from foraging habitat? Preliminary results of a case study at the Derrybrien wind farm, county Galway. *Irish Birds*, *8*, 231-236.
[56] Madders and Whitfield (2006) Upland raptors and assessment of wind farm impacts. Ibis. 148: 43-56.

Species (Sensitivity)	Disturbance/Displacement and Barrier Effect (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2022[20])
Peregrine (Medium)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site. Several studies have suggested that Peregrine are likely to habituate to the presence of operating turbines in the landscape[32] and unlikely to be affected by displacement due to operating turbines[56]. 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 disturbance displacement effects. As flight activity was below rotor blade height, a barrier effect is not likely to occur. Disturbance displacement and barrier effects are judged to be of **Low** magnitude.	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Long term, slight negative effect**
Sparrowhawk (Low)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site. Sparrowhawk activity within the proposed development site was found to be low. The widespread breeding distribution of this species limits the potential for ecologically significant effects. Given the low frequency of occurrence and low numbers per observation and the absence of regular flight paths across the site, effects associated with disturbance displacement and barrier effect are judged of **Low** magnitude**.**	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Long term, slight negative effect**
Merlin (Medium)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site. The uppermost limits for Merlin disturbance suggested in the literature is 500m[32]. No nest sites were confirmed onsite or within a 500m radius of the planning/ development boundary. As flight activity was below rotor blade height (as is typical of the flight behaviour of foraging Merlin), a barrier effect is not likely to occur. Given the low numbers recorded per observation (single individuals), the availability of alternative habitat nearby and the absence of regular flight paths across the site, effects associated with disturbance displacement and barrier effect are judged of **Low** magnitude**.**	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Long term, slight negative effect**
Dunlin (Medium)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site, which could result in effective habitat loss. Dunlin were judged to be a 'possible breeder' in the habitat the north-west of the proposed development site. This	Percival Significance is calculated as a product of the sensitivity (Medium) of the

Species (Sensitivity)	Disturbance/Displacement and Barrier Effect (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2022[20])
	record was located 1.7km from the nearest turbine location, thus is outside the 800m zone of sensitivity recommended by McGuinness *et al.* (2015)[57]. Given the low frequency of occurrence and low numbers per observation, together with the availability of alternative habitat in the wider surroundings disturbance displacement effects are judged of **Low** magnitude.	species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Long term, slight negative effect**
Redshank (Medium)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site which could result in effective habitat loss. However, the habitats onsite are considered sub-optimal for Redshank (cutover bog and degraded blanket bog). The species was only recorded on one occasion, over 1.9km from the nearest turbine location, thus is outside the 800m zone of sensitivity recommended by McGuinness *et al.* (2015)[57]. In the event a barrier effect exists for migrating birds; the additional energy expenditure involved in birds diverting around the wind farm are not considered significant in the context of the overall distances involved in migrating. Redshank have been shown to utilise the proposed development area in low numbers, no regular flight paths have emerged from survey work, therefore disturbance displacement and barrier effect are judged to be of **Low** magnitude.	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Long term, slight negative effect**
Greenshank (Low)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site, which could result in effective habitat loss. Greenshank were judged to be a 'possible breeder' in the north of the site. The nearest record being over 700m from the nearest turbine location. Relative to the total area of the site, the number of breeding territories was found to be low. Given the low frequency of occurrence and low numbers per observation, together with the availability of alternative habitat in the wider surroundings disturbance displacement effects are judged of **Low** magnitude.	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Long term, slight negative effect**

[57] Mc Guinness, S., 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. BirdWatch Ireland, Kilcoole, Wicklow

Species (Sensitivity)	Disturbance/Displacement and Barrier Effect (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2022[20])
Golden Plover (Medium)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site. This could result in effective habitat loss. A review of literature suggests no significant effect of disturbance displacement for this species (Fieldings *et al*, 2015)[58]. Hotker *et al*., (2006) observed Golden Plover to approach operating turbines to within 175m in the non-breeding season[59]. The population recorded at the proposed development area and within the surroundings is a wintering population. The majority of observations of this species have been of flocks foraging/ roosting on bare peat or low grass. Flocks recorded onsite ranged in size from 10 to 70 individuals, with a flock of 400 individuals recorded on one occasion. The majority of the local population has been noted to occur in the bogs surrounding local rivers to the north and east of the proposed development area. The proposed development site is located in an open landscape, this topographical characteristic limits the potential for a barrier effect. Studies have shown this species to be capable of navigating between operating turbines, even during the hours of darkness[49]. In the event a barrier effect exists for migrating birds; the additional energy expenditure involved in birds diverting around the wind farm are not considered significant in the context of the overall distances involved in migrating. Golden Plover have been shown to utilise the proposed development area in varying numbers, with the majority of the local population favouring habitats located offsite, no regular flight paths have emerged from survey work, therefore disturbance displacement and barrier effect are judged to be of **Low** magnitude.	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Medium** significance. **Long term, moderate negative effect**
Ringed Plover (Low)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site which could result in effective habitat loss. Ringed Plover were confirmed breeding on bare peat and small ponds on the site. Relative to the total area of the site, the number of breeding territories was found to be low. Given the low frequency of occurrence and low numbers per observation, together with the availability of alternative habitat in the wider surroundings disturbance displacement effects are judged of **Low** magnitude.	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect.

[58] Fielding and Haworth (2015) Farr windfarm: A review of displacement disturbance on golden plover arising from operational turbines between 2005-2015. Haworth Conservation, Mull.
[59] Hötker, H., Thomsen, K. M., & Köster, H. (2006). Impacts on biodiversity of exploitation of renewable energy sources: the example of birds and bats. *Facts, gaps in knowledge, demands for further research, and ornithological guidelines for the development of renewable energy exploitation. Michael-Otto-Institut im NABU, Bergenhusen*, *65*.

Species (Sensitivity)	Disturbance/Displacement and Barrier Effect (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2022[20])
		Evaluation: **Very Low** significance. **Long term, slight negative effect**
Common Sandpiper (Low)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site. This could result in effective habitat loss. Common Sandpiper were confirmed breeding close to flowing water and small ponds on the site. Relative to the total area of the site, the number of breeding territories was found to be low. Given the low frequency of occurrence and low numbers per observation, together with the availability of alternative habitat in the wider surroundings disturbance displacement effects are judged of **Low** magnitude.	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Long term, slight negative effect**
Snipe (Medium)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site which could result in effective habitat loss. Pearce-Higgins *et al.* (2012) [60] show bird density to decline within 500m of operating turbines. No nest sites were confirmed onsite, however at least one territory was recorded within 500m of the site. The widespread distribution of this species limits the potential for ecologically significant effects. Given the low numbers recorded per observation (1 - 5 individuals), the availability of alternative habitat nearby and the absence of regular flight paths across the site, effects associated with disturbance displacement and barrier effect are judged of **Low** magnitude.	Percival Significance is calculated as a product of the sensitivity (Medium) of the species and the magnitude (Low) of the effect. Evaluation: **Low** significance. **Long term, slight negative effect**
Lesser Black-backed Gull (Low)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site, which can result in effective habitat loss. However, the habitats onsite are not considered suitable for this species. Studies show Gulls to show disturbance effects at distances of 500m[21]. This species was recorded frequently at the proposed development area,	Percival Significance is calculated as a product of the sensitivity (Low) of the

[60] Pearce-Higgins, J. W., Stephen, L., Douse, A., & Langston, R. H. (2012). Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. *Journal of Applied Ecology*, *49*(2), 386-394.

Species (Sensitivity)	Disturbance/Displacement and Barrier Effect (Magnitude)	Significance Evaluation* (Percival 2003[21] & EPA 2022[20])
	with the majority if these observed characterised as commuting flights. Habituation is considered to be a likely scenario. In which case this flight path would remain open to commuting individuals, therefore disturbance displacement and barrier effects are deemed to be of **Low** magnitude.	species and the magnitude (Low) of the effect. Evaluation: **Very Low** significance. **Long term, slight negative effect**
Common Gull (Low)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site, which can result in effective habitat loss. However, the habitats onsite are suitable for this species and breeding has been confirmed in north and south of the site, of which the nearest confirmed recorded being over 2km from proposed turbines. Studies of Gulls show disturbance effects at distances of 500m[21] thus the confirmed breeding records are outside the zone of disturbance to operational turbines. This species was however recorded frequently commuting through the proposed development area, likely between the two nesting areas in the north and south of the site, however these flight were limited, usually involving one or two individuals. Habituation is considered to be a likely scenario, in which case this flight path would remain open to commuting individuals, therefore disturbance displacement and barrier effects are deemed to be of **Medium** magnitude.	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Medium) of the effect. Evaluation: **Low** significance. **Long term, slight negative effect**
Great Black-backed Gull (Low)	There is limited potential for disturbance displacement effects associated with avoidance of operating turbines at the proposed development site, which could result in effective habitat loss. However, the habitats onsite are not considered suitable for this species. This species was recorded infrequently at the proposed development area, with the majority of these observed characterised as commuting flights. Habituation is considered to be a likely scenario. In which case, this flight path would remain open to commuting individuals, therefore disturbance displacement and barrier effects are deemed to be of **Low** magnitude.	Percival Significance is calculated as a product of the sensitivity (Low) of the species and the magnitude (Medium) of the effect. Evaluation: **Low** significance. **Long term, slight negative effect**

8.8.3.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase but the potential for impacts considerably less. Decommissioning of the proposed development would result in the cessation of renewable energy generation, the removal of turbines, and the potential (though unlikely) removal of other infrastructural elements and any effects would be short-term in duration.

Significant effects are not anticipated as a result of the decommissioning phase works.

8.9 CUMULATIVE EFFECTS

An assessment was made of the potential for impacts from other plans and projects cumulatively with the predicted impacts from the proposed Oweninny Wind Farm Phase 3. Particular focus was made on other wind farm projects within the relevant geographical scale. However, other existing and plans and projects were also considered. Reference was made to SNH (2018)[61] on Assessing the Cumulative Impacts of Onshore Wind Energy Developments on birds.

A search was conducted of planning applications (projects) within the vicinity of the proposed development, using the Mayo County Council planning portal map viewer[62] and the Department of Housing, Planning and Local Government EIA portal map viewer[63]. The search excluded retention applications (i.e. typically local-scale residential or commercial developments where an impact has already occurred), incomplete, withdrawn, expired and refused applications. The relevant projects with potential for in-combination adverse effects on the integrity of European sites, are detailed below.

8.1.2 Projects

8.9.1.1 Wind Farms

Existing and proposed windfarms within proximity to the proposed development are discussed hereunder.

[61] SNH (2018). Assessing the Cumulative Impacts of Onshore Wind Farms on Birds. available online at: https://www.nature.scot/doc/guidance-assessing-cumulative-impacts-onshore-wind-farms-birds [accessed January 2023]
[62] Available online at https://www.eplanning.ie/mayocc/searchtypes Accessed January 2023.
[63] Available online at http://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1. Accessed January 2023.

Multiple wind farms located in proximity can have a cumulative impact of collision mortality and the loss of habitat/displacement, depending on the size, distance and the type of bird species which occur within the area. There are currently three approved (conditional) windfarms located within the planning application site boundary Refer to Table 8-22 below.

Table 8-22 Wind Farms Located in Proximity.

Project	Planning Status	Number of Turbines/Masts	Distance to Proposed Development Site
Oweninny Wind Farm Phase 1	Constructed	29	Immediately north-west of the proposed development site boundary
Oweninny Wind Farm Phase 2	Under Construction	31	2km west of the proposed development site boundary
Dooleeg Wind Farm (Mayo Co. Co. Planning Ref.: 20467)	Conditional	1	300m south of the proposed development site boundary
Sheskin Wind Farm (Mayo Co. Co. Planning Ref.: 15825)	Conditional	8	6.5km north-west of the proposed development site
Sheskin South Wind Farm (An Bord Pleanála Case reference: 315933)	Determination due 28/08/2023	21	6km west of the proposed development site
Glencora Wind Farm (Case reference: 310528)	Pre-planning consultation	22	12km north of the proposed development site

Oweninny Wind Farm

The Oweninny Wind Farm Project is being developed by Oweninny Power Ltd. a joint venture between ESB Wind Development Limited and Bord na Móna Energy Limited. Phase 1 of the Oweninny Wind Farm project, which has been in operation since mid-2019, is located across lands immediately to the northwest of the Proposed Development site. While Phase 2 of the Oweninny Wind Farm Project, which is currently under construction and expected to be operational by winter 2022/Spring 2023, is located c. 2km west of the Proposed Development site, to the west of the Oweninny River.

A NIS and EIAR of the Oweninny Wind Farm Project was undertaken in 2013 by Biosphere Environmental Services, on behalf of ESB. The reports identified the potential for likely significant effects on the designated sites, Bellacorick Bog Complex SAC, Bellacorick Iron Flush SAC, Lough Dahybaun SAC, River Moy SAC and Carrowmore Lake SAC, due to the risk of peat slippage due to the construction works and a degradation of water quality from a runoff of

suspended solids and construction related pollutants but proposed robust mitigations to reduce and minimise potential impacts. No potential impacts were identified for nearby SPAs. Habitats within the site were also predicated to change as part of development, but these changes can be considered as being consistent with the rehabilitation of the site since commercial peat extraction ceased in the early 2000's.

Bird species, including the wintering Hen Harriers, were considered not to be affected by the project. However, breeding Snipe were expected to decrease due to their low tolerance of turbines (though any decrease would be offset by further development of suitable wetland habitat elsewhere on site). Some bird collisions were predicted to occur, but species particularly prone to collision, especially swans and geese, occur within the site area only on an occasional basis and in small numbers.

Phase one of this wind farm is currently constructed and operational since 2019, phase two is currently under construction and is expected to be complete in 2023. There is not expected to be any potential for in-combination effects with this project, with respect to potential surface water impacts. This is due to the similar robust mitigation measures proposed in both this project and the proposed development, similarly there will be a lack of overlap between the construction phases of this project and the proposed development.

Potential still exists for disturbance, barrier effects or collision risk with turbines in both developments. However, the proposed development and the Oweninny wind farm phases 1 & 2 found that there was a negligible and not significant of potential for collision of identified KARs and the areas in and around all the developments did not identify any important or notable migration routes or fly away populations. There is therefore no potential for combination effects with this project on bird populations in the area.

Sheskin Wind Farm

Shekin Wind Farm (Mayo Co. Co. Planning reference: 15825) is comprised of 8 wind turbines with associated works, with an overall max height of 150 metres and is located approximately 6.5km form the Proposed Development site. It was granted conditional planning permission 2016.

The NIS and EIAR for this project identified the potential for likely significant effects on the designated sites of Bellacorrick Bog Complex SAC; Owenduff/Nephin Complex SPA Bellacorrick Iron Flush SAC; Lough Dahybaun, Blacksod Bay/Broadhaven SPA; and the River

Moy SAC aswell as potential impacts associated with surface water degradation and disturbance and collision risk. Mitigation measures to prevent surface water degradation and disturbance impacts from lighting was proposed.

This wind farm is currently under construction and is expected to be complete in Q4 2023. There is not expected to be any potential for in-combination effects with this project with respect to potential surface water impacts. This is due to the similar robust mitigation measures proposed in both this projects and the proposed development, similarly there will be a lack of overlap between the construction phases of this project and the proposed development.

Potential still exists for disturbance, barrier effects or collision risk with turbines in both developments. However, both this project and the results from the proposed development found that there is a lack of potential for collision with the SCIs identified in the nearby SPAs. The areas in and around both developments also did not identify any important or notable migration routes or fly away populations. There is therefore no potential for in-combination effects with this project on bird populations in the area.

Sheskin South Wind Farm

Sheskin South Wind Farm (An Bord Pleanála Case reference: 315933) is comprised of 21 no. wind turbines and all associated works and is located approximately 6km from the proposed development site. The application for this proposed development was submitted on the 01/03/2023 and no decision has been determined at time of writing (March 2023). An EIAR for this development was produced and concluded that with the implementation of appropriate mitigation measures, the proposed Sheskin South wind farm will have no significant effects on the existing environment including habitats, designated sites, and birds.

Dooleeg Wind Turbine

Permission for a single wind turbine generator (Mayo Co. Co. Planning reference: 20467), with an overall max height of 180 metres and 20kV grid connection to Bellacorick 110kV substation, is located approximately 300m from the proposed development site. It was granted conditional permission in 2021.

A NIS and EIAR for this project identified the potential for likely significant effects on one designated site, the River Moy SAC. The potential impact identified was associated with the discharge of surface drainage waters during the construction phase. Mitigation measures are to be implemented with this project to prevent any discharge of silt, pollutants, cement or sewage

into the River Deel catchment (River Moy SAC) during the construction phase. No potential impacts were identified for nearby SPAs as part of this project.

There is not expected to be any potential for in-combination effects with this project on the identified protected Site, with respect to potential surface water impacts. This is due to the similar robust mitigation measures proposed in both this projects and the proposed development.

Potential still exists for disturbance, barrier effects or collision risk with turbines in both developments. However, both this project and the results from the proposed development found that there is a lack of potential for collision with the SCIs identified in the nearby SPAs. The areas in and around both developments also did not identify any important or notable migration routes or fly away populations. There is therefore no potential for in-combination effects with this project on bird populations in the area.

Glencora Wind Farm

This proposed wind farm, located approximately 12km north of the proposed development site, is currently in the pre-planning stage and will be comprised of 22 no. wind turbines and all associated works[64]. A pre-application consultation with An Bord Pleanála (Case reference: 310528) for this proposed development was submitted on the 16/06/2023 and no decision has been determined at time of writing (March 2023).

8.9.1.2 Other Projects

Owenniny Bog – Substitute Consent

A proposed application with the potential for cumulative effects is being applied for by Bord na Móna, to An Bord Pleanála for Substitute Consent under Section 177E (Application for Substitute Consent) of the Planning and Development Act 2000, as amended which will be referred to as the 'Planning Acts'. This Substitute Consent application is regarding historic peat extraction activities in Oweninny Bog, Bellacorick, County Mayo. Industrial scale peat production operations began at Oweninny Bog in the 1950's and continued for over half a century to supply the ESB Bellacorick peat burning power station. A remedial Environmental Impact Assessment Report (rEIAR) has been prepared in support of the Substitute Consent application for the historic peat extraction activities carried out at Oweninny Bog, as prescribed

[64] https://www.glenorawindfarm.com

under Part XA 177F of the Planning Acts. The rEIAR presents a detailed assessment of the likely significant effects on the environment at Oweninny Bog.

When focusing on Biodiversity the rEIAR found bog preparation works and Peat harvesting activities would have resulted in negative direct and indirect effects on the waterbodies, bog habitats, flora and fauna within the bog, which would have had significant long term negative effects.

However, the implementation of an IPC licence in 2000, the implementation of the rehabilitation plan in 2003 and the subsequent decommissioning of peat extraction in 2005 reduced any long-term residual effects from the peat extraction activities and resulted in a long-term positive effect on the remediation of watercourses, habitat and vegetation. Some areas of habitat loss remain; however, the rehabilitation of the bog as a whole will ensure the regeneration of habitats overtime. With the continued regeneration of the bog following the rehabilitation plan, it is likely that biodiversity at Oweninny Bog will continue to improve and increase. There will be no overlap between the proposed development and the rehabilitated peatlands as part of the IPC license, therefore no cumulative effects are anticipated.

Mayo Green Hydrogen Production Plant

The development of a hydrogen plant (Mayo Co. Co. Planning Ref: 22502) that will produce hydrogen by the electrolysis of water, is proposed at a site approx. 1km from the Phase 3 site boundary. The hydrogen produced will be stored on site and available for Injection into the transmission gas network or the removal off site by trucks with tube trailers. Water will be abstracted from the adjacent Oweninny river, ground water or a combination of both. The oxygen produced from electrolysis will be vented to atmosphere.

A NIS and EIAR for this development have been produced, which included an assessment of potential significant adverse effects and impacts from the Proposed Development on nearby European sites and Ecological receptors. The NIS identified the potential for the proposed hydrogen plant to result in adverse effect on two protected sites, of which the Blacksod Bay / Broad Haven SPA, was also identified to be at risk of potential impacts as part of the Proposed Developments NIS. Following the application of mitigation measures, potential significant adverse effects will be avoided or reduced and determined that there will be no risk of significant adverse effects on the qualifying interests' habitats and species, or on overall site integrity, nor in the attainment of the specific conservation objectives for the Owenduff / Nephin Complex SAC and Blacksod Bay / Broad haven SPA.

There is not expected to be any potential for in-combination effects with this project on the identified protected Site, with respect to potential surface water impacts. This is due to the similar robust mitigation measures proposed in both this projects and the proposed development.

Small scale Developments

A review of the Mayo County Council planning portal indicates that proposed projects in close proximity to the Proposed Development site includes small scale residential and rural developments (e.g. residential one-off housing, sheds, garages, etc.) within close proximity to the site. These are not expected to have any in-combination effects with the Proposed Development due to the small-scale nature of the residential development and lack of connectivity to European sites. A full list of planning applications within the wider area of the site are provided in Chapter 5 (Policy, Planning & Development Context) of this EIAR.

8.10 CUMULATIVE EFFECTS SUMMARY

No significant residual effects on any ecological receptor have been identified from the sections above.

No significant residual pollution, disturbance, displacement, collision or habitat loss effects were reported for any receptors within any of the nearby wind farm/other assessment reviewed. Taking into consideration other plans or projects no residual cumulative effects are anticipated.

The potential for other plans or projects to act cumulatively with the proposed development to adversely affect the integrity of any European sites, is considered in the NIS (termed “in combination effects” in the context of the NIS assessment, which accompanies this planning application). No cumulative and/or in-combination effects on any of the Qis/SCIs of the relevant European site were identified as a result of the proposed development.

8.11 MITIGATION MEASURES

The measures described in the following sections have been designed to mitigate potential negative and harmful effects as a result of the proposed development on the KAR’s identified as part of the impact assessment.

8.11.1 Mitigation by Design

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

The proposed development has been deliberately designed to avoid the most sensitive areas for birds within the study area following preliminary results from the continued survey effort from April 2019 and desktop research using available data sources, maps and reports. These sensitive areas include intact blanket bog habitat, or areas which are currently in the progress of rehabilitation. The proposed development will largely be confined to already modified, cutover bog habitat and follow a number of existing roadways or infrastructure sites.

Hard standing areas, roads and turning bays have been designed to the minimum size necessary to accommodate the turbine dimensions and number of vehicles and machinery required.

The proposed substation will be located entirely within the proposed development site boundary, as will the majority of the associated grid connection infrastructure. The proposed wind farm will be connected to the national electricity grid through the existing ESB Bellacorick 110 kV substation, located immediately to its south-west. The works associated with the construction of the substation and burying the cable will require excavation, although entirely confined to heavily modified cutover bog habitat or existing road and trackways. These areas have been subjected to detailed bird surveys across the survey period.

8.11.2 Construction Phase

8.11.2.1 General Mitigation Measures

The proposed development has been designed to incorporate current industry best practice with regards to construction and operation of wind farms, which is described in detail in Chapter 3 (Description of the Proposed Development) of this EIAR.

Best practice measures incorporated into the project design aim to avoid significant effects on the surrounding biodiversity. A CEMP has been developed to provide a framework for how significant effects on the environment will be avoided during the construction phase.

A suitably qualified Ecological Clerk of Works (EcoW) will be appointed by the Contractor and will be required full time on site during the construction works. The EcoW will ensure that all mitigation measures outlined within this Chapter are implemented correctly during the construction phase.

8.11.2.1.1 Habitat Loss

Where areas of potentially sensitive breeding bird habitat are proposed to be removed during construction, these works will be timed to avoid the breeding birds nesting season from 1st of March to 31st of August. This measure will avoid any potentially significant effects to breeding bird species. In the event that the bird nesting season cannot be avoided, a license will be sought from NPWS to undertake the clearance of vegetation within the season. Upon license approval, a suitably qualified ornithologist/ecologist will undertake a pre-construction survey of the vegetation proposed to be removed to establish the presence of breeding birds and nests. Where an active nest is found, the nest will be clearly marked and avoided if possible. Where avoidance of the nest is not possible, the nest will only be removed once the chicks have fledged or where nesting has failed.

A pre-construction survey will be undertaken by a suitably qualified ornithologist/ecologist for ground nesting species, which have been identified as having a confirmed or possible breeding status, or species which may potentially be found nesting (e.g. Greenshank, Dunlin, Golden Plover, Redshank, Lapwing, Ringed Plover, Common Sandpiper, Curlew, Snipe, Meadow Pipit or Common Gull) will also be undertaken within the cutover bog within the proposed site boundary at the south and east of the proposed development site to identify the presence of any nest prior to the clearance of vegetation.

8.11.2.1.2 Disturbance/Displacement of Protected Species

The following measures, in relation to birds, are proposed for the construction phase:

- As part of the iterative project design process, turbines have been located away from habitats identified as particular value to protected or sensitive avian species and all will be located in habitats not evaluated as valuable to avian species and typically of low ecological value. This mitigation by avoidance will reduce potential habitat loss impacts for key avian species;
- Pre-construction surveys will be required to identify the location of any breeding birds onsite, in particular breeding waders (e.g. Greenshank, Dunlin, Golden Plover, Redshank, Lapwing, Ringed Plover, Common Sandpiper, Curlew or Snipe) and breeding gulls (e.g Common Gull). Such surveys can only be conducted between the months of April to July. These surveys are required to inform site clearance activities given the legal protection of all breeding birds;
- As noted, any removal of scrub vegetation will be undertaken outside the bird breeding season, where feasible, which begins on the 1st day of March and ends on the 31st day of August. Where this is not possible, these works/activities will not take place before a confirmatory survey of the affected area (i.e. ground-based nests) is undertaken by the EcoW. In the event of any key ornithological receptor nests being found, the works will immediately cease, the survey findings will be reported to the competent authority and the developer will engage with NPWS.

8.11.3 Operational Phase

Based on the extensive bird survey findings and the nature of the proposed development, no operational phase impacts requiring mitigation were identified.

8.12 BIRD MONITORING PROGRAMME

A bird monitoring programme will be undertaken at the proposed development site and results of the monitoring will be submitted to the competent authority and NPWS. More details on the components of the programme can be seen in Appendix 8.5. Monitoring objectives will include the following:

- To ensure any required pre-commencement/ pre-construction phase monitoring is scheduled to ensure any impacts on birds are avoided.
- To record usage of the site by birds and interaction with operating turbines during the post-construction phase of the development.
- To monitor short-term and long-term effects on bird populations with a particular emphasis on wintering and breeding birds deemed to be of high conservation concern (Annex I; EU Birds Directive and BoCCI red list species) such as hen harrier.
- To undertake collision monitoring and corpse searches for potential bird fatalities as a result of collision with turbine blades.
- To record usage of the enhancement area by key ornithological receptors and in particular breeding ground nesting waders.
- Report on findings of post construction monitoring at the end of each monitoring year (Year 1, 2, 3, 5, 10 and 15 of the lifetime of the wind farm).

8.13 RESIDUAL EFFECTS

The proposed avoidance and mitigation measures (as outlined above) associated with the KAR will ensure that all avifauna species are protected. Taking into account the effect significance levels identified and the recommended mitigation measures, significant residual effects on KARs with regards to direct habitat loss, displacement or collision risk are not anticipated.

8.14 SUMMARY

This chapter presents an evaluation of the potential ornithological impacts of the proposed development on KARs and prescribes detailed mitigation for the avoidance of potential significant impacts on avifauna biodiversity. The residual effects assessment, post implementation of mitigation measures, concludes that the proposed development, when considered individually and/or cumulatively with any other existing plan or project, will not result in significant effects on any of the identified KARs.

Overall, it can be concluded that the proposed development will not have significant effects on the identified KARs at any geographic scale, and the proposed development will be constructed, operated and decommissioned in accordance with the design and mitigation described in this EIAR