

waterbirds, gulls and other birds of conservation concern. Along with target species, all additional species observed were recorded to inform the evaluation of supporting habitat.

Walkover surveys were carried out between daylight hours during the core breeding season months of April, May, June and July (2018 and 2019), with the site being visited four days per month on each occasion. The timing of visits followed the recommendations of Calladine et al. (2009). Following all survey visits, the field maps were analysed to determine the number and location of breeding territories. All non-breeding individuals and species encountered were also recorded.

Survey effort is presented in Appendix 7-2, Table 1-2. This includes full details of dates, times, survey locations, survey duration and weather conditions for each survey. Figure 7-3 in shows the transect routes surveyed.

#### 7.2.4.2.3 **Breeding Raptor Surveys**

Breeding raptor surveys (i.e. birds of prey and owls) were undertaken within the study area and its immediate surrounds. Survey methodology was as outlined in Hardey et al. (2013). Following guidance from NPWS, informed by research carried out by University College Cork (Wilson et al. 2015), the Breeding Raptor Survey area extended to 5km from the wind farm site boundary rather than the 2km given by SNH (2017), in order to account for foraging distance recorded for hen harrier in Ireland. All areas of suitable habitat within 5km of the site boundary were surveyed for the presence of hen harrier, merlin, peregrine, red kite, goshawk and other more abundant raptor species.

Raptor surveys, in the form of short VP watches, were conducted within and up to 5km outside the site boundary on a monthly basis during the core breeding season (April – July 2018 & 2019). The aim of these surveys was to identify occupied territories or successful breeding attempts by any raptor species. Surveys from a number of alternate locations were carried out during the 2018 breeding season, in order to ensure that the most suitable areas of breeding raptor habitat were covered. These locations were further refined for the 2019 breeding season as the best raptor VP locations were continued from the 2019 breeding season.

Survey effort details are provided in Appendix 7-2, Table 1-3. Figure 7-4 shows the areas surveyed.

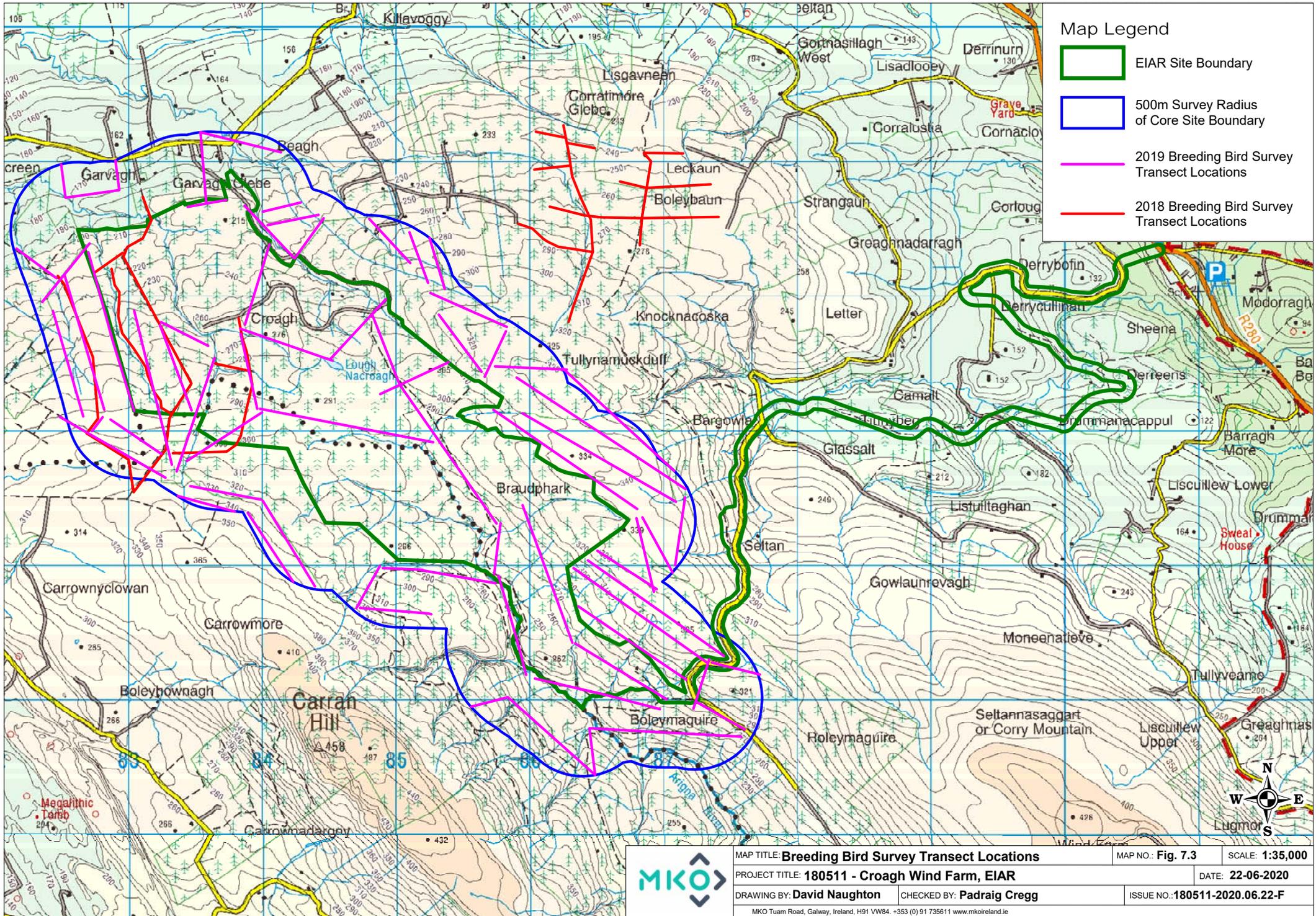
#### 7.2.4.2.4 **Breeding Woodcock Surveys**

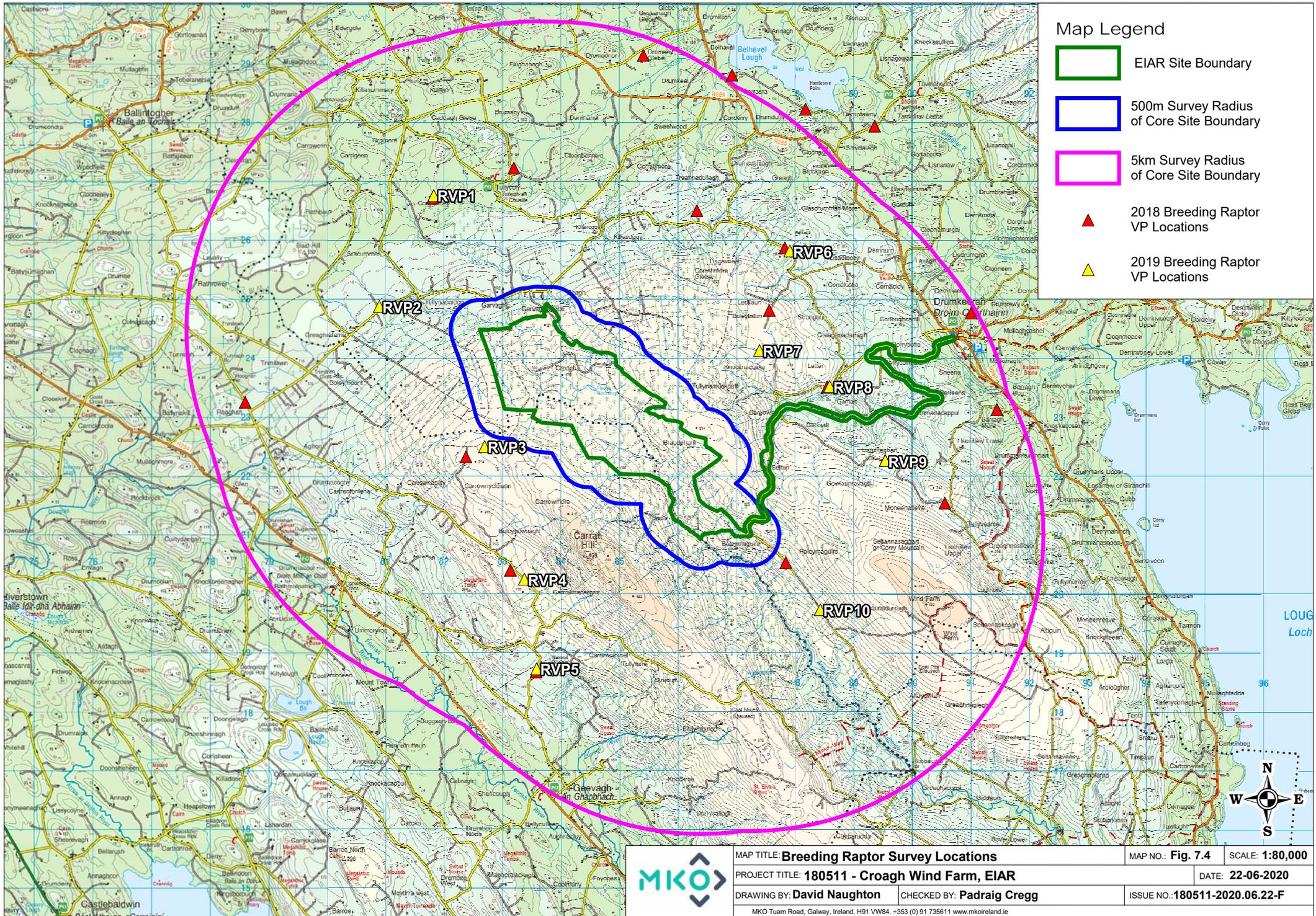
Breeding woodcock surveys were undertaken in accordance with Gilbert et.al (1998). Four dusk surveys were undertaken in areas of suitable breeding habitat (i.e. forestry/woodland) during June 2018 and six dusk surveys between May and June 2019. Surveys commenced one hour before sunset and continued for one hour after sunset or until it was too dark to see. Transects were slowly walked through areas of suitable woodland habitat within the survey area and all observations of woodcock (as well as the areas covered) were recorded. The aim of the survey was to record the presence of roding (displaying) male woodcock and thereby establish the distribution and abundance of the species in the study area. This survey method also allowed the observer to survey for owls, i.e. barn owls and long-eared owls.

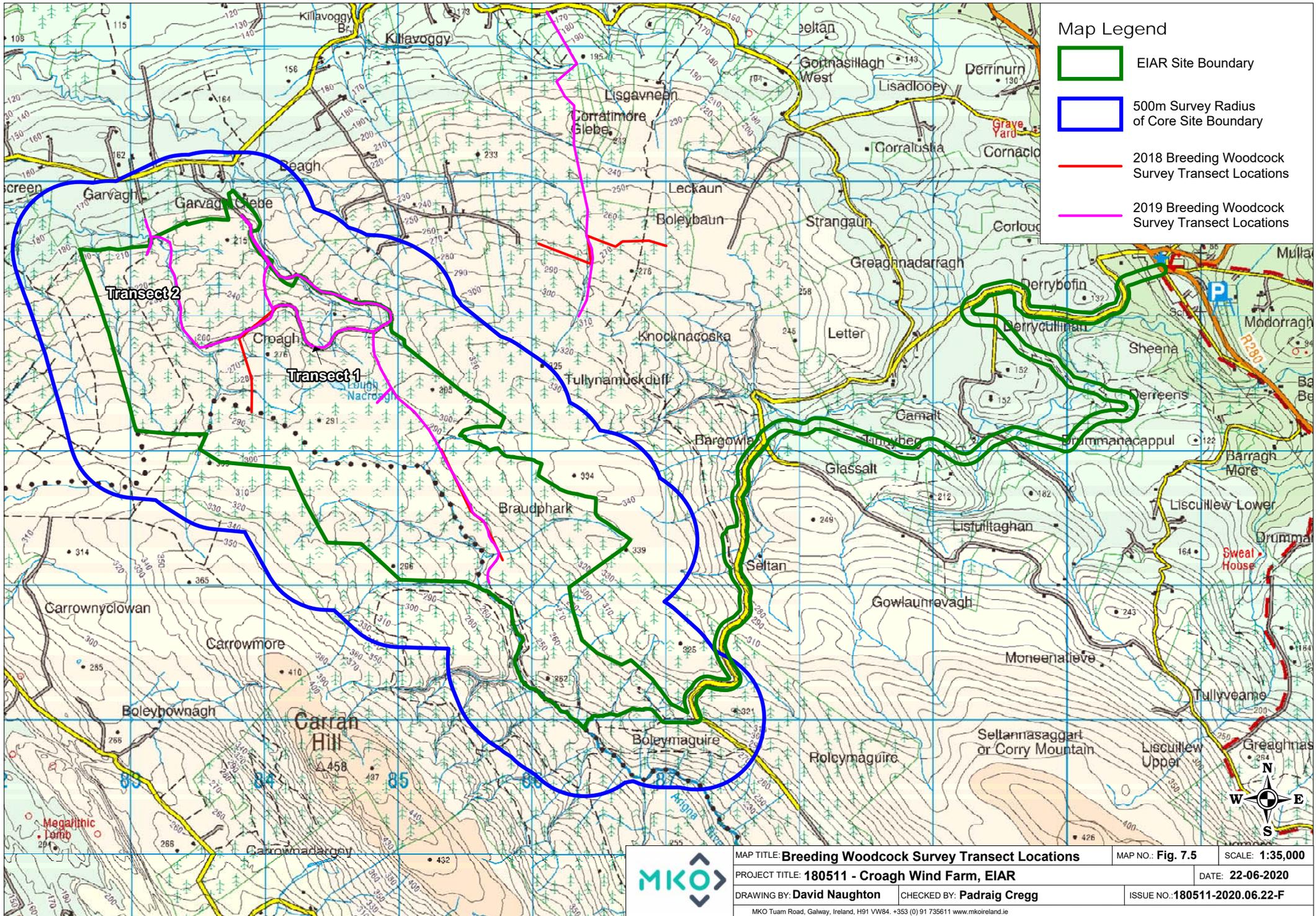
Survey effort is presented in Appendix 7-2, Table 1-4. This includes full details of dates, times, survey locations, survey duration and weather conditions for each survey. Figure 7-5 in shows the transect routes surveyed.

#### 7.2.4.2.5 **Red Grouse Surveys**

Red Grouse surveys were undertaken during (March) 2018 and (March) 2019. The methodology used was derived from that described in Bibby et al. (2000) and the survey methods for the most recent national Red Grouse survey (2006/2007 to 2007/2008) coordinated by BirdWatch Ireland and submitted to the NPWS (Murray et al., 2013). The survey targeted areas of suitable habitat (i.e. open moorland and areas of heather). Areas of forestry were not surveyed as they do not have potential to support red







grouse populations. The survey consisted of tape luring transects. Survey details are provided in Appendix 7-2, Table 1-5. Figure 7-6 shows the areas surveyed.

The work was carried out under NPWS Licence Numbers 013/2018 & 17/2019.

#### 7.2.4.2.6 **Hen Harrier Roost Surveys**

Suitable habitat for roosting hen harrier within 2km of the proposed development area (as per SNH 2017) were surveyed for the presence of hen harrier during the winter season. Survey work was undertaken in accordance with the methodology devised by Gilbert et al. (1998) and the ‘Irish Hen Harrier Winter Roost Survey’ (unpublished document coordinated by members of NPWS). Surveys were carried out throughout the entirety of both non-breeding seasons (October 2017 - March 2018 & Oct 2018 – Mar 2019). Full details of survey effort are provided in Appendix 7-2 Table 1-6. Figure 7-7 shows the locations of Hen Harrier Roost Survey VP locations.

#### 7.2.4.2.7 **Winter Transect Surveys**

Winter transect surveys were conducted to determine the presence of bird species of high conservation concern within areas of potential suitable habitat in the study area.

Transect routes were devised to ensure coverage of different habitat complexes between vantage point locations within the study area, during winter months. Methodology was broadly based on methods described in Bibby et al. (2000). Target species were raptors, waterbirds, gulls and ground birds of conservation interest. Along with target species, all additional species observed were recorded to inform the evaluation of supporting habitat.

Survey effort, including details of survey duration and weather condition, is presented in Appendix 7-2, Table 7. Figure 7-8 shows the surveyed area.

#### 7.2.4.2.8 **Access Road Survey**

On the 14<sup>th</sup> of August 2019 and the 29<sup>th</sup> January 2020, the access road was subject to a multi-disciplinary ecological survey. In addition, the area surveyed for the breeding raptor survey overlaps with the route of the access road. Three breeding raptor vantage points: RVP7, RVP8 and RVP9, are all sited in close proximity to the access road route as can be seen in Figure 7.4. The aim of these surveys was to identify occupied territories or successful breeding attempts by any raptor species.

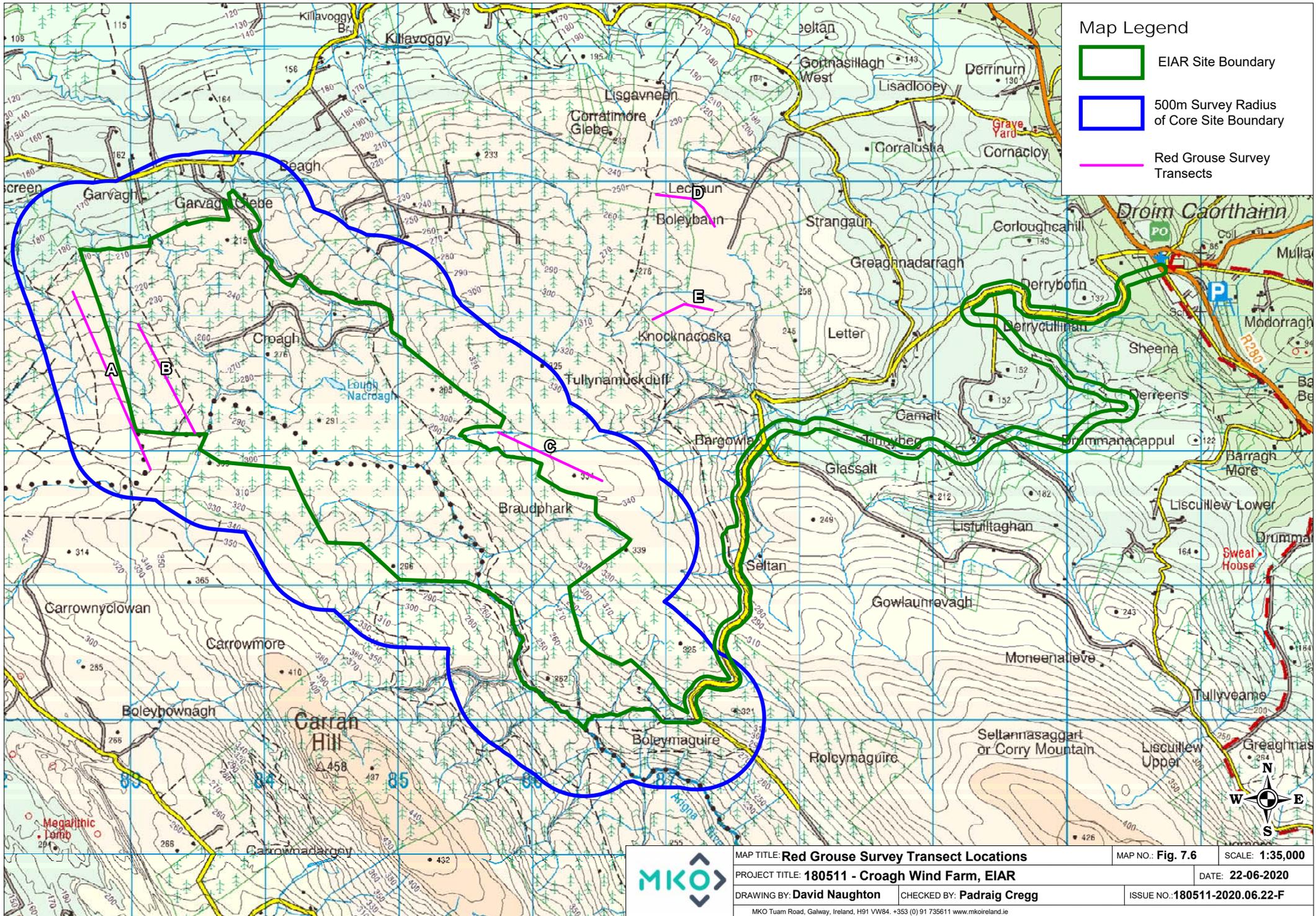
### 7.2.5 **Ornithological Evaluation Criteria and Impact Assessment Methodology**

#### 7.2.5.1 **Potential Effects Associated with Proposed Development**

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

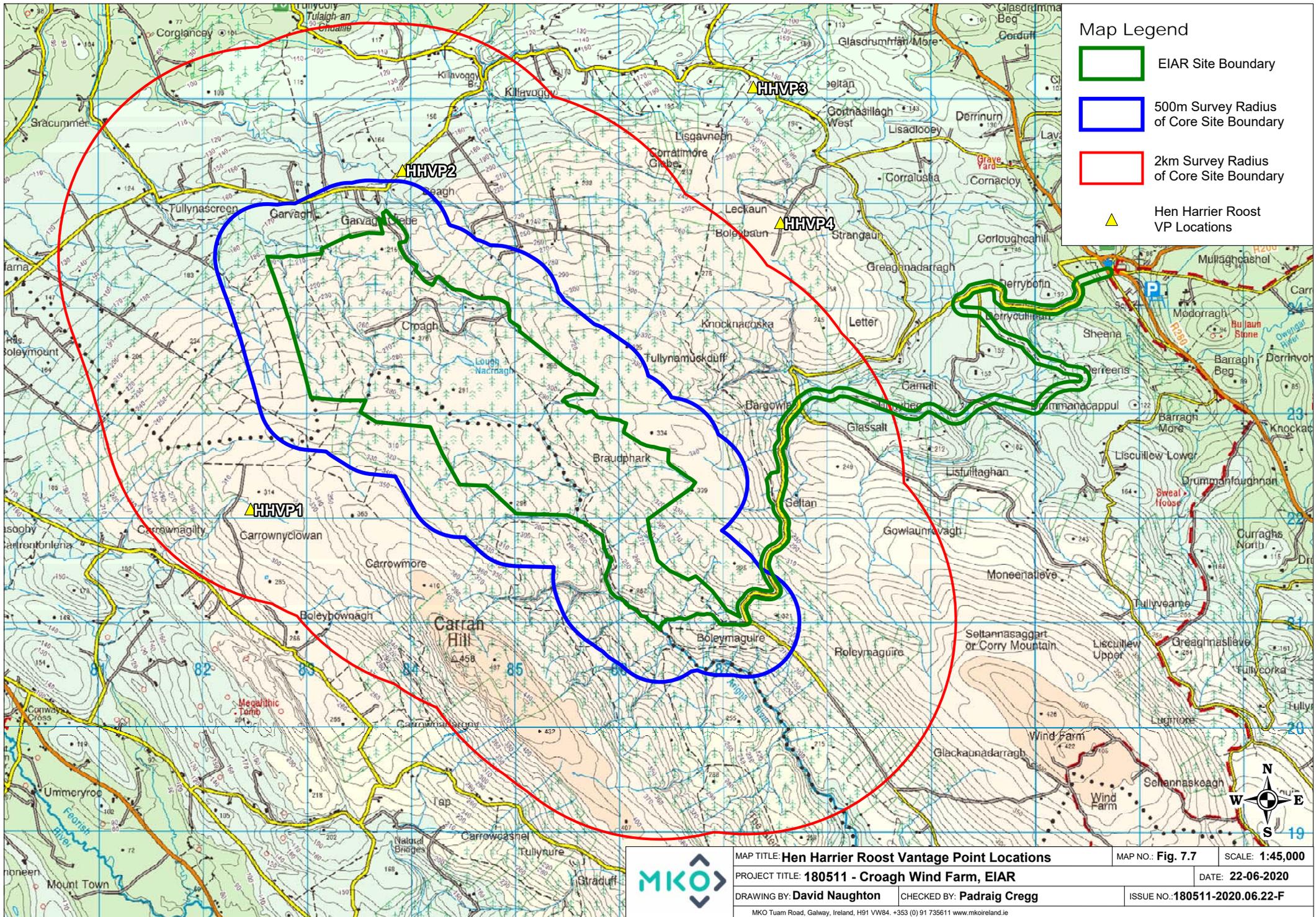
- **Direct habitat loss** through construction of wind farm infrastructure;
- **Displacement** (sometimes called indirect habitat loss) if birds avoid the wind farm and its surrounding area due to turbine construction and operation. Displacement may also include barrier effects in which birds are deterred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

For each of these three risks, the detailed knowledge of bird distribution and flight activity within and surrounding the site has been utilised to predict the potential effects of the Proposed Development on



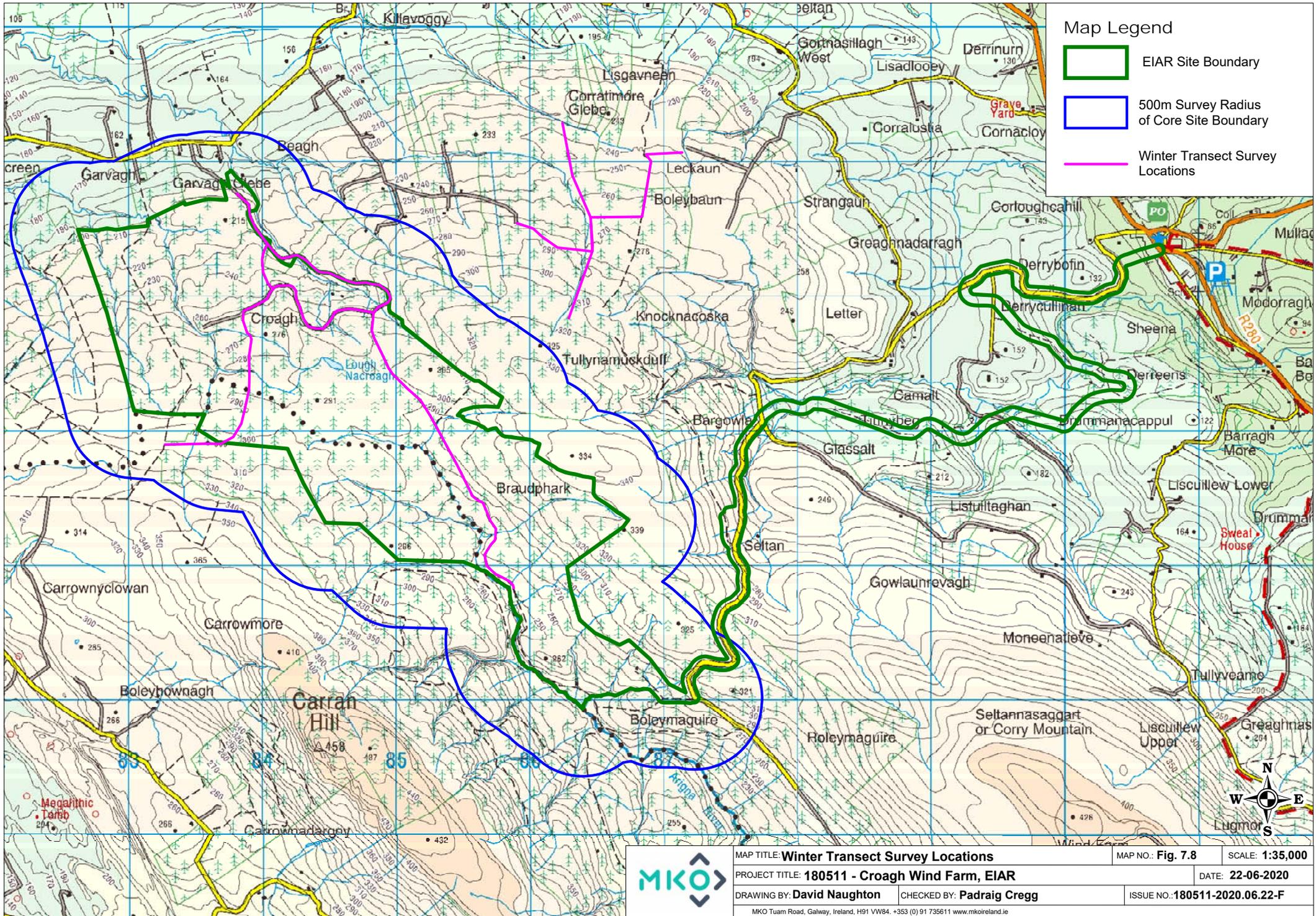
- Map Legend**
- EIAR Site Boundary
  - 500m Survey Radius of Core Site Boundary
  - Red Grouse Survey Transects

	MAP TITLE: <b>Red Grouse Survey Transect Locations</b>		MAP NO.: <b>Fig. 7.6</b>	SCALE: <b>1:35,000</b>	
	PROJECT TITLE: <b>180511 - Croagh Wind Farm, EIAR</b>			DATE: <b>22-06-2020</b>	
	DRAWING BY: <b>David Naughton</b>		CHECKED BY: <b>Padraig Cregg</b>		ISSUE NO.: <b>180511-2020.06.22-F</b>
	MKO Tuam Road, Galway, Ireland, H91 VW84. +353 (0) 91 735611 www.mkoireland.ie				



- Map Legend**
- EIAR Site Boundary
  - 500m Survey Radius of Core Site Boundary
  - 2km Survey Radius of Core Site Boundary
  - ▲ Hen Harrier Roost VP Locations

<b>MAP TITLE: Hen Harrier Roost Vantage Point Locations</b>		<b>MAP NO.: Fig. 7.7</b>	<b>SCALE: 1:45,000</b>
<b>PROJECT TITLE: 180511 - Croagh Wind Farm, EIAR</b>			<b>DATE: 22-06-2020</b>
<b>DRAWING BY: David Naughton</b>	<b>CHECKED BY: Pdraig Cregg</b>	<b>ISSUE NO.: 180511-2020.06.22-F</b>	
MKO Tuam Road, Galway, Ireland, H91 VW84. +353 (0) 91 735611 www.mkoireland.ie			



birds. Effects are assessed with regard to the construction phase, the operational phase and the decommissioning phase. They are also assessed cumulatively with other projects and plans.

### 7.2.5.2 Geographical Framework

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

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

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

### 7.2.5.3 Receptor Evaluation and Impact Assessment (Percival 2003)

Percival’s (2003) methodology for assessing the effects of wind farms on birds has been applied to assess the sensitivity of a species to the development type, the magnitude of the effect and the significance of the potential impact. The following tables (Table 7-3 - Sensitivity, Table 7-4 – Magnitude of effect, Table 7-5 – Determination of significance) outline the assessment criteria for each stage.

Table 7-3 Evaluation of Sensitivity for Birds (Percival 2003)

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

Table 7-4 Determination of Magnitude of Effects (Percival 2003)

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

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

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

#### 7.2.5.4 Impact Assessment – EPA Criteria (2017 Draft)

Effects identified as per the Percival 2003 criteria have been equated with EPA impact assessment criteria described below in Table 7-6 and Table 7-7.

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

- > Momentary – effects lasting from seconds to minutes
- > Brief – effects lasting less than a day
- > Temporary – effects lasting less than a year
- > Short-term – effects lasting 1 to 7 years
- > Medium term – effects lasting 7 to 15 years
- > Long term – effects lasting 15 to 60 years
- > Permanent – effects lasting over 60 years
- > Reversible – effects that can be undone, for example through remediation or restoration
- > Frequency – How often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)

Table 7-6 Criteria for assessing impact significance based on (EPA, 2017)

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

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

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

### 7.2.5.5 Collision Risk Assessment

Collision risk is calculated using a mathematical model to predict the numbers of individual birds, of a particular species, that may be killed by collision with moving wind turbine rotor blades. The modelling

method used in this collision risk calculation follows Scottish Natural Heritage (SNH) guidance which is sometimes referred to as the Band Model (Band et al. (2007).

Two stages are involved in the model:

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

Please see Appendix 7-6 for full details on the collision risk modelling method.

## 7.2.6 Survey Justification

A comprehensive suite of bird surveys has been undertaken at the Proposed Development site between September 2017 and September 2019.

Results are derived from a continuous two years of surveying undertaken in line with SNH Guidance. These are the results that are analysed to inform this assessment.

The surveys undertaken provide the information necessary to allow a complete, comprehensive and robust assessment of the potential impacts of the Proposed Development on avian receptors.

### 7.2.6.1 Mitigation

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

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

The potential effects of the Proposed Development were considered and assessed to ensure that all effects on KORs are adequately addressed and no significant residual effects are likely to remain following the implementation of mitigation measures / best practice measures. As discussed in further detail in Section 7.16.

### 7.2.6.2 Limitations

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

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

## 7.4 Baseline Conditions and Receptor Evaluation

### 7.4.1 Identification of Designated Sites within the Likely Zone of Influence of the Development

A screening assessment and Natura Impact Statement were prepared to provide the competent authority with the information necessary to complete an Appropriate Assessment for the Proposed Development in compliance with Article 6(3) of the Habitats Directive.

As per EPA draft Guidance 2017, “a biodiversity section of an EIAR, should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement” but should “incorporate their key findings as available and appropriate”. This section provides a summary of the key screening assessment findings with regard to Special Protection Areas. A summary of key assessment findings with regard to Special Areas of Conservation is provided in Chapter 6 of this EIAR.

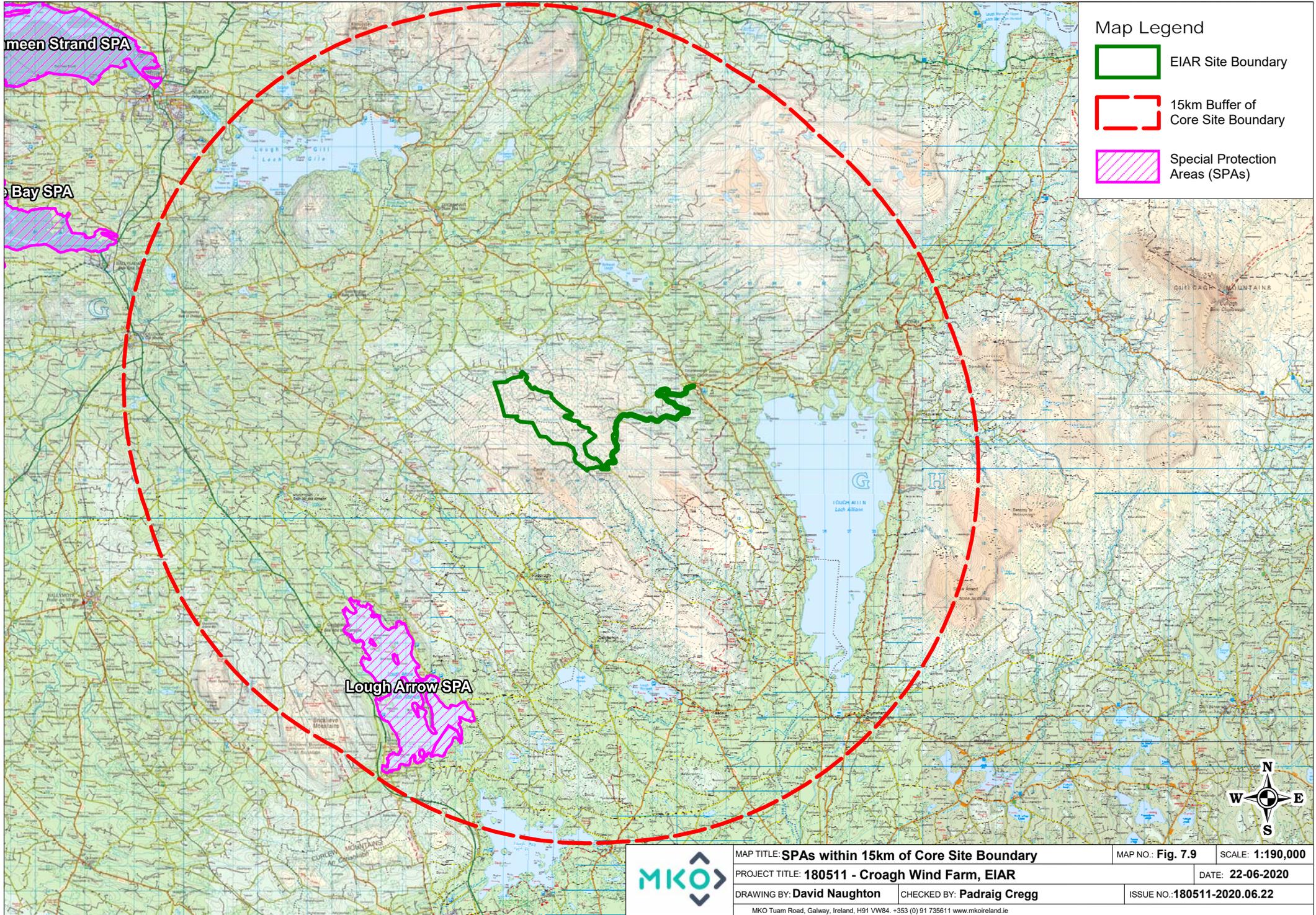
Using GIS software, sites designated for nature conservation within the potential ZOI of the Proposed Development were identified. The ZOI was derived utilising a precautionary approach. Initially, sites within a 15-kilometre radius of the proposed works were identified. Then designated sites located outside the 15km buffer zone were taken into account and assessed. In this case, no potential for direct or indirect impacts for species listed as Special Conservation Interest of SPAs more than 15km from the development site was identified.

None of the pNHAs or NHAs within the ZOI were considered as KORs in their own right for the following reasons:

- Distance/buffer from the proposed development.
- Nature of the conservation sites (e.g. qualifying interest)

In addition, and in the absence of any specific European or Irish guidance, the Scottish Natural Heritage (SNH) Guidance, ‘Assessing Connectivity with Special Protection Areas (SPA)’ (2016) was consulted. This document provides guidance in relation to the identification of connectivity between Proposed Development and Special Protection Areas. The guidance takes into consideration the distances some species may travel beyond the boundary of their SPAs and outlines information on dispersal and foraging ranges of bird species which are frequently encountered when considering projects. Potential effects on wetlands and supporting habitats associated with Special Protection Areas and indirect potential pathways in the form of surface water pollution are considered in the Appropriate Assessment Screening Report and Natura Impact Statement of this application.

Only one SPA was located within the Likely Zone of Influence of the development, which is listed below in Table 7-8 and illustrated on Figure 7-9.



**Map Legend**

- EIAR Site Boundary
- 15km Buffer of Core Site Boundary
- Special Protection Areas (SPAs)

MAP TITLE: <b>SPAs within 15km of Core Site Boundary</b>		MAP NO.: <b>Fig. 7.9</b>	SCALE: <b>1:190,000</b>
PROJECT TITLE: <b>180511 - Croagh Wind Farm, EIAR</b>			DATE: <b>22-06-2020</b>
DRAWING BY: <b>David Naughton</b>		CHECKED BY: <b>Padraig Cregg</b>	ISSUE NO.: <b>180511-2020.06.22</b>
<small>MKO Tuam Road, Galway, Ireland, H91 VW84. +353 (0) 91 735611 www.mkoireland.ie</small>			

Table 7-8 Designated Sites in the Zone of Influence

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 03/07/2020	Conservation Objectives	Likely Zone of Impact Determination	Possibility of Significant Effects? (If Yes Progress To Stage 2 Of AA Process)
<b>Special Protection Area</b>				
Lough Arrow SPA [004050]  <b>Distance:</b> 9.3km	<ul style="list-style-type: none"> <li>➤ Little Grebe (<i>Tachybaptus ruficollis</i>) [A004]</li> <li>➤ Tufted Duck (<i>Aythya fuligula</i>) [A061]</li> <li>➤ Wetland and Waterbirds [A999]</li> </ul>	<p>This site has the generic conservation objective:  <i>‘To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests of this SPA.’</i> (NPWS Generic version 6.0, 2018)</p> <p>This site has a second conservation objective:  <i>‘To maintain or restore the favourable conservation condition of the wetland habitat at Lough Arrow SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.’</i></p>	<p>There will be no direct effects as the project footprint is located entirely outside the designated site.</p> <p>The European Site is located in a separate hydrological catchment than the proposed development and therefore no potential pathways for surface water impacts on SCI’s exist.</p> <p>These SCI species are strongly associated with the waterbodies and located over 9km from the SPA. It is also located outside the zone of sensitivity of any species that is listed as particularly sensitive to wind energy development in Mc Guinness et.al (2015).</p>	<p>No – Potential for significant effect has been excluded and there is no need to progress to Stage 2 of the Appropriate Assessment process.</p>

			<p><i>No pathways for significant effect on the European Site was identified. Thus it can be excluded beyond reasonable scientific doubt, in view of best scientific knowledge, on the basis of objective information and in light of the conservation objectives of the European site, that the proposed development, individually or in combination with other plans and projects, would therefore not have a significant effect on this European Site.</i></p>	
<p>Cummeen Strand SPA (004035)</p> <p><b>Distance:</b> 18.1km (approximately 29.1km surface water distance)</p>	<ul style="list-style-type: none"> <li>&gt; Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046]</li> <li>&gt; Oystercatcher (<i>Haematopus ostralegus</i>) [A130]</li> <li>&gt; Redshank (<i>Tringa totanus</i>) [A162]</li> <li>&gt; Wetland and Waterbirds [A999]</li> </ul>	<p>Detailed conservation objectives for this site (Version 1, September 2013) were reviewed as part of the assessment and are available at <a href="http://www.npws.ie">www.npws.ie</a></p>	<p>There will be no direct effects as the project footprint is located entirely outside the designated site.</p> <p>Hydrological connectivity with the SPA has been identified via the Killanummery River that joins the River Bonet further downstream. The River Bonet enters into Lough Gill before entering the SPA at Drumcliff Bay, via the Garavogue River, located over 29 km hydrological distance downstream of the proposed development.</p> <p>Therefore, taking a precautionary approach the potential for</p>	<p>Yes – Potential for significant effect has been identified and there is a need to progress to Stage 2 of the Appropriate Assessment process.</p>

			<p>deterioration of surface water quality affecting the supporting habitat of SCI species has been identified. The potential effect requires further assessment and will be considered under the Wetland and Waterbird [A999] conservation objective.</p> <p>The proposed development site does not offer suitable supporting habitat for the SCI species for which the SPA is designated. In addition, the site is located over 18km from the proposed development, significantly outside the core foraging range of the SCI species for which the SPA has been designated (SNH, 2016). Therefore, disturbance/displacement related effects on SCI species have been excluded.</p> <p><b>This site is considered to be within the Likely Zone of Impact and further assessment will be provided in a Natura Impact Statement.</b></p>	
<p>Ballykenny-Fisherstown Bog SPA (004101)</p> <p><b>Distance:</b> 43.1 km (approximately 61.0km surface water distance)</p>	<p>➤ Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395]</p>	<p>This site has the generic conservation objective:  <i>‘To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests of this SPA.’</i> (NPWS Generic version 6.0, 2018)</p>	<p>There will be no direct effects as the project footprint is located entirely outside the designated site.</p>	<p>No – Potential for significant effect has been excluded and there is no need to progress to Stage 2 of the Appropriate Assessment process.</p>

			<p>Surface water connectivity between the proposed development site and the SPA exists via the Arigna River and River Shannon. However, any potential pollutants would have to travel over 60km via rivers and pass through a number of large waterbodies including Lough Allen, Lough Corry, Lough Nanoge, Lough Tap, Lough Boderg and Lough Bofin. Given the nature of the watercourses on the site, the attenuation effect of the intervening waterbodies as listed and the distance to the European Site, in the absence of any mitigation there is no potential for the proposed works to result in any significant effect thereon. This conclusion is confirmed in the detailed hydrological assessment that is provided in Chapter 9 of the ELAR with the relevant section from that chapter included in Section 3.1.1 below.</p> <p>The proposed development site is located over 43.1 km from the EU designated site and is located significantly outside the foraging range (5-8km) of the SCI species (SNH, 2016). Additionally, the SPA is not designated for Wetland and Waterbirds. There</p>	
--	--	--	---	--

			<p>is therefore no potential for significant effects as a result of the proposed development.</p> <p><i>No pathways for significant effect on the European Site was identified. Thus it can be excluded beyond reasonable scientific doubt, in view of best scientific knowledge, on the basis of objective information and in light of the conservation objectives of the European site, that the proposed development, individually or in combination with other plans and projects, would therefore not have a significant effect on this European Site. development to result in effects on this European Site was identified.</i></p>	
<p><b>Nationally Designated Sites</b></p>				
<p>Other than sites, which are encompassed by the above listed SPAs, no nationally designated sites of ornithological significance occur within the potential ZOI.</p>				

## 7.4.2 Breeding and Wintering Bird Atlas Records

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

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

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

The entire development site lies within hectad G82. Table 7-9 presents a list of species of conservation interest species recorded from the relevant hectads:

Table 7-9 Breeding Bird Atlas Data (Hectad G82)

Species Name	Breeding Atlas 68-72 (G82)	Breeding Atlas 88-91 (G82)	Breeding Atlas 07-11 (G82)	Conservation Status
Hen Harrier ( <i>Circus cyaneus</i> )	Possible	-	Probable	Annex I EU Birds Directive
Peregrine ( <i>Falco peregrinus</i> )	-	-	Present	Annex I EU Birds Directive
Corncrake ( <i>Crex crex</i> )	Probable	-	-	Annex I EU Birds Directive
Common Tern ( <i>Sterna hirundo</i> )	Possible	-	-	Annex I EU Birds Directive
Red Grouse ( <i>Lagopus lagopus</i> )	Possible	-	-	BOCCI Red Listed
Black-headed Gull ( <i>Larus ridibundus</i> )	Confirmed	-	-	BOCCI Red Listed
Woodcock ( <i>Scolopax rusticola</i> )	Probable	-	Possible	BOCCI Red Listed
Curlew ( <i>Numenius arquata</i> )	Probable	Breeding	Probable	BOCCI Red Listed
Redshank ( <i>Tringa totanus</i> )	Confirmed	-	-	BOCCI Red Listed
Tufted Duck ( <i>Aythya fuligula</i> )	Confirmed	-	-	BOCCI Red Listed
Meadow Pipit ( <i>Anthus pratensis</i> )	Confirmed	Breeding	Confirmed	BOCCI Red Listed

Species Name	Breeding Atlas 68-72 (G82)	Breeding Atlas 88-91 (G82)	Breeding Atlas 07-11 (G82)	Conservation Status
Grey Wagtail ( <i>Motacilla cinerea</i> )	Confirmed	Breeding	Probable	BOCCI Red Listed
Yellowhammer ( <i>Emberiza citrinella</i> )	Probable	-	-	BOCCI Red Listed

Seen = recorded; Possible = possible breeding; Probable = probable breeding; Confirmed = confirmed breeding; - = not-recorded

Table 7-10 shows those species recorded in the relevant hectad (G82) in the wintering birds’ atlases that are also protected under the EU Birds Directive or mentioned on the Birds of Conservation Concern in Ireland (BoCCI) red list.

Table 7-10 Wintering Bird Atlas Data (Hectad G82)

Species Name	Wintering Atlas 81-84 (G82)	Wintering Atlas 07-11 (G82)	Conservation Status
Hen Harrier ( <i>Circus cyaneus</i> )	-	Present	Annex I EU Birds Directive
Whooper Swan ( <i>Cygnus cygnus</i> )	Present	Present	Annex I EU Birds Directive
Peregrine ( <i>Falco peregrinus</i> )	-	Present	Annex I EU Birds Directive
Black-headed Gull ( <i>Larus ridibundus</i> )	Present	-	BOCCI Red Listed
Woodcock ( <i>Scolopax rusticola</i> )	Present	Present	BOCCI Red Listed
Curlew ( <i>Numenius arquata</i> )	Present	-	BOCCI Red Listed
Lapwing ( <i>Vanellus vanellus</i> )	Present	-	BOCCI Red Listed
Tufted Duck ( <i>Aythya fuligula</i> )	Present	Present	BOCCI Red Listed
Wigeon ( <i>Anas penelope</i> )	-	Present	BOCCI Red Listed
Meadow Pipit ( <i>Anthus pratensis</i> )	Present	Present	BOCCI Red Listed

Present = recorded; - = not-recorded

### 7.4.3 Bird Sensitivity Mapping Tool

A Bird Sensitivity Mapping Tool for wind energy development was developed by BirdWatch Ireland and provides a measured spatial indication of where protected birds are likely to be sensitive to wind energy developments. The tool can be accessed via the National Biodiversity Data Centre Website ([www.biodiversityireland.ie](http://www.biodiversityireland.ie)) and is accompanied by a guidance document (McGuinness et al. (2015). The criteria for estimating a zone of sensitivity (i.e. ‘low’, ‘medium’, ‘high’ and ‘highest’) is based on a review of the behavioural, ecological and distributional data available for each species.

The majority of the development site is not located within a bird sensitivity zone. However, a small section (in the north of the development area) is located within a zone of *Low* sensitivity to windfarm development.

#### 7.4.4 Irish Wetland Bird Survey (I-WeBS) Records

The study area is not covered by an I-WeBS site and the nearest site is located approximately 6.5km from the development site boundary. The development site lies on the border for County Leitrim and County Sligo. Data from I-WeBS sites in both County Leitrim and County Sligo has been used to estimate wintering populations of waterbirds identified as KORs. Datasets for the following sites were downloaded from [www.birdwatchireland.ie](http://www.birdwatchireland.ie) and reviewed:

##### Leitrim I-WeBS Sites

- > Acres Lake (Drumshanbo)
- > Ballinamore Lakes
- > Ballinamore/Ballyconnell Canal
- > Beaghmore Lough
- > Clooncoose Lough
- > Drowes River Bundrowes Bridge
- > Drumshanbo Lough
- > Eslin River
- > Fearglass Lough
- > Glencar Lough
- > Gortermone Lough
- > Gulladoo Lough
- > Keeldra Lough
- > Killylea Lough
- > Kilmaddaroe Lough
- > Lough MacNean (Upper)
- > Lough Nabelwy
- > Lough Sallagh
- > North West Leitrim Mountain Lakes
- > Rinn Lough Wetlands
- > River Shannon Upper (Drumsna – Carrick-on-Shannon)

##### Sligo I-WeBS Sites

- > Ballysadare Bay
- > Drumcliff Bay Estuary
- > Garvogue River
- > Inishmurray
- > Lough Arrow
- > Lough Gara
- > Lough Gill
- > Sligo Harbour

#### 7.4.5 NPWS Rare and Protected Species Dataset

An information request was sent to the NPWS requesting records from the Rare and Protected Species Database. The sections below provide the records obtained from the NPWS (9th April 2019) regarding rare and protected bird species. The NPWS were contacted via email on the 25/07/2019, prior to finalising this EIAR chapter, and it was confirmed that no new records were available. The NPWS were again contacted on the 26<sup>th</sup> of September 2019 to request information on the extent of the Leitrim Uplands non-designated regionally important area for hen harrier.

## Hen Harrier

Table 7-11 below provides the NPWS records for Hen Harrier to defined radii (km) of the development site.

Table 7-11 NPWS Hen Harrier Records (April 2019)

Year	Within Site Boundary	0-1km from site boundary	1-3km from site boundary	3-5km from site boundary
2015	1 record of possible breeding	No Records	No Records	No Records
2010	No Records	No Records	No Records	No Records
2005	No Records	No Records	No Records	No Records
1998-2004	No Records	No Records	No Records	No Records

On the 7<sup>th</sup> of October 2019, NPWS confirmed that the Leitrim Uplands non-designated regionally important area for hen harrier does not overlap with the proposed development area and at its nearest point is located 7km from the national grid squares in which the site is located (G72 and G82).

## Curlew

The NPWS identified one confirmed breeding curlew site within the wider surroundings of the site. The observation was recorded during a survey in 2014, approximately one kilometre north of the development site.

## Red Grouse

The NPWS identified that several Red grouse observations were recorded within four kilometres of the development site during the National Red Grouse Survey 2006-2008. However, the nearest records of red grouse were approximately 1.5km southwest of the development site at Carran Hill.

## 7.5

# Additional Boleybaun Surveys (offsite)

Surveying between September 2017 and September 2019 included an area c.2km to the northeast of the proposed development site (Boleybaun), which consists predominantly of conifer plantation with small fragmented areas of upland blanket bog, dry heath and wet grassland. This area was surveyed from VP2, as well as during Breeding Bird Surveys and Winter Transect Surveys. The following target species were recorded in the area during the breeding season, hen harrier, merlin, red grouse, buzzard, sparrowhawk and kestrel. During the winter months golden plover, hen harrier and kestrel were the only species of note recorded here. No evidence of breeding or roosting activity for any species was recorded during surveys in the area.

Whilst it is no longer proposed to site any infrastructure in this location, the results of surveys from the Boleybaun area provide information on the distribution and abundance of key receptor species in the wider surroundings of the proposed development area.

Figures showing flightlines during VP surveys as well as observations during distribution and abundance surveys can be found in Appendix 7-5.

## Field Survey Results

A comprehensive list of all bird species recorded during surveys is provided in Table 1-1 of Appendix 7-1. The target species listed below were recorded within the zone of influence of the Proposed Development during the ornithological surveys. The list is ordered in accordance with conservation significance: Annex I species, SCIs of designated sites, Red listed species and raptors.

- > Whooper Swan (Annex I species)
- > Golden Plover (Annex I species)
- > Hen Harrier (Annex I species)
- > Merlin (Annex I species)
- > Peregrine (Annex I species)
- > Red Grouse (Red listed with regard to Breeding populations)
- > Woodcock (Red listed with regard to Breeding populations)
- > Curlew (Red listed with regard to Breeding & Wintering populations)
- > Buzzard (Raptor, Schedule IV of the Wildlife Act; 1976)
- > Sparrowhawk (Raptor, Schedule IV of the Wildlife Act; 1976)
- > Kestrel (Raptor, Schedule IV of the Wildlife Act; 1976)
- > Snipe (Amber listed with regard to Breeding & Wintering populations)

The following sections describe the observations of each target species under the individual survey headings. Survey data and mapping for each target species is provided in the technical appendices. Appendix 7-3 presents results summary tables including:

- > Summary of seasonal Vantage Point Survey Effort.
- > Summary of the monthly distribution of flight activity recorded for the target species during the vantage point watches.
- > Summary of observations at Potential Collision Height for target species during vantage point watches.
- > Summary of the monthly distribution of flight activity recorded for the non-target species during the vantage point watches.
- > Summary of monthly distribution of target species during Breeding Bird Surveys.
- > Summary of monthly distribution of non-target species during Breeding Bird Surveys.
- > Summary of monthly distribution of Breeding Raptor Survey results.
- > Summary of monthly distribution of target species during Winter Transect Surveys.
- > Summary of monthly distribution of non-target species during Winter Transect Surveys.

### Whooper Swan

Raw Survey data for Whooper Swan is provided in Appendix 7-4. Results summary tables are present in Appendix 7-3.

#### Vantage Point Surveys

Whooper swan were only recorded on four occasions during Vantage Point Surveys. (see Appendix 7-4, Figure 7.1.1). All four observations occurred during the 2018/2019 winter season, between October 2018 and March 2019. All four observations occurred within 500m of the proposed turbine layout. Flock sizes ranged from 4 – 20 birds. Two observations occurred in October and one observation in late March 2019. All three of these observations were noted by the surveyors as likely migrating flocks. A flock of four birds was observed on the 3<sup>rd</sup> of December 2018 travelling over the development site.

## Incidental Observations

There was one incidental observation of whooper swan during a Hen Harrier Roost Survey on the 26<sup>th</sup> of October 2018 (see Figure 7.10.1, Appendix 7-4). A flock of 23 birds were seen flying from north to south over the development site, presumed to be on migration. The flight occurred within 500m of the proposed turbine layout.

There were no additional observations of this species during any of the other comprehensive surveys.

### 7.6.2

## Golden Plover

Raw Survey data for Golden Plover is provided in Appendix 7-4. Results summary tables are present in Appendix 7-3.

### Vantage Point Surveys

Golden plover were recorded on 32 occasions during Vantage Point Surveys (see Appendix 7-4, Figure 7.1.2). 28 of these were observed in flight, while four observations were of birds heard calling but not seen in November 2017. There were 14 observations of birds in flight within the 500m of the proposed turbine layout.

All observations of this species occurred during winter months. Only five of the 28 flights were recorded during the 2017/2018 winter season, with flocks between 5 and 37 birds recorded in flight and landing/emerging from loafing areas on heath and upland blanket bog. The remaining 23 flights were recorded during the 2018/2019 winter season (October – March). Observations ranged from an individual to a flock of 270 birds. Flocks were seen flying, calling and landing/emerging from loafing/roosting areas on heath, wet grassland and upland blanket bog. Flocks of greater than 40 birds were only recorded on four dates during the vantage point surveys.

### Winter Transect Surveys

Golden plover were only recorded twice during Winter Transect Surveys (see Appendix 7-4, Figure 7.8.1). Both observations occurred during the 2018/2019 season. A flock of 40 birds were recorded in flight on the 16<sup>th</sup> of October 2018, while on the 8<sup>th</sup> of January 2019 a flock of 30 birds were recorded travelling over conifer plantation. Both flights occurred within the development site and within 500m of the proposed turbine layout. No flocks of greater than 40 birds were recorded during these surveys.

## Incidental Observations

There were four incidental observations of golden plover between September 2017 and September 2019. On the 10<sup>th</sup> of November 2017 a flock of six birds were flushed from heather by the surveyor as he walked off site after concluding a VP survey. A flock 50 - 60 golden plover were flushed by the surveyor on the 25<sup>th</sup> of January 2019 as he walked off site after a VP survey.

On the 17<sup>th</sup> of May 2018 during a breeding raptor survey a single golden plover was heard calling from an area of dense heather, approximately 1km from the development site. This was noted as a possible breeding territory, the location of which can be found on Figure 7.10.2 in Appendix 7-4.

On the 13<sup>th</sup> of March 2019 a flock of 26 golden plover was flushed from an area of heather, approximately 200m east of the proposed development site, during a red grouse survey. The location of all incidental golden plover observations can be seen on Figure 7.10.2 in Appendix 7-4.

There were no additional observations of this species during any of the other comprehensive surveys.

### 7.6.3 Hen Harrier

Raw Survey data for Hen Harrier is provided in Appendix 7-4. Results summary tables are present in Appendix 7-3.

#### Vantage Point Surveys

Hen harrier were recorded on eight occasions during Vantage Point Surveys between September 2017 and September 2019 (see Appendix 7-4, Figure 7.1.3). There were four observations of birds in flight within 500m of the proposed turbine layout. All eight observations were of individual birds in hunting flights over areas of heath and upland blanket bog. Six of the eight observations were recorded during the 2018 breeding season, four of which occurred during late August. In addition, there was a single observation in December 2018 of a male hen harrier in a hunting flight. On the 7<sup>th</sup> of August 2019 a male hen harrier was seen travelling in a low flight before circling low over an area and dropping out of view. This area was identified by the surveyor as a possible roost site and further surveys were undertaken to determine its significance. No further roosting activity was recorded on subsequent watches at this vantage point and it is not considered to be a regular roost for the species.

#### Breeding Bird Surveys

Hen harrier were only observed once during Breeding Bird Surveys (see Appendix 7-4, Figure 7.3.1). On the 25<sup>th</sup> of June 2019 an adult male was seen foraging an area of bog and conifer plantation, approximately 200m northwest of the development site.

#### Breeding Raptor Surveys

Hen harrier were only recorded on two occasions during Breeding Raptor Surveys (see Appendix 7-4, Figure 7.4.1). On the 7<sup>th</sup> of May 2018 an adult male was seen in a short flight before landing in an area of dense wet grassland and heather, approximately 2.5km northwest of the development site. On the 23<sup>rd</sup> of July 2019 a male hen harrier was observed hunting over areas of dry meadows and grassy verges, approximately 50m north of the development site.

#### Hen Harrier Roost Surveys

Hen harrier were only recorded twice during Hen Harrier Roost Surveys (see Appendix 7-4, Figure 7.7.1). Both flights were recorded in the same area approximately one kilometre west of the proposed development site. On the 25<sup>th</sup> of March 2018 an adult male was seen flying low over heather moorland before flying in to roost, approximately one kilometre west of the proposed development site. This area was identified by the surveyor as a possible roost site and further surveys were undertaken to determine its significance. No further roosting activity was recorded on subsequent watches and it is not considered to be a regular roost for the species. On the 26<sup>th</sup> of October 2018 an adult male was seen flying low over an area of upland blanket bog in the same area as the identified roost site from the previous winter period, though no evidence of roosting was recorded.

### 7.6.4 Merlin

Raw Survey data for Merlin is provided in Appendix 7-4. Results summary tables are present in Appendix 7-3.

#### Vantage Point Surveys

Merlin were only recorded once during Vantage Point Surveys between September 2017 and September 2019 (see Appendix 7-4, Figure 7.1.4). The observation occurred on the 17<sup>th</sup> of September

2019 as an individual bird was seen hunting over bog, within the proposed development site and approximately 400m south-west of the closest turbine.

There were no additional observations of this species during any of the other comprehensive surveys.

### 7.6.5 Peregrine

Raw Survey data for Peregrine is provided in Appendix 7-4. Results summary tables are present in Appendix 7-3.

#### Breeding Raptor Surveys

Peregrine were only recorded once during Breeding Raptor Surveys (see Appendix 7-4, Figure 7.4.2). On the 17<sup>th</sup> of July 2018 an adult female was seen in a short flight, approximately 1.8km southwest of the development site.

There were no additional observations of this species during any of the other comprehensive surveys.

### 7.6.6 Red Grouse

Raw Survey data for Red Grouse is provided in Appendix 7-4. Results summary tables are present in Appendix 7-3.

#### Vantage Point Surveys

Red Grouse were recorded in flight on five occasions during Vantage Point Surveys between September 2017 and September 2019 (see Appendix 7-4, Figure 7.1.5). All five observations occurred outside of the proposed development site and more than 500m away from the nearest turbine location, in areas of suitable heath and blanket bog to the west of the site. On the 12<sup>th</sup> of December 2017 three red grouse were recorded in a short flight. Individuals were recorded in flight in the same area on the 2<sup>nd</sup> of May 2018 and the 15<sup>th</sup> of January 2019. On the 5<sup>th</sup> of September 2019 a pair of red grouse were recorded in a short flight on two occasions during the VP survey in the same area as before. All flight activity was less than 10m above ground level (i.e. below PCH).

There were a further 23 observations of red grouse heard calling from areas of heather, but not seen during VP surveys.

#### Breeding Bird Surveys

Red grouse were only observed twice during Breeding Bird Surveys (see Appendix 7-4, Figure 7.3.2). On the 10<sup>th</sup> of July 2018 an adult male was flushed from an area of bog, approximately 400m west of the development site. On the 25<sup>th</sup> of June 2019 a male red grouse was recorded in a brief low flight, approximately 300m east of the development site.

#### Red Grouse Surveys

Red Grouse were only recorded twice during dedicated Red Grouse Surveys (see Appendix 7-4, Figure 7.6.1). One observation occurred during the 2018 breeding surveys and one during the 2019 breeding surveys. Both observations occurred in the same area, approximately 300-400m west of the development site. Both observations were of adult males calling in response to the tape lure. These observations indicate that red grouse held a breeding territory in this area, within 500m of the development site, during both the 2018 and 2019 breeding seasons.

## Winter Transect Surveys

Red grouse were only recorded once during Winter Transect Surveys (see Appendix 7-4, Figure 7.8.2). On the 16<sup>th</sup> of October 2018 an individual bird was flushed from an area of upland blanket bog, approximately 200m east of the development site.

## Incidental Observations

There were ten incidental observations of red grouse between September 2017 and September 2019 (see Figure 7.10.3, Appendix 7-4). Five of these occurred either before or after Vantage Point Surveys, as red grouse were either flushed from heather or heard calling by the surveyor on his walk to or from the VP locations. Two more observations occurred during Hen Harrier Roost Surveys as red grouse were recorded during surveys several hundred meters from the development site.

There were three incidental observations of red grouse during Breeding Raptor Surveys. All three observations occurred in May 2019 as individual birds were heard calling from areas of dry heath and wet grassland. Two observations were recorded on the 9<sup>th</sup> of May 2019 in the same area, approximately 750m west of the development site. The remaining observation occurred more than 1.5km southeast of the development site on the 7<sup>th</sup> of May 2019.

### 7.6.7 Woodcock

Raw Survey data for woodcock is provided in Appendix 7-4. Results summary tables are present in Appendix 7-3.

## Vantage Point Surveys

Woodcock were only recorded once during Vantage Point Surveys between September 2017 and September 2019 (see Appendix 7-4, Figure 7.1.6). The observation occurred on the 29<sup>th</sup> of April 2019, an adult male was recorded in a roding (displaying) flight, within 500m of the nearest turbines.

## Breeding Woodcock Surveys

Woodcock were only recorded twice during dedicated Breeding Woodcock Surveys (see Appendix 7-4, Figure 7.5.1). Both observations occurred on the 4<sup>th</sup> of June 2019, a roding male was recorded in flight on two occasions. 10 minutes apart in the same area, near Lough Nacroagh, within the development site.

## Incidental Observations

There were twelve incidental observations of woodcock between September 2017 and September 2019. All twelve observations were recorded during winter months when the populations of native breeding woodcock are greatly supplemented by wintering birds from Eastern Europe. Eight of the twelve observations occurred either before or after Vantage Point Surveys, as woodcock were flushed or seen in flight by the surveyor on his walk to or from the VP locations. The remaining four observations occurred during Hen Harrier Roost Surveys, with birds recorded during surveys several hundred meters from the development site.

There were no additional observations of this species during any of the other comprehensive surveys.

## 7.6.8 Curlew

Raw Survey data for Curlew is provided in Appendix 7-4. Results summary tables are present in Appendix 7-3.

### Vantage Point Surveys

Curlew were only recorded on a single day of Vantage Point Surveys between September 2017 and September 2019 (see Appendix 7-4, Figure 7.1.7). There were six observations of curlew during a survey at VP4 on the 29<sup>th</sup> of April 2018. Only one of these observations was of a bird in flight; a bird was recorded flying over conifers, approximately 750m east of the development site. The remaining five observations were of an individual heard calling between 05:28 and 7:53am. The approximate location of where this calling bird was heard can be found on Figure 7.1.7.1 in Appendix 7-4. Due to the nature of the records and time of year these observations have been noted as a possible breeding territory.

### Incidental Observations

There were two incidental observations of curlew during a Hen Harrier Roost Survey on the 25<sup>th</sup> of March 2018 more than 1km west of the development site. Both observations were of an individual bird heard calling and bubbling but not seen. Due to the nature of the records and time of year these observations have been noted as a possible breeding territory. However, on subsequent visits to this location during breeding raptor surveys (April to July inclusive) no evidence of territory occupancy was recorded.

The location of this territory as well the breeding territory identified during the Vantage Point Surveys can both be found on Figure 7.7.2 in Appendix 7-4.

## 7.6.9 Buzzard

Raw Survey data for Buzzard is provided in Appendix 7-4. Results summary tables are present in Appendix 7-3.

### Vantage Point Surveys

Buzzard were observed on ten occasions during Vantage Point Surveys between September 2017 and September 2019 (see Appendix 7-4, Figure 7.1.8). All observations were of individual birds, in flight or soaring on thermals over nearby ridges. Five observations occurred during winter months and five during the breeding season months.

### Breeding Bird Surveys

Buzzard were only observed twice during Breeding Bird Surveys (see Appendix 7-4, Figure 7.3.3). On the 18<sup>th</sup> of April 2019 a single buzzard was heard calling, but not seen, from an area of forestry within the development site and 500m of the turbine layout. On the 26<sup>th</sup> of June 2019 an individual adult was recorded soaring, approximately 400m south of the development site.

### Breeding Raptor Surveys

Buzzard were recorded on nine occasions during Breeding Raptor Surveys (see Appendix 7-4, Figure 7.4.3). Four observations occurred during the 2018 breeding season, while the remaining five observations occurred during the 2019 breeding season. Eight of the nine observations were recorded more than 2km away from the development site during surveys for breeding hen harrier out to 5km.

These observations were further away than the core foraging range for this species (i.e. 2km) as detailed in Hardey et al (2013).

### Incidental Observations

There was one incidental observation of buzzard on the 9<sup>th</sup> of May 2019. The surveyor spotted a buzzard in flight in proximity of VP3 while driving off site after concluding a breeding raptor survey.

There were no additional observations of this species during any of the other comprehensive surveys.

## 7.6.10 Sparrowhawk

Raw Survey data for Sparrowhawk is provided in Appendix 7-4. Results summary tables are present in Appendix 7-3.

### Vantage Point Surveys

Sparrowhawk were only recorded on three occasions during Vantage Point Surveys between September 2017 and September 2019 (see Appendix 7-4, Figure 7.1.9). Only one of these observations occurred within the proposed development site. On the 13<sup>th</sup> of August 2018 an individual bird was briefly recorded hunting around conifers, approximately 650m east of the nearest turbine. On the 23<sup>rd</sup> of October 2018 a female was recorded hunting and perched along the edge of conifer plantation, approximately 650m west of the nearest turbine. On the 13<sup>th</sup> of June 2019 an individual was recorded soaring over conifer plantation within the development site.

### Breeding Bird Surveys

Sparrowhawk were only observed twice during Breeding Bird Surveys (see Appendix 7-4, Figure 7.3.4). On the 18<sup>th</sup> of April 2019 a single sparrowhawk was flushed from an area of scrub at the very northern most edge of the development site, before seen in a brief flight north and out of view. On the 24<sup>th</sup> of June 2019 an adult male was seen flying from a *Sitka spruce* tree, approximately 700m east of the development site. This was noted by the surveyor as a possible nest location.

### Breeding Raptor Surveys

Sparrowhawk were recorded on 13 occasions during Breeding Raptor Surveys (see Appendix 7-4, Figure 7.4.4). Nine observations occurred during the 2018 breeding season, while the remaining four observations occurred during the 2019 breeding season. Only seven of the 13 observations were recorded within 2km of the development while the remaining six observations occurred between 2 – 5km away during surveys for breeding hen harrier out to a 5km radius of the proposed development area.

### Incidental Observations

There were four incidental observation of sparrowhawk during surveys between September 2017 and September 2019. Two observations occurred before or after VP survey as the surveyor made his way from the survey location. There was incidental observation of a sparrowhawk in flight after a breeding walkover on the 16<sup>th</sup> of July 2019. The remaining observation was of a sparrowhawk hunting a blackbird during a Hen Harrier Roost Survey on the 8<sup>th</sup> of January 2019.

There were no additional observations of this species during any of the other comprehensive surveys.

## 7.6.11 Kestrel

Raw Survey data for kestrel is provided in Appendix 7-4. Results summary tables are present in Appendix 7-3.

### Vantage Point Surveys

Kestrel were observed on 17 occasions during Vantage Point Surveys between September 2017 and September 2019 (see Appendix 7-4, Figure 7.1.10). All observations were of individual birds in hunting flights. Thirteen observations occurred during the 2018 breeding season, while there were only two observations during the 2018/19 winter season and two observations during the 2019 breeding season. Thirteen of the 17 observations occurred within 500m of the proposed turbine layout. Flight activity was primarily associated with areas of heath and bog in the northwest of the development site around Turbines 1 and 3.

### Breeding Bird Surveys

Kestrel were observed on six occasions during Breeding Bird Surveys (see Appendix 7-4, Figure 7.3.5). Only one observation occurred during the 2018 breeding season while the remaining five observations occurred during the 2019 breeding season.

### Breeding Raptor Surveys

Kestrel were recorded on 13 occasions during Breeding Raptor Surveys (see Appendix 7-4, Figure 7.4.5). Eleven observations occurred during the 2018 breeding season, while the remaining two observations occurred during the 2019 breeding season. Only four of the 13 observations were recorded within 2km of the development while the remaining nine observations occurred between 2 – 5km away during surveys for breeding hen harrier out to 5km. A possible kestrel breeding territory was recorded 2.5km to the north of the proposed development area.

### Incidental Observations

There were four incidental observations of Kestrel during Hen Harrier Roost surveys between September 2017 and September 2019. All four observations occurred during the 2018/19 winter season as individuals were seen in hunting flights.

There were no additional observations of this species during any of the other comprehensive surveys.

## 7.6.12 Snipe

Raw Survey data for Snipe is provided in Appendix 7-4. Results summary tables are present in Appendix 7-3.

### Vantage Point Surveys

Snipe were observed in flight on eleven occasions during Vantage Point Surveys between September 2017 and September 2019 (see Appendix 7-4, Figure 7.1.11). Only four of these observations occurred in winter months while the remaining seven observations occurred during the 2019 breeding season. All seven observations of snipe during the breeding season were of displaying birds (i.e. drumming or chipping while in flight). The majority of the flight activity occurred more than 500m west of the proposed turbine layout in areas of confirmed breeding.

Furthermore, there were a further 15 observations of snipe heard calling or drumming during VP surveys but not seen. Six of these observations occurred during the 2018 breeding season while the remaining nine observations occurred during the 2019 breeding season. The location of all breeding territories can be found on Figure 7.11 in Appendix 7-4.

### Breeding Bird Surveys

Snipe were observed on nine occasions during Breeding Bird Surveys (see Appendix 7-4, Figure 7.3.6). Only three observations occurred during the 2018 breeding season while the remaining six observations occurred during the 2019 breeding season. Drumming snipe were heard on two occasions on the 21<sup>st</sup> of May 2019. The locations of breeding territories identified during this survey and all other surveys can be found on Figure 7.11 in Appendix 7-4.

### Incidental Observations

There were 39 incidental observations of snipe during surveys between September 2017 and September 2019 (see Figure 7.10.5, Appendix 7-4). Twenty-two observations occurred during breeding raptor surveys, several hundred meters from the development site. A further five observations occurred during Hen Harrier Roost Surveys within 2km of the development site. There were eleven incidental observations of snipe flushed or heard calling or drumming as the survey made his way to and from his VP surveys. The remaining observation was of a snipe heard drumming, but not seen, during a breeding woodcock survey on the 13<sup>th</sup> of June 2019.

There were no additional observations of this species during any of the other comprehensive surveys.

## 7.6.13 Passerines (Red Listed)

The BoCCI Red listed species meadow pipit, grey wagtail and whinchat was recorded during the surveys undertaken. Whinchat were only recorded once during surveys undertaken between September 2017 and September 2019. A single female was seen during a breeding bird survey on the 18<sup>th</sup> of April 2019, approximately 300m west of the development site. There were no further observations of this species.

## Evaluation

A determination of population importance of birds within the likely zone of influence is provided in the sections below following criteria described in Section 7.2.5. Estimates of National population sizes were obtained from the NPWS Article 12 Reporting (2008-2012) which details the status and trends of Ireland's Bird species. The development site lies on the border for County Leitrim and County Sligo. Where relevant, estimates for mean county populations has been derived following a review of I-WeBS sites in County Leitrim and County Sligo.

### Whooper Swan

#### Wintering

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

The Swan Census 2015 (Crowe et. al., 2015) was consulted regarding the population data for Whooper Swans in Counties Leitrim and Sligo. Based on the 2015 Swan Census data, in January 2015 the County Leitrim population was 302 individuals, while the County Sligo population was 198 individuals. Based on the above, a population of 2-3 Whooper Swans is required for County Importance classification in the Sligo-Leitrim area. This EIAR utilises the lower threshold figure of 198 birds as a baseline for County population on a highly precautionary basis.

During the 2017-2019 surveys, whooper swan flocks of county importance, as per NRA criteria Crowe et al. (2015), were observed on five occasions. Four of the five flights were described as birds likely to be on migration over the site due to the time of the observations. No evidence of feeding or roosting activity was recorded within the proposed windfarm site. The recorded evidence and random flight distribution do not suggest that the proposed development is located on a defined migratory corridor for the species, although the potential for displacement and collision requires further assessment.

The flocks recorded flying over the development site were assigned **County Importance** on a precautionary basis. This species was not recorded to regularly occur at the site.

#### Breeding

The species is not dependent of the development site for breeding.

### Golden Plover

#### Wintering

The estimated national wintering population of Golden Plover in Ireland is 80,707 for the Republic of Ireland (ROI) (Burke et al. 2018). 1% of the ROI National wintering population of Golden Plover is 807 birds. As per NRA 2009, a regularly occurring population of 807 Golden Plover is required for classification as Nationally Important. The maximum number of birds recorded from the winter season was 270 birds. This maximum number does not correspond with the classification criteria for National or International Importance (Burke et al. 2018).

## Estimating population of County Importance

Typically to estimate the county population, a review of I-WeBS sites in both County Leitrim and County Sligo would be undertaken. However, I-WeBS counts are acknowledged to underestimate the numbers of certain species, e.g. golden plover (Burke et al. 2018). I-WeBS surveys focus on wetland sites, whereas golden plover regularly foraging in terrestrial habitats (e.g. agricultural grassland). In the present case, no golden plover were recorded at Leitrim I-WeBS sites and no golden plover were recorded at non-coastal Sligo I-WeBS sites. Given that golden plover were recorded on the site during the surveys undertaken, a population estimate of zero based on I-WeBS data would clearly be inaccurate.

As a result, an alternative method to provide an estimate of the size of the population that is important at the County scale has been undertaken based on the average wintering population density for the species. This methodology is described below. The data used for this estimation is taken from the Bird Atlas survey (2007-11) (Balmer et al., 2013). It should be noted that this is very much an estimation that provides a guide against which to assess the ecological importance of the populations of golden plover at the wind farm site.

The population density for wintering golden plover in Ireland from Bird Atlas survey data (2007-11) (Balmer et al., 2013) is 11.9 birds per tetrad (i.e. 4km<sup>2</sup>). This means that the average population density of wintering golden plover in Ireland is 2.975 birds per square kilometre.

For the purposes of the assessment, it is assumed that the number of golden plover in any given County is three times the number of square kilometres in that county. In this case, the wind farm is located in both Co. Leitrim and Co. Sligo and the land area of both these Counties is provided below in square kilometres:

- Co. Sligo = 1,838 square kilometres
- Co. Leitrim = 1,590 square kilometres

Following a precautionary approach, the assumptions are based on the county with the smaller land area and smaller estimated population (Co. Leitrim). The estimated county population of golden plover for Co. Leitrim is 4,770 birds.

Therefore, a regularly occurring population of 48 birds (1% of the County population) is considered of County Importance in the context of the development site. Such flocks of **County** Importance were only recorded on five dates during the extensive surveys undertaken.

## Estimating population of Local importance

The core foraging range of golden plover during the winter months is 12km (Gillings and Fuller, 1999). The total area within a 12km radius of the proposed development area is approximately 612km<sup>2</sup>. When the average population density (i.e. 3 birds per km<sup>2</sup>) was applied to this area, a rough estimate of the local population is 1,836 individuals.

Therefore, a regularly occurring population of 18 birds (1% of the local population) is considered of Local Importance in the context of the development site. Flocks of 18 birds or greater were recorded on 11 dates during the survey period.

## Evaluation of importance of wintering golden plover on the wind farm site

The site is utilised on a regular basis by a wintering population that is estimated to be of **Local** importance as evidenced during the surveys undertaken. This population was recorded loafing and roosting in the open areas of the site and flying over the entire site, including the forestry. Flocks that

are estimated to be of **County** importance were recorded occasionally (on only 5 dates) primarily flying over the site.

### Breeding

This species was only observed once during the breeding season. A single bird was heard calling from an area of dense heather, approximately 1km from the proposed development site. No evidence of breeding was recorded. There were no further observations of this species during the breeding season.

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

## 7.7.3 Hen Harrier

### Wintering

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

Taking a precautionary approach, it is assumed that the individuals recorded during the winter season are associated with a **Nationally/Internationally** important wintering population.

### Breeding

Based on the latest Breeding Hen Harrier Survey (NPWS 2015), the ROI National breeding population is in the range of 108-157 pairs. Therefore, a single breeding pair in Ireland conforms to National/International Importance as per NRA criteria.

This species was infrequently recorded during the breeding season, i.e. hen harrier were recorded on nine occasions during the breeding season. The majority of these observations were recorded in August, which is considered to be outside the core breeding season of April to July. No indication of breeding behaviour was observed either on site or within 5km of same.

Taking a precautionary approach, it is likely that the individuals recorded outside the core breeding season are associated with a **Nationally/Internationally** important population from the wider area.

## 7.7.4 Merlin

As per the latest NPWS Article 12 reporting document, the estimated population of Merlin is between 200 – 400 pairs based on Hardy et al (2009).

The species was only recorded once within 500m of the turbine layout. Taking a precautionary approach, the population recorded was assigned **Local Importance (Higher Value)**.

## 7.7.5 Peregrine

The development site is not of significance to this species and numbers of ecological significance were not recorded on or near the site. Only one record of this species occurred with an adult female recorded in flight approximately 2km away from the development site.

The development site is not of significance to the species.

### 7.7.6 Red Grouse

Red Grouse is BOCCI Red Listed during the breeding season in Ireland. The European population of the species is identified as Secure. The species is Red Listed in Ireland with regard to breeding populations. As per the latest NPWS Article 12 reporting document, the estimated population of red grouse in Ireland is 1,898 breeding pairs. Therefore 1% of the ROI National breeding population is 19 breeding pairs. As per NRA 2009, a regularly occurring breeding population of 19 red grouse pairs is required for classification as Nationally Important. The population recorded at Croagh does not correspond to national importance and falls well below the threshold of 19 breeding pairs with only five breeding territories identified during surveys, of which only two were within 500m of the development site and none within the site itself. The most recent national survey for red grouse, estimates the population for the northwest to number 2,038 individuals (Cummins 2010).

Taking a precautionary approach, the population recorded was assigned **County Importance** on the basis of a resident/regularly occurring population assessed to be important at the county level.

### 7.7.7 Woodcock

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

This species was only recorded on three occasions during breeding season bird surveys at Croagh Windfarm between September and September 2019. Two separate roding woodcock was recorded during the core-breeding season.

Taking a precautionary approach, the population recorded was assigned **Local Importance (Higher Value)** on the basis of a resident breeding population assessed to be important at the local level.

### 7.7.8 Curlew

Curlew is Red listed during both the breeding and wintering seasons in Ireland.

This species was only recorded on two survey dates during the extensive 25-months of bird surveys at Croagh Windfarm between September 2017 and September 2019. Both observations occurred during the 2018 breeding season. A single bird was heard calling from an area of heather on the 25<sup>th</sup> of March, approximately 1km west of the development site during the 2018 breeding season. A single bird was heard calling from an area of heather on the 29<sup>th</sup> of April, approximately 200m east of the development site during the 2018 breeding season. Both observations were initially noted as possible breeding, on a highly precautionary basis, despite only an individual bird being recorded on both occasions.

The individual recorded 1km to the north of the proposed development can be excluded from further consideration, given the zone of sensitivity for curlew is referenced as 800m from windfarm developments (Pearce-Higgins et al. 2012; McGuinness et al. 2015). Therefore, disturbance displacement impacts are not predicted for this individual as this bird was recorded beyond the likely zone of sensitivity for this species.

The individual that was recorded on a single occasion within 200m of the proposed development, was not subsequently recorded despite a concerted survey effort in this location. The location of this April curlew observation fell within the view shed of VP4 and was surveyed for a total 30 hours between March and July 2018. Had a curlew pair bred in this area it would have been observed from VP4, particularly given the conspicuous display flights of this species.

It can be assumed that both the observation in late March and late April, was of an individual male prospecting various areas within the wider surroundings of the development site in search of a mate,

before ultimately moving on from the area. In addition, the NPWS provided records on breeding curlew which identified a confirmed nest site from 2014, approximately one kilometre north of the development site.

As previously stated, the zone of sensitivity for Curlew is referenced as 800m from windfarm developments (Pearce-Higgins et al. 2012; McGuinness et al. 2015). The confirmed historic territory from 2014, submitted by the NPWS is beyond the likely zone of sensitivity for this species, while the observations from surveys at the site in 2018 indicate a male bird prospecting potential breeding areas, but ultimately there were no breeding attempts occurring within 2km of the development site in either 2018 or 2019.

The development site is not of significance to the species.

### 7.7.9 Buzzard

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

### 7.7.10 Sparrowhawk

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

### 7.7.11 Kestrel

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

### 7.7.12 Snipe

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

### 7.7.13 Passerines (Red Listed)

Meadow pipit, grey wagtail and whinchat are Red listed in Ireland during the breeding season. Whinchat were only recorded once during surveys undertaken between September 2017 and September 2019. Populations recorded were deemed to be of no greater than Local Importance (Lower Value).

## 7.8 Identification of Key Ornithological Receptors

Table 7-12 Avifaunal Receptor Evaluation and Selection Criteria Rational

Species	Conservation Status	NRA Evaluation (NRA, 2009)	Rational for inclusion/exclusion as KOR	KOR Yes/No
<b>Whooper Swan</b>	Annex I; EU Birds Directive	<u>Wintering</u>  Flocks of County Importance recorded	<p>This species was not recorded utilising habitats within the site boundary for foraging or roosting. There is no potential for direct habitat loss.</p> <p>Birds were recorded flying over the development site and within 500m of the turbine layout. Taking a precautionary approach, <b>the potential for displacement exists.</b></p> <p>This species was recorded flying over the development site within the potential collision risk zone. <b>A collision risk assessment is required.</b></p>	<b>Yes</b>
<b>Golden Plover</b>	Annex I, EU Birds Directive; BoCCI Red List & Irish Wildlife Act.	<u>Wintering</u>  Flocks of County Importance recorded	<p>This species was occasionally recorded loafing/roosting within the development site and within 500m of same during winter months. The potential for habitat loss cannot be excluded. <b>An assessment of direct habitat loss is required.</b></p> <p>Birds were recorded within the development site boundary. Taking a precautionary approach, <b>the potential for displacement exists.</b></p> <p>This species was recorded flying over the development site within the potential collision risk zone. <b>A collision risk assessment is required.</b></p>	<b>Yes</b>
		<u>Breeding</u>	<p>This species was not recorded on site or in the wider areas during the 2019 breeding season. There was only one observation of a single bird heard calling, more than 1km from the development site, during the 2018 breeding season in May. There was no evidence of breeding activity recorded. There is</p>	<b>No</b>

Species	Conservation Status	NRA Evaluation (NRA, 2009)	Rational for inclusion/exclusion as KOR	KOR Yes/No
		No population of ecological significance recorded	no evidence to suggest that the development site is of significance to this species during the breeding season. There is no potential for direct habitat loss or displacement. On the basis of the separation distance between the observation and the proposed development, no pathways for significant direct or indirect effects were identified.	
<b>Hen Harrier</b>	Annex I, EU Birds Directive; BoCCI Amber List & Irish Wildlife Act.	<u>All Seasons</u> National/International Importance recorded	<p>There was no evidence of breeding activity recorded during either the 2018 or 2019 breeding seasons. This species was occasionally recorded in flight within the development site. The potential for direct habitat loss cannot be excluded. <b>An assessment of direct habitat loss is required.</b></p> <p>Birds were recorded within the development site boundary. Taking a precautionary approach, <b>the potential for displacement exists.</b></p> <p>This species was recorded flying over the development site within the potential collision risk zone. <b>A collision risk assessment is required.</b></p>	<b>Yes</b>
<b>Merlin</b>	Annex I, EU Birds Directive; BoCCI Amber List & Irish Wildlife Act.	<u>All Seasons</u> Local Importance (Higher Value)	<p>This species was only recorded once within 500m of the turbine layout during surveys between September 2017 and September 2019. No evidence of breeding or roosting activity was recorded. There is no potential for direct habitat loss.</p> <p>This species was only recorded once within 500m of the turbine layout during surveys between September 2017 and September 2019. Taking a highly precautionary approach, <b>an assessment of displacement effects is required.</b></p> <p>This species was recorded flying over the development site within the potential collision risk zone. <b>A collision risk assessment is required.</b></p>	<b>Yes</b>

Species	Conservation Status	NRA Evaluation (NRA, 2009)	Rational for inclusion/exclusion as KOR	KOR Yes/No
<b>Peregrine</b>	Annex I, EU Birds Directive; BoCCI Green List & Irish Wildlife Act.	<u>All Seasons</u> No population of ecological significance recorded	This species was not recorded within the development site. Only one record of this species occurred with an individual bird recorded in flight approximately 1.8km away from the development site. There is no evidence to suggest that the development site is of significance to this species. There is no potential for direct habitat loss or displacement.  No pathways for significant direct or indirect effects were identified.  No flights were recorded during VP surveys. Collision risk modelling cannot therefore be carried out, with the available data	<b>No</b>
<b>Red Grouse</b>	BoCCI Red Listed (Breeding Populations)	<u>All Seasons</u> County Importance	The development site is dominated by conifer plantation, this habitat is not utilised by foraging or breeding red grouse. The majority of observations occurred in areas of suitable breeding habitat, predominantly to the west of the development site. There is no evidence to suggest that the development site is of significance to this species.  While birds were not recorded within the development site itself, there were a number of observations within 500m of same. Taking a precautionary approach, <b>an assessment of displacement effects is required.</b>  No flights were recorded at PCH during VP surveys. Collision risk modelling cannot therefore be carried out, based on survey results.	<b>Yes</b>
<b>Woodcock</b>	BoCCI Red Listed (Breeding Populations)	<u>Breeding</u> Local Importance (Higher Value)	This species was recorded within the development site on three occasions during the 2019 breeding season. All three observations were of roding males, which occurred in two distinct locations, indicating breeding locally. The potential for habitat loss cannot be excluded. <b>An assessment of direct habitat loss is required.</b>	<b>Yes</b>

Species	Conservation Status	NRA Evaluation (NRA, 2009)	Rational for inclusion/exclusion as KOR	KOR Yes/No
			<p>Birds were recorded within the development site boundary and within 500m of the proposed turbine layout. Taking a precautionary approach, <b>the potential for displacement exists.</b></p> <p>No flights were recorded within PCH during VP surveys. Collision risk modelling cannot therefore be carried out, with the available data.</p>	
<b>Curlew</b>	BoCCI Red List (breeding and wintering) & Irish Wildlife Act	<p><u>All Seasons</u></p> <p>No population of ecological significance recorded</p>	<p>Curlew was not recorded within the development site. The development site is dominated by conifer plantation. There is no evidence to suggest that the development site is of significance to this species. There is no potential for direct habitat loss.</p> <p>This species was only recorded on two survey dates during the extensive 25-months of bird surveys. Both observations were of a single individual, believed to be a male, prospecting potential breeding habitat in search of a mate during the early part of the 2018 breeding season. Only one record occurred within the zone of sensitivity for this species, i.e. within 800m of the development site. There were no subsequent observations of this species throughout the extensive suite of breeding season surveys. There were no observations of curlew during the 2019 breeding season. Significant displacement effects are not anticipated particularly given the low levels of activity recorded.</p> <p>No flights were recorded during VP surveys within the Potential Collision Height (PCH). Collision risk modelling cannot therefore be carried out, with the available data.</p>	<b>No</b>
<b>Buzzard</b>	Irish Wildlife Act	<u>All Seasons</u>	The potential for habitat loss, while minimal, cannot be excluded. <b>An assessment of direct habitat loss is required.</b>	<b>Yes</b>

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

Species	Conservation Status	NRA Evaluation (NRA, 2009)	Rational for inclusion/exclusion as KOR	KOR Yes/No
			This species was recorded flying over the site within the potential collision risk zone. <b>A collision risk assessment is required.</b>	
<b>Passerines (Red Listed)</b>	Irish Wildlife Act	<u>All Seasons</u> Local Importance (Lower Value)	As per SNH guidance, it is generally considered that passerine species are not significantly impacted by wind farms.	<b>No</b>

## 7.9 KOR Sensitivity Determination

Criteria developed by Percival (2003) is presented in Table 7-3 (Section 7.2.5.3) for assessing bird sensitivity within the study area. There were no **Very High** sensitivity KORs as there were no bird populations recorded which were likely to be associated with SPA populations.

**High Sensitivity** KORs include:

- Hen Harrier (Ecologically sensitive species)

**Medium Sensitivity** KORs include:

- Whooper Swan (Annex I; EU Birds Directive)
- Golden Plover (Annex I; EU Birds Directive)
- Merlin (Annex I; EU Birds Directive)
- Red Grouse (BoCCI; Red Listed)
- Woodcock (BoCCI; Red Listed)

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

- Buzzard
- Sparrowhawk
- Kestrel
- Snipe

## 7.10 Likely and Significant Effects

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

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

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

1. Construction of 10 No. wind turbines with a maximum overall blade tip height of up to 170 metres, and associated hardstand areas;
2. 1 no. 38kV permanent electrical substation including a control building with welfare facilities, all associated electrical plant and equipment, security fencing, all associated underground cabling, waste water holding tank and all ancillary works;
3. 1 no. permanent Meteorological Mast with a maximum height of up to 100 metres;
4. All associated underground electrical and communications cabling connecting the turbines to the proposed wind farm substation;
5. All works associated with the connection of the proposed wind farm to the national electricity grid, via underground cabling to the existing Garvagh substation;
6. Upgrade of existing tracks and roads, provision of new site access roads and hardstand areas;
7. The partial demolition and alteration of two agricultural buildings in the townlands of Sheena and associated junction access and road works to the existing yard, agricultural buildings and agricultural lands in the townlands of Sheena and Derrybofin to provide a link road primarily for construction traffic off the R280. This link road will be used for

*the delivery of abnormal loads to the site during the construction period and may be used during the operational period if necessary or to facilitate the decommissioning of the wind farm. Following construction, access to the link road will be closed off and the yard/agricultural building will revert to its use for agricultural purposes except if and when required for delivery of abnormal loads during the operational period of the windfarm or to facilitate the decommissioning of the wind farm;*

- 8. 1 no. borrow pit;*
- 9. 2 no. peat and spoil repository areas*
- 10. 2 no. temporary construction compounds;*
- 11. Recreation and amenity works, including marked trails, boardwalk and viewing area provision of a permanent amenity car park, and associated recreation and amenity signage*
- 12. Site Drainage;*
- 13. Permanent Signage;*
- 14. Ancillary Forestry Felling to facilitate construction and operation of the proposed development; and*
- 15. All associated site development works*

This application seeks a ten-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm.

### 7.10.1 Do-Nothing Effect

The land that forms the study area is dominated by conifer plantation, with small areas in the surrounding landscape of wet grassland, heath and degraded peatland.

If the proposed development for which this EIAR has been prepared does not go ahead, the site would continue to be managed for the existing commercial forestry that has been present for approx. the past 40 years. The biodiversity on the site would likely remain similar to its current state as activity levels and land use would not change significantly.

## 7.10.2 Effects on Key Ornithological Receptors during Construction and Operation

### 7.10.2.1 Whooper Swan (Wintering)

Table 7-13 Impact Characterisation for Ecological Receptors based on Percival (2003) & EPA (2017).

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
<b>Construction Phase</b>			
<b>Direct Habitat Loss</b>	<p>This species was not recorded utilising habitats within the site boundary. The development site is dominated by conifer plantation. Observations of this species were predominantly recorded during periods of migration (i.e. spring and autumn).</p> <p>The development site and surrounding areas provide very limited potential to support wintering whooper swan populations in terms of suitable habitat. Significant effects with regard to direct habitat loss are not anticipated at any geographical scale.</p>	<b>No Effect</b>	<b>No Effect</b>
<b>Displacement &amp; Barrier Effect</b>	<p>As per McGuinness et al (2015) the zone of sensitivity for the species is 600m. This species was recorded in flight within 600m of the development site on four occasions. Numbers recorded ranged from individuals to a flock of 23 birds.</p> <p>A study undertaken by Rees (2005) in relation to Whooper Swan behavioural responses to human activity suggests that swans become less sensitive to disturbance if the frequency of daily disturbance is high. Rees et al. (2006) conducted a study at Black Cart Special SPA near Glasgow in relation to Whooper Swan behavioural and disturbance responses to different types of</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Medium</i> Sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance.</p>	<b>Short-term Slight Negative Effect</b>

	<p>human activity. The study was undertaken over three winters (from 1997/98 to 1999/00) at agricultural lands used by Whooper Swan. The study found that activities relating to cars, tractors, bicycles, farm workers on foot and cattle (livestock) exhibited the least disturbance to Whooper Swan flocks (within 100m disturbance distance bands). The development site is subject to regular forestry activity and the construction will require works similar to those described in the Rees assessment. Significant disturbance to Whooper Swan is therefore not anticipated as the populations are expected to become habituated to the levels of disturbance.</p> <p>Very few transits of commuting birds were recorded and there is no evidence to suggest that the development site lies on an important commuting or migratory route for the species.</p> <p>Significant displacement effects are not anticipated at any geographical scale.</p>		
<b>Operational Phase</b>			
<b>Direct Habitat Loss</b>	Direct or indirect effects are not anticipated at any geographical scale.	<b>No Effect</b>	<b>No Effect</b>
<b>Displacement &amp; Barrier Effect</b>	<p>As per McGuinness et al (2015) the zone of sensitivity for the species is 600m. This species was recorded in flight within 600m of the development site on four occasions. Numbers recorded ranged from individuals to a flock of 23 birds.</p> <p>Observations of whooper swan non-breeding activity from 8 European studies have given a mean minimum avoidance distance of 150 m from the base of wind turbines (Hötker et al. 2006). Only three of the observed flights of whooper swan were recorded within 150m of the proposed turbine layout. This few transits across the site limits the potential for significant impact to result.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Medium</i> Sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance.</p>	<b>Long-term Slight Negative Effect</b>

	<p>Very few transits of commuting birds were recorded and there is no evidence to suggest that the development site lies on an important commuting or migratory route for the species.</p> <p>Significant displacement effects are not anticipated at any geographical scale.</p>		
<b>Collision</b>	<p>The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 7-6.</p> <p>The collision risk has been calculated at a ratio of 0.220 collisions per year or one bird every 4.5 years. Annual mortality of adult whooper swan has been calculated at 20% per annum (Brazil, 2003). If 0.220 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the county population (i.e. 198) by 0.56%. The predicted collision risk is therefore negligible in the context of the county population. No significant effects are anticipated regarding collision risk at any geographical scale.</p>	<p>The magnitude of the effect is assessed as <i>Negligible</i>.</p> <p>The cross tabulation of a <i>Medium</i> Sensitivity species and <i>Negligible</i> Impact corresponds to a <b>Very Low</b> effect significance.</p>	<b>Long-term Imperceptible Effect</b>

### 7.10.2.2 Golden Plover (Wintering)

Table 7-14 Impact Characterisation for Ecological Receptors based on Percival (2003) & EPA (2017).

Analysis of potential effects during construction and operational phases of the Proposed Development		Magnitude and Significance of potential effect (Percival 2003)	Significance of potential effect (EPA 2017)
<b>Construction Phase</b>			
<b>Direct Habitat Loss</b>	<p>Flocks deemed to be of Local Importance were recorded flying, calling and landing/emerging from loafing/roosting areas on heath, wet grassland and upland blanket bog. Larger flocks of County importance were also occasionally recorded at the site. Observations occurred regularly throughout</p>	<p>The magnitude of the effect is assessed as <i>low</i>.</p>	<b>Long-term Slight Negative Effect</b>

	<p>both winter seasons surveyed and occurred on-site and within 500m of the proposed turbine layout.</p> <p>The development site is dominated by conifer plantation and does not provide significant areas of suitable habitat for wintering populations. Golden plover activity occurred predominantly offsite and around the northwest and southeast margins of the development area.</p> <p>Significant effects with regard to direct habitat loss are not anticipated at any geographical scale.</p>	<p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Low</b> effect significance</p>	
<b>Displacement</b>	<p>As per McGuinness et al (2015) the zone of sensitivity for the species is 800m during the breeding season only. The species is not identified as being particularly sensitive to wind farm developments during the wintering period. Taking a highly precautionary approach, all observations of birds within 800m of the development site were deemed to be sensitive to displacement effects for wintering populations also. There were 30 observations of golden plover within 800m of the development site during surveys between September 2017 and September 2019.</p> <p>However, disturbance during construction is unlikely to discourage flight activity over the site. Furthermore, given the majority of the site is dominated by coniferous plantation significant impacts are not predicted at any geographical scale.</p>	<p>The magnitude of the effect is assessed as <i>low</i>.</p> <p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Low</b> effect significance</p>	<b>Short-term Slight Negative Effect</b>
<b>Operational Phase</b>			
<b>Direct Habitat Loss</b>	Direct or indirect effects are not anticipated	<b>No Effect</b>	<b>No Effect</b>
<b>Displacement</b>	A study by (Pearce-Higgins et al. 2009) found reduced use of habitat surrounding operating turbines, to within 200 m of the turbine base. A review of 29 other studies suggests Golden Plover will approach wind turbines to an average distance of 175 m in non-breeding season (Hötter et al. 2006). There	The magnitude of the effect is assessed as <i>low</i> .	<b>Long-term Slight Negative Effect</b>

	<p>were 14 observations of golden plover within 200m of the proposed turbine layout during surveys between September 2017 and September 2019.</p> <p>Furthermore, post-construction monitoring at 15 upland wind farms showed no significant decline in populations post construction (Pearce-Higgins et al. 2012). In addition, the character of onsite habitats (e.g. dominated by forestry) limits the potential for ecologically significant displacement impacts to result.</p> <p>In the event of displacement, there are extensive areas of suitable habitat in the wider area. This would likely render such an effect inconsequential.</p> <p>There is no evidence to suggest that the development site lies on a migratory/regular commuting route for the species therefore barrier effect is not anticipated.</p> <p>Significant displacement effects are not anticipated at any geographical scale.</p>	<p>The cross tabulation of <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Low</b> effect significance</p>	
<p><b>Collision</b></p>	<p>Collision risk for waders is generally deemed to be low, due to a relatively low cursory flight path, coupled with high flight manoeuvrability (McGuinness et al. 2015). A review of pan-European collision assessments revealed much lower Golden Plover collision records than other species, though this was not controlled for survey effort or corpse recovery rates (Hötter et al. 2006).</p> <p>The species was recorded flying within the potential collision risk zone during VP surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 7-6. The collision risk assessment has followed a precautionary approach and utilises flight observations recorded across all seasons and includes flights several hundred meters from the proposed turbine layout. Therefore, the assessment provided below is highly conservative.</p> <p>The collision risk has been calculated at a rate of 22 collisions per year. Annual mortality of adult golden plover has been calculated at 27% per annum</p>	<p>The magnitude of the effect is assessed as <i>medium</i>.</p> <p>The cross tabulation of a <i>Medium</i> sensitivity species and <i>Low</i> Impact corresponds to a <b>Low</b> effect significance</p>	<p><b>Long-term Slight Negative Effect</b></p>