7 ORNITHOLOGY

7.1 INTRODUCTION

This chapter of the EIAR describes the ornithology (avian ecology) of the proposed Shronowen Wind Farm development, which includes the development, as set out and described in Chapters 1, 2 and 3 of this EIAR, and assesses the likely significant effects the project may have on avian receptors. Non avian ecology is addressed in EIAR **Chapter 6, Biodiversity,** of this EIAR. The aim of the current chapter is to assess whether the project is likely to result in significant impacts on bird species. Where potential impacts are identified, mitigation measures have been developed to avoid or reduce residual significant effects.

This assessment is based on published literature and on ornithological surveys completed at the study area over two consecutive years, between October 2018 and September 2020. The following reports are included as appendices to this chapter (see Volume 3 of the EIAR) are as follows:

- Appendix 7-1: 2018/19 Winter Bird Survey Report
- Appendix 7-2: 2019 Breeding Bird Survey Report
- Appendix 7-3: 2019/20 Winter Bird Survey Report
- Appendix 7-4: 2020 Breeding Bird Survey Report

These supporting appendices include all the data from the ornithological surveys completed within the study area. The study area was defined as the project site and surrounds, extending away from the project site as necessary to account for birds potentially affected. The chapter should be read in conjunction with the supporting appendices.

Areas designated for nature conservation under the Habitats Directive[1] and the Birds Directive[2] have been considered in a standalone Natura Impact Statement (NIS) report prepared to deal specifically with European sites.

This impact assessment was carried out with regard to the following publications:

- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2017)
- Guidelines for Ecological Impact Assessment in the UK and Ireland - Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2019)
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009)
- Birds and wind farms in Ireland: a review of potential issues and impact assessment. Percival, S.M. (2003)
- Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage (SNH, 2017)

[1] 92/43/EEC

[2] 2009/147/EC

- Assessing Connectivity with Special Protection Areas (SPAs). Scottish Natural Heritage SNH (2016a)
- Wind energy development and Natura 2000. Guidance document (European Commission, 2010)
- European Commission Guidance on the preparation of the Environmental Impact Assessment Report (EC, 2017)
- Best Practice Guidelines for the Irish Wind Energy Industry (Irish Wind Energy Association, 2012)
- Assessing the Cumulative Impact of Onshore Wind Energy Developments. Scottish Natural Heritage (SNH, 2012)
- Assessing Significance of Impacts from Onshore Windfarms on Birds Outwith Designated Areas (SNH, 2018)

Article 3(1) of the EIA Directive requires the EIAR to identify, describe and assess the direct and indirect significant effects of a project on biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC. This chapter meets these criteria through identification, description and assessment of direct and indirect significant effects of the project on birds, as required under these directives. As the focus of this assessment is solely on birds, the assessment of habitats and other species is presented in Chapter 6, Biodiversity.

7.1.1 Scope of Assessment

The chapter comprises an ecological impact assessment of the project focusing on ornithology or bird species potentially affected by the project. Ecological impact assessment (EcIA) is "the process of identifying, quantifying, and evaluating the potential impacts of defined actions[3] on ecosystems or their components" (Treweek, 1999 cited in NRA, 2009; CIEEM, 2019). In the case of this project, the process will determine whether the ornithological interests associated with the site will be subject to impacts from the project and it will characterise these impacts and their effects. To that end this chapter will:

- In **Section 7.2**, describe the methodology used to collect information on the ornithological interest of the site and surrounds.
- In **Section 7.3**, describe the ornithological features within the Zone of Influence of the project.
- In **Section 7.3.4**, identify and select, from among those features, the receptors upon which impacts ensuing from the proposal are likely. These are referred to as Important Ecological Features
- In **Section 7.4**, identify the potential direct, indirect and cumulative impacts of the project that are probable or likely to occur during its lifetime. Assess whether said impacts are likely to result in significant direct, indirect and cumulative effects upon the Important Ecological Features.
- In **Section 7.5**, where necessary propose mitigation measures to remove or reduce those impacts.
- In **Section 7.6**, **a**ssess the residual ecological effects of the project (those remaining after mitigation).

[3] In this case the defined actions are the activities associated with the wind farm project.

The Zone of Influence (ZOI) of the project was established on the basis of the details of the project extent and characteristics, the desk study and field survey results, guidance in SNH (2016) for establishing connectivity with Special Protection Areas, CIEEM (2019) criteria for establishing a ZOI and professional judgement. Using these criteria, an assessment was made that the area within a 15km radius of the proposed development was within a potential ZOI of the proposal.

Features of ornithological significance occurring or likely to occur within the ZOI of the development were classified as Important Ecological Features (IEF). In the case of this assessment, an IEF referred to an important bird species using the site and were identified on the basis of the ornithological surveys completed at the site between November 2018 and March 2020. IEF or important bird species included bird species with national and international protection under the Wildlife Act 1976 as amended and the EU Birds Directive 2009/147/EC, respectively, and red-listed bird species listed in Colhoun, K. & Cummins, S., (2013). IEF were also considered to be designated sites for nature conservation which supported important bird populations.

This chapter quantifies any potential impacts relating to the Important Ecological Features (IEF) and identifies any measures required to avoid, reduce and mitigate likely significant effects. Identification of effects and prescribed mitigation has been derived following a collaborative approach working with a multi-disciplinary team including site ornithologists, ecologists, and project engineers. The results of the ornithological surveys have been utilised to inform the design of the project, thereby minimising potential effects on avian ecology, sensitive habitats, and species of conservation interest.

The information provided in this EIAR chapter, accurately and comprehensively describes the baseline ornithological environment; provides an accurate prediction of the potential impacts on the IEF from the project; prescribes mitigation where necessary; and, describes the residual effects on avian ecology.

7.1.2 Description of Project

The Shronowen Wind Farm is located mainly within a cutover bog in north County Kerry. Much of the bog has been historically drained and cut with evidence of current cutting in the east of the site; the edge of the site supports improved agricultural grassland and stands of conifer forestry plantation. The following sets out the elements of the project for which development consent is being sought and all other associated project components.

Proposed Development for which planning consent is being sought	**Core Wind Farm Components** • Twelve (12) No. wind turbines (maximum turbine tip height 150m) with associated foundations and crane hardstand areas. • New and upgraded internal site service roads (4.43km of existing tracks to be upgraded and 6.85km of new internal access tracks to be constructed). • Underground 33kV electric cabling systems between turbines within the wind farm site and wind farm substation. • One (1) No. permanent meteorological mast (90m height) and associated hardstand area. • Six peat deposition areas located across the wind farm site with a total volume of 225,456m^3 • New junction off the L-6021 at the north east of the site to facilitate construction and access. • New junction off the L-1009 on the west of the site to facilitate construction and access. **Grid Connection Components** • One (1) No. proposed 110kV substation including: an outdoor electrical yard, two single storey buildings (one for the system operator and one for the wind farm operator) containing associated facilities (control, switchgear and metering rooms, welfare facilities, workshop and office). • A 225m long 110kV underground cable connection from the 110kV wind farm substation to the existing 110kV transmission line due east of the wind farm site. **Other Associated Components** • Two (2) No. temporary construction site compounds (95m x 50m and 55m x 25m in size). • Associated surface water management system. • Felling of approximately 3.15ha of coniferous forestry to facilitate site development.
Other Associated Project Components subject to EIA for which planning consent is not being sought within the current application	• Temporary works on sections of the public road network along the turbine delivery route (including hedge or tree cutting, relocation of powerlines/poles, lampposts, signage and local road widening) • Replanting of permanently felled forestry in lands adjacent to Turbine T1 and T7. • An alternative 5.5km underground cable connection from the onsite wind farm substation to the previously granted Tullamore Solar Farm due south of the wind farm site (KCC Planning Ref 18/720 and ABP Ref. PL.08.302681).

7.1.3 Legislation

The most important legislation underpinning biodiversity and nature conservation in Ireland are the:

- Wildlife Acts 1976 to 2018
- Council Directive 92/43/EEC referred to as the 'Habitats Directive'
- Council Directive 2009/147/EC referred to as the 'Birds Directive'
- European Communities (Birds and Natural Habitats) Regulations 2011-2015
- Planning and Development Act (2000) (as amended)
- Planning and Development Regulations 2001 to 2020

The Convention on Wetlands of International Importance especially as waterfowl habitat, more commonly known as the Ramsar Convention, was ratified by Ireland in 1984 and came into force for Ireland on 15 March 1985. While this is not legislation it is an international treaty. Ireland presently has 45 sites designated as Wetlands of International Importance, with a surface area of 66,994 hectares.

7.1.4 Consultation

Consultation was undertaken with a number of relevant consultees including An Taisce, BirdWatch Ireland, National Parks and Wildlife Service and Irish Wildlife Trust. However, no responses have been received to date.

7.2 METHODOLOGY

7.2.1 Desktop Study

A desktop review of the information available for the study area was undertaken. The study area includes lands directly affected by the project, as well as habitats that may be geographically distant from the project but whose ecological interests may be indirectly affected by the construction and operation of the project.

Relevant published books, reports and scientific literature was reviewed. A full list of the literature sources utilised in the desk study is provided in **Section 7.8**.

The following publications, resources and datasets were accessed/consulted:

- Ordnance Survey Ireland (OSI) aerial photography and 1:50000 mapping, and other sources of online aerial imagery
- National Parks and Wildlife Service (NPWS) (online resources and records from the Rare and Protected Species Database)
- National Biodiversity Data Centre (NBDC) (online);
- BirdWatch Ireland - online resources
- BirdLife International – online resources
- Irish Wetland Bird Survey I-WeBS online
- Bird Atlas: Balmer *et al.*, 2013.
- Birds of Conservation Concern (BoCCI) in Ireland 2014-2019 (Colhoun & Cummins, 2013)
- Environmental Impact Statements from windfarms in the area including Leanamore Wind Farm EIS and Ballylongford Wind Farm EIS
- Bird monitoring reports or data from Tullahennel Wind Farm
- Bird Sensitivity Mapping for Wind Energy Developments and Associated Infrastructure in the Republic of Ireland. Guidance Document (McGuinness *et al.*, 2015).
- Other information sources and reports footnoted in the course of the report

The project lies within the juncture of four Ordnance Survey National Grid 10km squares: Q93, Q94, R03 and R04.

7.2.2 Identification of Target Species

The results of the desktop study and reconnaissance surveys, conducted as part of the initial scoping exercise prior to the commencement of the surveys, were used to identify those bird species which were considered likely to occur at the site and in the surrounding area. Of these, target species were identified which formed the focus of the bird surveys.

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

- Annex I of the Birds Directive
- Special Conservation Interests (SCI) of Special Protection Areas (SPA) within a 15km radius of the project site

- Species protected under the fourth schedule of the Wildlife Acts 1976-2018 (buzzards, eagles, falcons, harriers, hawks, kites, osprey, owls)
- Red-listed birds of Conservation Concern (Colhoun and Cummins, 2013)
- Bird species that are susceptible to impacts from this type of development.

To ensure other species which may be sensitive to wind farms were not missed during surveys all other species of wader, duck, and cormorant were included as secondary target species. It is generally considered that passerine species are not significantly impacted by windfarms (SNH, 2017). While they were not, therefore, included as either primary target or secondary target species their presence was recorded in order to provide a complete picture of bird usage of the site. Target species lists from surveys completed can be viewed in **Volume 3**, **Appendix 7-1** to **7-4**, of the EIAR and are included here:

The Primary Target Species were:

- Hen harrier (*C. cyaneus*)
- Merlin (*F. columbarius*)
- Kestrel (*F. tinnunculus*)
- Sparrowhawk (*A. nisus*)
- Short-eared owl (*A. flammeus*)
- Whooper swan (*C. cygnus*)
- Mute swan (*C. olor*)
- Light-bellied brent goose (*B. bernicla hrota*)
- Greylag goose (*A. anser)*
- Golden plover (*P. apricaria*)
- Lapwing (*V. vanellus*)
- Curlew (*N. arquata*)
- Black-headed gull (*C. ridibundus*)

The Secondary Target Species were:

- Cormorant (*P. carbo*)
- Shelduck (*T. tadorna*)
- Wigeon (*A. penelope*)
- Teal (*A. crecca*)
- Pintail (*A. acuta*)
- Shoveler (*A. clypeata*)
- Scaup (*A. marila*)
- Ringed plover (*C. hiaticula*)
- Grey plover (*P. squatarola*)
- Knot (*C. canutus*)
- Dunlin (*C. alpina*)
- Black-tailed godwit (*L. limosa*)
- Bar-tailed godwit (*L. lapponica*)
- Redshank (*T. totanus*)
- Greenshank (*T. nebularia*)
- Snipe (*G. gallinago*)

7.2.3 Surveys

Bird surveys were conducted at the Shronowen wind farm site on a monthly basis over six-month periods during the winter (November 2018 to March 2019 and October 2019 to March 2020, inclusive) and breeding (April through to September 2019 and 2020, inclusive) seasons totalling two years of bird surveys during:

- Winter 2018/19
- Breeding 2019
- Winter 2019/20
- Breeding 2020

The main broad survey type included in the survey design was Vantage point (VP) surveys. The survey methods are detailed in the Volume 3, **Appendix 7-1** to **7-4, of the EIAR** and are summarised below. Surveys started at the site in November 2018 so an additional month of vantage point watches was completed between then and March 2019 to ensure the equivalent of 6 months of survey work was completed i.e. 36 hour watches at each VP. In other words, while 23 months of survey work was done, the equivalent in hours to 24 months or two years was completed.

Monthly vantage point (VP) surveys were carried out at three VP locations in accordance with methodology set out in SNH (2017) guidance, '*Recommended bird survey methods to inform impact assessment of onshore wind farms*'. VP locations and associated viewsheds are illustrated in **Figures 7-1** and **7-2** below. The viewsheds were completed at 14m target height, 1.6m observer height and a VP arc of 2km. VP surveys involve observations of birds from a stationary position using binoculars or telescope. The overall aim of these surveys was to quantify the level of flight activity and its distribution over the survey areas. During VP surveys the flight behaviour of target and secondary target species was recorded. Behaviour of secondary species was also recorded; however, recording of secondary species was subsidiary to recording of target species (SNH, 2017). Details on VP watch surveys are presented in Volume 3, **Appendix 7-1** to **7-4**. This includes full details of dates, times, survey locations, survey duration and weather conditions for each survey.

A survey of suitable waterbird sites in the surrounding hinterland was conducted and site specific surveys were undertaken where evidence of waterbird usage existed.

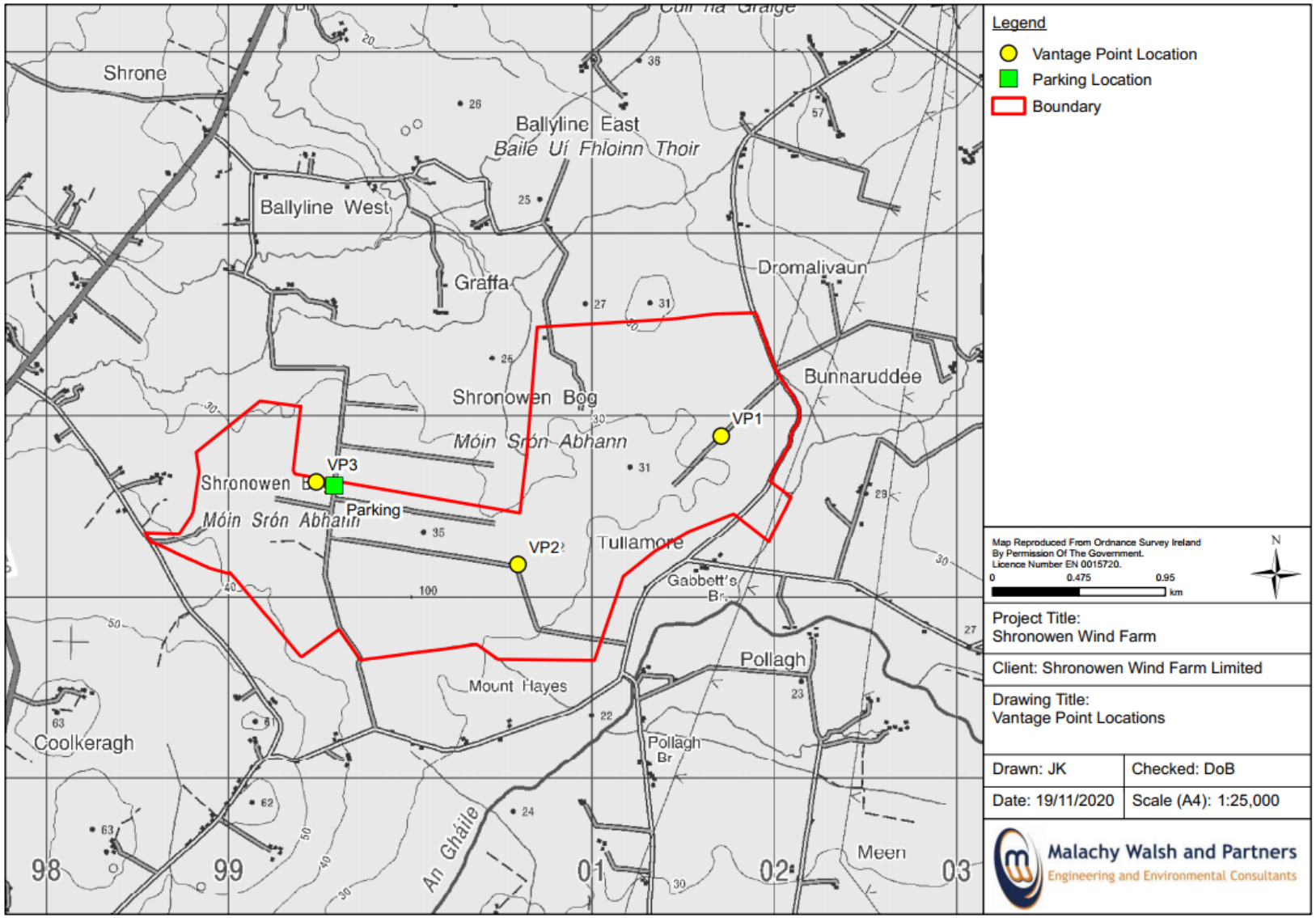

Figure 7-1. Vantage point locations

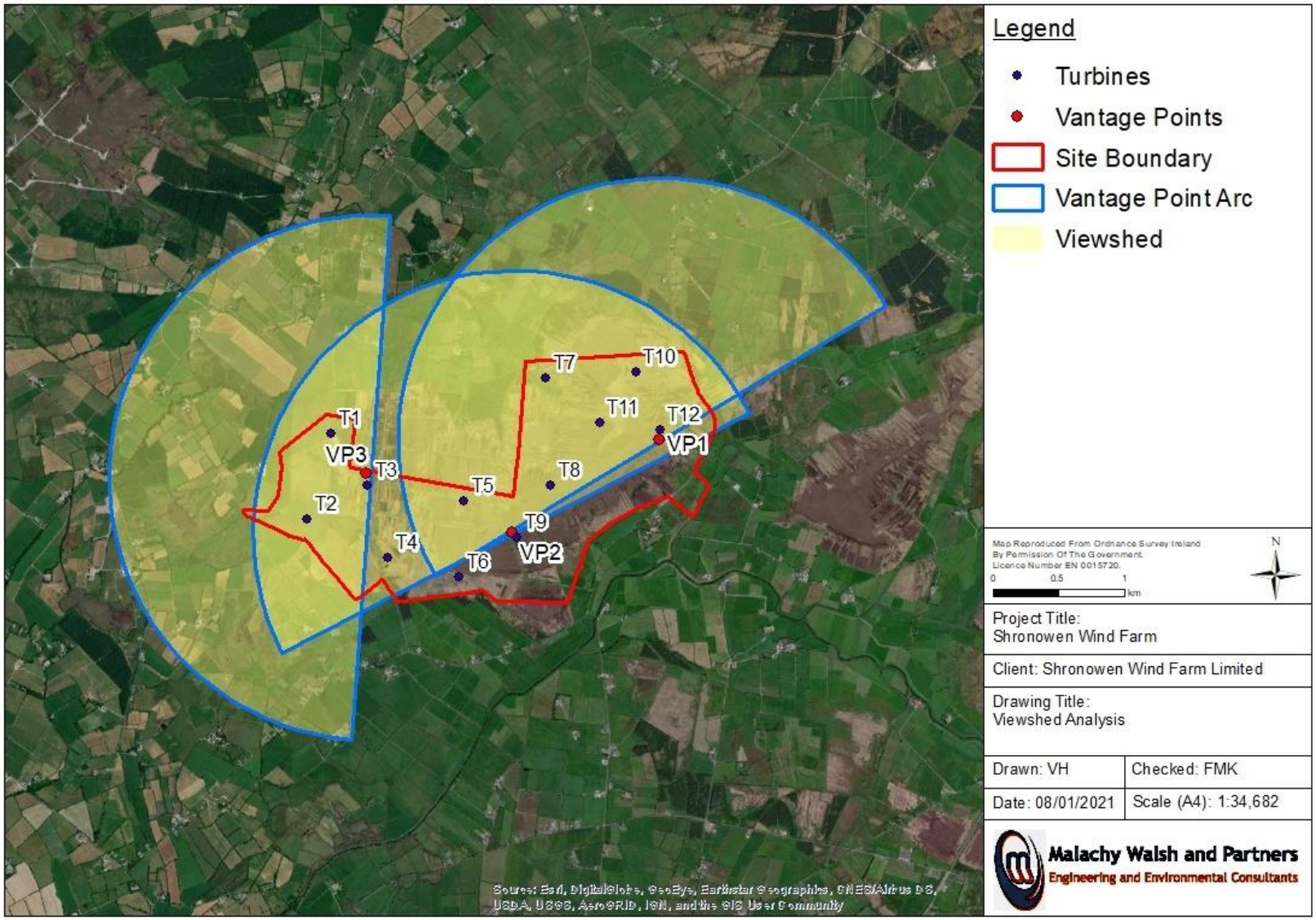

Figure 7-2. Vantage point locations and viewsheds

7.2.4 Evaluation of Important Ecological Features (IEF)

Important Ecological Features (IEF) are important features that could be potentially affected by the project and should be subject to detailed assessment (CIEEM, 2019). IEF were considered to be target bird species (see **Section 7.2.2**) identified during bird surveys at the site (see **Section 7.2.3**) and designated sites for nature conservation, in particular those designated for their bird populations. For species, IEF were considered to be target species that were recorded on more than one occasion during the two year survey period and where suitable habitat occurred at the project site (see **Section 7.3.4**). These were then brought forward to the impact assessment stage (**Section 7.4**) to determine the likelihood of significant ecological effects to the selected bird species. Special Protected Areas (SPAs) are internationally important sites classified for the conservation of birds listed in Annex I of the Birds Directive[4] and regularly occurring migratory species not listed in Annex I. Internationally important sites can also include Ramsar sites. Those of national importance include Natural Heritage Areas (NHA) as well as proposed NHAs. **Section 7.3.2.1** presents designated sites considered to be within the ZOI of the project while **Section 7.4** includes an assessment of likely significant effects on designated sites within the ZOI of the project.

7.2.5 Impact Assessment Methodology

Significance is a concept related to the weight that should be attached to effects when decisions are made (CIEEM, 2019). A significant effect is an effect that undermines either the long-term distribution or abundance of bird populations, at the appropriate geographical scale (locally, regionally, or in the case of rare and restricted species, nationally (Drewitt and Langston (2006)), or the conservation objectives of a designated site (NRA, 2009; CIEEM, 2019). The significance of the effect of the project on IEF was assessed using the methodology provided in Percival (2003), which provides a methodology for assessing the effects of a wind farm on ornithological interests in an Irish context. The methodology follows a stepwise procedure where firstly the sensitivity of a species is established, followed by a determination of the magnitude of potential impacts that may occur on those species/populations before finally determining the significance of the potential impact, and hence their acceptability in a planning context (Percival, 2003). In the following section, **Table 7-1** presents the method for assessing the sensitivity of a species to a wind farm development, **Table 7-2** the method for determining the magnitude of the effect while **Table 7-3** combines the level of sensitivity and the degree of magnitude in a matrix format to determine the significance of the potential effect of the wind farm on bird species selected as IEF. Ecological impacts and effects were also characterized using CIEEM (2019) and EPA (2017) guidance.

7.2.5.1 Determining sensitivity of bird species, and magnitude and significance of effects

The sensitivity of a species can be defined as its ecological importance and nature conservation interest at the site being assessed Percival (2003).

[4] 2009/147/EC

Table 7-1. Determining the sensitivity of bird species (adapted from Percival, 2003)[5]

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 EU Birds Directive. Species present in regionally important numbers (>1% regional (county) population). Other species on BirdWatch Ireland's red list of Birds of Conservation Concern.
Low	Any other species of conservation interest, including species on BirdWatch Ireland's amber list of Birds of Conservation Concern not covered above.

Once the bird populations in the study area have been evaluated in terms of their sensitivity, the next step is to determine the magnitude of the possible effects that may occur. The determination of the magnitude of the effects is shown in **Table 7-2**.

Table 7-2. Determining the magnitude of effects on a site (Percival, 2003)

Magnitude	Description
Very High	Total loss or very significant alteration of the baseline features such that the post development character/composition/attributes will be fundamentally changed and may be lost from the site *Guide: <20% of local 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 local population/habitat lost*
Medium	Loss or alteration of one or more key elements/features of the baseline conditions, such that the post-development character/composition/attributes etc. would be partially changed. *Guide: 5-20% of local 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 conditions will be similar to pre-development circumstances/patterns. *Guide: 1-5% of local population/habitat lost*
Negligible	Very slight change from baseline situation. Change barely distinguishable, approximating to the "no change" situation. *Guide: <1% of local population/habitat lost*

The significance of any one impact is a product of the sensitivity of the receptor and the magnitude of the impact as presented in **Table 7-3**.

[5] A more recent bird sensitivity rating system is available in Percival (2007), however, it's modified accordingly to fit the UK context.

Table 7-3 Matrix determining the significance of the effects (Percival, 2003)

Magnitude	Sensitivity			
	Very high	High	Medium	Low
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

7.2.5.2 Criteria for Characterising the Significance of Effects

The significance of potential ecological effects on birds was determined using Percival (2003) together with professional judgement. The effects were further described with reference to EPA (2017) and CIEEM (2019) criteria for characterising ecological impacts. **Table 7- 4** incorporates this criteria into one table.

Table 7-4. Criteria for assessing impacts based on CIEEM (2019) and (EPA, 2017)

Parameter	Description	
Quality	Positive effect: A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).	
	Neutral effect: No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.	
	Negative effect: A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).	
Extent	The area over which an impact occurs.	
Duration	• Momentary – effects lasting from seconds to minutes • Brief – effects lasting less than a day • Temporary – effects lasting less than a year • Short-term – effects lasting 1 to 7 years • Medium term – effects lasting 7 to 15 years • Long term – effects lasting 15 to 60 years • Permanent – effects lasting over 60 years • Reversible	
Reversibility	Irreversible impacts: permanent changes from which recovery is not possible within a reasonable time scale or for which there is no reasonable chance of action being taken to reverse it. Reversible impact: temporary changes in which spontaneous recovery is possible or for which effective mitigation (avoidance/cancellation/reduction of effect) or compensation (offset/recompense/offer benefit) is possible.	
Frequency and Timing	Frequency – How often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually) Timing – the timing of an activity or change may result in an impact if it coincides with critical life-stages or seasons e.g. bird nesting season.	
Describing the significance	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.

Parameter	Description	
of effects (EPA, 2017)	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
	Significant	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	An effect which obliterates sensitive characteristics

7.2.6 Collision Risk Model (CRM)

A collision risk model was undertaken for two species of conservation concern, kestrel and hen harrier. In line with Scottish Natural Heritage (SNH, 2000) guidance, the Band Collision Risk Model (Band *et al.*, 2007) was used in this assessment. The Band modelling method involves two stages:

- Stage 1: Establishing the number of birds or flights that pass through the air space swept by the turbine rotors. These transits are determined by using either the "Regular or Random flight" model depending on flight activity and behaviour.

- Stage 2: Calculating the probability of a bird being struck when making a transit through a rotor.

The figures obtained in both stages are then multiplied together to give a theoretical annual collision mortality rate based on the supposition that birds make no attempt to avoid collision. However in "real-life" circumstances, birds demonstrate high rates of avoidance - usually 98-99% according to SNH (2018). To account for these evasion measures, known avoidance rates are applied as a percentage to the theoretical collision value as a final step.

Band Model values are solely speculative and representative of worst-case estimates, only drawing conclusions by assuming likely levels of active avoidance by specific species. Accordingly, results obtained are dependent on the quality of field observation data and accuracy of the avoidance rates used, and must therefore be interpreted with a certain degree of caution.

The model estimates the risk of collision based on the activity levels and flight behaviour of these species, the number, layout and specifications of the proposed turbines, and the biometrics of relevant species. The model inputs and outputs are presented in tables below in **Section 7.4.2.2**, **Tables 7-17 to 7-22**, below.

7.2.7 Statement on Limitations and Difficulties Encountered

There were no limitations or difficulties encountered during the bird survey work or the preparation of this chapter.

7.3 RECEIVING ENVIRONMENT

7.3.1 Site Description

The site of the proposed Shronowen Wind Farm is situated in North Co. Kerry in the townlands of Tullamore, Ballyline West, Dromalivaun and Coolkeragh, approximately 4km southeast of Ballylongford village and 6km north of Listowel town in an area of open cutover bog to the east of the R552 Regional Road linking these settlements.

The site largely comprises cutover bog which in its original form was a raised blanket bog, but which is now substantially cutover or drained with a lowering of the water table and its ecological functioning considerably altered by turf cutting. It is situated within a landscape dominated by agricultural grassland habitats interspersed by areas of conifer forestry plantation and other bog. The topography of the site is essentially flat - albeit with the slight peat dome that is a characteristic of the lowland raised bog type. The site is intersected by a network of access tracks of robust construction that, while too rough for cars, are, for the most part, in good condition. The southern boundary of the project site is situated in close proximity to a 1st order tributary of the Galey River to the south which drains to the River Feale; the Ballyline River drains from the northern part of the site to the inner reaches of Ballylongford Bay.

Turbary rights pertain to the entire site and much of the original peat mass has been removed and a significant proportion of the bog now comprises a mix of exhausted banks or banks that are currently being, or historically have been, worked. While a large central area remains relatively uncut, a crisscross network of drains transect the site the effect of which is the lowering of the water table across the site. Because the water table is the key determinant of aerobic and anaerobic processes in a bog, the lowering of the water table within the peat boundary between the upper aerobic acrotelm (living) layer and the underlying, water-logged and compacted, catotelm (dead) layer, has fundamentally altered the peat forming capacity of Shronowen Bog.

The vegetation communities that the bog supports are constrained by the nutrient poor conditions that pertain and the cover currently comprises a relatively uniform and homogenous cover of purple moor-grass (*Molinia caerulea*). While heather is present, surveys indicate that it is not a significant component in the overall plant mix. A few isolated tree lines are present; these consist primarily of birch (*Betula spp*.) and all are of a relatively low stature with an average canopy height in the region of 5 m. Areas of willow scrub (*Salix* spp.*)* are also present; however, these are primarily distributed within the transitional marginal habitats that fringe the bog, in the interface areas between the agricultural and commercial forestry habitats and the bog itself. Willow shrub lines also fringe the sides of the tracks in many places. Gorse (*Ulex europaeus*) is a common feature along tracks through the site. A variety of grasses and ruderal species have colonised the margins along the sides of the tracks where disturbance has disrupted the dominance of the indigenous vegetation that dominates the reminder of the site. A proportion of the site comprises bare unvegetated ground which is present in areas where sustained peat extraction has been occurring recently.

Apart from some localised ponding of water in some of the lower lying peat banks no established ponds or other bodies of standing water were noted during the site surveys and none are visible in the range of aerial imagery reviewed. While stands of bulrush (*Typha latifolia*) are present in some trackside drains in the western part of the site, the individual stands are generally small and localised and the distribution within the site is somewhat uneven and diffuse.

In summary the site is, both topographically and ecologically, relatively homogeneous, a characteristic that inhibits species diversity not only in terms of the floristic communities but also in the variety of animal species routinely present.

7.3.2 Desk Study

7.3.2.1 Designated Sites including SACs, SPAs, NHAs and PNHAs

Designated sites for nature conservation within the ZOI of the project were identified. For designated sites, the ZOI marks the area within which ecologically important features associated within sites could be affected and, following a desk-top assessment for this project, was considered as the zone extending to an area of 15km surrounding the site. Designated sites outside of this were also considered for inclusion within the ZOI as applicable.

Special Protected Areas (SPA)

SPA sites were designated under the Directive on the Conservation of Wild Birds ('The Birds Directive') Directive 79/409/EEC and amended in the Directive 2009/147/EC, and are now protected as Natura 2000 Sites under the EU 'Habitats Directive'. There are two SPA sites within ZOI of project.

Special Areas of Conservations (SAC)

SAC sites are protected under the European Union (EU) 'Habitats Directive' (92/43/EEC), as implemented in Ireland by the European Communities (Birds and Natural Habitats) Regulations, 2011. There are ten SAC sites within the ZOI of the project.

Natural Heritage Areas (NHA)

Sites of National Importance in the Republic of Ireland are termed, Natural Heritage Areas (NHA) and proposed Natural Heritage Areas (pNHA). While the Wildlife (Amendment) Act 2000 has been passed into law, pNHAs will not have legal protection until the consultative process with landowners has been completed. There are seven NHA sites, and thirteen pNHA sites located within 15km of the site.

It is considered that SPAs beyond 15km are outside the ZOI of the project based on guidance in SNH (2016) and the results of the two year bird survey. This guidance provides information on dispersal and foraging distances for a range of bird species which are frequently encountered when considering plans and projects. To assess whether there are processes or pathways by which the proposal may influence a site's qualifying interests, SNH (2016) notes the importance of considering distances that some species may travel beyond the boundary of their SPAs. The foraging range from nest sites during the breeding season and from night roosts during winter season are given in SNH (2016). No SCI for which SPAs beyond 15km were designated are within the core foraging range the site (SNH, 2016)

The effect of the project on the integrity of SPAs and SAC's, collectively referred to as Natura 2000 sites, have been assessed in a NIS accompanying the planning submission, and so have not been considered in any more detail in this chapter. This is in line with EPA (2017) guidance, which states that a biodiversity section of an EIAR should not repeat the detailed assessment of potential effects on European sites contained in a NIS, but it should refer to the findings of that separate assessment. The conclusions of the Screening for Appropriate Assessment (see Appendix 2 of the NIS submitted with this planning application) and NIS with respect to SPA's and SAC's potentially within the ZOI of the project is presented in the following table where applicable. The table lists all SACs, SPAs, NHAs and pNHAs within 15km of the project site boundary that are considered within the ZOI of the project

and establishes whether these sites will be significantly affected by the project or not. Sites that will not be significantly affected by the project are not considered further in the assessment. **Figure 7-3** to **Figure 7-5** shows the location of SACs, SPAs, NHAs and pNHAs within a 15km radius of the project.

Designated sites within 15km of the project are listed in **Tables 7-5** and **7-6**, along with their qualifying features and distance to the project site. This table establishes if designated sites are likely to be affected by the project and whether they will be considered further in this chapter, or whether they have been already been considered or assessed in the Screening for Appropriate Assessment report or the Natura Impact Assessment (NIS).

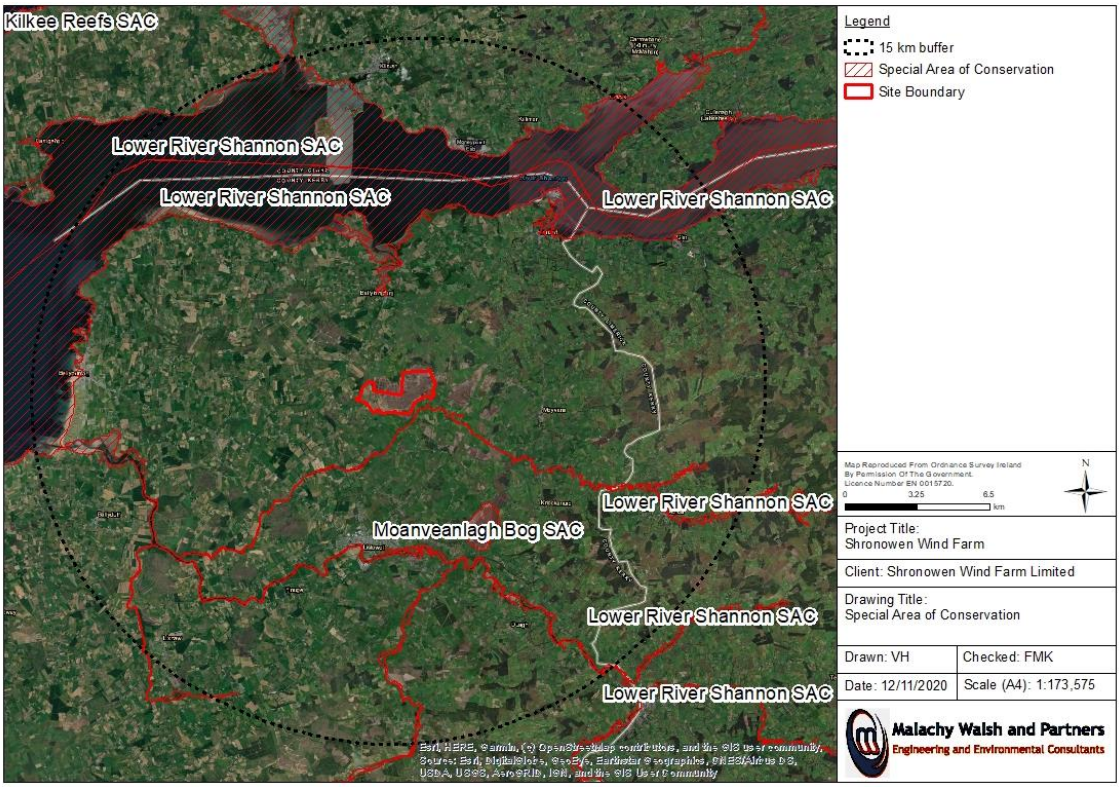

Figure 7-3. SACs within 15km of the project

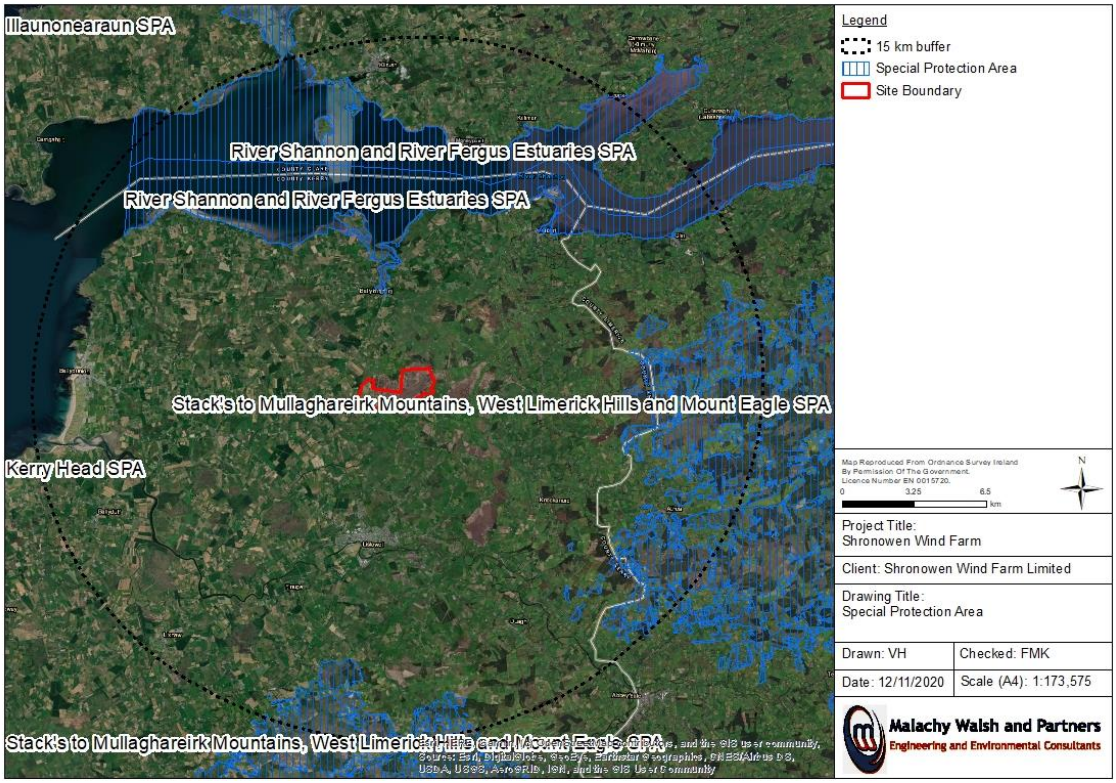

Figure 7-4. SPAs within 15km of the project

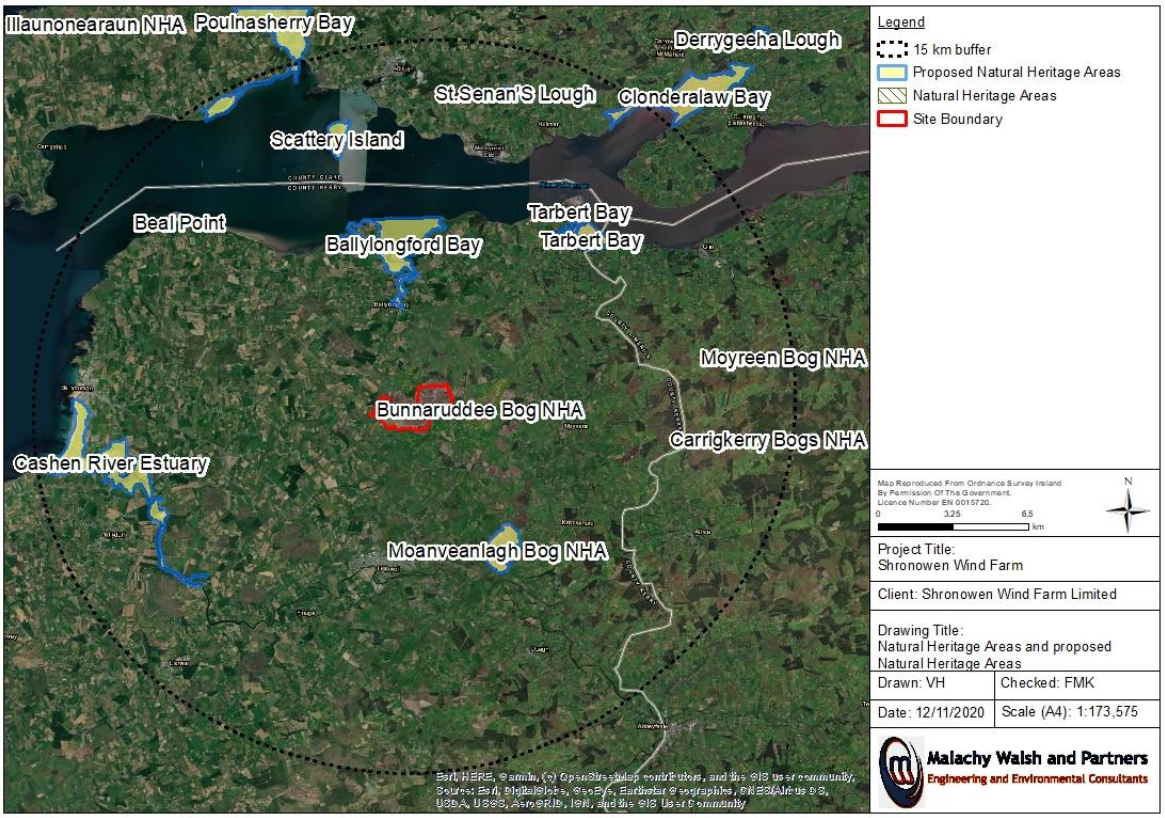

Figure 7-5. NHAs and pNHAs within 15km of the project

Table 7-5. Designated SACs and SPAs within 15km of the wind farm site

Designated Site	Reason for site selection	Distance from designated site	Assessed in NIS (yes/no)?
Lower River Shannon SAC (002165)	Species • Freshwater pearl mussel (*Margaritifera margaritifera)* • Sea lamprey (*Petromyzon marinus)* • Brook lamprey (*Lampetra planeri)* • River lamprey (*Lampetra fluviatilis)* • Atlantic salmon (*Salmo salar)* (QI status pertains only to fresh water phases of life cycle) • Bottlenose dolphin (*Tursiops truncates)* • Otter (*Lutra lutra)* Habitats • Sandbanks which are slightly covered by sea water all the time • Estuaries • Mudflats and sandflats not covered by seawater at low tide] • Coastal lagoons* • Large shallow inlets and bays • Reefs • Perennial vegetation of stony banks • Vegetated sea cliffs of the Atlantic and Baltic coasts • *Salicornia* and other annuals colonizing mud and sand • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) • Mediterranean salt meadows (*Juncetalia maritimi*) • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation • *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)*	The Galey River is situated 1km south of the project site boundary. However, a 1st order tributary of the Galey lies adjacent to the site boundary. The inner reaches of Ballylongford Bay are situated approximately 5.8 river kilometres downstream[6] to the north of the project site.	Yes: The effect of the project on the SAC has been assessed in the NIS, which concluded that the project will not adversely affect the integrity of the Lower River Shannon SAC.
River Shannon and River Fergus Estuaries SPA (004077)	Species • Cormorant (*Phalacrocorax carbo)* breeding + wintering • Whooper swan (*Cygnus cygnus)* wintering • Light-bellied Brent goose (*Branta bernicla hrota* wintering • Shelduck (*Tadorna tadorna)* wintering • Wigeon (*Anas penelope)* wintering • Teal (*Anas crecca)* wintering	3km north, and approximately 5.8 river kilometres downstream, of the project site.	Yes: The effect of the project on the SPA has been assessed in the NIS, which concluded that the project will not adversely affect the integrity of the River Shannon and River Fergus Estuaries

[6] In this report, river kilometres refers to the distance along the rivers length as opposed to a linear measure such “as the crow flies”.

Designated Site	Reason for site selection	Distance from designated site	Assessed in NIS (yes/no)?
	• Pintail (*Anas acuta)* wintering • Shoveler (*Anas clypeata)* wintering • Scaup (*Aythya marila)* wintering • Ringed plover (*Charadrius hiaticula)* wintering • Golden plover (*Pluvialis apricaria)* wintering • Grey plover (*Pluvialis squatarola)* wintering • Lapwing (*Vanellus vanellus)* wintering • Knot (*Calidris canutus)* wintering • Dunlin (*Calidris alpina)* wintering • Black-tailed godwit (*Limosa limosa)* wintering • Bar-tailed godwit (*Limosa lapponica)* wintering • Curlew (*Numenius arquata)* wintering • Redshank (*Tringa tetanus)* wintering • Greenshank (*Tringa nebularia)* wintering • Black-headed gull (*Chroicocephalus ridibundus)* wintering <u>Habitat and species complex</u> Wetland and Waterbirds		SPA.
Moanveanlagh Bog SAC (002351)	• Active raised bogs • Degraded raised bogs still capable of natural regeneration • Depressions on peat substrates of the Rhynchosporion	5.4km southeast of the project site.	No: It has been determined that the Moanveanlagh Bog SAC will not be significantly affected by the project in the Screening for Appropriate Assessment Report.
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161	• Hen harrier (*Circus cyaneus*)	8.6 km east of the project site.	No: It has been determined that the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA will not be significantly affected by the project in the Screening for Appropriate Assessment Report.

Table 7-6. Designated NHAs and pNHAs within 15km of the wind farm site

Designated Site	Reason for site selection	Distance from designated site	Included within boundary of SAC or SPA (yes/no)?
Bunnaruddee Bog NHA (001352)	Bunnaruddee Bog is designated for peatlands, namely what is referred to as a Western raised bog. While birds certainly use the site, there is no mention of bird species in the site synopsis[7].	0.9km southeast of the project site.	No: The site does not overlap with any SAC. There is an indirect hydrological connection between the Bunnaruddee Bog NHA, which is however situated upgradient of any ecological effect from the project. The likely significant effects of the project on the NHA are considered further in **Section 7.4** of this chapter.
Ballylongford Bay pNHA (001332)	Ballylongford Bay pNHA is proposed for designation for coastal habitats including saltmarsh and mudflats and spatially overlaps part of the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. The bay supports wintering waterfowl[8]. There is no site synopsis available for this site.	3.6km northeast of the project site.	Yes: The Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA overlap with the Ballylongford Bay pNHA and the effect of the project on the pNHA has thus been assessed in the NIS. The NIS concluded that the project will not adversely affect the integrity of Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA and therefore will not significantly affect the Ballylongford pNHA.
Moanveanlagh Bog pNHA (000374)	There is no site synopsis available for this site. This pNHA overlaps with Moanveanlagh Bog SAC (002351) which is designated for: • Active raised bogs • Degraded raised bogs still capable of natural regeneration • Depressions on peat substrates of the Rhynchosporion	5.4km southeast of the project site.	Yes: It has been determined that Moanveanlagh Bog SAC will not be significantly affected by the project in the Screening for Appropriate Assessment Report. Therefore, Moanveanlagh Bog pNHA, which spatially overlaps with the Moanveanlagh Bog SAC, will not be significantly affected by the project.
Tarbert Bay pNHA (001386)	The Tarbert Bay pNHA site consists of mudflats and intertidal bay fringed by saline vegetation and includes some deciduous woodland. Tarbert Bay supports wintering waterfowl and is surveyed as part of the I-WeBS	8.1km northeast of the project site.	Yes: The effects of the project on the Lower River Shannon SAC and the River Shannon and River

[7] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY001352.pdf

[8] https://ballylongfordtidytowns.files.wordpress.com/2020/02/ballylongford-report-2020.pdf

	wetland bird survey. This pNHA spatially overlaps part of the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. There is no site synopsis available for this site.		Fergus Estuaries SPA which overlap with this pNHA have been assessed in the NIS. The NIS concluded that the project will not adversely affect the integrity of the SPA and SAC and therefore will not significantly affect the Tarbert Bay pNHA.
Cashen River Estuary pNHA (0013400)	This pNHA is situated where the River Feale flows west and enters the coastal waters at the mouth of the Shannon estuary. The site supports mudflats and sandflats, and salt marsh habitat. The estuary supports wintering waterfowl and is surveyed as part of the I-WeBS wetland bird survey. This pNHA spatially overlaps with much of the Lower River Shannon SAC. There is no site synopsis available for this site.	10.1km southwest of the project site.	Yes: The effects of the project on the Lower River Shannon SAC which overlaps with this pNHA has been assessed in the NIS. The NIS concluded that the project will not adversely affect the integrity of this SPA and SAC and therefore will not significantly affect the Cashen River Estuary pNHA.
Scattery Island pNHA (001911)	Scattery Island is situated 2.5km southwest of Kilrush, Co. Clare and supports a small (10ha), shallow, “estuarine” natural sedimentary lagoon with a cobble/shingle barrier (NPWS, 2012(a)) and is known to be important for birds. This pNHA spatially overlaps with the Lower River Shannon SAC while the shore areas overlap with the River Shannon and Fergus Estuaries SPA. There is no site synopsis available for this site.	10.6km north of the project site.	Yes: The effects of the project on the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA, which fully and partially overlap with Scattery Island pNHA have been assessed in the NIS. The NIS concluded that the project will not adversely affect the integrity of the SPA and SAC and therefore will not significantly affect Scattery Island pNHA.
Beal Point pNHA (001335)	Beal Point is a small coastal site and sand dune system on the southern shore of the mouth of the Shannon estuary[9]. This pNHA spatially overlaps with the Lower River Shannon SAC and with a section of the River Shannon and River Fergus Estuaries SPA. There is no site synopsis available for this site.	11.2km northwest of the project site.	Yes: The effects of the project on the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA which overlap with this pNHA have been assessed in the NIS. The NIS concluded that the project will not adversely affect the integrity of the SPA and SAC and therefore will not significantly affect the Beal Point pNHA.
St. Senan's Lough pNHA (001025)	St. Senan’s Lough in south County Clare is an acidic lake with adjoining marsh habitats. Acidic wetlands of this type can also support small numbers of waterfowl (NPWS, 2009).	12.9km northeast of the project site.	No: There is no spatial overlap between the site and any SAC or SPA. The likely significant effects of the

[9] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002165.pdf

			project on the pNHA are considered further in **Section 7.4** of this chapter.
Clonderlaw Bay pNHA (000027)	Clonderlaw Bay pNHA is situated in south County Clare and is a saltmarsh system (NPWS, 2012(b)) and spatially overlaps most of the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. It is surveyed as part of the I-WeBS wetland bird survey. There is no site synopsis available for this site.	13.2km northeast of the project site.	Yes: The effects of the project on the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA which overlap with this pNHA have been assessed in the NIS. The NIS concluded that the project will not adversely affect the integrity of the SPA and SAC and therefore will not significantly affect Clonderlaw Bay pNHA.
Poulnasherry Bay pNHA (000065)	Poulnasherry Bay is a small stony estuary which is unusually rich in species and biotopes and situated near the mouth of the Shannon estuary in south County Clare and is surveyed as part of the I-WeBS wetland bird survey. This pNHA overlaps with the Lower River Shannon candidate Special Area of Conservation (SAC) and the River Shannon and River Fergus Estuaries SPA. There is no site synopsis available for this site.	Subject site is 14.2km south of the pNHA	Yes: The effect of the project on the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA which overlap with this pNHA have been assessed in the NIS. The NIS concluded that the project will not adversely affect the integrity of the SPA and SAC and therefore will not significantly affect the Poulnasherry Bay pNHA.

5.1.1.1 Ramsar Sites

The Convention on Wetlands, also known as the Ramsar Convention, is an intergovernmental treaty which aims to conserve and protect wetlands and their resources around the world. The desk-top review concluded that there are no Ramsar sites within 15km of the site boundary or within the ZOI of the project. The nearest Ramsar sites are Tralee Bay to the southwest and to the northeast at Ballyallia Lough in Co. Clare. Ramsar sites are thus not considered any further in this assessment.

7.3.2.2 Important Bird and Biodiversity Areas (IBAs)

The Important Bird and Biodiversity Areas (IBA) Programme is a BirdLife International initiative aimed at identifying and protecting a network of sites critical to the conservation of the world's birds. A total of 140 Important Bird Areas (IBAs) have been identified in Ireland, covering an area of about 4,309 km², equivalent to 6% of the land area. These sites are important for breeding seabirds and for wintering wildfowl. There are two IBAs within 15km of the project site boundary.

There are two IBA site within 15km of the survey area, namely the Shannon and Fergus Estuaries (IE08) and the Stacks to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle. The Shannon and Fergus Estuaries (IE08)[10] is encompassed within the significantly larger River Shannon and River Fergus Estuaries SPA (004077), is one of the most important sites in Ireland for wintering and migrating waterfowl and supports 10 species in numbers of international importance all which are also SCI for the SPA designation. These species are[11]whooper swan, brent goose (*Branta bernicla*)[12], scaup, golden plover, knot, dunlin, black-tailed godwit, bar-tailed godwit, curlew and redshank. A further 13 species occur in numbers of national importance, including, *inter alia*, greylag goose (*Anser anser*), shelduck, wigeon, teal, pintail, shoveler, lapwing and greenshank[13]. Of these species only greylag goose is not a Species of Conservation Interest (SCI) species for which the River Shannon and River Fergus Estuaries SPA (004077) is selected.

The effect of the project on the River Fergus Estuaries IBA which overlap with the Shannon and Fergus Estuaries SPA have been assessed in the NIS. The NIS concluded that the project will not adversely affect the integrity of the SPA and SAC and therefore will not significantly affect the IBA.

The Stacks to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle is encompassed within the Stacks to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161), both sites are important for breeding hen harrier[14]. It has been determined that the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA will not be significantly affected by the project in the Screening for Appropriate Assessment Report. It is thus reasonable to conclude that the Stacks to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle IBA will not be significantly affected by the project.

[10] http://datazone.birdlife.org/site/factsheet/shannon-and-fergus-estuaries-iba-ireland/map

[11] Http://datazone.birdlife.org/site/factsheet/shannon-and-fergus-estuaries-iba-ireland/details

[12] light-bellied brent goose a species for which the spa site (004077) is selected, is a sub species of brent goose

[13] no further information on the other species is provided on the website.

[14]http://datazone.birdlife.org/site/factsheet/stacks-to-mullaghareirk-mountains-west-limerick-and-mount-eagle-iba-ireland/details

7.3.2.3 I-WeBS Sites within 15km

I-WeBS (Irish Wetland Bird Survey) is a joint project between BirdWatch Ireland and National Parks and Wildlife (NPWS) in which specific wetland sites are surveyed[15]. In order to count the wetland birds a 'look-see' method is used in which all birds present within a pre-defined area are counted. The aim of these surveys is to monitor non-breeding birds in Ireland and contribute to population counts and it is also important to help assess the quality of these wetland areas. The bird groups to be counted for I-WeBS consist of swans and geese, ducks, divers, waders and gulls. Counts are made once per month from September to March annually[15].

There is one I-WeBS[16] site within 15km of the study area as listed in **Table 7-7**, the Cashen River & Estuary I-WEBS site, which has an extensive list (42) of species which include species population counts of national importance between 2008/09 and 2017/18[17], see **Table 7-8** below. Species present in nationally important numbers include whooper swan, ringed plover, golden plover, lapwing, knot and sanderling.

Table 7-7. I-WeBS sites within 15km of the project site

I-WeBS Site	Proximity to project site
Site: Cashen River & Estuary (Site code - 0K423)	Located ca. 12km west of the project site

Table 7-8 . Species list of I-WeBs site for the Cashen River & Estuary (Site code - 0K423)

Species	1% National	1% International	2008/09	2011/12	2013/14	2015/16	2017/18	Mean
Mute swan (*Cygnus olor*)	90	100	12*		2	2	2	3
Whooper swan	150	340	157*	257				12
Pink-footed goose (*Anser brachyrhynchus*)				1				0
Greylag goose	35	980		1				0
Light-bellied brent goose	350	400	60*	135	42	73	73	117
Shelduck	100	2500		12		7	7	4
Wigeon	560	14000	120*	458	170	144	144	248
Teal	360	5000	23*	300	113			30
Mallard (*Anas platyrhynchos*)	280	53000	46*		10			2
Shoveler	20	650		11				0
Pochard (*Aythya ferina)*	110	2000						2
Common scoter (Melanitta nigra)	110	7500			12			2
Great northern diver (*Gavia immer*)	20	50	2*		2	2	2	1
Cormorant	110	1200	9*	4	26	5	5	14

[15] https://birdwatchireland.ie/our-work/surveys-research/research-surveys/irish-wetland-bird-survey/.

[16] https://bwi.maps.arcgis.com/apps/View/index.html?appid=1043ba01fcb74c78bc75e306eda48d3a

[17] https://c0amf055.caspio.com/dp/f4db30005dbe20614b404564be88

Species	1% National	1% International	2008/09	2011/12	2013/14	2015/16	2017/18	Mean
Little egret (*Egretta garzetta*)	20	1100	5*		3	4	4	3
Grey heron (Ardea cinerea)	25	5000	3*		3	2	2	3
Oystercatcher (*Haematopus ostralegus*)	610	8200	38*		88	32	32	51
Ringed plover	120	540	22*	21	200			42
Golden plover	920	9300	400*	2000	1120	970	970	670
Grey plover	30	2000	2*					0
Lapwing	850	72300	800*	3000	847	270	270	539
Knot	160	5300		180				24
Sanderling (*Calidris alba*)	85	2000	4*		250	80	80	75
Dunlin	460	13300	80*	84	150	140	140	58
Ruff (*Philomachus pugnax*)								1
Snipe (*Gallinago gallinago*)			8*					1
Black-tailed godwit	200	1100			28	610	610	368
Bar-tailed godwit	170	1500	4*	23	122			376
Whimbrel (*Numenius phaeopus*)								15
Curlew	350	7600	220*		96	17	17	45
Greenshank	20	3300		14				0
Redshank	240	2400	4*	25	116	22	22	37
Turnstone (*Arenaria interpres)*	95	1400	10*	16				0
Mediterranean gull *(Larus melanocephalus)*				6				0
Black-headed Gull			18*	11	240	27	27	104
Ring-billed gull (*Larus delawarensis)*				1				0
Common gull *(Larus canus*)			38*	130				0
Lesser Black-backed gull (*Larus fuscus*)				2	48	4	4	12

Species	1% National	1% International	2008/09	2011/12	2013/14	2015/16	2017/18	Mean
Herring gull (*Larus argentatus*)					97	72	72	53
Iceland gull (*Larus glaucoides*)				2				0
Glaucous gull (*Larus hyperboreus*)				1				0
Great black-backed gull (*Larus marinus*)			4*	4	14	5	5	8

* Counts that are poor quality are represented by an asterisk.

7.3.2.4 BirdWatch Ireland (Bird Sensitivity Tool)

A Bird Sensitivity Mapping Tool for wind energy projects, which was developed by BirdWatch Ireland, provides a measured spatial indication of where protected birds are likely to be sensitive to wind energy projects. The tool can be accessed on the National Biodiversity Data Centre Website[18] and is accompanied by a guidance document (McGuiness *et al*., 2015). The criteria for estimating a zone of sensitivity (i.e. 'low', 'medium', 'high' and 'highest') is based on a review of the behavioural, ecological and distributional data available for each species.

A map indicating bird sensitivity to wind energy is provided below (see **Figure 7-6**). The project site intersects a number of 1km squares where bird sensitivity to wind energy is 'Low'. The only bird listed within the proposed wind farm site is barn owl (*Tyto alba*), with a sensitivity rating of 14.8 (low). In information received from NPWS Rare and Protected Species Records, there are records of barn owl to the south, south of the Galey River.

[18] https://maps.biodiversityireland.ie/Map

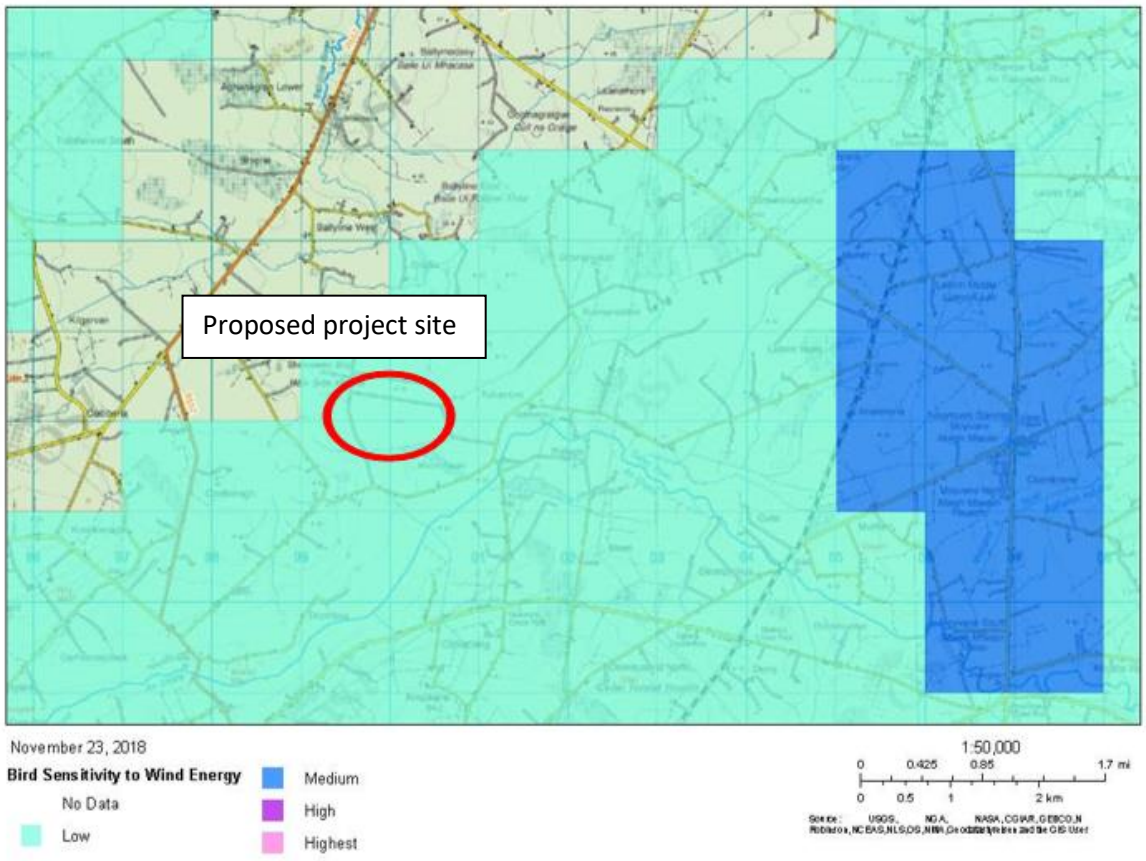

Figure 7-6. Bird sensitivity to wind energy at and in the environs of the project site

7.3.2.5 Bird Records and Distribution

The following section provide bird records and distribution at the project site from the breeding and wintering bird atlas (BirdWatch Ireland, Bird Atlas 2007-2011). The study area intersects four 10km hectads (a hectad is 10km x 10km): Q93, Q94, R03 and R04. The northern hectads Q94 and R04 encompass part of the Lower Shannon Estuary while the lower hectads, Q93 and R03 encompass the lower River Feale catchment and the upper reaches of the Cashen estuary. **Table 7-9** outlines all species which have been previously recorded in these four hectads and which are either of conservation concern and/or are afforded a higher level of legislative protection in an Irish or European context, including their wintering and breeding status. The list covers four hectads and the large area of 400km^2 and variety of habitats encompassed including the Shannon estuary and coastline, rivers, bogs, broadleaved and conifer woodlands, and farmland.

Table 7-9. Bird Atlas (2007-2011) status of species previously recorded in the 10km hectads Q93, Q94, R03 and R04

Species Common Name	Hectad	Winter Atlas '07-11	Breeding Atlas '07-11	Conservation/Protection Status
Barn owl	R03, Q94	Present	Confirmed	BoCCI Red-listed/Wildlife Act 1976-2018
	R04	Present	Possible	
	Q93	Absent	Probable	
Barn swallow (*Hirundo rustica*)	R03, R04, Q93, Q94	Absent	Confirmed	BoCCI Amber-listed/Wildlife Act 1976-2018

Species Common Name	Hectad	Winter Atlas '07-11	Breeding Atlas '07-11	Conservation/Protection Status
Barnacle goose (*Branta leucopsis*)	Q93	Present	Absent	BoCCI Amber-listed/Wildlife Act 1976-2018
Bar-tailed godwit	R04, Q94	Present	Absent	BoCCI Amber-listed/Annex I EU Birds Directive
Black Redstart (*Phoenicurus ochruros gibraltarensis*)	R03, Q93	Present	Absent	BoCCI Green-listed/Wildlife Act 1976-2018
Black-billed magpie (*Pica pica*)	R03, Q93	Present	Confirmed	BoCCI Green-listed/Wildlife Act 1976-2018
	R04, Q94	Present	Probable	
Blackcap (*Sylvia atricapilla*)	R03	Absent	Probable	BoCCI Green-listed/Wildlife Act 1976-2018
	R04	Present	Probable	
	Q93	Present	Possible	
	Q94	Present	Absent	
Black-headed gull	R03, R04, Q93, Q94	Present	Absent	BoCCI Red-listed/Wildlife Act 1976-2018
Black-legged kittiwake (*Rissa tridactyla*)	Q94	Present	Absent	BoCCI Amber-listed/Wildlife Act 1976-2018
Black-tailed godwit	R04, Q94	Present	Absent	BoCCI Amber-listed/4th schedule of the WA 1976-2018
Blue tit (*Cyanistes caeruleus*)	R03, Q93, Q94	Present	Confirmed	BoCCI Green-listed/Wildlife Act 1976-2018
	R04	Present	Probable	
Brent goose	Q94	Present	Absent	BoCCI Amber-listed/Wildlife Act 1976-2018
Chaffinch (*Fringilla coelebs*)	R03, Q93	Present	Confirmed	BoCCI Green-listed/Wildlife Act 1976-2018
	R04, Q94	Present	Probable	
Coal tit (*Periparus ater)*	R03, Q93	Present	Confirmed	BoCCI Green-listed/Wildlife Act 1976-2018
	R04, Q94	Present	Possible	
Common blackbird (*Turdus merula*)	R03, R04, Q93, Q94	Present	Confirmed	BoCCI Green-listed/Wildlife Act 1976-2018
Common bullfinch (*Pyrrhula pyrrhula*)	R03, Q93, Q94	Present	Confirmed	BoCCI Green-listed/Wildlife Act 1976-2018
	R04	Present	Probable	
Common chiffchaff (*Phylloscopus collybita*)	R03	Absent	Probable	BoCCI Green-listed/ Wildlife Act 1976-2018
	R04, Q94	Absent	Possible	
	Q93	Absent	Confirmed	
Common coot (*Fulica atra*)	R04	Present	Absent	BoCCI Amber-listed/Annex II & III EU Birds Directive
Common cuckoo (*Cuculus canorus*)	R03, R04, Q93, Q94	Absent	Possible	BoCCI Green-listed/ Wildlife Act 1976-2018
Common goldeneye (*Bucephala clangula*)	R04	Present	Absent	BoCCI Amber-listed/Annex II EU Birds Directive
Common grasshopper	R03, Q93	Absent	Possible	BoCCI Amber-listed/ Wildlife Act 1976-2018
	R04, Q94	Absent	Probable	

Species Common Name	Hectad	Winter Atlas '07-11	Breeding Atlas '07-11	Conservation/Protection Status
warbler (*Locustella naevia*)				
Common greenshank	R04, Q94	Present	Absent	BoCCI Amber-listed/ Wildlife Act 1976-2018
Common kestrel (*Falco tinnunculus*)	R03, R04	Present	Confirmed	BoCCI Amber-listed/Wildlife Act 1976-2018
	Q93	Present	Possible	
	Q94	Present	Probable	
Common kingfisher (*Alcedo atthis*)	R03, Q94	Present	Absent	BoCCI Amber-listed/ Wildlife Act 1976-2018
	R04	Present	Possible	
	Q93	Absent	Confirmed	
Common linnet (*Linaria cannabina*)	R04	Absent	Probable	BoCCI Amber-listed/ Wildlife Act 1976-2018
	Q94	Present	Absent	
	R03, Q93	Present	Probable	
Common moorhen (*Gallinula chloropus*)	R03	Present	Possible	BoCCI Green-listed/ Wildlife Act 1976-2018
	R04, Q93	Present	Absent	
	Q94	Absent	Possible	
Common pheasant (*Phasianus colchicus*)	R03, Q94	Present	Confirmed	BoCCI Amber-listed
	R04, Q93	Present	Probable	
Common raven (*Corvus corax*)	R03, Q93	Present	Confirmed	BoCCI Green-listed/ Wildlife Act 1976-2018
	R04	Present	Possible	
	Q94	Present	Probable	
Common redshank	R04, Q93, Q94	Present	Absent	BoCCI Red-listed/ Wildlife Act 1976-2018
Common sandpiper (*Actitis hypoleucos*)	R03, R04	Present	Absent	BoCCI Amber-listed/ Wildlife Act 1976-2018
	Q93	Present	Possible	
	Q94	Absent	Possible	
Common shelduck	R04, Q94	Present	Confirmed	BoCCI Amber-listed/ Wildlife Act 1976-2018
Common snipe	R03, R04	Present	Probable	BoCCI Amber-listed/ Wildlife Act 1976-2018
	Q93, Q94	Present	Absent	
Common starling (*Sturnus vulgaris*)	R03, R04, Q93, Q94	Present	Confirmed	BoCCI Amber-listed
Common swift (*Apus apus*)	R04, Q94	Absent	Probable	BoCCI Amber-listed/ Wildlife Act 1976-2018
	Q93	Absent	Confirmed	
Common whitethroat (*Sylvia communis*)	R03, Q93	Absent	Possible	BoCCI Green-listed/ Wildlife Act 1976-2018
Common wood pigeon (*Columba palumbus*)	R03, Q93, Q94	Present	Confirmed	BoCCI Green-listed/Wildlife Act 1976-2018
	R04	Present	Probable	
Dunlin	R04, Q94	Present	Absent	BoCCI Amber-listed/Annex I EU Birds Directive,
Eurasian collard dove (*Streptopelia decaocto*)	R03	Present	Probable	
	Q93, R04, Q94	Present	Confirmed	BoCCI Green-listed/ Wildlife Act 1976-2018

Species Common Name	Hectad	Winter Atlas '07-11	Breeding Atlas '07-11	Conservation/Protection Status
Eurasian curlew	R03, R04, Q94	Present	Absent	BoCCI Red-listed/Annex II EU Birds Directive/ Wildlife Act 1976-2018
	Q93	Present	Possible	
Eurasian jackdaw (*Corvus monedula*)	R03, R04, Q93, Q94	Present	Confirmed	BoCCI Green-listed/ Wildlife Act 1976-2018
Eurasian oystercatcher	R04, Q94	Present	Absent	BoCCI Amber-listed/ Wildlife Act 1976-2018
Eurasian siskin (*Spinus spinus*)	R03, Q93	Present	Confirmed	BoCCI Green-listed/Wildlife Act 1976-2018
	R04	Present	Absent	
Eurasian Sparrowhawk (*Accipiter nisus*)	R03, R04	Present	Confirmed	BoCCI Amber-listed/Wildlife Act 1976-2018
	Q93	Present	Possible	
	Q94	Absent	Possible	
Eurasian teal	R03, R04, Q93, Q94	Present	Absent	BoCCI Amber-listed/Annex II & III EU Birds Directive,
Eurasian tree sparrow (*Passer montanus*)	Q93	Absent	Confirmed	BoCCI Amber-listed/Wildlife Act 1976-2018
	R03, R04, Q93	Present	Absent	
Eurasian wigeon	R04, Q94	Present	Absent	BoCCI Amber-listed/Annex II & III EU Birds Directive
Eurasian woodcock (*Scolopax rusticola*)	R04, R03, Q93	Present	Absent	Amber-listed/Annex II & III EU Birds Directive, BoCCI
European golden plover	R03, R04, Q93, Q94	Present	Absent	BoCCI Red-listed/Annex I, II & III EU Birds Directive,
European goldfinch (*Carduelis carduelis*)	R03, Q93	Present	Confirmed	BoCCI Green-listed Wildlife Act 1976-2018
	R04	Present	Probable	
	Q94	Present	Possible	
European greenfinch (*Chloris chloris*)	R04, Q94	Present	Probable	BoCCI Green-listed/Wildlife Act 1976-2018
	R03, Q93	Present	Confirmed	
European robin (*Erithacus rubecula*)	R03, R04, Q93, Q94	Present	Confirmed	BoCCI Amber-listed/Wildlife Act 1976-2018
Fieldfare (*Turdus pilaris*)	R03, R04, Q93, Q94	Present	Absent	BoCCI Green-listed/Wildlife Act 1976-2018
Gadwall (*Mareca strepera*)	Q94	Absent	Probable	BoCCI Amber-listed/Annex II EU Birds Directive,
Goldcrest (*Regulus regulus*)	R03, R04, Q93	Present	Confirmed	BoCCI Amber-listed/Wildlife Act 1976-2018
	Q94	Present	Probable	
Great black-backed gull	R04, Q94	Present	Absent	BoCCI Amber-listed
Great cormorant	R03, R04, Q93, Q94	Present	Absent	BoCCI Amber-listed/Wildlife Act 1976-2018
Great northern diver	R04, Q94	Present	Absent	BoCCI Amber-listed/Annex I EU Birds Directive

Species Common Name	Hectad	Winter Atlas '07-11	Breeding Atlas '07-11	Conservation/Protection Status
Great tit (*Parus major*)	R03, R04, Q93	Present	Confirmed	BoCCI Green-listed/Wildlife Act 1976-2018
	Q94	Present	Probable	
Great-crested grebe	R04, Q94	Present	Absent	BoCCI Amber-listed/Wildlife Act 1976-2018
Greater scaup	R04, Q94	Present	Absent	BoCCI Amber-listed/Annex II & III EU Birds Directive,
Green sandpiper (*Tringa ochropus*)	R03	Present	Absent	BoCCI Amber-listed/Wildlife Act 1976-2018
Green-winged teal (*Anas carolinensis)*	Q94	Present	Absent	BoCCI Green-listed/Wildlife Act 1976-2018
Grey heron	R03, Q93, Q94	Present	Possible	BoCCI Green-listed/Wildlife Act 1976-2018
	R04	Present	Confirmed	
Grey plover	R04, Q94	Present	Absent	BoCCI Amber-listed/Wildlife Act 1976-2018
Grey wagtail (*Motacilla cinerea*)	R03	Present	Confirmed	BoCCI Red-listed/Wildlife Act 1976-2018
	R04, Q93, Q94	Present	Probable	
Hedge Accentor/dunnock (*Prunella modularis*)	R03, R04, Q93, Q94	Present	Confirmed	BoCCI Green-listed/ Wildlife Act 1976-2018
Hen harrier	R03	Present	Confirmed	BoCCI Amber-listed/Annex II EU Birds Directive
	R04, Q93, Q94	Present	Absent	
Herring gull	R04, Q93, Q94	Present	Absent	BoCCI Red-listed
Hooded crow (*Corvus cornix*)	R03, R04, Q93	Present	Confirmed	BoCCI Green-listed
	Q94	Present	Probable	
House martin (*Delichon urbicum*)	R03, R04, Q93, Q94	Absent	Confirmed	BoCCI Amber-listed/Annex II & Annex III EU Birds Directive
House sparrow (*Passer domesticus*)	R03, R04, Q93, Q94	Present	Confirmed	BoCCI Amber-listed/Annex II & Annex III EU Birds Directive
Iceland gull	R04	Present	Absent	BoCCI Green-listed/Wildlife Act 1976-2018
Jack snipe (*Lymnocryptes minimus*)	R04, Q94	Present	Absent	BoCCI Amber-listed/Annex II & Annex III EU Birds Directive
Lesser redpoll (*Acanthis cabaret*)	R03	Present	possible	BoCCI Green-listed/Wildlife Act 1976-2018
	R04	Present	Absent	
	Q93	Present	Confirmed	
	Q94	Absent	Confirmed	
Little egret	R03, Q94	Present	Absent	BoCCI Green-listed/Annex I EU Birds Directive
	R04	Present	Confirmed	
Little grebe	R04, Q94	Present	Absent	BoCCI Amber-listed/Annex II & Annex III EU Birds Directive
	R03	Present	Possible	BoCCI Green-listed/Wildlife Act 1976-2018

Species Common Name	Hectad	Winter Atlas '07-11	Breeding Atlas '07-11	Conservation/Protection Status
Long-tailed tit (*Aegithalos caudatus*)	R04, Q93	Present	Confirmed	
	Q94	Absent	Probable	
Mallard	R03, R04, Q93, Q94	Present	Confirmed	BoCCI Green-listed/Annex II & III EU Birds Directive,
Meadow pipit (*Anthus pratensis*)	R03, R04, Q93, Q94	Present	Confirmed	BoCCI Red-listed/Wildlife Act 1976-2018
Mediterranean gull	R04	Present	Absent	BoCCI Amber-listed/Annex I EU Birds Directive
Merlin (*Falco columbarius*)	Q94	Present	Absent	BoCCI Amber-listed/Annex I EU Birds Directive,
Mew gull/common gull	R04, Q94	Present	Absent	BoCCI Amber-listed/Annex I EU Birds Directive,
Mistle thrush (*Turdus viscivorus*)	R03, Q93	Present	Confirmed	BoCCI Green-listed/Wildlife Act 1976-2018
	R04	Present	Absent	
	Q94	Present	Probable	
Mute swan	R03, Q93	Present	Probable	BoCCI Amber-listed/Wildlife Act 1976-2018
	R04	Present	Absent	
	Q94	Present	Confirmed	
Northern shoveler (*Spatula clypeata*)	Q94	Present	Absent	BoCCI Red-listed/Annex II & III EU Birds Directive
Northern lapwing	R03, R04, Q93, Q94	Present	Absent	BoCCI Red-listed/Annex II EU Birds Directive,
Northern pintail	Q94	Present	Absent	BoCCI Red-listed/Annex II & III EU Birds Directive
Peregrine falcon (*Falco peregrinus*)	R04, Q93, Q94	Absent	Possible	BoCCI Green-listed/Annex I EU Birds Directive
Razorbill (*Alca torda*)	R04, Q94	Present	Absent	BoCCI Amber-listed/Wildlife Act 1976-2018
Red knot	R04	Present	Absent	BoCCI Red-listed/Wildlife Act 1976-2018
Red-breasted merganser (*Mergus serrator*)	R04, Q94	Present	Absent	BoCCI Green-listed/Annex II EU Birds Directive
Red-throated diver (*Gavia stellate*)	R04, Q94	Present	Absent	BoCCI Amber-listed/Annex I EU Birds Directive,
Redwing (*Turdus iliacus*)	R03, R04, Q93, Q94	Present	Absent	BoCCI Green-listed/Wildlife Act 1976-2018
Reed bunting (*Emberiza schoeniclus*)	R03, R04, Q93,	Present	Confirmed	BoCCI Green-listed/Wildlife Act 1976-2018
	Q94	Present	Probable	
Ring-billed gull	R04	Present	Absent	BoCCI Green-listed/Wildlife Act 1976-2018
Ringed plover	R04	Present	Possible	BoCCI Amber-listed/Wildlife Act 1976-2018
	Q94	Present	Confirmed	
Rock pigeon (*Columba livia*)	R03	Present	Possible	BoCCI Green-listed/Annex II EU Birds Directive,
	R04	Present	Confirmed	
	Q93	Present	Probable	

Species Common Name	Hectad	Winter Atlas '07-11	Breeding Atlas '07-11	Conservation/Protection Status
	Q94	Absent	Probable	
Rock pipit (*Anthus petrosus*)	R04, Q94	Present	Confirmed	BoCCI Green-listed/Wildlife Act 1976-2018
Rook (*Corvus frugilegus*)	R03, R04, Q93, Q94	Present	Confirmed	BoCCI Green-listed
Ruddy turnstone (*Arenaria interpres*)	R04, Q94	Present	Absent	BoCCI Green-listed/Wildlife Act 1976-2018
Sand martin (*Riparia riparia*)	R03, Q93	Absent	Probable	
	R04	Absent	Confirmed	BoCCI Amber-listed/Wildlife Act 1976-2018
	Q94	Absent	Possible	
Sanderling	Q94	Present	Absent	BoCCI Green-listed/Wildlife Act 1976-2018
Sedge warbler (*Acrocephalus schoenobaenus*)	R03, R04	Absent	Possible	BoCCI Green-listed/Wildlife Act 1976-2018
	Q93	Absent	Probable	
	Q94	Absent	Confirmed	
Skylark (*Alauda arvensis*)	R03, Q93, Q94	Present	Probable	BoCCI Amber-listed/Annex II EU Birds Directive,
Smew (*Mergellus albellus*)	Q94	Present	Absent	BoCCI Green-listed/Wildlife Act 1976-2018
Song thrush (*Turdus philomelos*)	R03, Q93, Q94	Present	Confirmed	BoCCI Green-listed/Wildlife Act 1976-2018
	R04	Present	Probable	
Spotted flycatcher (*Muscicapa striata*)	R04	Absent	Confirmed	BoCCI Amber-listed/Wildlife Act 1976-2018
	Q93	Absent	Probable	
	Q94	Absent	Possible	
Stonechat (*Saxicola torquate*)	R03, R04, Q94	Present	Probable	BoCCI Amber-listed/Wildlife Act 1976-2018
	Q93	Present	Confirmed	
Water rail (*Rallus aquaticus*)	Q94	Present	Possible	BoCCI Amber-listed/Wildlife Act 1976-2018
White wagtail (*Motacilla alba*)	R03, R04, Q93, Q94	Present	Confirmed	BoCCI Green-listed/Wildlife Act 1976-2018
White-throated dipper (*Cinclus cinclus*)	R03, Q93	Present	Absent	BoCCI Green-listed/Wildlife Act 1976-2018
Whooper swan	Q93, Q94	Present	Absent	BoCCI Amber-listed/Annex I EU Birds Directive,
Willow warbler (*Phylloscopus trochilus*)	R03, R04, Q93	Absent	Confirmed	BoCCI Green-listed/Wildlife Act 1976-2018
	Q94	Absent	Probable	
Wren (*Troglodytes troglodytes)*	R03, R04, Q93, Q94	Present	Confirmed	BoCCI Green-listed/Wildlife Act 1976-2018

7.3.2.6 Other Wind Farms in the Area

There are a number of operational wind farms in the greater area of the project site. The closest three operational wind farms are listed in **Table 7-10** below along with one permitted wind farm. The

information in this section has been mainly gathered from Environmental Impact Statements completed for these wind farms.

Table 7-10 Closest wind farms to the Shronowen

Wind Farm Name	Status	Distance and Direction from Shronowen Wind Farm	No. turbines
Tullahennel	Existing	c. 2.4 km to the north west	13
Ballylonford	Permitted	c. 2.3 km to the north west	6
Leanamore	Existing	c. 2.5 km to the north east	9
Toberatooreen	Existing	c. 6.5 km to the south east	4

Tullahennel Wind Farm

Tullahennel Wind Farm is located 2.4km to the northwest of the project site in low lying lands to the south of Ballylongford and approximately 9km north of Listowel. A 33kV underground cable connects the wind farm development with the 200/110kV substation at Kilpaddoge, Tarbert. There is a total of 13 turbines made up of three separate developments: Tullahennel South Wind Farm (9 wind turbines); Tullahennel North Wind Farm (2 wind turbines); and Larha Wind Farm (2 wind turbines). Bird surveys were not carried out by Malachy Walsh and Partners for these 3 applications. Malachy Walsh and Partners did however carry out construction phase bird surveys for Tullahennel Wind Farm, a summary of which is provided hereunder.

Bird surveys conducted in the period October 2016 to September 2017 established that while hen harriers and kestrel forage adjacent to and, occasionally, within the site, the survey data to date indicated no evidence of breeding by either raptor species. Most of the observations were in the area around the four turbines in Tullahennel North and Larha and while some flight paths have been through the wind farm the bulk of the flight paths were recorded at a remove from the wind farm. A male was observed hunting along his routine flight path and was unperturbed by the ongoing construction activity including noise and visual intrusions from heavy plant machinery, which was less than 10m away at its closest.

With regard to seabirds, notwithstanding the frequent observations of lesser black-backed gull in the agricultural habitats surrounding the site and their occasional over flights over the wind farm, seabirds, as a group, were not present within the site to any significant extent. With regard to wildfowl, the following were recorded: mallard, both resident and migratory populations, which were recorded on 8 survey days over the survey year; snipe which was recorded on 6 survey days; and one occasion, when a pair of swans was observed flying at height to the west of the wind farm. Overall, wildfowl species observed at Tullahennel Wind Farm were recorded in low numbers.

Malachy Walsh and Partners have been carrying out operational monitoring of Tullahennel Wind Farm at one vantage point every month and in the last year there have been no sightings of hen harrier.

Leanamore Wind Farm

Leanamore Wind Farm is located in the rural environment between Tarbert and Ballylongford in North County Kerry and is situated 2.5km northeast of the project site. The site is dominated by degraded bog, coniferous forestry and agricultural pasture. The site is surrounded by agricultural fields to the north, south, east and west of the site with degraded bog to the northeast of the site. Bird surveys were carried out between 2009 and 2010 for both winter and breeding seasons by Malachy Walsh

and Partners and included vantage point watches, transects, an upland breeding bird survey on the bog area of the site and a breeding merlin survey, and the results are summarised below.

Winter surveys recorded a total of 31 species with the majority being passerines. Bird species recorded at the site in winter are typical of the habitats present. The most abundant species within the site during the winter bird survey was hooded crow. The numbers of bird species observed at the site reflected weather patterns and seasonal movements over the course of the winter. There was an influx of snipe to the site in November and December 2009. These birds were likely to be of Continental origin. Skylark were absent at the site throughout the winter and became more evident in March. Returning birds in spring were evident as breeding territories were established. Weather conditions deteriorated at the site in January and small passerines present in November and December were noticeably absent in January and February reflecting high mortality levels. Birds noticeably absent in January and February that were present in November and December included meadow pipit, robin and stonechat. The harsh weather in January saw an influx of thrush species, namely, fieldfare, song thrush and redwing. Fieldfare and redwing are winter visitors to Ireland from Scandinavia and Continental Europe. Three raptors were recorded: hen harrier, merlin and kestrel. Kestrel was observed most frequently, followed by merlin and hen harrier. With the numerous sightings of kestrel foraging during the course of the winter season, it is believed that at least two individuals were using the site.

A total of 44 species were recorded during the course of the summer breeding period. Bird species recorded at the site in summer were typical of the habitats present. Meadow pipit and skylark were the most abundant species recorded at the site. The number of species observed at the site in summer was greater than in winter due to the arrival of breeding migrants, including willow warbler, chiffchaff, sedge warbler, grasshopper warbler and whitethroat. A flock of 55 golden plover was observed in April flying high over the site. There was no evidence during the survey period that the site was used as a regular foraging ground in winter. The site is deemed unsuitable for breeding golden plover due to the low elevation of the site and absence of suitable breeding habitat such as extensive moorland. Out of the three raptors recorded in the winter season only two were observed in the breeding season: hen harrier and kestrel. Kestrel was observed the most frequently. Observations at the site suggest that the site is used infrequently by foraging hen harriers, and there was no evidence that breeding occurred at the site in 2010. Kestrel most likely do breed in the site. Merlin activity was not recorded, and a merlin breeding survey carried out determined there was no evidence of merlin breeding.

Toberatooreen Wind Farm

Toberatooreen Wind Farm is located in north Co. Kerry, approximately 1.85km east of the village of Moyvane and 6.5km to the southeast of the project site and lies close to the Co. Limerick border. The site is dominated by lowland blanket bog, cutover bog, coniferous forestry and agricultural pasture. The site is surrounded by cutover blanket bog to the north, south and east of the site, with agricultural fields to the west of the site. Similarly, the surrounding local landscape beyond is a mixture of predominantly lowland blanket bog, coniferous woodland and improved agricultural grassland. Bird surveys were carried out between 2010 and 2011 for both winter and breeding seasons by Malachy Walsh and Partners and included vantage point watches, transects and a breeding merlin survey, and the results are summarised below.

A total of 43 species were recorded during the winter bird survey with the majority being passerines. The bird species recorded at the site in winter were typical of the habitats present, with the exception

of the record of greenshank. Greenshank is mainly a coastal species, frequenting mudflats. The bird possibly moved inland in search of foraging habitat, due to cold weather. The most abundant species within the site during the winter bird survey was reed bunting. The numbers of bird species observed at the site reflected weather patterns and seasonal movements over the course of the winter. Skylark were absent at the site throughout most of the winter and became more evident in March. Skylark tend to move from inland areas to coastal areas in winter. Returning birds in spring were evident as breeding territories were established. Weather conditions deteriorated at the site in January and small passerines present in November and December were noticeably absent in January and February reflecting high mortality levels. There was a noticeable absence of stonechat in the latter half of the winter due to the harsh weather conditions in January. Five raptors were recorded: hen harrier, merlin, kestrel, peregrine and sparrowhawk. Hen harrier was recorded the most of the five raptors followed by kestrel, peregrine, sparrowhawk and merlin. There were nineteen observations of hen harrier in total over the winter period concerning three different individuals. Most of the observations were of the same adult male. Male hen harriers tend to remain on breeding grounds in winter, for the most part.

A total of 54 species were recorded during the course of the summer bird survey. Bird species recorded at the site in summer are typical of the habitats present. The number of species observed at the site in summer 2011 was greater than in winter due to the arrival of breeding migrants, including willow warbler, chiffchaff, sedge warbler, grasshopper warbler and whitethroat. The scarcity of stonechat numbers at the site in summer was notable and reflected the high mortality due to harsh weather conditions in January 2010. Four of the five raptors recorded in winter were observed during the breeding season, these consisted of: hen harrier, kestrel, peregrine and sparrowhawk. Merlin activity was not recorded. Kestrel was recorded the most of the four raptors followed by hen harrier, peregrine and sparrowhawk. While there was no evidence of breeding hen harrier observed within the site, a pair was observed displaying over conifer plantation and nest building, northeast of the site, in May 2011. This indicated that they may have attempted to breed in the vicinity of the site. However, no juveniles were observed at the site in late summer.

Ballylongford Wind Farm

The permitted Ballylongford Wind Farm (An Bord Pleanála ref. PL08.304807) is located 2km northwest of the wind farm site and lies adjacent to Tullahennel Wind Farm on its northeast side. It comprises 6 turbines. Winter and summer walkover surveys were undertaken between February 2015 and 2016 and April and June 2018. Vantage point surveys were undertaken between September 2016 and 2018. Waterbird surveys were also carried out at known and potentially suitable sites. Survey work was completed by Wetland Surveys Ireland.

A single peregrine falcon was observed during the course of the surveys. Twenty one observations were made of hen harrier during the survey period, seven during winter 2016-2017, two on a single date during the breeding season of 2017, eleven during the winter 2017-2018 and an individual sighting in September 2018 with no records during the breeding season of 2018. Of the total flight activity 82% was below 10m height, 7% between 10 and 20m and 11% between 20 and 130m. All but one of the twenty one observations were of adults males with one ringtail. Most activity related to foraging over bogland, although birds were observed flying over much of the site. The report concluded that the surveys indicate that the site is occasionally used by foraging hen harrier during winter and that hen harrier did not breed in proximity to the site during 2016, 2017 or 2018. One hundred and twelve observations of kestrel were made during vantage point surveys. Total flight

activity recorded for the species was 18,386s. All but two observations related to individual birds, mostly hunting over the site. The report concluded that kestrel breed in proximity to the site and use the area throughout the year for foraging. Three observations of merlin were made indicating they occasionally use the site. Twenty observations of sparrowhawk were made during the vantage point watches spread over all seasons with the species also observed during walkover surveys. An adult male carrying prey suggested a nest site nearby. Three observations of buzzard flying over the site were made in winter.

Curlew were observed on two occasions flying over the site. There was a single observation of a flock of golden plover flying through the site in September 2016 with a further observation of a flock flying south in January 2017. There were no observation of whooper swan during surveys with a single observation of four individuals recorded flying outside the site in February 2017 in a northeast direction. Other off site observations include swans foraging at a grassland site at the Ballyline River, approximately 0.6km east of the wind farm, have confirmed a regular commuting route from this foraging site along the Ballyline River to Ballylongford Bay. The report concluded that whooper swan do not use the site either for foraging or flying over. Dusk watches confirmed that the birds roost at Ballylongford Bay and commute between the two sites along the Ballyline River in a northeast/southwest direction with a peak count of eight individuals. Twelve observations of snipe were made flying over the site during vantage point surveys in winter with numbers ranging from one individual to a flock of 40 with most of the flight activity associated with six birds of less. Snipe were consistently recorded during walkover surveys in winter and summer and was the only wader recorded using the bogland habitat within the site. Twenty six observations of mallard of between one and four individuals flying over the site were made in winter and summer. Eight observations of a single individual grey heron in winter and summer and the report concluded that the species occasionally fly over the site but do not use the habitats within the site. Other observations included: a single observation of whimbrel flying over the site in summer; four observations of little egret flying over the site in winter and summer; three observations of great black backed gull flying over the site in e summer; two observation of lesser black backed gull in winter and summer, and one of a distant flock of 70 individuals in winter, with a single observation of nine birds in agricultural grassland in winter; four observations of cormorant were made in winter and summer; and a single observation of greenshank in winter. Twenty nine observations of raven were recorded during the 2018 breeding season.

Breeding birds also recorded during the walkover surveys reflected both the peatland habitats and included skylark, meadow pipit, grasshopper warbler and reed bunting, and the woodland and included woodpigeon, sparrowhawk, blue tit, goldcrest and chiffchaff. Birds recorded during the winter walkovers were similar to the breeding season with the absence of breeding migrants such as chiffchaff and included fieldfare, a winter migrant, and increased abundance of snipe and starling in particular.

The report concluded that the waterbirds that use Ballylongford Bay do not interact with the Tullahennel Wind Farm site and typically are restricted to the coastal and marine habitats in the area.

7.3.3 Field Survey Results

The target and secondary species recorded during bird surveys carried out at the proposed Shronowen Wind Farm site during the winter periods of 2018/19 and 2019/20 and summer periods of 2018 and

2019 are presented in **Table 7-11**. Detailed survey results are presented in **Appendix 7-1** to **7-4**, **Volume 3** of the EIAR.

Table 7-11. Target species recorded during bird surveys (Annex I species are highlighted in bold)

Target Species	2018/19 winter	2019 breeding	2019/2020 winter	2020 breeding
Hen harrier	✓	✓	✓	✓
Kestrel	✓	✓	✓	✓
Sparrowhawk	✓			✓
Whooper swan	✓		✓	
Curlew	✓			
Cormorant	✓			✓
Snipe	✓	✓	✓	✓

Five Primary and two Secondary target species were recorded during the winter 2018/19 surveys. Two Annex I species were recorded, hen harrier and whooper swan. Hen harrier was recorded on several occasions inside and outside the site boundary during Vantage Point (VP) watches. Whooper swan, which were not recorded during vantage point watches, were recorded on six occasions using an area outside the wind farm site boundary to the northwest during a watch of foraging grounds during a search of an area for whooper swan inland sites. The species listed above in **Table 7-11** can be grouped further as follows:

Raptors

- Hen harrier
- Kestrel
- Sparrowhawk

Swans

- Whooper swan

Waders

- Cormorant
- Curlew
- Snipe

The species listed above are discussed below in this order.

7.3.3.1 Hen harrier

Hen harrier is an amber-listed bird of prey and is an Annex I listed species and were observed on 14 occasions during the 2 years of vantage point watches. During the winter 2018/19 survey period hen harrier was observed on four occasions during the VP watches in November, December and February. The observations in November and December occurred during the VP2 watch, the one observation in February during VP3 and the other during VP1. An additional *ad hoc* record of an observation of a female in flight near VP3 was made by a local person familiar with the site in January. One of the observations was of an adult male, two were of adult females and the remaining observation was categorised as a ringtail (females and immature birds). The male hen harrier was observed outside the site and the others were recorded inside the site boundary. Three of the observations were of birds flying over bog; other habitats flown over included scrub, first rotation forestry and heather moorland. Flight heights were recorded at 0-20m.

During the breeding 2019 survey period hen harrier was recorded on four occasions during VP surveys in April, June, July and September. During this survey period flight paths were recorded twice during VP2 and on one occasion at VP1 and VP3. Two of these were observations of an adult male, one was of an adult female and the remaining bird was categorised as a juvenile female. Three of these observations were made within the site boundary and one male hen harrier was observed flying eastwardly from VP1 outside the site boundary. They were observed flying, circling, hunting and perched over bog mainly but also over first rotation forestry, scrub and grassland moorland. Flight heights ranged between 0-20m for two of the flights and the remaining two ranged between between 0-100m and 0-150m.

During the winter 2019/20 survey period four observations of hen harrier were recorded and these occurred in October, December and February. Three of these were of adult males, one was of an adult female. All flight paths were within the site boundary. All the flight paths were observed from VP1 and they were observed flying and hunting over bog, scrub and first^{t} rotation forestry. Flight paths ranged in height from 0-20m and the remaining one ranged between 0-50m. An incidental sighting was made of a female adult in March south of VP3 hunting over improved grassland and bog within the site boundary.

During the breeding 2020 survey period hen harrier was recorded on one occasion in May. This observation was recorded from VP3 and was of an adult male observed hunting over bog within the site boundary. Flight heights were within the 0-20m range.

7.3.3.2 Kestrel

Kestrel is an amber-listed species and were observed on 30 occasions during vantage point watches. During the winter 2018/19 survey period there were eight observations of kestrels inside the site boundary during the months of November, January and February. Four observations occurred at VP3, three occurred at VP1 and one at VP2. The kestrels were observed flying, hunting, soaring and circling at various heights ranging from 0-100 m. While the primary habitat flown over was bog, individuals were also recorded flying over scrub, heather moorland, first rotation forestry and a bog track.

During the breeding 2019 survey period kestrel was recorded on 14 occasions during the months of June through to September. The majority of the observations were made within the site boundary with half of the activity recorded in the northeast of the site recorded from VP1. The sightings were of birds hunting, flying, perched and circling over bog mainly, however, a variety of habitat types were utilised including grassland moorland, first rotation forestry, scrub, improved grassland and a bog track. The kestrels were observed flying at various heights ranging from 0-50m over these habitats.

During the winter 2019/20 survey period five observations of kestrel were recorded and these occurred in October, November, December and March. All observations were made within the site boundary, two were made from VP1 and VP2 and one was made from VP3. These were seen within the bog habitat at various heights ranging from 0-100m and the activities observed mainly included flying as well as hunting and perching.

During the breeding 2020 survey period there were three observations (one of which was an incidental sighting) of kestrels inside the site boundary during August and September. All three observations occurred at VP1. The kestrels were observed perched, flying and hunting at various heights ranging from 0-20m. The habitat flown over was bog.

7.3.3.3 Sparrowhawk

Sparrowhawk is an amber-listed species and was observed on four occasions during vantage point watches. During the winter 2018/19 survey period there were three observations of sparrowhawk during the survey period all inside the site boundary. Two adults and one juvenile were observed from VP2 and VP3 and the species was recorded in November and February. Flight heights were within the 0-20m range. The individuals recorded were observed perched, flying and hunting over bog habitat.

During the breeding 2019 survey period no observations of sparrowhawk occurred.

During the winter 2019/20 survey period no observations of sparrowhawk occurred.

During the breeding 2020 survey period there was one observation of sparrowhawk, this sighting was inside the site boundary. The bird was observed from VP2 and the species was recorded in May only. Flight heights were within the 0-20m range. The individual recorded was observed flying over bog habitat.

7.3.3.4 Whooper swan

Whooper swan is both an amber-listed species and an Annex I listed species. Whooper swan were not recorded during the VP survey but were recorded during the waterbird survey of the hinterland and thereafter during dedicated watches.

During the winter 2018/19 survey period there were six observations of whooper swan flocks. The observations occurred during the whooper swan survey and occurred at a location outside the proposed wind farm site. Specifically, these observations occurred at location in improved grassland the flocks were using as foraging ground. The numbers varied between 11 and 15, the birds observed were adults and flocks were recorded in February and March. On the first occasion the surveyor observed the flock for 20 minutes; on subsequent occasions the observation time was extended to 30 minutes.

During the breeding 2019 survey period no observations of whooper swan occurred.

During the winter 2019/20 survey period one observation of whooper swan was recorded, and this occurred in November. This observation was made outside the site boundary. Twelve whooper swans were observed on the ground on improved grassland to the north-west of VP3 in the same general location as they were observed in during the previous winter survey period.

During the breeding 2020 survey period no observations of whooper swan occurred.

7.3.3.5 Cormorant

Cormorant is an amber-listed species. During the winter 2018/19 survey period there were two observations of cormorants in flight during November and both occurred within the site boundary from VP2 and VP3 location. They were observed flying over bog habitat in the south and west of the site. Flight heights were within the 0-50m range.

During the breeding 2019 survey period no observations of cormorant occurred.

During the winter 2019/20 survey period no observations of cormorant occurred.

During the breeding 2020 survey period there was one observation of cormorant in flight during August from VP1 and this occurred inside the site boundary. This cormorant was observed flying over bog habitat in the east of the site. Flight heights were within the 20-50m height range.

7.3.3.6 Curlew

Curlew is an amber-listed species. There was no sighting of curlew during the two year bird survey; however, an individual was heard calling from VP2 during the winter 2018/19 survey period on November 11th.

7.3.3.7 Snipe

Snipe is an amber-listed species. During the winter 2018/19 survey period there were two sightings of snipe during this survey period; one in December and the other in February. The first was observed from VP3 inside the site boundary and the second observed from VP1 flew from outside the boundary to within the site. The flight paths observed were all on the eastern side of the site over bog and rough grassland. Flight heights were within the 0-50m range.

During the breeding 2019 survey period there were two sightings of adult snipe. The flight paths observed were all on the eastern side of the site from VP2 and these snipe were flying over bog and scrub at heights between 0-20m. These observations were made in April and September.

During the winter 2019/20 survey period two recordings of snipe were made and these occurred in November. Snipe was heard calling after dark at VP1 location on the 05/11/2019 and 2-3 snipe were heard calling after dark at VP2 location on the 30/11/2019.

During the breeding 2020 survey there was one record of snipe. In May during VP1 drumming was heard from two areas inside the site boundary to the west of the site. This is a display behaviour indicative of breeding.

During a site walkover in November 2019, a number of snipe were flushed from the cutover bog.

7.3.3.8 Other additional non-target species recorded

Buzzard

Buzzard is a green-listed bird of prey. During the breeding 2019 survey period buzzard was recorded on one occasion during April. This male's flight path was recorded from VP1 and flew across the site from the northeast to the west over first rotation forest and heather moorland within the site boundary over bog over a period of 7 minutes. Flight heights ranged between 50- >150m.

Peregrine falcon

Peregrine falcon is a green-listed species. During the winter 2019/20 survey period, two observations of this species were recorded in October and December. Observations were made within and outside the site boundary from VP2 and VP1 locations. These birds were observed flying and perched over bog and first rotation forestry habitat, flight heights were between 0-150m.

Mallard

Mallard is a green-listed duck. There was an observation of a pair of mallard in March 2019 flying through the site.

During the breeding 2019 survey period this species was recorded on four occasions during April and May. During this survey period all flight paths were recorded from VP2. All flights observed were made in the east of the site within the site boundary over bog. Both males and females were recorded together during this survey period. Flight heights ranged from 0-50m.

During the winter 2019/20 survey period three observations of this species were recorded and these occurred in October, February and March. These observations were made from VP1, VP2 and VP3. These were observed flying over bog habitat with heights within 0-50m.

During the breeding 2020 period there was one observation of mallard. This observation was made from VP1 location. Mallard appeared in April only, flight heights were within 0-20m and the mallard was observed flying over bog habitat and on the ground.

Grey heron

Grey heron is a green-listed species. During the breeding 2020 survey period there was one observation of grey heron during the month of May. This observation was made from VP3 location. Flight heights ranged between 0-30m and the heron was flying over bog habitat and on the ground.

Little egret

Little egret is a green-listed species. During the breeding 2019 survey period this species was recorded at VP 3 once in the month of May and once in the month of July. Flight heights were in the 0-50m category height band. On each occasion the little egret was observed flying over bog, scrub and first rotation forestry in the west of the site, within the site boundary.

Lesser black-backed gull and unidentified gull

Lesser black-backed gull is an amber-listed species. During the breeding 2019 survey period this species was recorded on two occasions in June from VP1 and VP3. Flight heights were between 20-100m. On each occasion the birds were observed flying over bog, first rotation forestry and grassland moorland in the northeast and northwest of the site, within and outside the site boundary. During the

breeding 2020 survey period there was one observation of lesser black-backed gull. This observation was made from VP1 location in May, flight heights were between 0-30m and the bird was flying over bog habitat.

During the breeding 2019 survey period an unidentified gull was recorded during June. During this survey period flight paths were recorded from VP1. Flight heights were between 20-50m. The gull was observed flying over bog, in the northeast of the site, within and outside the site boundary.

Passerines (perched birds or songbirds)

Meadow pipit is a red-listed species and was recorded every month throughout the site during the winter 2018/19 period and in two months of the winter 2019/20 period. Amber-listed non-target species most frequently recorded included robin, stonechat and skylark. The amber-listed species least commonly recorded comprised house martin, mistle thrush, starling and goldcrest.

Meadow pipit was recorded every month throughout the site during the breeding 2019 and 2020 period. Another red-listed species recorded less frequently was dunlin. Amber-listed species most frequently recorded included robin, stonechat and skylark. Amber-listed species less frequently recorded included swallow and mistle thrush. The least commonly recorded species comprised house martin, greenfinch, starling, linnet and wheatear (*Oenanthe oenanthe*).

No evidence of barn owl was observed during surveys.

7.3.4 Identification and Evaluation of Important Ecological Features

The following table (**Table 7-12**) identifies and evaluates Important Ecological Features (IEF), and presents the rationale for inclusion as IEF or exclusion based on criteria set out in **Section 7.2.4**. The likely significant of the project on bird species that are included as IEF are considered further in **Section 7.4**, Likely significant Effects. The likely significant of the project on designated sites that are considered IEF are considered in **Section 7.3.2.1** and **7.4**, Likely significant Effects.

Table 7-12. Evaluation of ecological receptors and selection criteria, and rationale for inclusion/exclusion as Important Ecological Features (IEF)

Species	Conservation status	Population size estimate	IEF (Yes/No)	Rationale for inclusion/exclusion criteria
Raptors				
Hen harrier	– Annex I, EU Birds Directive – BoCCI Amber List – Wildlife Act	– Recorded within hectads: R03, R04, Q93 and Q94. – Based on a 2015 national survey Ruddock et al. (2016) estimated the population to be 108 – 157 breeding pairs. – Population size/estimate (NPWS Article 12, Wilson-Parr (2013)) estimates a mid-winter population range of 269-349 individuals.	**Yes**	– Conservation status. – Recorded in breeding and winter atlas hectad R03. – No evidence of breeding at the project site but recorded in each season during bird surveys.
Kestrel	– BoCCI Amber List – Wildlife Act	– Recorded within hectad: R03, R04, Q93 and Q94 – Kestrel is widespread in Ireland. – Population size/estimate (NPWS Article 12): Min: 12,100; Max: 21,220[19].	**Yes**	– Conservation status. – Recorded in breeding and winter atlas for hectads R03, R04, Q93 and Q94. – No evidence of breeding at the project site but recorded during bird surveys in each season, frequent use of the site.
Sparrowhawk	– BoCCI Amber List – Wildlife Act	– Recorded within hectad: R03, R04, Q93 and Q94 – The Sparrowhawk is the most common and widespread species of raptor in Ireland (Newton, 2002 (cited in Hardey et al, 2009)). – Population size/estimate (NPWS Article 12): Min: 9,100; Max: 14,830.	**Yes**	– Conservation status – Recorded in winter atlas in hectads: R03, R04 and Q93. – Confirmed breeding atlas in hectads R03 and R04 and possible breeding in Q93 and Q94. – Recorded on four occasions, three in winter 2018/19 and one in breeding 2020 season, infrequent use of the site. No evidence of breeding at the site.
Peregrine	– Annex I, EU Birds Directive	– Recorded within hectad: R03, R04, Q93 and Q94	**Yes**	– Conservation status.

[19]NPWS Article 12: accessed at:
http://cdr.eionet.europa.eu/Converters/run_conversion?file=/ie/eu/art12/envuvesya/IE_birds_reports-14328-144944.xml&conv=343&source=remote#A082_B

Species	Conservation status	Population size estimate	IEF (Yes/No)	Rationale for inclusion/exclusion criteria
	– BoCCI Green List – Wildlife Act	– Estimated national breeding population of peregrine: 425 breeding pairs (IRSG, 2017).		– Confirmed breeding atlas within hectad R03 and possible breeding atlas within hectads R04, Q93 and Q94. – Recorded on two occasions during winter 2019/20, occasional use of the site. No evidence of breeding at the site. – Precautionary Principle.
Buzzard	– BoCCI Green list – Wildlife Act	– Recorded within hectad Q93 – This species is largely resident, throughout Ireland, receives birds from Britain during the winter – Buzzard breeding numbers and range has been steadily increasing after a historical decline in Ireland (Greenwood et al.,2003 (cited in Hardey et al., 2009)) – NPWS Article 12: population size/estimate: 1,500.	**No**	– Conservation status. – Recorded on one occasion during summer 2019, very occasional use of the site. No evidence of breeding at the site.
Whooper swan (winter)	– Annex I, EU Birds Directive – BoCCI Amber List – Wildlife Act	– Recorded within hectad: R04, Q93 and Q94. – NPWS Article 12: estimated national wintering population of whooper swan in Ireland is 10,520.	**Yes**	– Conservation status. – Recorded in winter atlas hectads: Q93 and Q94. – Whooper swan were recorded using agricultural fields outside of the site, however no records of species using the site were made.
Mallard	– BoCCI Green list – Wildlife Act	– Recorded within hectad: R03, R04, Q93 and Q94 – NPWS Article 12: estimated winter population of 20,050; estimated breeding population of 15,400.	**Yes**	– Confirmed breeding atlas hectads R03, R04 and Q94 and probable breeding in hectad Q93. – Were recorded in winter 2018/19 breeding 2019, winter 2019/20 and breeding 2020 survey periods. No evidence of breeding at the site. – Precautionary Principle.
Cormorant	– Annex I, EU Birds Directive – BoCCI Amber List	– Recorded within hectad: R03, R04, Q93 and Q94. – Population size/estimate (NPWS Article 12):	**Yes**	– Conservation status. – Recorded in winter atlas hectads: R03, R04, Q93 and Q94.

Species	Conservation status	Population size estimate	IEF (Yes/No)	Rationale for inclusion/exclusion criteria
	– Wildlife Act	Min: 4366 Max: 4366.		– Recorded twice throughout the four survey periods. Three times in winter 2018/19 and once in breeding 2020. No evidence of breeding at the site. – Precautionary Principle.
Curlew	– Annex II, EU Birds Directive – BoCCI Red List – Wildlife Act	– Recorded within hectads: R03, R04, Q93 and Q94. – Population size/estimate (NPWS Article 12): Min: 27830; Max: 27830	**No**	– Conservation status. – Recorded in winter atlas hectad R03, R04, Q93 and Q94 and possible breeding in hectad R93. – No evidence of breeding at the project site and only heard on one occasion during winter 2018/19 season.
Snipe	– BoCCI Amber list – Wildlife Act	– Recorded within hectads: R03, R04, Q93 and Q94 – NPWS Article 12: estimated breeding population of 4,275.	**Yes**	– Conservation status. – Probable breeding atlas hectad R03 and R04. – Recorded during all survey periods. Possibly breeding at the site.
Grey Heron	– BoCCI Green list – Wildlife Act	– Recorded within hectads: R03, R04, Q93 and Q94 – NPWS Article 12: estimated population of 3,087.	**No**	– Conservation status. – Confirmed breeding atlas in hectad R04 – Possible breeding atlas in hectads R03, Q93 and Q94. – Only recorded on one occasion during breeding 2020 survey period. No evidence of breeding at the site.
Little egret	– Annex I, EU Birds – Directive – BoCCI Green list – Wildlife Act	– Recorded within hectads: R03, R04 and Q94 – Population size/estimate (NPWS Article 12): Min: 456; Max: 1,011.	**Yes**	– Conservation Status. – Confirmed atlas breeding in hectad R04 – Recorded on two occasions during the breeding 2019 survey period. No evidence of breeding at the site.

Species	Conservation status	Population size estimate	IEF (Yes/No)	Rationale for inclusion/exclusion criteria
Lesser black-backed gull	– BoCCI Amber List – Wildlife Act	– NPWS Article 12: estimated winter population of 10,363; estimated breeding population of 4,239.	**No**	– Not recorded in breeding atlas hectads. – Recorded twice during breeding 2019 survey period, very occasional use of the site. – No evidence of breeding or roosting activity was recorded within the study area. Likely gulls roam inland attracted to silage fields and slurry spreading. No suitable breeding and limited foraging habitat at the site.
Passerines (e.g. meadow pipit, grey wagtail)	– BoCCI Red list and Amber List – Wildlife Act	– Population size varies between species but is typically large for passerines.	**Yes**	– Conservation status. – Resident population. – Significant effects are not anticipated as a result of the project. As described in SNH guidance (2017), it is generally considered that passerine species are not significantly impacted by windfarm developments. – Included as they are prey for birds of prey that utilise the site and surrounds.

The determination of the sensitivity of bird species selected as IEF in the previous section follows the guidance set out for the assessment of birds as outlined in Percival (2003). The criteria are outlined in **Section 7.2.5.1**. Consideration of the field survey results against **Table 7-12** above indicates one High sensitivity species has been recorded, four Medium sensitivity species and four Low sensitivity species have been recorded (see **Table 7-13**).

Table 7-13. High sensitivity species, Medium sensitivity species and Low sensitivity species

	High Sensitivity	Medium Sensitivity	Low Sensitivity
Species	**Hen harrier** (Annex I)	Cormorant (Annex I) Little egret (Annex I) Peregrine (Annex I) **Whooper swan** (Annex I)	Kestrel (Amber list) Sparrowhawk (Amber list) Snipe (Amber-list) Passerines, including meadow pipit (Red list)

7.3.5 Do-Nothing Scenario

The project site is situated predominantly within a cutover bog site. If the project does not proceed, it is likely that current land management will remain the same including turf cutting, and forestry and agriculture to a lesser degree.

7.4 LIKELY SIGNIFICANT EFFECTS

The construction phase impacts associated with the proposed development and operation of the proposed development are outlined below. As described in SNH Guidance (2017), wind farms present three main potential risks to birds (Drewitt & Langston 2006, 2008; Band *et al*., 2007) most notably target species. These include:

- Direct habitat loss through construction of wind farm infrastructure.
- Indirect effects such as displacement; if birds avoid the wind farm and its surrounding area due to turbine construction and operation. Displacement due to disturbance during the construction and operational phase may occur. Displacement may also include barrier effects in which birds are deterred from using normal routes to feeding or roosting grounds.
- Direct effect of mortality caused by collisions with turbine blades and other infrastructure.

The construction impacts relate to habitat loss, disturbance/displacement during construction and barrier effect. The operation impacts relate to disturbance/displacement, barrier effect and bird collisions with moving turbine rotors.

Important Ecological Features (IEF) are important features that could be potentially affected by the project and should be subject to detailed assessment (CIEEM, 2019). IEF included target bird species identified during bird surveys at the site that could be potentially affected by the project (see **Section 7.3.4**) and designated sites for nature conservation (see **Section 7.3.2.1**), in particular those designated for important bird populations within the zone of influence of the project.

To assess the significance of potential impacts on bird species identified as IEF, an appraisal of the magnitude of impacts on these species is necessary. Percival (2003) details an assessment methodology to determine the significance of an impact based on the product of the sensitivity of the receptor and the magnitude of the effect. The sensitivity of a species is defined by Percival (2003) as its ecological importance and nature conservation interest at the site being assessed. 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. The assessment in the following subsections follows this assessment methodology outlined in Percival (2003) (refer to **Section 7.2.5**). Criteria for assessing impact significance based on CIEEM (2019) and EPA (2017) guidance has also been used in the assessment of likely significant effects (see **Table 7-4** above).

It must be noted that the identification of a risk does not represent a prediction either that it will occur, or that it will create or cause significant impact.

7.4.1 Construction Phase

7.4.1.1 Designated Sites

The main risk to important bird populations within designated sites during the construction phase arises indirectly from habitat loss or alteration (via a deterioration in water quality) and from direct and indirect disturbance. Given that the nearest designated site for nature conservation, the Lower River Shannon SAC, is at a remove of 1km south of the site at its closest point (see **Figure 7-3**, above) the project will not result in any direct habitat loss. There is potential for indirect effects to watercourse habitats via hydrological connections between the project site and designated sites.

Given the intervening distance between the nearest site designated for birds (see **Figure 7-4**, above), the River Shannon and River Fergus Estuaries SPA, which lies over 2km to the north of the site, there will be no direct disturbance to birds using the SPA. There is potential for indirect disturbance to species of conservation interest (SCI) for which the SPA is designated that might use the project site for commuting or foraging.

A number of designated sites were identified within the zone of influence (ZOI) of the project. These are listed above in **Table 7-5**, internationally important SACs and SPAs, and **Table 7-6**, nationally important NHAs and pNHAs.

A screening for appropriate assessment report concluded that two European sites, Moanveanlagh Bog SAC and Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA, both within the ZOI of the project, would not be significantly affected by the project. The report concluded that significant effects could not be ruled out for a further two European sites including the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA (refer to Appendix 2 of the NIS, which accompanies the planning submission). Therefore, further assessment was required and a Natura Impact Statement (NIS) was prepared. The main source of potentially significant effects identified were water quality impacts arising during the construction and associated earthworks phase of the project. With the full and proper implementation of mitigation measures to control water quality within the project site, the NIS concluded that the project would not result in an adverse effect to the integrity of the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.

Many of the NHAs and pNHAs within the ZOI of the project spatially overlapped with the Lower River Shannon SAC and/or River Shannon and River Fergus Estuaries SPA including Ballylongford Bay pNHA, Tarbert Bay pNHA, Cashen River Estuary pNHA, Scattery Island pNHA, Beal Point pNHA, Clonderlaw Bay pNHA and Poulnahsherry Bay pNHA, and thus the effects of the project on these were assessed in the NIS. The NIS concluded that the project would not result in an adverse effect on the integrity of the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA, and thus it is reasonable to conclude that the project will not significantly affect Ballylongford Bay pNHA, Tarbert Bay pNHA, Cashen River Estuary pNHA, Scattery Island pNHA, Beal Point pNHA, Clonderlaw Bay pNHA and Poulnahsherry Bay pNHA.

Moanveanlagh Bog pNHA spatially overlaps with Moanveanlagh Bog SAC; as already noted in **Table 7-6** the screening for appropriate assessment report concluded that the SAC will not be significantly affected by the project, and thus it is reasonable to conclude that the project will not significantly affect Moanveanlagh Bog pNHA.

There is an indirect hydrological link between Bunnaruddee Bog NHA, which is designated for peatlands and consists of a raised bog, and the project site. The NHA lies up-gradient of any ecological effects and while birds certainly use the site, it is not designated for bird species and there is no mention of birds in the NPWS site synopsis. Thus, it is concluded that the NHA will not be significantly affected by the project.

There is no hydrological connection between St. Senan's Lough pNHA and the project site, thus the project will not have any direct or indirect effect on the habitats within the site, and given the intervening distance of 13km between the project and this site, the project will not result in any

disturbance or displacement effects on birds that use the site. It is reasonable to conclude that St. Senan's Lough pNHA will not be significantly affected by the project.

7.4.1.2 Important Ecological Features (IEF)

The construction phase of the wind energy development has the potential to result in habitat loss, disturbance and displacement of the bird species identified as IEF. The sensitivity rating of the IEF as per Percival (2003) is presented in **Table 7-14**, along with their preferred habitat and the season of observation. The colour coding in the table denotes the conservation status of the birds: red listed species are of high conservation concern, amber species are of medium conservation concern and green listed species are of low conservation concern. A description of habitat loss, and disturbance and displacement impacts during construction are provided in the following sections. The effect of habitat loss and alteration over the lifetime of the wind farm is discussed. Following this, the sensitivity of species and magnitude of the effect are combined via cross tablature to yield the construction impact significance of birds selected as IEF as listed in **Table 7-15**.

Table 7-14. Key ornithological receptor species and sensitivity to development (using criteria in Percival, 2003)

Species & BoCCI status[20]	Preferred habitat	Season of observation	Sensitivity/value of receptor
Hen harrier	Coastal (winter), upland (breeding)	Winter & Breeding	High
Kestrel	Open habitats	Winter & Breeding	Low
Sparrowhawk	Widespread; wooded areas, gardens, uplands, heaths, bogs	Winter & Breeding	Low
Peregrine	Coastal, wetland, mountainous	Winter & Breeding	Medium
Snipe	Wetlands, inland lakes	Winter & Breeding	Low
Whooper swan	Lakes, marshes, fields	Winter	Medium
Cormorant	Coast, lakes, cliffs, islands	Winter & Breeding	Low
Little egret	Marshes, lakes, estuaries	Breeding	Medium
Mallard	Lakes, ponds, marshes, estuaries	Winter & Breeding	Low
Passerines (meadow pipit, grey wagtail)	Widespread: wooded areas, gardens, uplands, heaths, bogs	Winter & Breeding	Low

Effect of Habitat Loss

The total area of the wind farm site is 364ha while the footprint occupied by the wind farm infrastructure within the site is 27.5ha, thus the project occupies 7.5% of the site on which it will have a direct impact. There will be a loss of 26ha of cutover bog, the main habitat type within the site. Habitat loss within the development area will be mostly in cutover bog habitat with some loss of conifer plantation and improved agricultural grassland towards the periphery of the site. There will be a loss of 0.5ha of scrub. Habitat loss will be restricted to the new and widened roads, turbine bases and hardstanding areas, substation, met mast and peat deposition areas. All of the internal access roads and turbine hardstands will be floated while the turbines bases will be excavated. The substation

[20] BoCCI status indicated by colour

is mainly located on agricultural grassland. Excess peat arising from the excavation of turbine base foundations will be permanently stored on site in the peat deposition areas. The proposed grid connection will be undergrounded through a mosaic of improved agricultural grassland and wet grassland to a new lattice tower construction along an existing 110kV overhead line while the alternative grid connection will undergrounded and confined to existing roads.

In summary the site is, both topographically and ecologically, relatively homogeneous in terms of the wider landscape, a characteristic that inhibits species diversity not only in terms of the floristic communities but also in the variety of animal species routinely present. The extant plant communities comprise low-growing, open vegetation with low plant species richness that lacks the variety and complexity required for high insect macro invertebrate productivity. This reflects the level of bird usage of the site. Passerines are concentrated in shrub areas and marginal habitats along roadside tracks and adjacent field boundaries.

The effects of habitat loss will result in a loss of habitat for foraging birds of prey, hen harrier, kestrel and sparrowhawk. Hen harrier is a ground nesting bird, nesting in open peatland habitats or young forestry. While hen harrier was observed using the site during the breeding season, there was no evidence of breeding hen harrier recorded as described in Hardey et al., (2013). Hen harrier use the site during winter for foraging and were recorded using the site on four occasions in both surveyed winters. Kestrel nest in a wide variety of habitats including old trees, buildings or on rock ledges (Shrubb, 1993) while sparrowhawk prefer to nest in mature forestry, preferring conifer over deciduous (Hardey et al., 2013). There is little suitable habitat for nesting kestrel and sparrowhawk at the site given the dominance of cutover bog with the exception of some scattered blocks of conifer plantation along the site boundary. Given the level of activity within the site during the 2019 breeding season, it is possible that kestrel bred in the surrounding area. In the two breeding bird seasons, there was only one sighting of sparrowhawk indicating that they are not breeding in proximity to the site and use the site on occasion. While kestrel use the site during winter months for foraging, sparrowhawk use it on occasion with no sightings observed during the winter of 2019/20. Peregrine falcon were only observed on two occasions over the two year survey period, in November and December 2019 indicating occasional use. There is no suitable breeding habitat for peregrine within the wind farm site.

While there will be a loss of foraging habitat for birds of prey, this will be limited to wind farm infrastructure and peat deposition areas while most of the habitat within the site will remain intact. The peat deposition areas have been sited on cutover bog where part of the original peat mass has been removed and thus heavily modified. Between 1-1.5m of peat will be deposited in these areas and will be covered by sod (actotelm layer containing vegetation and seed bank) excavated to accommodate wind farm infrastructure. Therefore, the habitat at the peat deposition areas will be altered rather than lost and will be available for passerines and foraging birds of prey. Refer to **Appendix 9-2** of Volume 3 for the Peat Spoil Management Plan.

The loss of cutover bog habitat has the potential to impact on passerines (perched birds or songbirds), which are frequent within the site. This can result in reduced feeding and nesting opportunities for birds. Passerines are also prey items for birds of prey so a reduced abundance of these bird species may reduce prey availability for birds of prey. The loss of cutover habitats will reduce the available nesting habitat for ground nesting passerines such as meadow pipit, skylark and stonechat, however,

even with the loss of nesting and foraging habitat as a result of the wind farm, suitable habitat is widely available within the site outside of the development footprint.

Snipe were recorded during both breeding and winter seasons. Snipe roost in the bog during the day and feed at night in surrounding fields. Snipe are ground nesting birds and likely breed at the site in the open cutover bog (at least a couple of pairs) and use the site for foraging and roosting during both seasons. The effects of habitat loss will result in a loss of foraging and nesting habitat for snipe though much of the cutover bog within the site will still be available for snipe.

Whooper swan were regularly observed in winter 2018/19 in flocks between 11 and 15 individuals in agricultural fields outside of the site to the northwest. A similar sized flock was observed in November 2019 using the same fields. This occurrence of whooper swan in this area was also confirmed in previous years during surveys carried out for the Ballylongford Wind Farm EIS (see **Section 7.3.2.6**). These birds did not appear to travel over the site and were not observed using the site while no suitable foraging habitat exists at the site, and thus are not expected to be significantly affected by habitat loss.

Cormorant were observed twice flying over the site in winter 2018/19 and once during the breeding season. The site does not contain suitable foraging or breeding habitat for cormorant. Habitat loss within the site will not affect cormorant.

Little egret were observed flying over the site on two occasions during the 2019 breeding season. The site does not contain suitable foraging or breeding habitat for little egret. Habitat loss within the site will not affect little egret.

Mallard were observed on a number of occasions during the winter bird surveys flying over the site but were not observed using the site and there is little suitable foraging habitat within the site for Mallard, thus they are not expected to be significantly affected by habitat loss.

The habitat loss associated with the proposed development will be restricted to the wind farm development footprint, which is linear in nature and makes use of existing tracks where possible within the site and will comprise mainly of cutover bog and to a lesser extent conifer plantation and agricultural grassland. Overall, the limited habitat loss associated with the proposed development site will not significantly impact foraging or breeding bird species as there is an abundance of similar habitat within the site and in the general area.

It is not considered that the construction of the undergrounded proposed grid connection or alternative connection along existing roads will result in significant habitat loss effects to IEF.

<u>Disturbance/Displacement and Barrier Effects</u>

The displacement of birds from areas within and surrounding wind farms due to visual intrusion and disturbance can amount effectively to habitat loss (Drewitt and Langston, 2006). Displacement of birds due to disturbance during the construction phase of the project may result in effective loss of habitat while barrier effects occur where the wind farm creates an obstacle to regular movements to and from breeding or foraging grounds. Both displacement and barrier effects manifest themselves as a reduction in the number of birds in flight within the wind farm (Humphreys et al., 2015).

For the 12 No. turbines, it is estimated that the total proposed development duration will be of the order of 18 months, of which 8 months will comprise heavy machinery. It is likely that both the turbine installation and grid connection works will take place simultaneously. During the construction phase disturbance to birds may arise from noise emissions and general disturbance from workers, plant and machinery activity. It is considered that the construction works present a moderate level of visual disturbance indicating that species will show behavioural changes such as reduced feeding and taking flight and moving to another area close by. By reducing the time that is available for feeding, disturbance may force birds to seek alternative feeding areas or increase their rate of intake in order to meet their daily energy requirements. Certain species may habituate to noise and activities associated with the construction work. The impact of disturbance on the bird population will also depend on the availability of alternative habitat. Work taking place during the summer months could cause disturbance to breeding birds and could lead to temporary displacement of some birds from the site and close surrounds during construction.

Hen harrier and kestrel use the site on an occasional to frequent basis, while sparrowhawk and peregrine use the site on occasion, for commuting and foraging. The wind farm is linear in nature and while it occupies the full extent of the site, it occupies a relatively small portion of the total site area. Therefore, much of the habitat will still be available for commuting and foraging birds of prey though the available area is likely to be reduced due to displacement effects caused by construction activity.

An assessment of the effects of a wind farm on a population of breeding hen harriers reported regular flights at close proximity to turbine bases (Madden & Porter 2007). This report also describes that, although reductions in flight activity around turbines were observed during the construction phase, the activity of bird populations quickly returned to pre-construction levels once construction was complete.

During the construction phase hen harrier monitoring at Coollegrean Wind farm, in north Kerry, hen harriers were observed foraging and commuting in the proximity of construction activities by ecologists for Malachy Walsh and Partners. This was noted on the 24th June 2016, where an adult male was observed using the conifer edge associated with the turbulence felling for turbine T5. The bird foraged low (2-5m) around the construction activities at a distance c.50m from the turbine base, where excavators and a number of site personnel were involved in construction activities. Again on the 29th July, 2016 a ringtail bird (juvenile or adult female) was observed commuting, and foraging in a southern direction following the main wind farm spine road, and at the location of T4, while construction activities were ongoing at this general location. The birds did not veer away from the locations where construction operations were being carried out, although during the latter observation the bird did gain height slightly.

Monitoring during the construction phase completed at one wind farm in the United States and at two wind farm projects in Scotland found no significant decrease in the use of sites during construction by northern harriers and hen harriers, respectively (Johnson et al., 2000, Haworth Conservation, 2013, cited in Wilson et al, 2015).

Evidence from a Pearce-Higgins (2012) study suggests that some bird species are more susceptible to disturbance during the construction phase than during the operational phase. In summary, it was

found that red grouse density recovered in the first year after construction following a significant decrease in the construction phase, that curlew and snipe densities declined during construction and did not recover during the first year of operation (whether they recover following this remains unclear), and that stonechat and skylark numbers increased during construction and remained higher during the early stages of operation. The study also showed a 53% decline of snipe within wind farm sites, which is reasonably consistent with an earlier study by Pearce-Higgins that identified a 48% decline in abundance in the species within 500m of turbine (Pearce-Higgins, 2009). The authors state that declines during construction are associated with direct disturbance and (non-significant) increases in numbers have been noted at reference sites which may indicate these birds move into the wider areas to breed as opposed to being lost to the population. However, there is no clear evidence to support this assertion at present[21].

It is not considered that the construction of the undergrounded proposed grid connection or alternative connection along existing roads will result in significant displacement effects to bird species selected as IEF.

The following table identifies and categorises the potential significance of the effects of habitat loss and displacement on bird species selected as Important Ecological Features (IEF) during the 18 month construction phase.

[21] http://www.bsg-ecology.com/wp-content/uploads/2015/03/Pearce-Higgins-et-al-2012.pdf

Table 7-15. Construction impact characterisation for IEF based on Percival (2003), CIEEM (2019) and EPA (2017)

KER & BoCCI status[22]	Potential impacts		Duration and Magnitude of potential impact[23]	Frequency and reversibility	Magnitude and Significance of effect[24]
Hen harrier	Direct Habitat Loss	This species utilises habitat within the site boundary for commuting and hunting. The development footprint is dominated by cutover bog, which will result in habitat loss for hunting birds. Most of this habitat within this site is outside of the wind farm development footprint and will remain intact. The loss of foraging habitat as a result of the construction of the new roads, road widening, turbines and hardstands and substation will be less than 10% with respect to the substantial areas of suitable habitat that will remain.	Long-term Slight Negative	Occurs once. Irreversible for cutover bog habitat.	The magnitude of impact is assessed as Low. **High** sensitivity species + **Low** Impact = **Low** effect significance. No likely significant effects at a local or county level are predicted.
	Displacement and barrier effect	Disturbance during construction is likely to discourage foraging in the vicinity of the proposed development. Foraging and commuting birds may temporarily avoid construction areas owing to the noise and increased activity. Heavy construction activities (roads, bases, peat deposition areas, earthworks) will occur within about 8 months of the 18 month total construction period. This is when most of the disturbance will likely occur. However any displacement impacts are not considered significant given the availability of similar and suitable foraging habitat within and surrounding the	Short-term Slight Negative	Occurs during the construction phase. Reversible once construction complete.	The magnitude of impact is assessed as Low. **High** sensitivity species + **Low** Impact = **Low** effect significance. No likely significant effects at a local or county level are predicted.

[22] BoCCI status indicated by colour

[23] Significance of potential impact based on EPA (2017)

[24] Magnitude and Significance of potential impact based on Percival (2003)

KER & BoCCI status[22]	Potential impacts		Duration and Magnitude of potential impact[23]	Frequency and reversibility	Magnitude and Significance of effect[24]
		site. It is anticipated that flight activity will return to pre-construction levels once construction is complete.			
Kestrel	Direct Habitat Loss	The proposed development site is dominated by cutover bog which provides foraging habitat for kestrel. Most of this habitat within this site is outside of the wind farm development footprint and will remain intact.	Long-term Slight Negative	Occurs once. Irreversible for cutover bog habitat.	The magnitude of the impact is assessed as Low. **Low** sensitivity species + **Low** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
	Displacement and barrier effect	The construction phase of the project may temporarily result in some disturbance, or displacement for kestrel. However any displacement impacts are not considered significant given the availability of similar and suitable breeding and foraging habitat within and surrounding the site.	Short-term Slight Negative	Occurs during the construction phase. Reversible once construction complete	The magnitude of the impact is assessed as Low. **Low** sensitivity species + **Low** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
Sparrowhawk	Direct Habitat Loss	The proposed development site is dominated by cutover bog which provides foraging habitat for sparrowhawk. Most of this habitat within this site is outside of the wind farm development footprint and will remain intact.	Long-term Slight Negative	Occurs once. Irreversible for cutover bog habitat.	The magnitude of the impact is assessed as Low. **Low** sensitivity species + **Low** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
	Displacement and barrier effect	While the site provides foraging habitat for sparrowhawk, it is used occasionally. There is an abundance of similar habitat extending away from	Short-term Slight Negative	Occurs during the construction phase.	The magnitude of the impact is assessed as Low.

KER & BoCCI status[22]	Potential impacts		Duration and Magnitude of potential impact[23]	Frequency and reversibility	Magnitude and Significance of effect[24]
		the site, in the wider area, including hedgerows bounding agricultural grassland.		Reversible once construction complete.	**Low** sensitivity species + **Low** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
Peregrine	Direct Habitat Loss	The proposed development site is dominated by cutover bog which provides foraging habitat for peregrine. Most of this habitat within this site is outside of the wind farm development footprint and will remain intact.	Long-term Imperceptible Negative	Occurs once. Irreversible for cutover bog habitat.	The magnitude of the impact is assessed as Low. **Medium** sensitivity species + **Low** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
	Displacement and barrier effect	While the site provides foraging habitat for peregrine, it is used on occasion. There is an abundance of similar open habitat extending away from the site, in the wider area.	Short-term Imperceptible Negative	Occurs during the construction phase. Reversible once construction complete.	The magnitude of the impact is assessed as Low. **Medium** sensitivity species + **Low** Impact = **Low** effect significance. No likely significant effects at a local level are predicted.
Snipe	Direct Habitat Loss	The development footprint is dominated by cutover bog, which provides suitable nesting, roosting and foraging habitat for the species though they feed in agricultural fields outside the site at night. Most of this habitat within this site is outside of the wind farm development footprint and will remain intact.	Long-term Slight Negative	Occurs once. Irreversible for cutover bog habitat.	The magnitude of the impact is assessed as Low. **Low** sensitivity species + **Low** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
	Displacement and barrier effect	Some displacement may occur. Pierce-Higgins *et al* (2012) note that snipe densities declined to the order of ca. 50% within 500 metres of turbines at wind	Short-term Moderate Negative	Occurs during the construction phase.	The magnitude of impact is assessed as Medium.

KER & BoCCI status[22]	Potential impacts		Duration and Magnitude of potential impact[23]	Frequency and reversibility	Magnitude and Significance of effect[24]
		farms during construction. Construction activities will be limited to the development footprint so direct disturbance effects will not extend beyond the works areas. There is potential for indirect disturbance to roosting and breeding snipe from noise and visual stimuli associated with construction activities. However, given the low number of snipe that use the site in the context of the estimated national breeding population of 4,275, it is not considered to be a significant effect.		May recover once construction complete or take a few years to recover.	**Low** sensitivity species + **Medium** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
Whooper swan	Direct Habitat Loss	Whooper swan were not observed using the site during the 2 year bird survey period, however, they were observed using agricultural fields northwest of the site.	Long-term Imperceptible Negative	Occurs once. Irreversible for cutover bog habitat.	The magnitude of the impact is assessed as Low. **Medium** sensitivity species + **Low** Impact = **Low** effect significance. No likely significant effects at a local level are predicted.
	Displacement and barrier effect	Whooper swan were observed occurring in agricultural fields about 0.5-1km northwest of the proposed turbine, T1, but were not recorded during VP surveys flying over the site.	Short-term Imperceptible Negative	Occurs during the construction phase. Reversible once construction complete.	The magnitude of impact is assessed as Medium. **Low** sensitivity species + **Low** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
Cormorant	Direct Habitat Loss	Cormorant were observed infrequently flying over the site in winter and once during the breeding season. Habitat loss within the site will not affect cormorant.	Long-term Imperceptible Negative	Occurs during the construction phase. Irreversible for cutover bog habitat.	The magnitude of the impact is assessed as Low. **Low** sensitivity species + **Low** Impact = **Very Low** effect significance.

KER & BoCCI status[22]	Potential impacts		Duration and Magnitude of potential impact[23]	Frequency and reversibility	Magnitude and Significance of effect[24]
					No likely significant effects at a local level are predicted.
	Displacement and barrier effect	Cormorant were observed infrequently flying over the site and will not be significantly affected by direct or indirect construction related disturbance and displacement.	Short-term Imperceptible Negative	Occurs during the construction phase. Reversible once construction complete.	The magnitude of impact is assessed as Low. **Low** sensitivity species + **Low** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
Little egret	Direct Habitat Loss	Little egret were observed infrequently flying over the site during the breeding season. Habitat loss within the site will not affect little egret.	Long-term Imperceptible Negative	Occurs during the construction phase. Irreversible for cutover bog habitat.	The magnitude of the impact is assessed as Low. **Medium** sensitivity species + **Low** Impact = **Low** effect significance. No likely significant effects at a local level are predicted.
	Displacement and barrier effect	Little egret were observed infrequently flying over the site and will not be significantly affected by direct or indirect construction related disturbance and displacement.	Short-term Imperceptible Negative	Occurs during the construction phase. Reversible once construction complete.	The magnitude of impact is assessed as Low. **Medium** sensitivity species + **Low** Impact = **Low** effect significance. No likely significant effects at a local level are predicted.
Mallard	Direct Habitat Loss	Mallard was observed on nearly all occasions flying over the site. There is little suitable habitat for Mallard within the site.	Long-term Imperceptible Negative	Occurs once. Irreversible for cutover bog habitat.	The magnitude of the impact is assessed as Low. **Low** sensitivity species + **Low** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.

KER & BoCCI status[22]	Potential impacts		Duration and Magnitude of potential impact[23]	Frequency and reversibility	Magnitude and Significance of effect[24]
	Displacement and barrier effect	Mallard was observed on nearly all occasions flying over the site and observed in all seasons over the two year survey period.	Short-term Slight Negative	Occurs during the construction phase. Reversible once construction complete.	The magnitude of the impact is assessed as Low. **Low** sensitivity species + **Low** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
Passerines (meadow pipit, stonechat, skylark)	Direct Habitat Loss	Loss of cutover bog will reduce available nesting and foraging habitat. Most of this habitat within this site is outside of the wind farm development footprint and will remain intact.	Long-term Slight Negative	Occurs once. Reversible in the case of conifer plantation, irreversible for peatland habitats.	The magnitude of impact is assessed as Low. **Medium** sensitivity species + **Low** Impact = **Low** effect significance. No likely significant effects at a local level are predicted.
	Displacement and barrier effect	The construction phase of the proposed development may temporarily result in some disturbance, or displacement for passerines. Disturbance during the construction phase of the proposed development is likely to be localised to the footprint of the wind farm and unlikely to discourage flight activity, foraging or breeding within the site boundary in a significant way.	Short-term Non-significant Negative	Occurs during the construction phase. Reversible once construction complete.	The magnitude of impact is assessed as Low**.** **Medium** sensitivity species + **Low** Impact = **Low** effect significance. No likely significant effects at a local level are predicted.

7.4.2 Operation Phase

7.4.2.1 Designated Sites

The main risks to important bird populations within designated sites during the operation of the wind farm is displacement and barrier, as well as collision, effects as a result of the presence of the 12No. turbine towers and associated rotating blades. There are two SPAs within the ZOI of the project. While there are no site synopses available for the pNHAs within the ZOI, those situated on the coast are likely to have a strong element of ornithological interest giving most of them are encompassed by the River Shannon and River Fergus Estuaries SPA.

A screening for appropriate assessment report concluded that the West Limerick Hills and Mount Eagle SPA would not be significantly affected by the project. The report concluded that significant effects could not be ruled out for the River Shannon and River Fergus Estuaries SPA (refer to Appendix 2 of the NIS, which accompanies the planning submission). Therefore, further assessment was required and a Natura Impact Statement (NIS) was prepared. The main source of potentially significant effects identified were water quality impacts arising during the construction and associated earthworks phase of the project. With the full and proper implementation of mitigation measures to control water quality within the project site, the NIS concluded that the project would not result in an adverse effect to the integrity of the River Shannon and River Fergus Estuaries SPA.

Many of the pNHAs within the ZOI of the project spatially overlap with the River Shannon and River Fergus Estuaries SPA including Ballylongford Bay pNHA, Tarbert Bay pNHA, Scattery Island pNHA (coast only), Beal Point pNHA, Clonderlaw Bay pNHA and Poulnahsherry Bay pNHA, and thus the effects of the project were assessed in the NIS. The NIS concluded that the project would not result in an adverse effect to the integrity of the River Shannon and River Fergus Estuaries SPA, and thus it is reasonable to conclude that the project will not significantly affect Ballylongford Bay pNHA, Tarbert Bay pNHA, Scattery Island pNHA (coast only), Beal Point pNHA, Clonderlaw Bay pNHA and Poulnahsherry Bay pNHA.

The Cashen River Estuary pNHA lies 10km southwest of the proposed wind farm site and supports important populations of wintering waterfowl. Of the species listed in the I-Webs counts (see **Table 7-7**), whooper swan, mallard, cormorant, little egret, grey heron, snipe, curlew (recorded once), lesser black-headed gull and dunlin, were observed during bird surveys at the site. Whooper swan were only ever recorded roosting in agricultural fields northwest of the site. Mallard, cormorant, little egret and grey heron were observed in low numbers flying over the site. Of these mallard was observed on occasion. Curlew was only heard on one occasion. Black-headed gull and dunlin were observed in very low numbers with little suitable habitat at the site and were not considered IEF. It is reasonable to conclude given the intervening distance of 10km and the low numbers of waterbirds recorded using the site, as well as the low suitability of the site for waterbirds, that the project will not significantly affect the wintering waterfowl populations of the Cashen River Estuary pNHA.

Moanveanlagh Bog pNHA spatially overlaps with Moanveanlagh Bog SAC; as already noted the screening for appropriate assessment report concluded that the SAC will not be significantly affected by the project, and thus it is reasonable to conclude that the project will not significantly effect Moanveanlagh Bog pNHA.

There is an indirect hydrological link between Bunnaruddee Bog NHA, which is designated for peatlands and consists of a raised bog, and the project site. The NHA lies upgradient of any ecological effects and while birds certainly use the site, it is not designated for bird species and there is no mention of birds in the NPWS site synopsis. Thus, it is concluded that the NHA will not be significantly affected by the operation of the wind farm.

Scattery Island pNHA is located over 10km north of the site in the Shannon estuary. It is not considered that the birds that use the island for breeding and roosting will not be significantly affected by the project.

Given the intervening distance of almost 13km between the site and St. Senans Lough pNHA in south County Clare and the low usage of the proposed wind farm site by waterbirds it is not considered that birds that use that site will not be significantly affected by the project.

7.4.2.2 Important Ecological Features (IEF)

The main operational effects of a wind farm are displacement (including barrier effects) and collision. These effects are outlined in Drewitt and Langston (2006) and are summarised hereunder.

Displacement and Barrier Effects

Displacement may be caused by the presence of the turbines themselves through visual intrusion, noise impacts, or as a result of vehicle and personnel movements related to site maintenance, while barrier effects occur where the wind farm creates an obstacle to regular movements to and from breeding or foraging grounds. In essence, it results in a reduction of flight activity at the wind farm site leading to an alteration in migration flyways or local flight paths to avoid a wind farm though there was no evidence of the site being used by migratory species as a migration route. This effect is of concern because of the possibility of increased energy expenditure when birds have to fly further, as a result of avoiding a large array of turbines, and the potential disruption of linkages between distant feeding, roosting, moulting and breeding areas otherwise unaffected by the wind farm.

Of the birds that use the Shronowen Wind Farm site, the species of most conservation concern is the hen harrier, which is an Annex I species, amber-listed with an estimated population of 108-157 breeding pairs (Ruddock *et al.*, 2016) and an estimated mid-winter population range of 269-349 individuals (Wilson-Parr, 2013[25]). There was no evidence of breeding hen harrier at or in close proximity to the site. From the monthly vantage point watches at three VPs, there was 4 observations in the breeding bird surveys in 2019 in the months of April, June, July and September, and one in May of 2020 while there was 4 observations of hen harrier in the winter of 2018/19 and five observation in 2019/20.

Displacement of foraging and flight behaviour has been recorded close to wind turbines in Britain (100m for foraging and 250m for flight) (Madders & Whitfield, 2006, Whitfield & Madders, 2006b, Pearce-Higgins et al. 2009 (cited in Wilson et al 2015)). Pearce-Higgins et al. (2009) describes a reduction of 52.5% in hen harrier flight activity within 500m of the turbine array. This same study found that hen harriers showed significant turbine avoidance out to at least 250m from the turbines. A study undertaken in the United States describes similar results for northern harriers, with a drop off

[25] https://www.npws.ie/status-and-trends-ireland%E2%80%99s-bird-species-%E2%80%93-article-12-reporting

in recorded flight activity of over 50% within the wind farm (Garvin et al., 2011), although a second study describes more frequent flights of northern harriers within 50m of turbines (Thelander et al., 2003).

A study was carried out by Madden and Porter (2007), at a wind farm site in east County Galway, to determine the usage of hen harrier at the site. This wind farm, situated within the Slieve Aughties Mountains, consists of 71 turbines, which required mass clearance of closed canopy forestry, with one significant area of upland blanket bog, with varying disturbance to the east, adjacent to the site. The distances between the turbines ranged from 159m to 260m apart. Prior to the construction phase (2004), the bogland to the east of the site was used by foraging hen harrier, likely by nesting pairs within 2km of the site. Post construction surveys (2006 and 2007) at this site indicated the continued use of the bogland to the east by hen harrier, with observations of birds passing between turbines, or along turbine lines, with no sudden or unusual movements that would indicate alarm, or sudden hesitation. The results of the operational phase monitoring indicated that the birds readily used the wind farm site during the first year of operational phase monitoring, and did not require a significant amount of time to habituate to the operational turbines. In summary, the study found that hen harriers continued to hunt over the area following construction of the wind farm, often passing within 50m of turbines. Both foraging and transient birds were observed.

The Athea Wind Farm in west Co. Limerick has been monitored by specialist bird surveyors prior to, during and post construction. The civil works associated with the construction of the wind farm were completed in March of 2013. When compared with the baseline studies, the operational phase monitoring results indicate that the post construction usage of the wind farm site by foraging hen harrier is similar to usage during the years prior to construction (Katherine Kelleher, pers. comm., 2016).

Based on these observations, and studies from elsewhere (Whitfield & Madders 2006, Madden & Porter 2007, Wilson et al, 2015), it is anticipated hen harriers will continue to use the Shronowen Wind Farm site, with some slight degree of turbine avoidance shown by hunting birds. Given the intervening distance between turbines of 0.46km (distance between T11 and T12) up to 0.74km (distance between T3 and T5), overall low densities of birds using the site, it is not considered that the wind farm will result in a significant displacement or barrier effect during the expected 30 year operational phase for bird species identified as IEF.

Collisions

Collision risk depends on a range of factors related to bird species, numbers and behaviour, weather conditions and topography and the nature of the wind farm itself, including the use of lighting. Clearly, the risk is likely to be greater on or near areas regularly used by large numbers of feeding or roosting birds, or on migratory flyways or local flight paths, especially where these are intercepted by the turbines. Large birds with poor manoeuvrability (such as certain raptors, swans and geese) are generally at greater risk of collision with structures (Brown et al. 1992) and species that habitually fly at dawn and dusk or at night are perhaps less likely to detect and avoid turbines (Larsen and Clausen, 2002). Collision risk may also vary for a particular species, depending on age, behaviour and stage of annual cycle. The loss of small numbers of individual birds is not predicted to have a significant effect on local bird populations. Any impacts are reversible if the overall population is deemed sufficiently robust to recover in terms of numbers and distribution within a relatively short space of time.

Studies at upland sites in the UK have generally reported very low collision rates, with some studies finding no collisions at all Percival (2003). This probably reflects the generally low bird densities present in these areas.

According to Percival (2003), it is clear that bird collisions with wind turbines can be a problem under some circumstances, and that it would seem from the evidence available from existing wind farms that there are two main types of sites that have had collision problems:

1. Sites with large raptors occurring regularly within the wind farm at the same height as the rotor blades. In Ireland the main species that would fall into this category would be golden eagle and hen harrier; and
2. Sites with very high densities of other birds flying at rotor height. In Ireland these could include seabird breeding colonies and feeding concentrations, wetlands (including coastal sites) with large waterfowl concentrations and on any major migration routes.

With regard to point 1 above, hen harrier is not considered a significant concern. A review of hen harrier collision risk studies included data on collision fatalities from at least 10 wind farms (nine in USA & one in Spain) where hen harriers (or Northern Harrier as the species is known in North America) occurred. Hen harrier deaths were recorded at three sites, with only a single study, involving searches over 7,500 turbine-years, recording more than one casualty, while there were no collision victims recorded at seven sites (Whitfield & Madders 2006). Documented mortality was not positively related to hen harrier activity, since the wind farms with recorded deaths were those with the lowest recorded levels of hen harrier activity. Overall, the review concluded that hen harriers do not appear to be susceptible to colliding with turbine blades and that collision mortality should rarely be a serious concern (Whitfield & Madders 2006b). Although, it is noted, that no comparable work has been published for Ireland, but a similar result would be expected. In Ireland between 2007 and 2019 however, six wind bird turbine strike incidents were recorded and included hen harrier, among other species, in the 13 year period (O'Donoghue *et al*., 2020).

Table 7-16 below lists the IEF recorded at potential collision height with turbine rotors (between 14m and 150m) over the two years of vantage point surveys at the site. The inputs and outputs of the Collision Risk Model (CRM) undertaken for hen harrier and kestrel are presented below in **Tables 7-17** to **7-22**.

Hen harrier was recorded within the Potential Collision Height (PCH) (rotor blade sweep is 14m - 150m from ground level) for 11.3 minutes (677 seconds) or 0.2 hours of a total of 432 hours of surveying over the 2-year survey period, which involved surveying for 25,920 minutes. Hen harrier have an avoidance rate of 99% (Whitfield & Madders, 2006). A Collision Risk Model (CRM) was carried out for hen harrier in accordance with SNH (2000) and Band (2007), which predicted that the mean number of predicted collisions per the 30 year lifetime of the wind farm would be 0.25 birds, which equates to one bird every 121 years. Thus, the collision risk for hen harrier is low. Refer to **Tables 7-17** to **7-22** for the stepwise CRM analysis, below.

Kestrel were recorded at PCH for a total of 2,249 seconds or 37.5 minutes. Kestrel also display a hovering behaviour during hunting which contributes to the time spent at collision height and

overestimates the collision risk. Kestrel have an avoidance rate of 95% (SNH, 2018) and are considered relatively more vulnerable to collision risk than other birds of prey (Whitfield and Madders, 2006). Although kestrel are widespread in Ireland with a population estimate of 12,000 to 21,000[26] with highest densities in the southwest of Ireland (IRSG, 2018), it is amber listed for its breeding population because the global population is concentrated in Europe (Colhoun and Cummins, 2013). A CRM was carried out for kestrel, which predicted that the mean number of predicted collisions per the 30 year lifetime of the wind farm would be 4 birds, which equates to one bird every 7 years, a tiny fraction of the national population. Thus, the collision risk for kestrel is low in the context of the population. Refer to **Tables 7-17** to **7-22** for the stepwise CRM analysis, below. Given the level of use of the site by kestrel and the high national population estimate with densities greatest in the southwest and the collision risk estimate, it is not considered that the risk of collision with turbines will be significant for kestrel.

Sparrowhawk, peregrine, snipe, cormorant, little egret and mallard were recorded at PCH height but in very low numbers and not regularly over the 2 years of bird surveys at the site. It is considered that these species represent a very low risk of collision.

Table 7-16. Important Ecological Features (IEF) recorded at potential collision height in seconds (Annex I species bolded)

IEF	2018/19 winter	2019 breeding	2019/20 winter	2020 breeding	Total
	Seconds at potential collision height (14-150m)[27]				
Hen harrier	63	356	247	11	677
Kestrel	968	941	320	20	2,249
Sparrowhawk	250	-	-	8	258
Peregrine	-	-	103	0	103
Snipe	16	25	-	-	41
Whooper swan	-	-	-	-	-
Cormorant	70	-	-	10	80
Little egret	-	25	-	-	25
Mallard	10	140	33	4	187

The CRM was run for hen harrier and kestrel and the stepwise inputs and outputs are presented in the following tables. The amount of time a species was observed flying at heights of between 14-150m, i.e. within the Potential Collision Height (PCH), is presented in Table 7-17 below. Species-specific morphometric measurements and flight speeds are also shown as well as total monthly values of bird-seconds at PCH within all viewsheds. The values for PCH differ from the previous table as only time spent within the viewshed was use for the model, therefore flight paths outside of this area were excluded.

[26]NPWS Article 12: accessed at:
http://cdr.eionet.europa.eu/Converters/run_conversion?file=/ie/eu/art12/envuvesya/IE_birds_reports-14328-144944.xml&conv=343&source=remote#A082_B

[27] The seconds at potential collision height includes 50% of the time spent between 0-20m and 100% of the time spend between 20-150m for each of the bird species selected as IEF to account for the rotor sweep of 14-150m.

Table 7-17. Bird biometrics, and bird-seconds of species at Potential Collision Height

Species	Length (m)	Wingspan (m)	Mean flight speed (m/s)	Bird-seconds in flight at PCH						Total bird-secs at PCH over 24 Months
				2018/2019			2019/2020			
				Winter	Breeding	Total	Winter	Breeding	Total	
Hen Harrier	0.48	1.10	12.0	31	141	172	117	11	128	300
Kestrel	0.34	0.76	10.1	355	760	1115	318	15	333	1874

Table 7-18 and 7-19 below, show results of Stage one calculations – the number of birds estimated to fly through the blades of the proposed turbines at the wind farm. **Table 7-18** reports the number of transits predicted per turbine within the viewshed of each VP during each breeding season and each winter season, while Table 7-19 gives further details on the mean predicted transits through each turbine per season, and mean predicted transits per season through all turbines across the proposed 12-turbine site.

Table 7-18. Predicted transits per turbine within each viewshed for the 2018/19 and 2019/20 winter seasons, and the 2018 and 2019 summer breeding seasons

Species	Year	VP1			VP2			VP3			24-Month Total
		Winter	Breeding	Total	Winter	Breeding	Total	Winter	Breeding	Total	
Hen Harrier	2018/19	0.14	0	0.14	0	0.33	0.33	0.50	4.40	4.90	5.37
	2019/20	1.60	0	1.60	0	0	0	0	0.34	0.34	1.94
Kestrel	2018/19	1.32	8.37	9.69	0	0.87	0.87	4.78	6.51	11.29	26.03
	2019/20	3.40	0.26	3.66	0.02	0	0.02	0.40	0	0.40	4.08

Table 7-19. Mean number of predicted transits per turbine per season, and mean number of predicted transits across entire wind farm site per season

Species	Year	Mean Transits per Turbine per Season			Mean Transits Across Entire Site per Season		
		Winter	Breeding	Entire Year	Winter	Breeding	Entire Year
Hen Harrier	2018/19	0 .21	1.57	1.78	2.53	18.89	21.42
	2019/20	0.53	0.11	0.64	6.39	1.35	7.74
Kestrel	2018/19	2.03	5.25	7.28	24.40	62.98	87.38
	2019/20	1.28	0.09	1.37	15.30	1.03	16.33

The second stage of calculations determines the percentage risk of collision of a bird flying through a rotating turbine. The theoretical collision rates for each species per season, based on the assumption that the bird makes no attempt to avoid the moving rotors, is presented in Table 7-20 below.

Table 7-20. Predicted collision rates per season assuming no avoidance measures taken by bird

Species	Collision Probability	Year	Predicted Collisions per Season with No Avoidance Measures Applied		
			Winter	Breeding	Total
Hen Harrier	5.65%	2018/2019	0.143	1.067	1.21
		2019/2020	0.361	0.077	0.438
Kestrel	5.25%	2018/2019	1.281	3.306	4.587
		2019/2020	0.803	0.054	0.857

The number of collisions predicted to occur over the life-span of the wind farm (30 years) was calculated with the application of the avoidance rate, 99% for hen harrier and 95% for kestrel, see **Table 7-21** below.

Table 7-21. Number of collisions predicted with the application of avoidance rates as specified by SNH (2018)

Species	Avoidance Rate	Year	Predicted Collisions per Season			Predicted Collisions over 30-Year lifetime of proposed wind farm		
			Winter	Breeding	Total	Winter	Breeding	Total
Hen Harrier	99%	2018/2019	0.001	0.011	0.012	0.043	0.320	0.363
		2019/2020	0.004	0.0007	0.0047	0.108	0.023	0.131
Kestrel	95%	2018/2019	0.064	0.165	0.229	1.921	4.960	6.881
		2019/2020	0.040	0.003	0.043	1.205	0.081	1.286

Table 7-22 below presents the final collision risk modelling results for hen harrier and kestrel.

Table 7-22. Mean number of predicted collisions per year and per 30-years, using 24 continuous months of data and the application of avoidance rates specified by SNH (2018)

Species	Mean no. of predicted collisions per year	Mean no. of predicted collisions per 30 years	Equivalent to 1 bird every x (years)
Hen Harrier	0.008	0.247	121.45
Kestrel	0.136	4.084	7.346

Passerines are not considered primary target species and are not considered at significant risk of collision.

It is not considered that the operation of the undergrounded proposed grid connection or alternative connection will pose a significant risk to IEF during the operational phase of the project.

With regard to point 2 above, the proposed development is not considered to represent a significant effect, as the core wind farm site is not a flyway for large numbers of migratory birds, or birds in transit between roost and foraging locations. Overall, low bird densities were recorded at the site during bird surveys. There was no evidence of large groups of birds using the site or surrounding lands. A group of whooper swans (10-15 in number) were observed feeding in fields to the northeast of the wind farm site at a remove of 0.5-1km from the nearest turbine and no evidence of whooper swan flying over the site was recorded during bird surveys.

The following table identifies and categorises the potential significance of the effect of the project on bird species selected as Important Ecological Features (IEF) during the 30 year operation phase. The sensitivity of species and magnitude of the effect are combined via cross tablature to yield the operational impact significance for birds selected as IEF in **Table 7-23**.

Table 7-23. Operational impact characterisation for IEF based on Percival (2003), CIEEM (2019) and EPA (2017)

KER & BoCCI status[28]	Potential impacts		Duration and Magnitude of potential impact[29]	Frequency and reversibility	Magnitude and Significance of effect[30]
Hen harrier	Displacement and barrier effect	Some slight displacement may occur in the vicinity of the turbines, however, it is considered that hen harrier will continue to use the site during the lifetime of the wind farm.	Long-term Slight Negative	Occurs during the 30 year operation phase. Reversible following decommissioning of the wind farm.	The magnitude of impact is assessed as Low. **High** sensitivity species + **Low** Impact = **Low** effect significance. No likely significant effects at a local or county level are predicted.
	Collision	This species was recorded within the potential collision height for only 4.7 minutes over the 2-year survey period, which involved surveying for 25,920 minutes. A collision risk model was carried out for hen harrier, which predicted that mean number of predicted collisions per the 30 year lifetime of the wind farm is 0.25 birds, which equates to one bird every 121 years. Thus, the collision risk for hen harrier is low. In light of this, the low number of turbine strikes recorded in Ireland in the last 13 years (O'Donoghue et al., 2020) and their tendency to fly at low elevations, significant effects are not anticipated.	Long-term Slight Negative	0.25 birds over lifetime of wind farm. Reversible following decommissioning of the wind farm.	The magnitude of impact is assessed as Low. **High** sensitivity species + **Low** Impact = **Low** effect significance. No likely significant effects at a local or county level are predicted.
Kestrel	Displacement and barrier effect	Kestrel are frequent users of the site and while they may show slight avoidance of turbines but they are expected to use the site in numbers similar to those observed during bird surveys.	Long-term Slight Negative	Occurs during the 30 year operation phase.	The magnitude of the impact is assessed as Very Low. **Low** sensitivity species + **Low** Impact = **Very Low** effect significance.

[28] BoCCI status indicated by colour

[29] Significance of potential impact based on EPA (2017)

[30] Magnitude and Significance of potential impact based on Percival (2003)

KER & BoCCI status[28]	Potential impacts		Duration and Magnitude of potential impact[29]	Frequency and reversibility	Magnitude and Significance of effect[30]
				Reversible following decommissioning of the wind farm.	No likely significant effects at a local level are predicted.
	Collision	Kestrel are relatively more vulnerable to collision that other birds of prey. A collision risk model was carried out for kestrel, which predicted that mean number of predicted collisions per the 30 year lifetime of the wind farm is 4 birds, which equates to one bird every 7 years. In light of this and the high national population estimate with the highest densities in the southwest, and the low number of turbine strikes recorded in Ireland in the last 13 years, it is not considered that the risk of collision with turbines will be significant.	Long-term Slight Negative	4 birds every 30 years. Reversible following decommissioning of the wind farm.	The magnitude of the impact is assessed as Low. **Low** sensitivity species + **Low** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
Sparrowhawk	Displacement and barrier effect	Sparrowhawk use the site infrequently, and thus significant displacement effects are not anticipated.	Long-term Slight Negative	Occurs during the 30 year operation phase. Reversible following decommissioning of the wind farm.	The magnitude of the impact is assessed as Negligible. **Low** sensitivity species + **Negligible** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
	Collision	Sparrowhawk use the site infrequently, are considered to have high manoeuvrability in flight, were not recorded at potential collision height, and thus significant risk of collision is not anticipated.	Long-term Slight Negative	Negligible frequency. Reversible following decommissioning of the wind farm.	The magnitude of the impact is assessed as Negligible. **Low** sensitivity species + **Negligible** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.

KER & BoCCI status[28]	Potential impacts		Duration and Magnitude of potential impact[29]	Frequency and reversibility	Magnitude and Significance of effect[30]
Peregrine	Displacement and barrier effect	The results of the surveys indicate that peregrine use the site occasionally, and thus significant displacement effects are not anticipated.	Long-term Slight Negative	Occurs during the 30 year operation phase. Reversible following decommissioning of the wind farm.	The magnitude of the impact is assessed as Negligible. **Low** sensitivity species + **Negligible** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
	Collision	Peregrine use the site very infrequently and are considered to have high manoeuvrability in flight, and thus significant risk of collision is not anticipated.	Long-term Slight Negative	Negligible frequency. Reversible following decommissioning of the wind farm.	The magnitude of the impact is assessed as Negligible. **Low** sensitivity species + **Negligible** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
Snipe	Displacement and barrier effect	Pearce-Higgins *et al* (2012) note that snipe densities did not recover after construction, and that levels of turbine avoidance suggest snipe breeding densities may be reduced within a 500m buffer of the turbines by 15–53%. However, given the low number of snipe recorded at the site, the extent of suitable bog habitat in the wider site, and the estimated national breeding population of 4,275, significant displacement during the operation phase is not anticipated.	Long-term Slight-Moderate Negative	Occurs during the 30 year operation phase. Reversible following decommissioning of the wind farm.	The magnitude of the impact is assessed as High. **Low** sensitivity species + **High** Impact = **Low** effect significance. No likely significant effects at a local level are predicted.
	Collision	This species has been shown to avoid turbines so no significant collision risk exists for this species. They were recorded at potential collision height for 41 seconds over the two year survey period.	Long-term Slight Negative	Negligible frequency.	The magnitude of impact is assessed as High. **Low** sensitivity species + **High** Impact = **Minor** effect significance.

KER & BoCCI status[28]	Potential impacts		Duration and Magnitude of potential impact[29]	Frequency and reversibility	Magnitude and Significance of effect[30]
				Reversible following decommissioning of the wind farm.	No likely significant effects at a local level are predicted.
Whooper swan	Displacement and barrier effect	Whooper swan have not been recorded using the site.	Long-term Imperceptible Negative	Occurs during the 30 year operation phase. Reversible following decommissioning of the wind farm.	The magnitude of the impact is assessed as Negligible. **Medium** sensitivity species + **Negligible** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
	Collision	Whooper swan have not been recorded using the site.	Long-term Imperceptible Negative	Negligible frequency. Reversible following decommissioning of the wind farm.	The magnitude of the impact is assessed as Negligible. **Medium** sensitivity species + **Negligible** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
Cormorant	Displacement and barrier effect	Cormorant have been recorded flying over the site on occasion.	Long-term Imperceptible Negative	Occurs during the 30 year operation phase. Reversible following decommissioning of the wind farm.	The magnitude of the impact is assessed as Negligible. **Low** sensitivity species + **Negligible** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
	Collision	Cormorant have been recorded flying over the site infrequently and were recorded at potential collision risk height for 80 seconds over the two year bird survey.	Long-term Imperceptible Negative	Negligible frequency.	The magnitude of the impact is assessed as Negligible.

KER & BoCCI status[28]	Potential impacts		Duration and Magnitude of potential impact[29]	Frequency and reversibility	Magnitude and Significance of effect[30]
				Reversible following decommissioning of the wind farm.	**Low** sensitivity species + **Negligible** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
Little egret	Displacement and barrier effect	Little egret have been recorded flying over the site infrequently.	Long-term Imperceptible Negative	Occurs during the 30 year operation phase. Reversible following decommissioning of the wind farm.	The magnitude of the impact is assessed as Negligible. **Low** sensitivity species + **Negligible** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
	Collision	Little egret have been recorded flying over the site on occasion and were recorded at potential collision risk height for 25 seconds over the two year bird survey.	Long-term Imperceptible Negative	Negligible frequency. Reversible following decommissioning of the wind farm.	The magnitude of the impact is assessed as Negligible. **Medium** sensitivity species + **Negligible** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
Mallard	Displacement and barrier effect	Mallard was observed infrequently and on nearly all occasions were flying over the site. There is little suitable habitat for Mallard within the site.	Long-term Imperceptible Negative	Occurs during the 30 year operation phase. Reversible following decommissioning of the wind farm.	The magnitude of the impact is assessed as negligible. **Low** sensitivity species + **Low** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.

KER & BoCCI status[28]	Potential impacts		Duration and Magnitude of potential impact[29]	Frequency and reversibility	Magnitude and Significance of effect[30]
	Collision	Mallard have been recorded flying over the site infrequently and were recorded at potential collision risk height for 187 seconds over the two year bird survey.	Long-term Imperceptible Negative	Negligible frequency. Reversible following decommissioning of the wind farm.	The magnitude of the impact is assessed as Negligible. **Low** sensitivity species + **Negligible** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.
Passerines (meadow pipit, stonechat, skylark)	Displacement and barrier effect	Loss of cutover bog will reduce available ground nesting and foraging habitat. Most of this habitat within this site is outside of the wind farm development footprint and will remain intact minimising displacement outside of the footprint of the proposed wind farm.	Long-term Imperceptible to Slight Negative	Occurs during the 30 year operation phase. Reversible following decommissioning of the wind farm.	The magnitude of impact is assessed as Low. **Medium** sensitivity species + **Low** Impact = **Low** effect significance. No likely significant effects at a local level are predicted.
	Collision	Collision risk of passerines cannot be ruled out but the risk associated with this group is low taking account of their general tendency to fly low.	Long-term Imperceptible Negative	Negligible frequency. Reversible following decommissioning of the wind farm.	The magnitude of the impact is assessed as Negligible. **Low** sensitivity species + **Negligible** Impact = **Very Low** effect significance. No likely significant effects at a local level are predicted.

7.4.3 Decommissioning Phase

The wind turbines have been designed to have an operational life of 30 years and any further proposals for development at the site after this time will be subject to a new planning permission application. If planning permission is not sought after 30 years, the site will be decommissioned and reinstated with all 12 No. wind turbines and towers removed. Upon decommissioning, all that will remain will be the roads. The substation will remain in place.

If the site is to be decommissioned, cranes of similar size to those used for construction will disassemble each turbine. The towers, blades and all components will then be removed. It is likely that any turbine component will be reused as they have a life well in excess of the wind turbine planning period i.e. greater than 30 years. Wind turbine components may also be recycled. Underground cables connecting the turbines to substation will be cut back and left underground unless otherwise agreed with Kerry County Council (KCC). Hardstand areas will be remediated to match the existing landscape. Access roads will be left for use by the landowner.

Wastes generated during the decommissioning phase will be taken off site and disposed of to an authorised waste facility. Any structural materials suitable for recycling will be disposed of in an appropriate manner.

Prior to the decommissioning work, a plan will be drawn up to ensure the safety of the public and workforce and the use of best available techniques at the time. A comprehensive reinstatement proposal, including the implementation of a program that details the removal of structures and landscaping, will be submitted to KCC for approval.

In the event decommissioning of the grid connection is required, the underground cables will be cut back and left *in situ*. Decommissioning operations will be agreed with KCC beforehand. If the cables are left *in situ* then no reinstatement works will be required and the associated environmental impact of project decommissioning would be minimal.

It is concluded that decommissioning phase works will have a temporary slight disturbance and displacement effect on the bird species selected as Important Ecological Features (IEF) and will not have any significant effect on designated sites for nature conservation identified within the ZOI of the project.

7.4.4 Cumulative Effects

7.4.4.1 Land management

The site is dominated by cutover bog, which was historically cut, and is currently used for turf in part of the site. The land beyond is dominated by agriculture with scattered stands of commercial conifer plantation. The main impacts from farming are loss of excess nutrients and sediment to water. Excess ammonium may also be a problem in some water bodies. These losses arise from point sources such as farmyards or from diffuse sources such as spreading of fertilisers and manures. Excess phosphorus and sediment are typical issues for rivers and lakes, and too much nitrogen is the main issue for estuaries and coastal waters (EPA, 2019). One of the effects of forestry on the local environment is habitat loss, habitat alteration and potential reduction in water quality. Birdwatch Ireland notes that the drive to afforest vast areas of farmland across the country in combination with the ongoing

intensification of agricultural land will result in one of the most dramatic changes in land-use on the island in centuries. Invariably the scale of the social and environmental changes will have far reaching consequences for biodiversity[31]. The cutover raised bog associated with the proposed wind farm site has been reclaimed for agriculture, cut and drained and has been considerably modified from its original state compromising its ecological structure and functioning and consequently significantly reducing its ecological importance or value.

There is potential for cumulative habitat loss and water quality effects when the project is considered in combination with current land management in the region, however, given the local value of the cutover bog habitat and the relative availability of the habitat within the site and surrounds, it is considered that the cumulative effect of habitat loss will be a **long-term slight negative impact**.

7.4.4.2 Renewable Energy Developments

Other wind energy developments have the potential to act in combination with the proposed wind farm development in the context of effects on water quality and birds. There are a number of wind farms in the area that could act in combination with the proposed project including the operational 9No. turbine Leanamore Wind Farm located 2.5km to the northeast and the 13 turbine Tullahennel Wind Farm 2km to the northwest. The permitted 6 No. Ballylongford Wind Farm lies 2km to the northwest and lies adjacent to Tullahdennel Wind Farm on its north-eastern side. Refer to **Figure 7-7** below and **Chapter 2.11.3**.

In terms of habitat loss, the turbines in Leanamore Wind Farm are mainly on agricultural land, a low ecological value habitat, with the remainder on cutover bog or forestry. The turbines at Tullahennel Wind Farm are predominantly on cutover bog while the proposed Ballylongford Wind Farm turbines are on a mix of cutover bog, a habitat of ecological value, forestry and agriculture, both habitats of low ecological value. Of the total 40 No. turbines in the area including the proposed development, 22 turbines are located on cutover bog, a habitat which is considered to be of local ecological importance for birds. Given that the loss of cutover bog habitat to wind farm infrastructure in the area is relatively small when compared with the availability of cutover bog habitat at Tullahennel, Leanamore and Shronowen Wind Farms, as well as other areas in the surrounding landscape, for birds identified as IEF, it is considered that the cumulative effect of habitat loss will be a **long-term slight negative effect**.

At Shronowen Wind Farm, it is considered that the bird species selected as IEF will continue to use the wider site, which remains physically unaffected by the development, with localised displacement around the wind farm infrastructure. In terms of displacement of habitat by the wind farm infrastructure, it is considered that the cumulative effect of displacement will be a **long-term slight negative effect.**

[31] https://birdwatchireland.ie/our-work/advocacy-policy/agriculture-forestry/forestry/

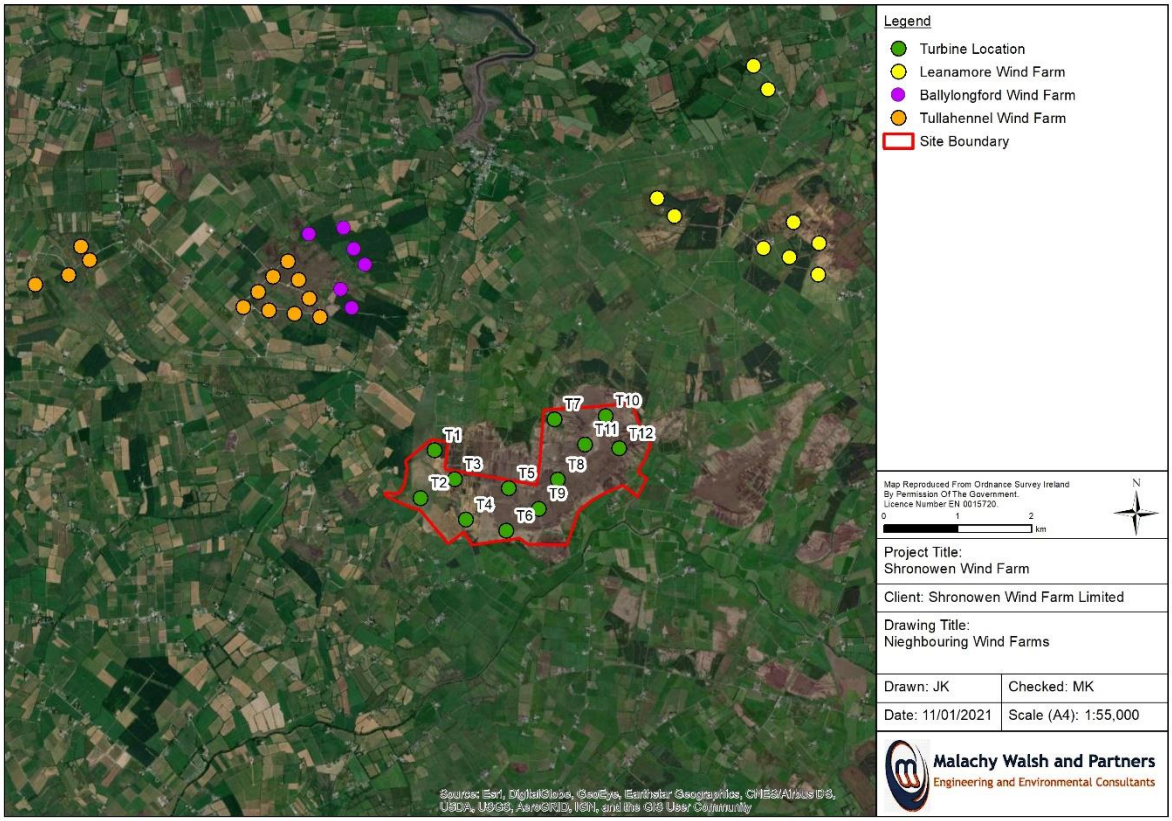

Figure 7-7. View of wind farms in the area

Multiple wind farms in an area can have a cumulative impact of collision mortality, depending on the scale and distance between projects and also the bird species that occur in an area. Mortality from collision is associated with very high numbers of turbines and densities of birds. The key question is whether any combined bird mortality will have a significant effect on populations of species of conservation concern. Species that do not fly regularly at turbine height (e.g. red grouse and many small passerines) are unlikely to be affected at an individual proposed development or at a cumulative level. Species that could potentially be significantly affected are those which have a large foraging range, and where the numbers of individuals in a local population are of conservation concern (e.g. raptors or species of wildfowl). Overall, low densities of birds and no large groups of birds, migratory or otherwise, were observed using the site during bird surveys and collision risk has been assessed as low. Given the intervening distance between the Shronowen Wind Farm and the other 3 wind farms in the area of at least 2km, and the low predicted risk of collision, it is considered that the risk of cumulative collision effects is a **long-term slight negative impact**.

The 50MW Drombeg Solar Farm is permitted and lies 2km south of the proposed wind farm site on agricultural grassland. There will be a loss of agricultural land considered of low ecological value and some removal of hedgerow and treelines limited to small sections; both of the latter habitats are of local ecological value and of potential foraging and breeding value to birds that use the Shronowen site. As part of the solar project, a landscape plan is proposed which will enhance and increase the hedgerow network at the site, however. It is considered that the Shronowen Wind Farm project will not have a **long-term non-significant negative impact** with the permitted Drombeg Solar Farm.

7.4.4.3 Climate Change

By the middle of this century, Ireland is projected to have significantly lower mean annual precipitation levels, particularly during the summer (Nolan et al., 2017). The frequency of heavy precipitation events is projected to increase during the autumn and winter months however, as are the number of extended dry periods during summer and autumn (Nolan et al., 2017). Changes in temperature and precipitation at different times of the year may result in changes to food availability (Robinson et al., 2007) and habitat distribution (Berry et al., 2002) and energy expenditure for both resident and migratory bird populations that will likely have population-level impacts at varying temporal and spatial scales. Pearce-Higgins et al. (2015) identified hot, dry summer weather as having a negative impact (via desiccation of larval stages of invertebrates with a time lag) on some bird populations' e.g. upland birds. The effect was greatest in species that rely on subsurface invertebrates (e.g. worms, fly larvae) as well as habitat specialists.

In Ireland, periods of prolonged cold winter and spring weather (e.g. winters 2010/11 and 2011/12) negatively affect the numbers of resident species including goldcrest, grey wagtail, long-tailed tit, meadow pipit, mistle thrush, song thrush, robin, skylark, stonechat and treecreeper (Countryside Bird Survey data). In spring 2018, a cold weather frontal system known as the 'Beast from the East', brought freezing temperatures and heavy snow cover to many parts of the country (Met Eireann Archive March 2018, unpublished data). This cold-weather front is considered to have adversely affected many resident insectivores. Despite predictions for increased average temperatures in Ireland in the future (e.g. EPA, 2019), any increase in relatively short-term severe winter weather conditions including heavy rainfall or snow, particularly when coupled with sub-zero temperatures, will cause high mortality in these species (Dobinson & Richards, 1964; Cawthorne & Marchant, 1980) which can impact subsequent recovery in the short and medium-term.

The proposed development will produce a net gain in terms of carbon budgets. Overall, with construction energy expenditure considered, the proposed development will reduce the need for fossil fuel energy over the lifetime of proposed construction and operation. This can be expected to benefit the environment in terms of climate change. The overall reduction in CO_2 emissions due to the proposed development is assessed as **long-term imperceptible positive impact**. No negative significant effects on local avifauna are predicted with regard to climate change and cumulative impacts.

7.5 MITIGATION

The following measures are designed to reduce the predicted impacts on bird populations.

7.5.1 Mitigation by Design

Consultation between the design team (Project Manager, Project Engineers, Project Ecologists (ECoW)) and the developer was conducted on an ongoing basis during the design phase, in order to formulate a proposed development design which will avoid, by design and at source, any construction activities, and minimise habitat loss for bird species. As a consequence, all aspects of the proposed development, including layout adopted an avoidance by design approach. During the wind farm design process, the most use was made out of existing tracks to avoid potentially significant habitat loss effects. Many of the turbines and peat deposition areas are mainly located in areas of degraded bog land or where turf had been cut at the site.

The project design stage has included the following measures to reduce the potential for significant effects on bird species, including:

- Avoidance and minimising infrastructure placement on cutover peat habitats.
- Minimising direct habitat loss by upgrading existing access tracks, where possible.
- Avoidance of a potential barrier effect on birds, the turbines have been positioned at distances of 0.46km up to 0.74km apart.
- Grid connection cables will be laid underground to avoid effects on roadside hedgerows and disturbance to nesting birds.

7.5.2 Mitigation by Management

7.5.2.1 Project Ornithologist

It is recommended that a Project Ecologist with appropriate expertise and recognised long-term ornithological experience will conduct preconstruction, construction and operational phase bird surveys at the site.

7.5.2.2 Ecological Clerk of Works (ECoW)/Project Ecologist

An Ecological Clerk of Works (ECoW) will be appointed for the construction phase of the project. Duties will include:

- Deliver Tool Box Talks, informing on-site personnel of the ornithological and ecological sensitivities within the project site.
- Liaise with Project Ornithologist, discussing issues that may arise.
- Provide guidance to contractors to ensure site is compliant with legislation.
- Liaising with NPWS, Local Authorities, other consenting authorities and other relevant bodies with regular updates in relation to construction progress.

7.5.2.3 Pre-construction and Construction Phase Bird Surveys

Pre-construction and construction bird surveys will be undertaken at the same vantage point (VP) locations using the same methodology. Construction bird surveys will be undertaken monthly for the duration of the build.

7.5.2.4 General Construction Mitigation Measures

The general construction mitigation measures below will be followed:

- Displacement and or disturbance impacts, and habitat degradation will be limited by controlling the movement of vehicles; vehicles will not encroach onto habitats beyond the proposed development footprint. This area will be demarcated on the ground.
- Depositing of excavated material on existing areas of heather or bog will not be permitted and all works will have to adhere to working only within the permitted development footprint.
- Where possible, heavy construction work, which is envisaged to take up to 8 months, will take place outside the breeding season where possible to minimise disturbance, and or displacement to breeding birds, but where works are necessary, there will be commitment to undertake relevant pre-work checks by the ECoW and Project Ornithologist.
- All plant and equipment will conform with the S.I. No. 632/2001 - European Communities (Noise Emission by Equipment For Use Outdoors) Regulations, 2001 and other relevant legislation.
- Plant and equipment will be turned off when not in use, with no unnecessary revving.

7.5.2.5 Measures for Minimising Disturbance to Breeding and Roosting Birds

The following measures will be undertaken to minimise disturbance of breeding and roosting birds:

- Vegetation removal, including hedgerows and trees will be conducted outside of the restricted period (March 1st to 31st of August), to prevent disturbance to breeding birds. If there is any remaining clearance during that period, it will only be completed following survey by the ECoW to confirm nesting birds are absent from the area to be cleared/felled.
- Site maintenance visits should be minimised and unnecessary onsite human activity will be minimised, especially between April and August.
- In the unlikely event that protected faunal species are found actively using the site for breeding and or roosting in the proximity of works during the construction phase, works will cease immediately, and the area will be cordoned off until advice is sought from the Project Ornithologist.

The construction phase of the project will likely be spread across the summer and winter survey periods. Vantage point surveys will be carried out prior to and during construction works in line with standard methodology. Although there is no evidence of hen harrier breeding on the site, in the case that a hen harrier nest is detected within 500m of the permitted construction works or within the general location of the wind farm site, the following will be carried out;

- The Project Ornithologist will immediately notify NPWS.
- The location of the nest will be treated as an Ecological Sensitive Area.
- All high impact, and heavy construction works will be suspended within 500m of any hen harrier breeding nest site.
- Management measures for the protection of any hen harrier breeding site at the site will be discussed, and agreed with NPWS.

- Following the implementation of management measures, an exclusion zone will be installed and enforced throughout the construction phase of the project.
- The Project Ecologist will monitor the Ecological Sensitive Area, and will liaise with NPWS to ensure all mitigation measures agreed with NPWS are fully implemented.

7.5.2.6 Site Reinstatement Measures

The following site reinstatement measures will be undertaken:

- Where hedgerow or treeline removal will be required, the equivalent, or like for like will be replanted, with species local to the area such as willow (*Salix* spp), alder (*Alnus glutinosa*) and hawthorn (*Crataegus monogyna*).
- Where there is the requirement to remove stands of scrub, the equivalent will be replanted.
- Where re-vegetation, is slow, reseeding will be carried out with suitable grass species native to the area.

7.5.2.7 CEMP

A CEMP will be implemented by the appointed contractor and will manage the environmental commitments of the project (refer to **Appendix 2-1**, Volume 3 of the EIAR for the full CEMP). The implementation of proposed mitigation measures, as well as the monitoring and supervision of these measures will be managed through the CEMP. Mitigation measures to prevent significant effects to the ecological receptors identified in this chapter will also be incorporated into the project through the CEMP. The finalised CEMP will take cognisance of Construction Industry Research and Information Association (CIRIA) technical guidance on water pollution control (Murnane, E., Heap, A., and Swain, A., 2006) and will include the following:

- Noise, Vibration, Dust and Air Control
- Management of Construction
- Water Quality/Sediment and Erosion Control
- Fuel and Oils Management
- Management of Concrete
- Emergency Response Plan
- Tree Felling and Vegetation Site Clearance Plan

7.5.3 Operational Phase Mitigation and Monitoring

7.5.3.1 Disturbance and Habitat Protection Measures

During the operational phase of the project displacement habitat degradation will be limited by controlling the movement of maintenance vehicles; maintenance vehicles will not encroach onto habitats beyond the project footprint with the exception of maintenance works on the site drainage system.

7.5.3.2 Operational Phase Bird Monitoring

Bird surveys will continue during the operational phase at the selected vantage point (VP) locations used during pre-construction and construction stages, taking note of any bird behaviour indicative of

avoidance, change of activity from baseline studies. The timing and extent of bird surveys will be agreed with NPWS. If there are detectable changes in bird behaviour or if collisions are found to be greater than those predicted, then additional mitigation such as curtailing operation times may be required. A detailed Operational Bird Monitoring Programme will be prepared for the operational phase of the project. The monitoring programme at a minimum will include:

- Breeding bird surveys.
- Winter bird surveys.
- Targeted bird collision surveys (corpse searches).

Consultations will remain ongoing with NPWS throughout the operational phase of the project to report on monitoring.

7.5.4 Decommissioning Phase

If it is decided to decommission the wind farm at the end of its operational life of 30 years, a comprehensive reinstatement proposal, including the implementation of a program that details the removal of all structures and landscaping, will be submitted to KCC and NPWS for approval prior to the decommissioning work.

An environmental assessment will be undertaken at that time. All elements of the decommissioning works will be agreed with KCC beforehand and there will be a consent requirement for decommissioning works.

The Shronowen Wind Farm will be in operation for 30 years. Decommissioning will adhere to best practice at the time and implement appropriate mitigation measures.

7.6 RESIDUAL IMPACTS

Significant residual impacts are impacts that remain, once mitigation has been implemented or, impacts that cannot be mitigated. No potentially significant effects on the long term distribution and abundance of bird species selected as Important Ecological Features (IEF) or on designated sites for nature conservation were identified, however, mitigation was put in place to minimise the predicted effects. With the avoidance measures (design phase), and full implementation of mitigation measures throughout the construction phase, operational phase, and decommissioning phase of the project, significant effects on IEF are not expected.

7.7 CONCLUSION

The following is concluded with regard to the proposed Shronowen Wind Farm taking account of mitigation outlined in **Section 7.5**:

- No significant effects are predicted on birds due to habitat loss during the construction, operational or decommissioning phases of the project.
- No significant effects are predicted on birds due to disturbance, displacement, and barrier effects during the construction or operational or decommissioning phases of the project.
- The proposed development will not result in significant collision effects on bird species.
- The proposed development will not result in significant cumulative impacts in combination with land management and other wind farms in the area.
- The proposed development will not result in any significant effects on any of the Important Ecological Features, either alone, or cumulatively, in combination with other projects.

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